

NAKIVO Backup & Replication v10.9

User Guide for Hyper-V

Table of Contents

- NAKIVO Backup & Replication Overview 5**
 - Data Protection 6
 - Data Recovery 21
 - Disaster Recovery 30
 - Reliability 36
 - Performance 53
 - Administration 68
 - Automation 72
 - Integration 76
 - BaaS 81
 - NAKIVO Licensing Policy 87
- Deployment 97**
 - Architecture 98
 - Deployment Scenarios 107
 - System Requirements 119
 - Installing NAKIVO Backup & Replication 171
 - Updating NAKIVO Backup & Replication 236
 - Uninstalling NAKIVO Backup & Replication 264
- Getting Started 268**
 - Logging in to NAKIVO Backup & Replication 269
 - First Steps with NAKIVO Backup & Replication 275
 - Web Interface Components 278

Managing Jobs and Activities	287
Settings	329
General	330
Inventory	402
Nodes	438
Backup Repositories	466
Tape	546
Expert Mode	580
Virtual Appliance Configuration	602
Multi-Tenant Mode Configuration	606
Support Bundles	616
Built-in Support Chat	618
Backup	625
Creating Hyper-V Backup Jobs	626
Creating Backup Copy Jobs	658
Backing Up to Tape	686
Deleting Backups	710
Staging (Seeding) Initial Backup	717
Replication	718
Creating Hyper-V Replication Jobs	719
Staging (Seeding) VM Replication	750
Recovery	751
Granular Recovery	752
Full Recovery	808

Performing Flash VM Boot Recovery	834
Planning Disaster Recovery	852
Integration and Automation	910
Command Line Interface	911
Automation with HTTP API	924
Aptare IT Analytics Integration	925
Multi-Tenant Mode	931
Creating a Local Tenant	931
Creating a Remote Tenant	938
Tenant Management	942
Granting Self-Service Access	956

NAKIVO Backup & Replication Overview

NAKIVO Backup & Replication offers backup, replication, failover, backup to cloud, backup to tape, backup copy, backup data reduction, instant verification, granular restore and disaster recovery orchestration for virtual, physical, cloud and SaaS environments - all in one convenient web interface.



The product provides image-based, application-aware, incremental backup and replication. You can easily schedule jobs using the calendar in the product's web interface and save up to 1,000 recovery points for each backup, rotating them on a GFS basis. You can also protect your VMs and instances more efficiently by taking advantage of Changed Block Tracking (for VMware), Resilient Change Tracking (for Hyper-V), or Changed Regions Tracking (for Nutanix), LAN-Free Data Transfer, Network Acceleration, and other product features. The solution includes an advanced disaster recovery (DR) functionality. It allows you to automate and orchestrate DR activities across multiple sites. Build advanced site recovery workflows to failover an entire site in just a few clicks, perform non-disruptive recoverability testing, and make sure you have a workable DR plan in place to help minimize downtime and prevent loss of revenue or data.

NAKIVO Backup & Replication allows you to simplify data protection management through the automation of core tasks such as backup, replication, and backup copy. Instead of tracking every change in your environment and manually adding VMs or physical machines to jobs, you can set up policies based on a VM/physical machine name, tag, size, location, power state, configuration, or other parameters. NAKIVO Backup & Replication can regularly scan your infrastructure and automatically protect VMs, physical machines, and Amazon EC2 instances that match policy rules.

With NAKIVO Backup & Replication, you can also ensure the safety and integrity of your Microsoft Office 365 data. The product allows you to reliably protect Microsoft Exchange mailboxes, OneDrives for Business, and SharePoint Online sites.

Data Protection

Data protection is the process of safeguarding business-critical information from loss, corruption or compromise. NAKIVO Backup & Replication offers a complete suite of backup features to protect physical, virtual, and cloud environments. By providing you with great flexibility and multiple automation options, the product can save you time and resources. For more information about the data protection offered by NAKIVO Backup & Replication, refer to the following topics:

- [“Backup Copy” on page 7](#)
- [“Backup to Cloud” on page 12](#)
- [“Backup to Tape” on page 15](#)
- [“Container Protection” on page 14](#)
- [“Virtual Machine Backup” on page 18](#)

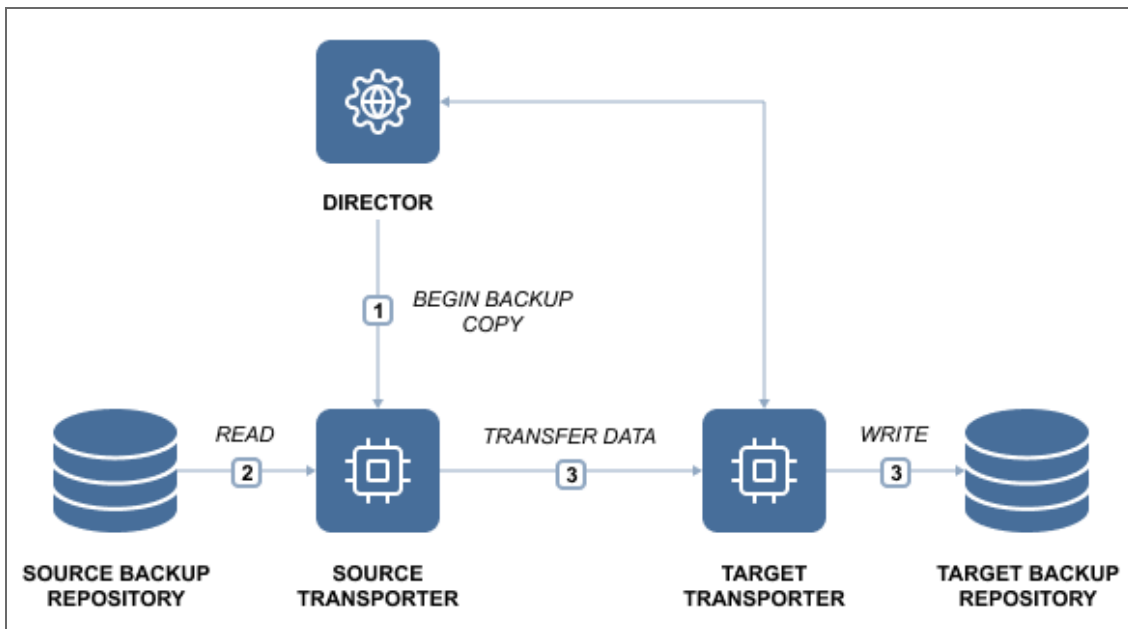
Backup Copy

Backups can be lost on account of a number of reasons, so having more than one copy of your business-critical backups is vital for ensuring that your data can be recovered in case of disaster. Backup Copy jobs provide a simple yet powerful way to create and maintain copies of your backups. Backup copy jobs copy backups from one Backup Repository to another without affecting the source ESXi hosts, VMs, or Amazon EC2 instances. This way, your source VMs or Amazon EC2 instances are read-only once while backups can be copied to one or multiple locations.

- [Create Mirrored Copy of your Backup Repository](#)
- [Copy Most Important Backups](#)
- [Copy Backups Created by Particular Backup Jobs](#)
- [Resource Efficiency and Variable Data Compression](#)
- [Copy Backups Offsite](#)
- [Copy Backups to Amazon Cloud](#)
- [Copy Recovery Points that You Need](#)
- [Schedule Backup Copy to Suit Your Needs](#)

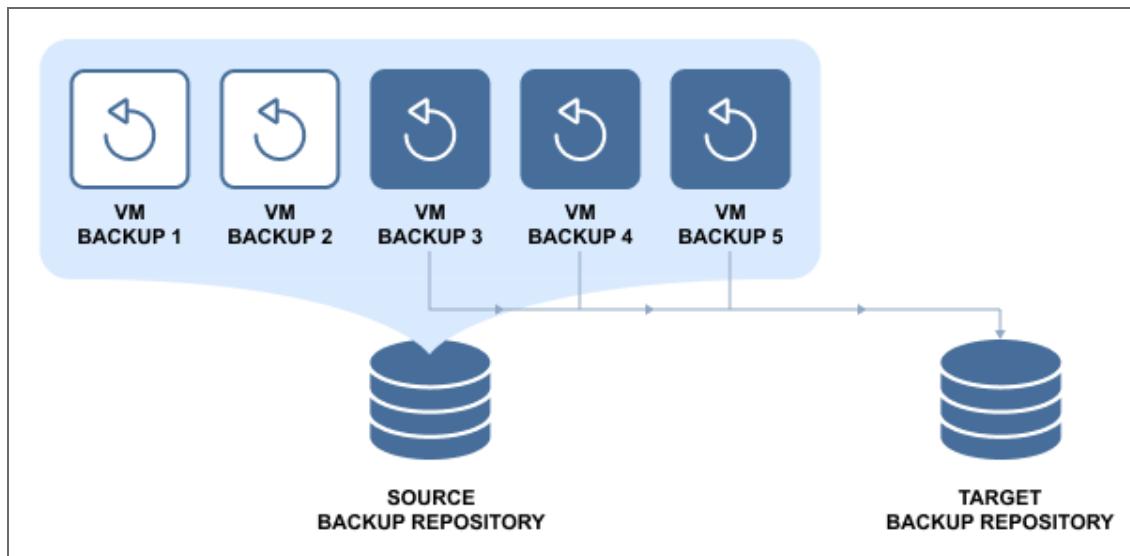
Create Mirrored Copy of your Backup Repository

With a Backup Copy job, you can create and maintain a mirrored copy of your primary Backup Repository, which is the simplest and the most reliable way to protect all your backups. Think of it as a Backup Repository replication: all backups and recovery points that appear in the Backup Repository A will be automatically sent to Backup Repository B:



Copy Most Important Backups

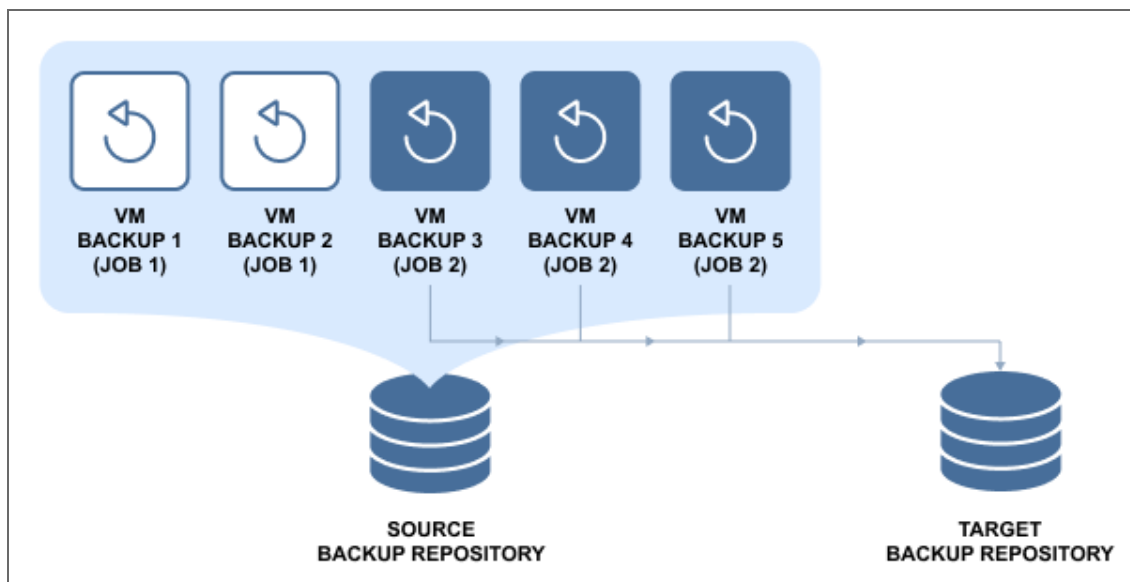
To save storage space on your secondary Backup Repository and to speed up data transfer, you can choose to create a Backup Copy job for only the most important backups:



This way, only the selected backups (and their recovery points) will be transferred to the secondary Backup Repository.

Copy Backups Created by Particular Backup Jobs

NAKIVO Backup & Replication enables you to create and maintain copies of backups created by particular Backup jobs:



This way, you can ensure that all backups created by important Backup jobs are copied to a secondary Backup Repository.

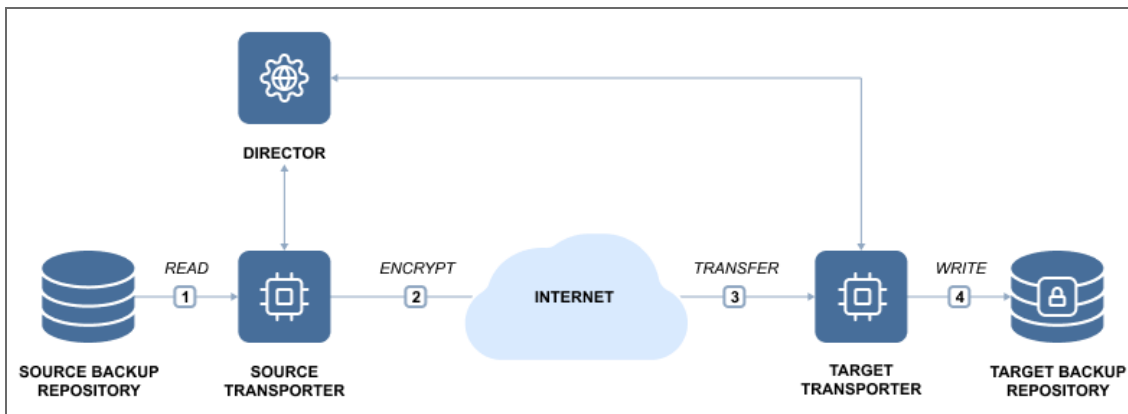
Resource Efficiency and Variable Data Compression

In addition to global data deduplication, NAKIVO Backup & Replication automatically compresses backed up data to reduce the amount of space that backups occupy in storage. By default, the compression level in the new Backup Repositories is set to “Fast,” so that your Backup jobs will run faster. When creating a secondary Backup Repository, you can set the compression level to “Best,” which uses more CPU, but delivers better compression levels. This way, the strongest compression algorithm will be used to compress backup data, resulting in smaller backups in your secondary Backup Repository.

Similarly, if source and target Repositories already share the same type and compression, NAKIVO Backup & Replication automatically skips data pack and unpack stages during Backup Copy jobs to cut down on time and resource usage.

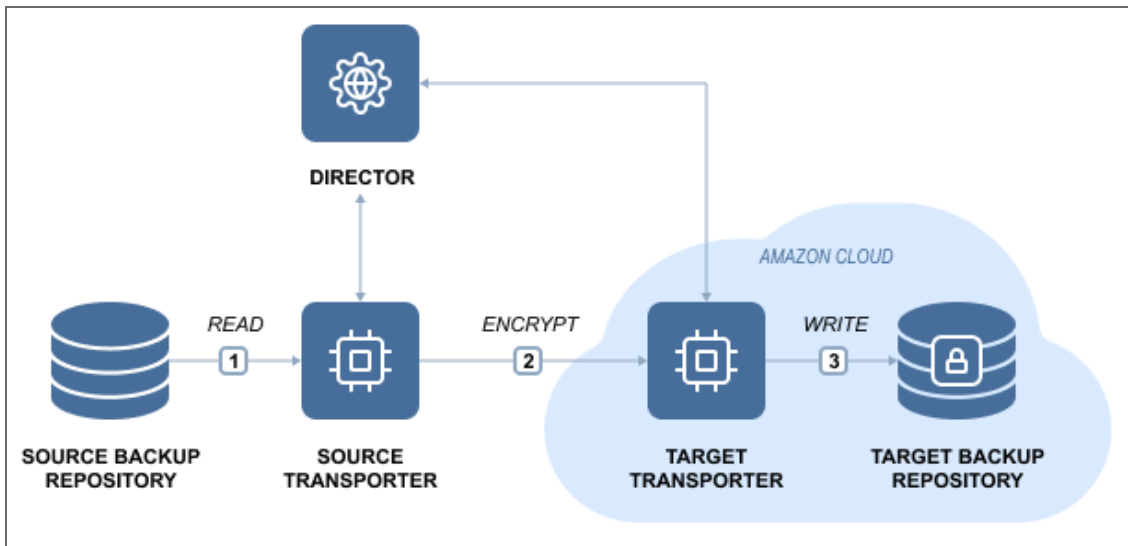
Copy Backups Offsite

While you can keep copies of your backups locally, having at least one copy of your most critical backups offsite can save you a lot of trouble in case a local disaster should wipe your primary backups. The secondary Backup Repository can be placed in any location that has a connection to the Internet, since backup data can be transferred via AES 256 encrypted link, and your secondary backup repository can be encrypted as well.



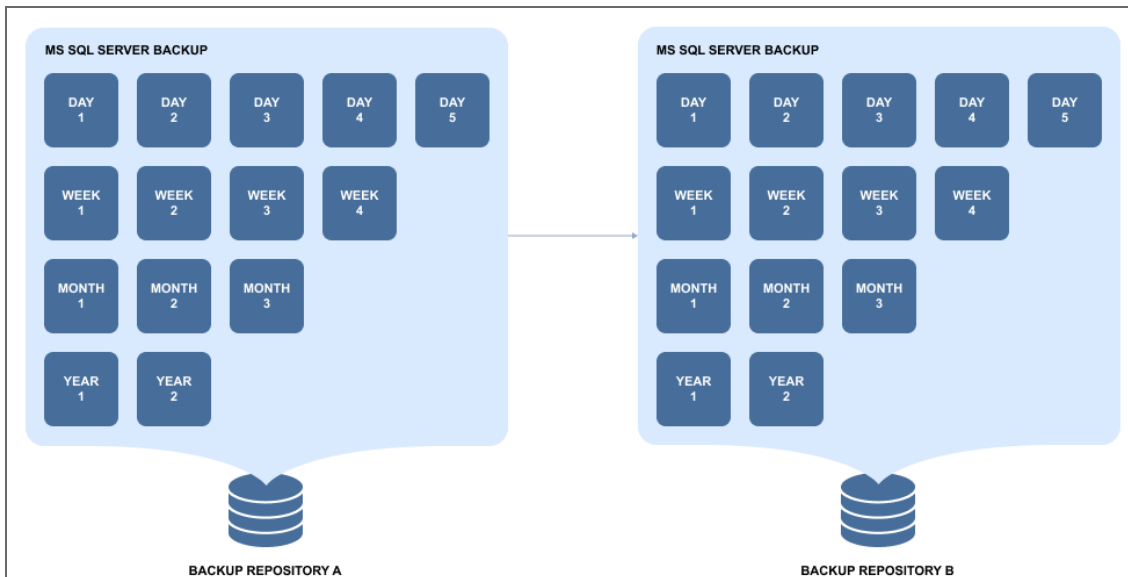
Copy Backups to Amazon Cloud

Amazon provides one of the most reliable and affordable cloud services in the industry. With NAKIVO Backup & Replication, you can use Amazon's fast, reliable, and affordable cloud to store copies of your backups.

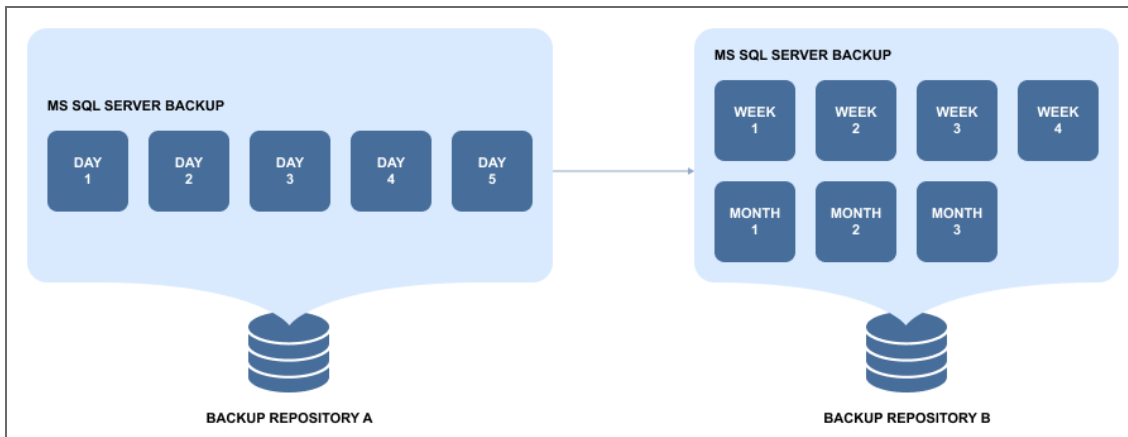


Copy Recovery Points that You Need

Each backup can contain up to 10,000 recovery points, which are saved based on recovery point retention policy, i.e. how many recovery points you want to have and for how long you want to keep them. With Backup Copy jobs, you can choose to create a mirrored copy of each backup: all recovery points that are available in Backup Repository A will be copied to Backup Repository B.



However, Backup and Backup Copy are different jobs, so you can set different retention policies for your primary backups and their copies in a different Backup Repository. This way, for example, you can store several daily backups onsite, and keep (archive) weekly, monthly, and yearly copies of backups in a secondary Backup Repository for long-term storage.



Also, you can use fast storage for a subset of backups and use slower, but more reliable storage for long-term archiving.

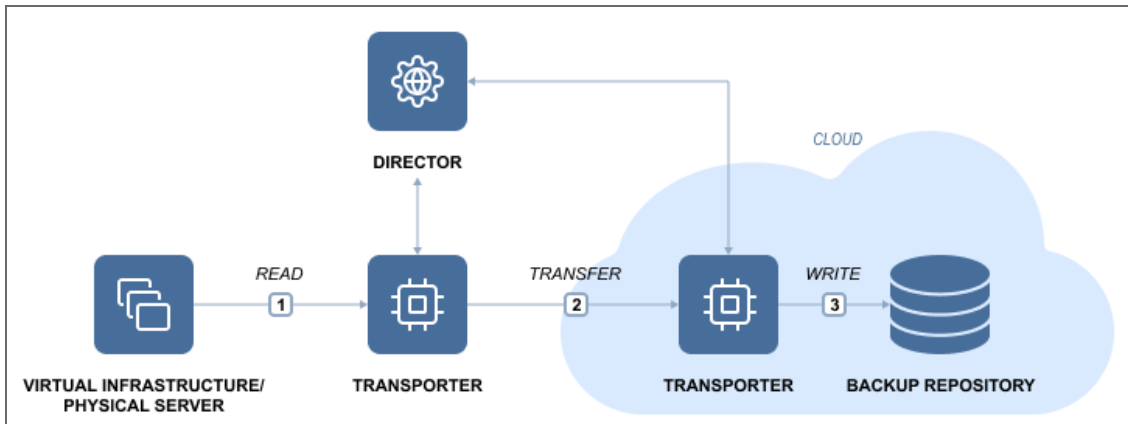
Schedule Backup Copy to Suit Your Needs

Backup Copy jobs have their own schedule, so you can set them up to run whenever it suits your needs. For example, you can set up a Backup Copy job to run every night on workdays, or set it up to run on weekends to send all backups made during the week to a secondary Backup Repository.

To learn how to create and run backup copy jobs with NAKIVO Backup & Replication, refer to [“Creating Backup Copy Jobs”](#) on page 658.

Backup to Cloud

NAKIVO Backup & Replication allows you to send backups and backup copies to Amazon EC2, Amazon S3, generic S3-compatible storage, Microsoft Azure, Backblaze B2, and Wasabi Hot Cloud Storage..



Keeping backups in the cloud provides a number of benefits, including:

- Safe backup storage. Storing backups in the cloud keeps them safe even if the local infrastructure becomes unavailable.
- Backup immutability. Backups stored in the cloud can also be made immutable to protect them from new ransomware attacks or accidental deletions.
- Flexible backup storage. Cloud storage can be easily expanded as required, eliminating the need to choose, order, install, and configure new servers or hard drives for your growing environment.
- Easy and quick data recovery. Backups can be accessed at any time and from anywhere.
- Affordable backup storage. Instead of buying, configuring and maintaining an offsite backup infrastructure, you can simply use your existing hardware.
- Simple backup management. The set it and forget it approach in NAKIVO Backup & Replication allows you to schedule regular backup jobs to the cloud.

While cloud providers offer cloud storage at an affordable price, NAKIVO Backup & Replication helps further reduce offsite backup costs with additional features like incremental backup, exclusion of swap files and partitions, and backup compression, among others. With NAKIVO Backup & Replication, you can use Amazon EC2, Amazon S3, generic S3-compatible storage, Microsoft Azure, Backblaze B2, or Wasabi as your primary or secondary backup storage destination.

How Backup to Cloud Works

A backup represents a point-in-time copy of a VM or physical machine that is stored in the Backup Repository. A Backup Repository is the destination for storing backup data. NAKIVO Backup & Replication allows you to create backup repositories in public clouds such as Amazon EC2, Amazon S3, generic S3-compatible storage, Microsoft Azure, Backblaze B2, or Wasabi. In NAKIVO Backup & Replication, a backup job is performed as follows:

1. The product automatically creates temporary snapshots of the source VMs/physical machines.
2. The data blocks that were changed since the last backup are identified and sent to the Backup Repository.
3. The temporary snapshots created in the process are removed.

However, backups can also get lost or damaged as a result of unexpected events. With NAKIVO Backup & Replication, you can also run backup copy jobs, which allow you to create copies of VMware vSphere VM, Microsoft Hyper-V, Amazon EC2, or physical machine backups. Creating copies of critical backups provides an additional level of data protection to avoid a single point of failure.

NAKIVO Backup & Replication enables you to copy backups from one Backup Repository to another without using the source hosts/VMs or physical machines. For more information, refer to [“Backup Copy” on page 7](#). NAKIVO Backup & Replication also includes an automated backup verification feature, which reads backups at the block level, compares the data written to the Backup Repository with the data from the source machine, then checks whether the data on both sites is identical and can be recovered in case of disaster.

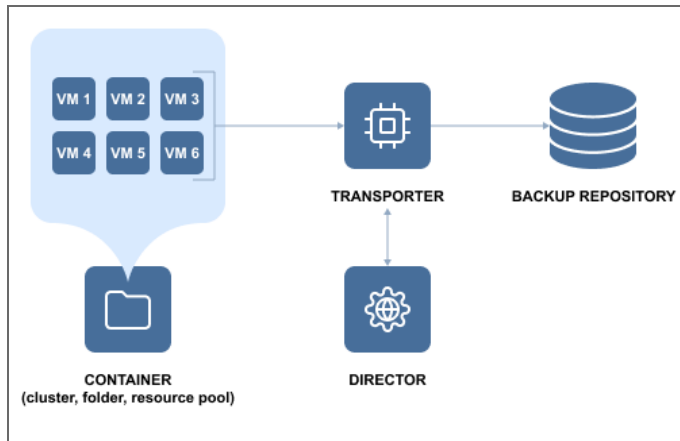
For more details on backing up to cloud, refer to the following topics:

- [“Backup Repository in Amazon EC2” on page 487](#)
- [“Backup Repository in Amazon S3” on page 493](#)
- [“Backup Repository in Microsoft Azure Blob Storage” on page 501](#)
- [“Backup Repository in Backblaze B2 Cloud Storage” on page 504](#)
- [“Backup Repository in Wasabi Hot Cloud Storage” on page 509](#)
- [“Backup Repository in Generic S3-Compatible Object Storage ” on page 497](#)

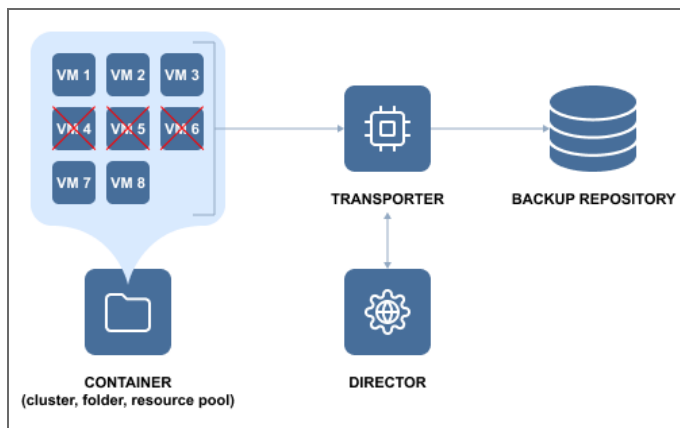
Container Protection

VMs can be organized into containers, such as resource pools, clusters, and folders. This form of organization allows you to easily add resources upon request and unload them when they are no longer necessary. NAKIVO Backup & Replication allows you to add an entire container to a backup or replication job. All changes in the container (i.e. adding to or removing from) are automatically reflected in a backup or replication job. Thus, all important VMs are continuously protected. If certain VMs inside a container are not required to be backed up or replicated frequently, you can exclude them from a backup or replication job. The container will still be protected but will not include less important VMs. This will save space in the Backup Repository and increase the speed of backup or replication jobs. For example, you set up a backup job for a cluster to run daily, but this cluster contains a couple of rather massive VMs that do not require frequent backups; you can edit the job by excluding those VMs. NAKIVO Backup & Replication will ask you whether to keep or remove backups made on previous job runs.

- Day 1



- Day 2



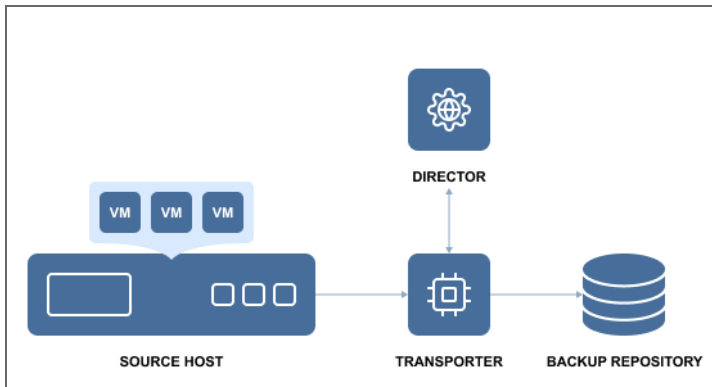
Backup to Tape

NAKIVO Backup & Replication provides native tape support for automated tape libraries, including virtual tape libraries (VTL), as well as standalone tape drives.

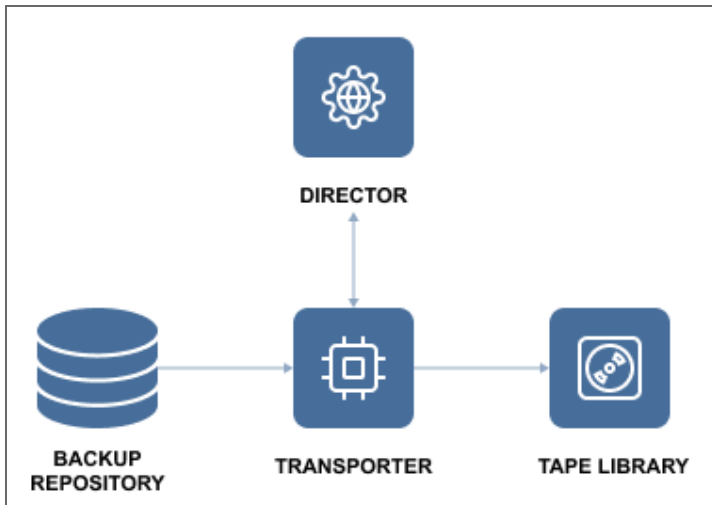
Backup to Tape is the process of backing up critical data to a tape cartridge. In essence, backing up to tape means creating a backup, storing it in the repository and then moving it to a tape cartridge for safekeeping. NAKIVO Backup & Replication supports backups of the following platforms: VMware, Hyper-V, Nutanix AHV, Amazon Amazon EC2, and physical machines. The backups can be sent to physical tape libraries or VTL for storing. NAKIVO Backup & Replication allows for realizing the Disk Staging (D2D2T) backup strategy, where disks are used as an additional, temporary stage of the backup process before finally storing backup to tape.

In NAKIVO Backup & Replication, the process of storing backups to tape consists of two stages:

Stage 1 – creating backups and storing them in the Backup Repository:



Stage 2 – copying backups from the repository to the tape library:



[Recovering from tape](#) is the reverse of backing up: the backups stored on the tape cartridges are first recovered to the Backup Repository and then recovered using NAKIVO Backup & Replication's tools.

Before you back up/recover to/from tape (physical or VTL), you need to [configure](#) NAKIVO Backup & Replication by adding tape libraries, discovering cartridges, etc.

The Native Tape support is fully integrated into NAKIVO Backup & Replication solution and allows you to administer all backup and restore operations on tapes directly from the application's user interface. Saving data on tapes presents you with the same data managing options as disk repositories: you can store full and incremental backups, apply user-defined retention settings to the archived data, select restore points and so on.

NAKIVO Backup & Replication supports Linear Tape-Open tape libraries and standalone tape drives starting from generation 3 (LTO3) or later as well as VTL. Using the solution, you can discover not only tape libraries and standalone devices, but also the tape cartridges in those devices.

Note

All the tape cartridges discovered within a Robotic Tape Library should have barcodes for the best performance of the product. For standalone tape devices, this is not essential.

Also, any changes to the tape infrastructure (moving or removing cartridges, changing their order, etc.) made by any other means (i.e. manually or via command line) rather than with NAKIVO Backup & Replication is the user's responsibility, since the system is unaware of such changes.

NAKIVO Backup & Replication supports writing/reading backups to/from discovered tape cartridges, as well as other operations, like moving cartridges between slots, erasing, scanning, etc.

The table below provides a description of some of the tape-related terms:

Term	Description
Tape Library	A storage device that includes one or more tape drives, a number of slots and a media changer (robot).
Tape Drive	A device component (or a standalone device) used to read and write the tape cartridge.
Slot	A place in the tape library designed to hold a single cartridge.
Mail Slot	A slot in the tape library that allows you to physically add or remove a tape cartridge without disturbing the operation of the tape library.
Media Changer	A device component used to move a single tape cartridge between slots and load/unload the cartridge to/from the tape drive.
Tape Cartridge (Tape)	A unit of sequential magnetic medium and an optional barcode used for identification.
Media Pool	A logical container that contains tape cartridges.

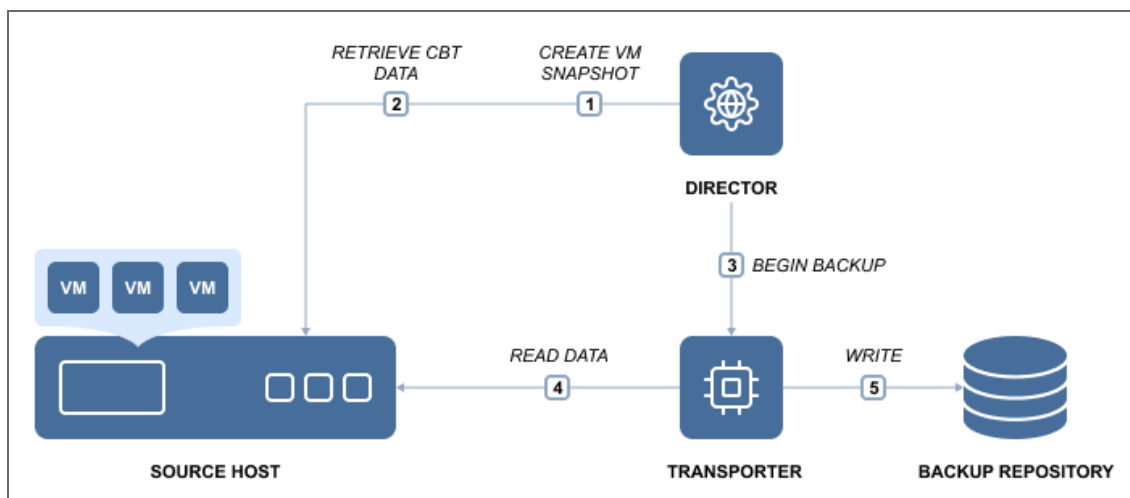
Term	Description
Backup (Tape)	A logical entity containing one or more recovery points on one or more tape cartridge(s) that belong to a single source object.
Recovery Point (Tape)	A complete or incomplete data set required to rebuild a VM or instance as of a particular moment in time.

Virtual Machine Backup

NAKIVO Backup & Replication works in a virtual environment and uses an image-based approach to VM backup. It is an agentless application that does not require you to install any additional software inside the VM guest OS to retrieve VM data. It exploits virtualization platforms' snapshot capabilities to back up VMs. When you initiate a VM backup, NAKIVO Backup & Replication requests a virtualization platform to create a VM snapshot which is basically a point-in-time copy of a VM including its configuration, OS, applications, associated data, system state, and so on. The snapshot is used as a source of data for backup. Copying of the data from the source datastore is performed at a block level. NAKIVO Backup & Replication fetches the VM data, performs compression and deduplication, and finally stores the backup files in the repository.

In NAKIVO Backup & Replication, backing up is performed via a job that must be created and configured prior to the backup itself. A backup job is a configuration unit of the backup activity that defines when, what, how and where is to be backed up. One or several VMs can be processed by a single backup job. A job can be started manually or scheduled for execution. The initial job's run always produces a complete backup of the VM image. The following sessions can create full or incremental backups. During incremental backups, NAKIVO Backup & Replication copies only blocks of data that have changed since the last backup job session. Tracking of changed data blocks is performed using the virtualization platforms' capabilities (CBT/RCT/CRT) or with NAKIVO Backup & Replication's proprietary method.

Technically, the VM backup process is performed according to the following flow depicted below:



To learn how to create VM backups with NAKIVO Backup & Replication, refer to [“Backup” on page 625](#).

Amazon EC2 Concepts

- [Instance](#)
- [EBS Volume](#)
- [Region](#)
- [Availability Zone](#)
- [VPC](#)
- [Subnet](#)
- [Security Group](#)
- [Key Pair](#)
- [Elastic Network Adapter](#)

Instance

An *Amazon EC2 Instance* is a virtual server in Amazon's Elastic Compute Cloud (EC2). Amazon EC2 provides different Instance types so you can choose the CPU, memory, storage, and networking capacity you need.

EBS Volume

An *Amazon EBS Volume* is a virtual disk that can be attached to any Amazon EC2 Instance that is in the same Availability Zone. Amazon EBS volumes persist independently from the life of the instance, i.e. deleting an Amazon EC2 Instance does not delete EBS Volumes that were connected to it.

Region

An *Amazon EC2 Region* is a geographic area where an Amazon EC2 Instance is hosted. Amazon EC2 provides multiple Regions so you can create and run your Amazon EC2 Instances in locations that meet your requirements. Each Region is completely independent and isolated from others.

Availability Zone

An *Amazon EC2 Availability Zone* is a location within an Amazon EC2 Region. Each Availability Zone is isolated from failures in other Availability Zones, yet all Availability Zones within the same region are connected with low-latency network connectivity to others in the same Region.

VPC

A *virtual private cloud* (VPC) is a virtual network in Amazon EC2. A VPC is dedicated to your AWS Account and is logically isolated from other virtual networks in the AWS cloud. Similar to regular networks, you can configure your VPCs: select IP address ranges, create subnets, configure route tables, network gateways, and security settings. After you have created and configured a VPC, you can connect your Amazon EC2 Instances to the VPC.

Subnet

A *subnet* is a range of IP addresses in a VPC. You can connect Amazon EC2 Instances to a subnet that you select: public subnets provide access to the Internet, while private subnets don't.

Security Group

A *security group* is a virtual firewall that controls the traffic for one or more instances. When you create an Amazon EC2 Instance, you associate one or more security groups with the Instance. You add rules to each security group that allows traffic to or from its associated instances. You can modify the rules for a security group at any time; the new rules are automatically applied to all instances that are associated with the security group. When we decide whether to allow traffic to reach an instance, we evaluate all the rules from all the security groups that are associated with the instance.

Key Pair

Amazon EC2 uses *key pairs* to encrypt and decrypt login information. A key pair consists of a Public Key that is used to encrypt passwords, and a Private Key is used to decrypt them. When creating a new Amazon EC2 Instance, you need to either create a new Key Pair for it or assign an existing key pair for the Instance. To log in to your Amazon EC2 Instance, you must provide the private key for it. Note that Linux instances have no password, and you use a key pair to log in using SSH. With Windows instances, you use a key pair to obtain the administrator password and then log in using RDP.

Elastic Network Adapter

Elastic Network Adapter (ENA) is a custom network interface with accompanying drivers providing Enhanced Networking on EC2 instances. ENA is optimized to deliver high throughput and packet per second performance and consistently low latencies on EC2 instances. Depending on the type of EC2 instance, you can utilize up to 20 Gbit/s of network bandwidth with ENA. For more information, refer to the corresponding [article](#) on the AWS website.

Data Recovery

One of the key elements of an effective protection strategy is ensuring that data can be restored quickly after any corruption or loss. NAKIVO Backup & Replication provides several recovery options for maintaining the operational backup of data and business continuity/disaster recovery:

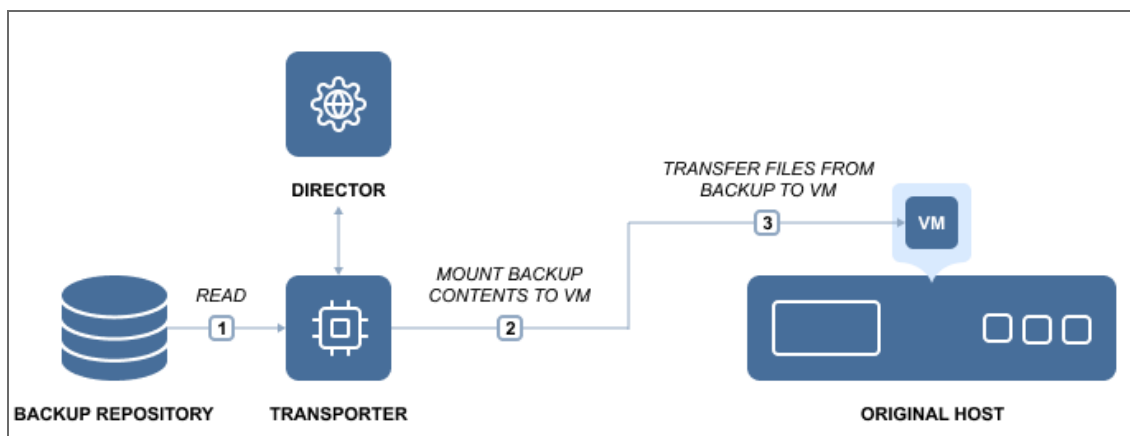
Refer to the following topics for more information about data recovery:

- [“Cross-Platform Recovery” on page 28](#)
- [“Instant File Recovery to Source” on page 22](#)
- [“Instant Object Recovery” on page 23](#)
- [“Instant VM Recovery - Flash VM Boot” on page 24](#)
- [“Recovery From Tape” on page 27](#)
- [“Universal Object Recovery” on page 26](#)

Instant File Recovery to Source

The Instant File Recovery to Source feature allows you to recover files and folders to their original location (or any custom location) in a single click. NAKIVO Backup & Replication can instantly recover files right from compressed and deduplicated backups. Files can be recovered from both Windows and Linux-based machines. With the push of a button, the selected files can be reinstated in their original location or in a new custom location on any VM/physical machine, downloaded to the local machine, or sent via email. When restoring files back to the original location, the file permissions are all restored as well. The Instant File Recovery feature works both via LAN and WAN. Thus, even if local backups are unavailable, you can recover from a backup copy located, for example, in an Amazon EC2 cloud a thousand miles away. Note that recovery to the source is executed via a system account.

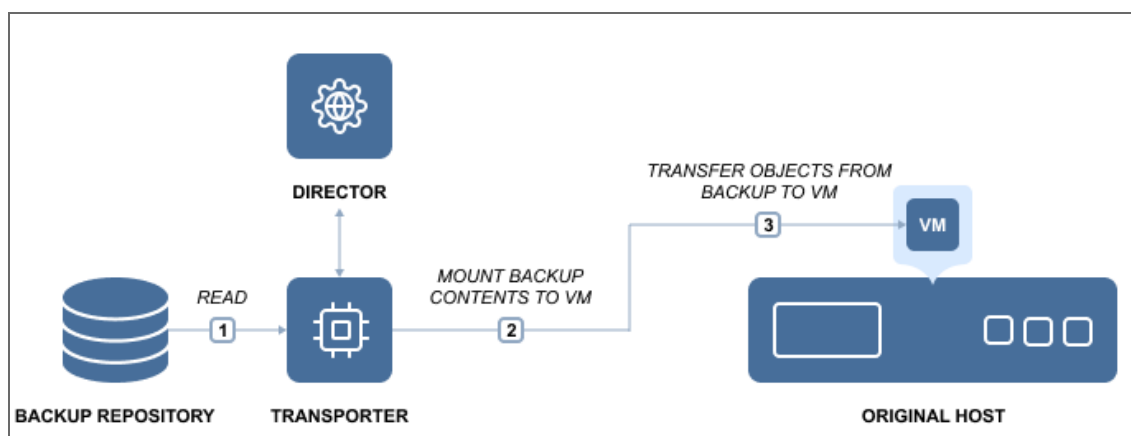
The file recovery process is simple and straightforward. First, select a backup and recovery point from which you wish to recover files. The files and folders available for recovery are displayed right in the NAKIVO Backup & Replication web interface. Browse or search for files, select the files you wish to recover, specify where you want them, click the button, and behold! The files are instantly recovered.



To learn how to recover files with NAKIVO Backup & Replication, refer to [“File Recovery” on page 753](#).

Instant Object Recovery

NAKIVO Backup & Replication provides you with the ability to instantly browse, search, and recover Microsoft Active Directory, Microsoft Exchange, and Microsoft SQL Server directly from compressed and deduplicated backups. The objects can be restored to the source server, to a different server, or exported to a custom location. The feature streamlines, automates, and speeds up the process of restoring your data, and is available out-of-the-box in NAKIVO Backup & Replication. For more information, refer to [“Granular Recovery” on page 752](#).



Instant VM Recovery - Flash VM Boot

The Flash VM Boot feature allows you to boot a VM directly from compressed and deduplicated backups for fast recovery during an outage. When a business-critical machine goes down, every minute of downtime has costly and damaging consequences. With NAKIVO Backup & Replication, you can recover entire machines from their backups in minutes. The Flash Boot feature allows you to boot machines directly from compressed and deduplicated backups without recovering entire machines first. This feature works right out of the box without any special setup. Just choose a backup, a recovery point, and a recovery location (a host, a resource pool, or a cluster where you want to run the recovered machine). Then press the button and your machine is booted in no time.

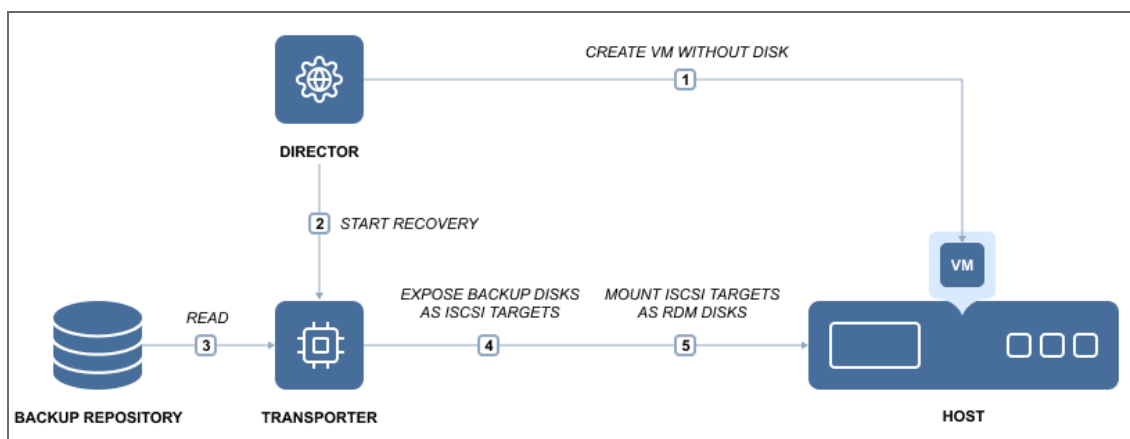
Once the machine is running, you can migrate it to production for permanent recovery. Note that the backup from which the VM is booted is not affected. Changes you make to the running VM will not modify or remove the data in your VM backup. In addition to the VM recovery capabilities, the Flash VM Boot feature offers other useful functions. For example, it allows you:

- Access the files, folders, and application objects of any application on any OS.
- Test system updates and application patches before applying them to your production machine.
- Verify the backup to ensure that the OS and applications run properly.
- Copy a VMDK or VHDX file, and then delete the virtual machine.

This is how the Flash VM Boot feature works:

NAKIVO Backup & Replication consists of two main components: the Director, which is the management component, and the Transporter, which performs actual data protection and recovery tasks. By default, both components are automatically installed to enable all features out of the box.

When you run a Flash VM Boot job, the Director creates a new VM without any disks on the target server, then commands the Transporter to expose the machine disks from the Backup Repository as iSCSI targets. Finally, the Director mounts the exposed disks to the newly created VM.



This process is fully automated and takes mere seconds to complete, after which the machine OS boot is started. Once booted, the machine can be migrated to the production environment using the hypervisor's native live migration feature.

With NAKIVO Backup & Replication you can also perform Flash VM Boot to run VMware VMs directly from physical machine backups. If a business-critical physical machine goes down, you can use Cross-Platform Flash Boot for instant recovery without having to manually install a new OS and applications on the new machine. The machine recovered this way can be used as a testing environment and can later be migrated for permanent use.

To learn how to create recovery jobs using the Flash VM Boot feature, refer to [“Performing Flash VM Boot Recovery” on page 834](#)

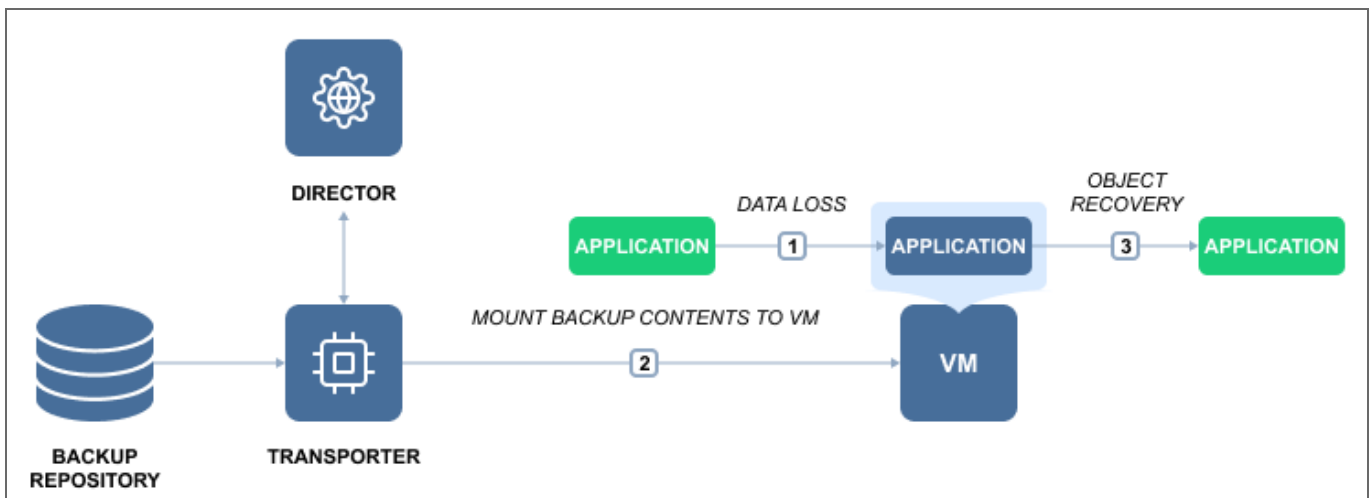
Universal Object Recovery

The Universal Object Recovery feature allows you to recover any object in the infrastructure – whatever the application or file system – in a matter of minutes by mounting the appropriate backup to a VM or physical machine and then recovering the necessary data using the native application tools.

Universal Object Recovery provides multiple recovery options, increases the flexibility of the recovery process, and saves a significant amount of time.

- **Versatility** – with Universal Object Recovery, you are not limited to certain applications or file systems: you can recover any object at any time (provided you have a recent backup). Moreover, the feature allows you to recover individual objects back to the source, to another VM or instance, or even to a physical machine.
- **Lower Overhead** – Universal Object Recovery lets you restore individual objects without having to recover the entire VM or physical machine. Thus, the feature eliminates the complexity of full machine recovery, saving you time that can be better used for other important tasks.
- **Faster Recovery** – recovering an entire machine from a deduplicated and compressed backup takes time, affecting your ability to meet your RTOs. With Universal Object Recovery, you can instantly mount disks from a backup, decreasing recovery time and ensuring minimal interruptions in your business operations.

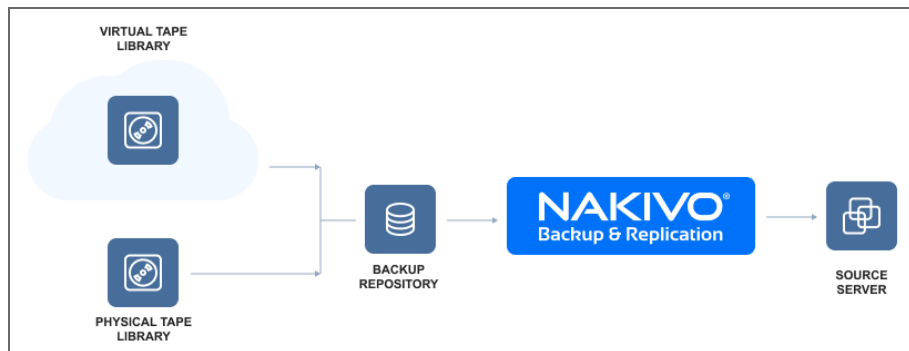
You can use NAKIVO Backup & Replication to recover application objects in a few simple steps: just open the Universal Object Recovery Wizard and select the appropriate recovery point. Once you choose the disks you wish to be mounted, NAKIVO Backup & Replication attaches said disks to the specified VM or physical machine. All you need to do after the mount is log into the corresponding VM or physical machine and use native application tools to recover the data.



To learn how to create object recovery jobs with NAKIVO Backup & Replication, refer to the corresponding topics of the [“Granular Recovery” on page 752](#) section.

Recovery From Tape

NAKIVO Backup & Replication allows you to recover VMs and EC2 instances directly from tape backups using the standard recovery tools. You can also move backed up data from a tape cartridge to an existing Backup Repository if needed.



Refer to the following topics for more information:

- [“Starting Recovery from Tape” on page 831](#)
- [“Starting Hyper-V VM Recovery” on page 810](#)

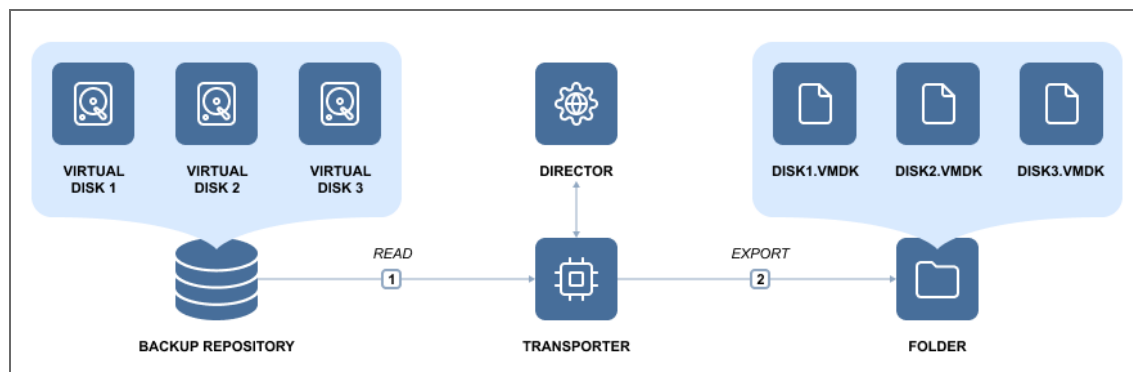
Cross-Platform Recovery

With Cross-Platform Recovery, you can seamlessly protect VM/physical machine data across multiple platforms and virtualized environments. You can also benefit from the following other advantages:

- **Data Migration** – whether a disaster renders one of your hypervisors/physical servers unavailable, or you simply make the decision to switch to a single-platform virtualized environment, Cross-Platform Recovery can be of help. Export your VM or physical machine backup data in the desired format, and know that you can recover on a different platform without encountering any incompatibility issues.
- **Long-Term Data Archiving** – the specifics of your line of business or legislative requirements may require you to store backups for years. With NAKIVO Backup & Replication, you can easily export and store data offsite for as long as you need. Moreover, if your choice of virtualization software changes over time, you shouldn't have any problems recovering from your old backups in the new environment.
- **Recoverability Testing** – the fact that you have a backup does not automatically mean you can recover from that backup. Cross-Platform Recovery gives you the freedom to test different scenarios of recoverability in multiple environments, thus helping ensure business continuity. With Cross-Platform Recovery, no disaster can catch you off guard.

You can export VM/physical machine data from any backup into the format of your choice in four simple steps:

1. Select a backup (VMware, Hyper-V, Nutanix AHV or physical server).
2. Choose one or multiple virtual disks that you would like to export.
3. Specify the target location and export format (VMDK, VHD, or VHDX).
4. Click a button and have the data of each selected disk exported into a separate file.



Once exported, the files can be used for recovery or long-term storage. Cross-Platform Recovery allows for unrestricted data protection across different hypervisors, physical machines and cloud platforms. Whether one of your hypervisors or physical machines is down or you need to migrate data from one platform to another, Cross-Platform Recovery gives you the necessary tools for seamless cross-platform data protection and recovery.

Disaster Recovery

Disaster Recovery (DR) is a practice intended to support an organization's ability to remain fully operational after an emergency event. DR serves to limit risks by getting an organization's infrastructure to run as close to normal as possible after an abrupt intermission. NAKIVO Backup & Replication allows you to address all major DR planning points by creating automated DR workflows for VMware, Microsoft Hyper-V, Nutanix AHV and Amazon EC2 environments. The application allows you to protect VMs running within a cluster, replicate VMs, and fail over to replicas.

When utilizing Site Recovery, you can include up to 200 actions to a single job, including failover, failback, start/stop VMs and instances, run/stop jobs, run script, attach or detach repository, send email, wait, and check condition. By arranging actions and conditions into one automated algorithm, you can create Site Recovery jobs of any complexity level.

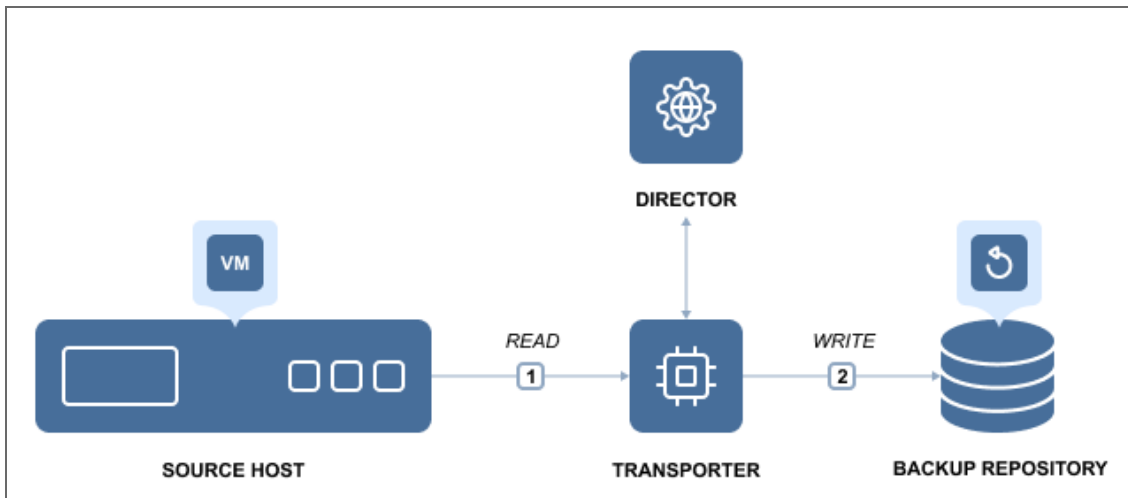
This section contains the following topics:

- [“Replication From Backup” on page 31](#)
- [“Site Recovery” on page 32](#)

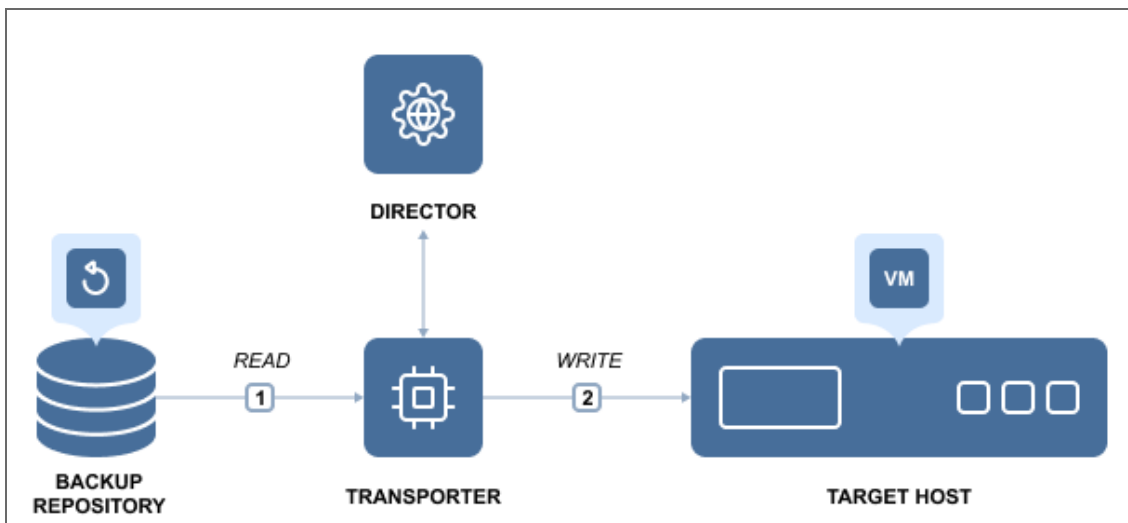
Replication From Backup

The Replication From Backup feature allows for offloading the production environment by replicating VMs directly from backups.

Step 1 - Create a backup



Step 2 - Replicate VM from backup

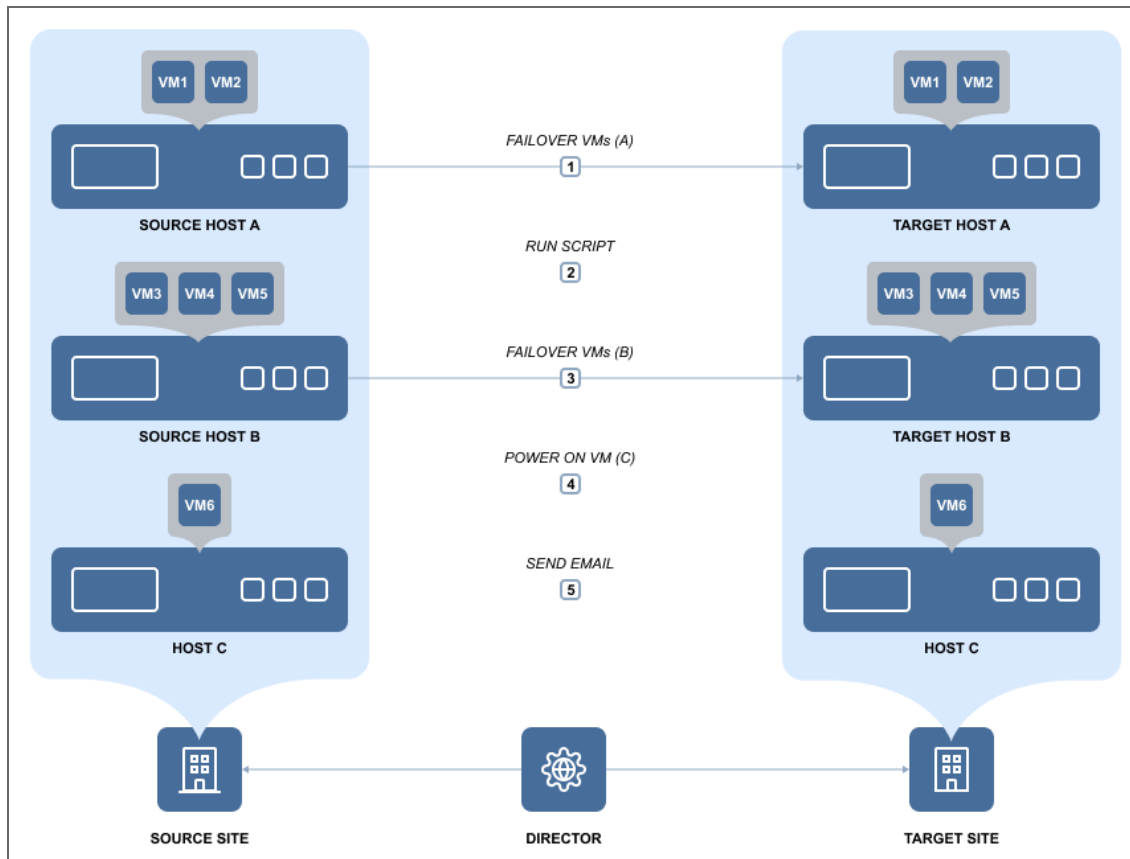


Setting up a replication from backup job for VMware and Hyper-V environments is no more time-consuming than setting up a traditional replication job. Once you launch a new replication job wizard and select VM backup as the source, NAKIVO Backup & Replication proceeds to read the data from the repository and injects it into the replica.

To learn how to create replication jobs with NAKIVO Backup & Replication, refer to [“Replication” on page 718](#).

Site Recovery

With [Site Recovery Jobs](#) introduced, NAKIVO Backup & Replication allows you to automate the execution of one or more actions. An action refers to a single task that can be included in a Site Recovery Job. Refer to [“Site Recovery Job Wizard: Actions” on page 879](#) for the list of available actions.



Special Actions that are used in recovering your IT environment with a Site Recovery Job are Failover and Failback:

- **Failover** switches workloads from the primary location to a secondary recovery location. With Failover action, you can temporarily suspend workloads on the primary location, and start them from the recovery location.
- **Failback** is the process of synchronizing data that has changed since Failover finished, back to the primary location. With Failback action, you can stop workloads on the secondary location and switch them back to the primary location.

Failover and Failback actions are applicable to replicas, and switch replica states from *Failover* to *Normal* correspondingly. The Site Recovery Job can be executed in one of the following modes:

- **Test mode** is designed to verify the Site Recovery Job workflow and results. You can execute a Site Recovery Job in the test mode on demand or on schedule. Refer to [“Running Site Recovery Job in Test Mode” on page 907](#) for details.
- **Production mode** is designed to recover the environment from a disaster. You can execute a Site Recovery Job in the production mode on demand only. Refer to [“Running Site Recovery Job in Production Mode” on page 908](#) for details.

When the Site Recovery Job is run in the production mode, Failover may be either of the following types:

- **Planned failover** is designed to achieve zero data loss when disaster happens. The application will sync replica data with the source VM before switching workloads to the replica.
- **Emergency failover** is designed to minimize downtime. The application will switch workloads from the source VM to the replica immediately.

The topic includes the following sections:

- [Workflow of Site Recovery Job](#)
- [Cleanup of Site Recovery Job Testing](#)

Workflow of Site Recovery Job

If your Site Recovery Job contains a Failover action, the action will be executed as follows:

- Site Recovery Job is executed in **production** mode as **Emergency Failover** is being carried out:
 1. Replication from the source VM to the replica will be disabled.
 2. The replica will be rolled back to a specified recovery point (optional, as the latest recovery point is used by default).
 3. The replica will be connected to a new network (optional).
 4. The static IP address of the replica will be modified (optional).
 5. The source VM will be powered off (optional).
 6. The replica will be powered on.
 7. The replica will be switched to the Failover state.
- Site Recovery Job is executed in **production** mode as **Planned Failover** is being carried out:
 1. Replication from the source VM to the replica will be disabled.
 2. An incremental replication from the source VM to the replica will be run once.
 3. The source VM will be powered off.
 4. An incremental replication from the source VM to the replica will be run once more.
 5. The replica will be connected to a new network (optional).
 6. The static IP address of the replica will be modified (optional).
 7. The replica will be powered on.
 8. The replica will be switched to the Failover state.
- Site Recovery Job is executed in **test** mode:

1. Replication from the source VM to the replica will be disabled.
2. An incremental replication from the source VM to the replica will be run once.
3. The replica will be connected to an isolated network (optional).
4. The static IP address of the replica will be modified (optional).
5. The replica will be powered on.
6. The replica will be switched to the Failover state.

If your Site Recovery Job contains a Failback action, the action will be executed as follows:

- Site Recovery Job is executed in the **production** mode:
 1. The source VM will be powered off (if it exists and is powered on).
 2. A protective snapshot of the source VM will be created.
 3. An incremental or full replication from the replica to the source VM will be run once.
 4. The replica will be powered off (optional).
 5. An incremental replication from replica to the source VM will be run once more.
 6. The source VM will be connected to a new network (optional).
 7. The static IP address of the source VM will be modified (optional).
 8. The source VM will be powered on.
- Site Recovery Job is executed in **test** mode:
 1. The source VM will be powered off (if it exists and is powered on).
 2. A protective snapshot of the source VM will be created.
 3. An incremental or full replication from replica to the source VM will be run once.
 4. The source VM will be connected to an isolated network (optional).
 5. The static IP address of the source VM will be modified (optional).
 6. The source VM will be powered on.

Cleanup of Site Recovery Job Testing

After executing a Site Recovery Job in test mode, the cleanup will be carried out as follows:

1. VMs that have been powered on during the Site Recovery Job testing will be powered off, and vice versa.
2. Repositories that have been attached during the Site Recovery Job testing will be detached, and vice versa.
3. Jobs that have been enabled during the Site Recovery Job testing will be disabled, and vice versa.
4. If the **Failover** action was part of the Site Recovery Job testing:
 - a. The replica will be powered off.
 - b. The replica will be reverted to the pre-Failover state via the snapshot.
 - c. The replica will be switched to the Normal state.
 - d. Replication from the source VM to the replica will be enabled.

5. If the **Failback** action was part of the Site Recovery Job testing:
 - a. The source VM will be removed (if it did not exist before the Site Recovery Job testing), or else:
 - b. The source VM will be reverted to the protective snapshot.
 - c. The source VM will be powered on (if it exists and was powered off).
 - d. The protective snapshot will be removed from the source VM.

Reliability

NAKIVO Backup & Replication employs various techniques to ensure that data is stored, transferred and recovered correctly and consistently.

This section contains the following topics :

- [“Application and Database Support” on page 37](#)
- [“Backup Immutability” on page 38](#)
- [“Backup Size Reduction” on page 40](#)
- [“Encryption in Flight and at Rest” on page 44](#)
- [“External Product Database Support” on page 45](#)
- [“Log Truncation” on page 46](#)
- [“Recovery Point Retention” on page 47](#)
- [“Self-Backup Feature” on page 50](#)
- [“Two-Factor Authentication” on page 51](#)
- [“VM Verification” on page 52](#)

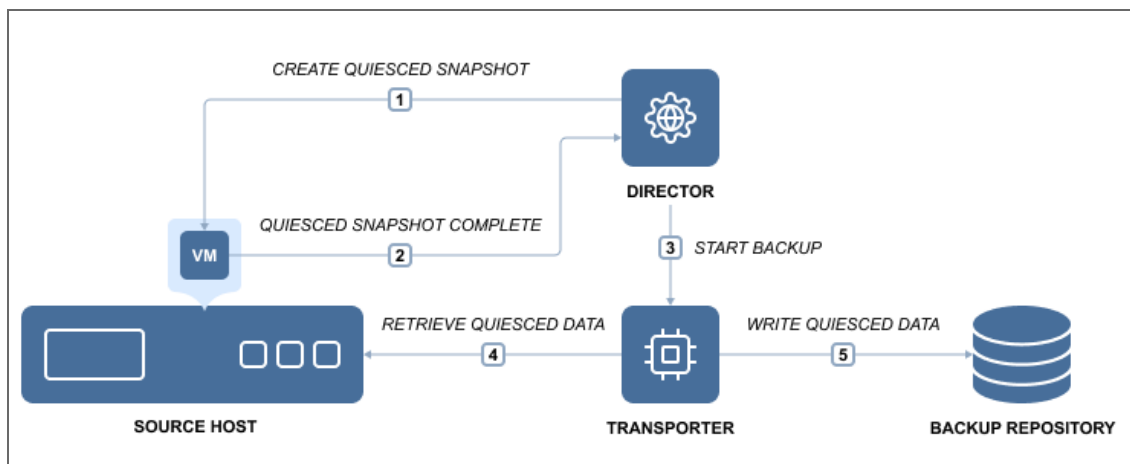
Application and Database Support

When you back up a VM that runs Active Directory, Microsoft SQL Server, Microsoft Exchange, or any other application or database, it is crucial to ensure that all data inside of those applications remain consistent in the backup. This is important because portions of data and some transactions kept in memory may be incomplete when the VM backup is made. If you take no actions to flush memory and I/O operations, the backups will be crash-consistent. It is similar to pulling the plug on a physical server and then powering it back on. Therefore, most modern applications and databases offer ways to recover from this state. However, in most cases you'll still need to spend some time on manual restore operations and run the risk of losing important data.

To ensure that all data is consistent in the backups, NAKIVO Backup & Replication allows you to use the application awareness feature which is called app-aware mode. To perform consistent backups and replicas of Windows-based environments, the product relies on the Microsoft Volume Shadow Copy (VSS) service running inside VMs. If your application is not VSS-aware or runs on Linux, it provides you with the ability to run [custom pre-freeze and post-thaw scripts](#) to enable application-consistent VM backup and replication. A pre-freeze script is executed before a snapshot of a VM is taken, and post-thaw script is executed after the snapshot has been taken.

With the app-aware mode turned on, your backups and replicas will contain consistent application and database data, so you won't need to take any extra configuration steps. As a result, you will be able to instantly recover not only full VMs, but also Microsoft Exchange and Active Directory objects, such as emails or users, directly from a compressed and deduplicated backup. If app-aware mode is disabled, NAKIVO Backup & Replication will create normal (standard) snapshots of source volumes instead of quiesced ones. In case of failure, the product will copy data directly from source volumes without displaying an error.

The app-aware mode can be enabled/disabled on the page of the backup and replication job wizard of all [supported platforms](#).



Backup Immutability

When creating a backup job and selecting the **Amazon EC2, Amazon S3, generic S3-compatible storage, Wasabi, Azure Blob Storage, Backblaze B2 Cloud Storage**, or **Local Folder** type of [Backup Repository](#), NAKIVO Backup & Replication allows you to make the recovery points in these repositories immutable. With immutability enabled, the recovery points are stored using the write-once-read-many (WORM) model. Immutability adds another layer of security to backups by protecting recovery points from encryption by ransomware or accidental deletions/modifications.

For the **Amazon EC2, Amazon S3, generic S3-compatible storage, Wasabi, Azure Blob Storage**, or **Backblaze B2 Cloud Storage** type of Backup Repository, Object Lock or version-level immutability support should be enabled for the bucket or blob container used to store backups. This type of immutability cannot be shortened or lifted, not even by the root user.

With the **Local Folder** type of Backup Repository, immutable recovery points cannot be overwritten, deleted, or changed by anyone except the root user before the specified period expires.

When the **Local Folder** type of Backup Repository is deployed as part of a VMware vSphere, Nutanix AHV virtual appliance, or a pre-configured AMI in Amazon EC2, NAKIVO Backup & Replication provides an even higher level of ransomware protection. You can make recovery points stored in this type of repository immutable, and the immutability cannot be lifted or changed by anyone, not even the root user.

You can find more details on how to enable immutability in the following articles:

- [“Backup Job Wizard for Hyper-V: Retention” on page 645](#)
- [“Backup Copy Job Wizard: Retention” on page 675](#)
- [“Deploying VMware Virtual Appliance” on page 172](#)
- [“Deploying Nutanix AHV Virtual Appliance” on page 179](#)
- [“Deploying Amazon Machine Image in Amazon EC2” on page 187](#)

For more details on the requirements for this feature, refer to [this page](#) in the User Guide.

Backup Malware Scan

With this feature, NAKIVO Backup & Replication can scan the selected backups for malware during the recovery process and perform specified actions if malware is detected.

When the feature is enabled, the product uses a supported antivirus software installed on a Repository Transporter or on a designated **Scan Server** added to the inventory to detect if malware is present in a backup.

You can find more details on how to enable recovery with malware detection in the following articles:

- [Adding Scan Servers](#)
- [Recovery Job Wizard for Hyper-V: Options](#)

- [Hyper-V Flash Boot Job Wizard: Options](#)
- [Universal Object Recovery Wizard: Options](#)

For more details on the requirements for this feature, refer to the [Feature Requirements](#).

Backup Size Reduction

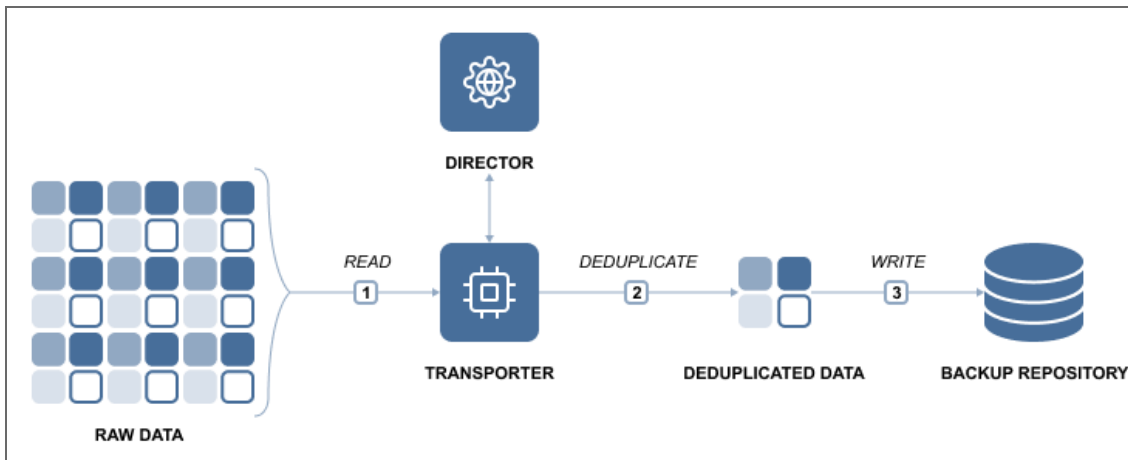
NAKIVO Backup & Replication utilizes multiple methods, such as deduplication and compression, to optimize the size of stored backups. The main purpose of these methods is to reach the correct balance between the amount of data read and transferred during backup.

This section contains the following topics:

- [“Global Data Deduplication and Compression” on page 41](#)
- [“Excluding Swap Files and Partitions” on page 42](#)
- [“Excluding Unused Blocks” on page 43](#)

Global Data Deduplication and Compression

Backup deduplication is a method for reducing backup size by excluding duplicate data blocks from the backup. In any given organization, VMs contain duplicates of data, such as VMs deployed from the same template, VMs with the same OS, and VMs that have some (semi) identical files, such as database entries. Block-level data deduplication enables you to reduce backup size by saving only unique data blocks to the Backup Repository while replacing duplicated blocks with references to existing ones.



NAKIVO Backup & Replication automatically deduplicates all backups in a given forever-incremental Backup Repository if this feature is enabled. This means that all data blocks are taken into account by backup deduplication, even if you back up your VMware VMs, Hyper-V VMs, and Amazon EC2 instances to the same Backup Repository. Global deduplication can be enabled during Backup Repository creation process. You can also use hardware-based data deduplication device such as an EMC Data Domain instead of enabling it for the repository.

Note

The backup deduplication method can be enabled/disabled during the Backup Repository creation process. For details, refer to one of the [Creating Backup Repositories](#) sections.

VM backup deduplication can provide a 10X to 30X reduction in storage capacity requirements. For example, you have 10 VMs running Windows Server 2016, which occupies 10 GB each. While the total amount of data is 100 GB, only one copy of OS data (10 GB) will be written to a backup repository with data deduplication, which provides 10 to 1 storage space savings.

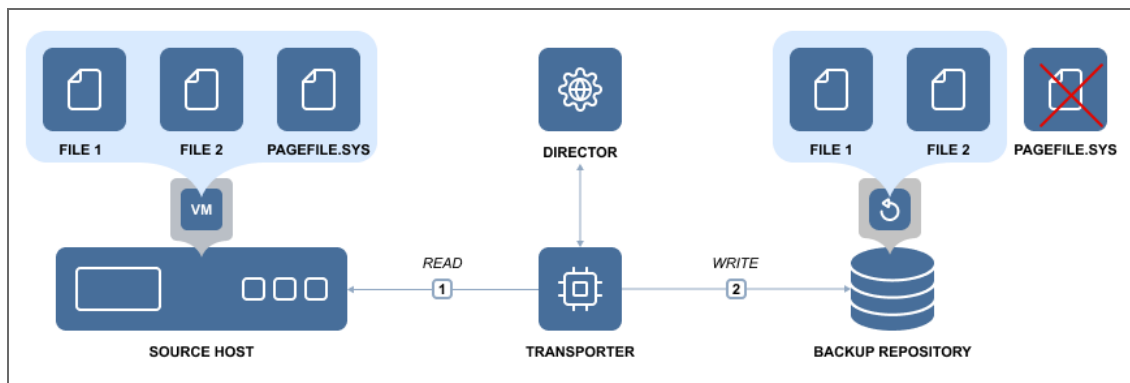
More efficient disk space utilization allows for storing more recovery points per VM backup. In addition, lower storage space requirements save money on direct storage costs (as fewer disks are needed to store the same amount of information) and on related costs (such as cooling, electricity, and maintenance).

Excluding Swap Files and Partitions

Swap files on Windows OS and swap partitions on Linux OS serve as “virtual memory” and store temporary runtime data that is not in use by RAM. Swap files and partitions improve OS performance: Once the physical memory is full, the OS can send less frequently used data to a swap file/partition and use the freed-up physical memory to perform high priority tasks. While this approach is great for OS and application performance, it has a negative effect on VM backup and replication.

The contents of the swap file change constantly, so each time you run a VM backup or VM replication, the swap file/partition is included in the backup/replica. Since the swap file can automatically grow up to 3x the size of RAM, gigabytes of unnecessary data are processed, transferred and stored each time you back up a VM. The impact of swap files and partitions on backup and replication is significant even in small environments. For example, if you run a backup for 10 VMs and each VM has just 2 GB of swap data, you will transfer and store: 10 VMs x 2 GB x 22 working days = 440 GB of useless data in one month alone.

NAKIVO Backup & Replication automatically excludes swap files and partitions in VMware VMs, Hyper-V VMs, and Amazon EC2 instances, which results in faster and smaller backups and replicas. Note that the application-aware mode instructs applications and databases running inside VMs to flush their data from memory to disk, which means that all important data will be included in your VM backups and replicas. This option can be enabled on a per-job basis.



Excluding Unused Blocks

In addition to excluding swap files and partitions, NAKIVO Backup & Replication allows you to exclude unused disk blocks during the backup or replication process. This includes the following fragments within the file system:

- Never used volume area.
- File area used by deleted files (without hard reference).

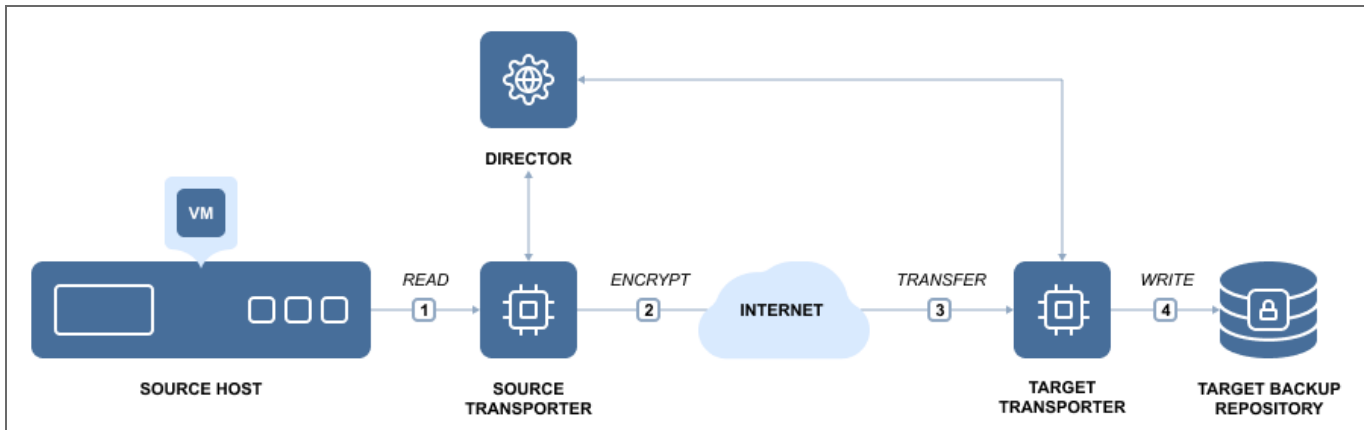
Enabling this option reduces the size of backups and replicas, ensuring that only relevant data is copied.

Excluding these blocks of data also means that less processing power and time are required for the workflow to finish.

This option can be configured on a per-job basis on the **Options** page of backup and replication jobs and is enabled by default. The feature supports processing source objects running on Windows OS. It is available for the NTFS file system.

Encryption in Flight and at Rest

VM backup encryption uses a mathematical algorithm that transforms source information into a non-readable cipher text. The goal of VM backup encryption is to make your data unintelligible to unauthorized readers and impossible to decipher when attacked. VM backups that are sent over the Internet should be encrypted before the first bit leaves your organization and travels over the WAN (backup encryption in flight). If the destination is not secure, your data should remain encrypted as well (backup encryption at rest).



NAKIVO Backup & Replication uses AES 256 encryption to protect VM backups, which is the de facto worldwide encryption standard that secures online information and transactions by financial institutions, banks, and e-commerce sites.

- [VM Backup Encryption in Flight](#)
- [VM Backup Encryption at Rest](#)

VM Backup Encryption in Flight

VM backup encryption in flight is performed by a pair of Transporters. The Transporter is a component of NAKIVO Backup & Replication that performs all data protection and recovery tasks: data read, compression, deduplication, encryption, transfer, write, verification, granular and full VM recovery, and so on.

The source Transporter for the offsite backup encrypts and sends the encrypted data. The target Transporter receives and decrypts data. For example, when you back up VMs over the WAN to an offsite location, the Transporter installed in the source site compresses and encrypts VM data before transferring it over WAN. Then, the Transporter installed in the Target site receives and unencrypts the data prior to writing it to the Backup Repository.

VM Backup Encryption at Rest

It is equally important for the data at rest to be secured by encryption. NAKIVO Backup and Replication provides you with the ability to encrypt Backup Repositories so that backup data at rest, housed in the repository itself, is secure. You can set up encryption on the Options page of the repository creation wizard. For details, refer to the following topics:

- [“Local Backup Repository” on page 472](#)
- [“Backup Repository on CIFS Share” on page 477](#)
- [“Backup Repository on NFS Share” on page 482](#)
- [“Backup Repository in Amazon EC2” on page 487](#)
- [“Backup Repository on Deduplication Appliance” on page 513](#)

External Product Database Support

With NAKIVO Backup & Replication, you can use an external database for the [Director](#) instead of the built-in database. This feature can help you avoid corruption of the built-in database, which can sometimes occur in large environments. You can migrate the existing database to a supported external database at any time. The feature is available for both the single-tenant and the multi-tenant modes of the product. For more information, refer to the following articles:

- [Database Options](#)
- [Troubleshooting External Database Connection Issues](#)

Log Truncation

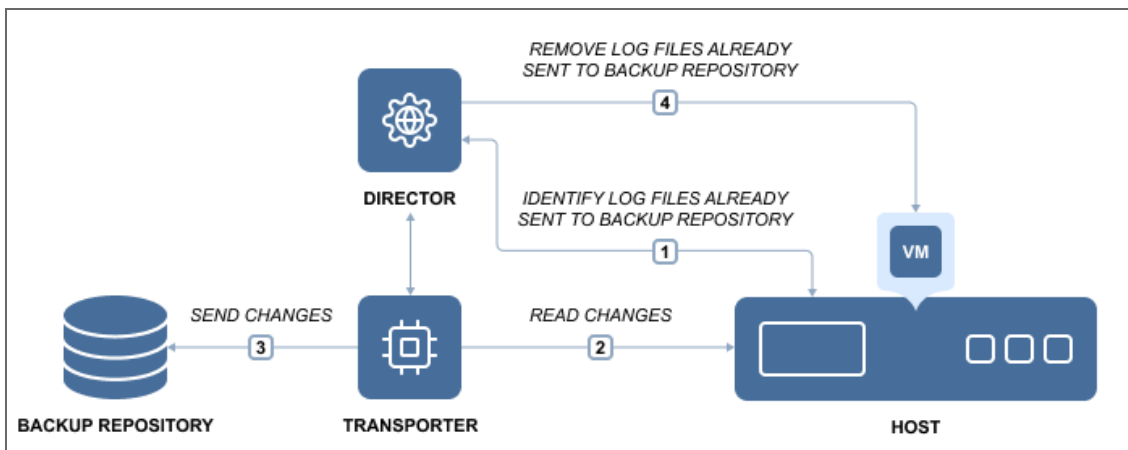
With NAKIVO Backup & Replication, you can remove (truncate) transaction log files of Microsoft Exchange and Microsoft SQL servers which will allow you to reduce the size of backups and, as a result, to optimize the use of storage space. Log truncation can be enabled on the **Options** page of backup and replication jobs.

- [Microsoft Exchange Server Log Truncation](#)
- [Microsoft SQL Server Log Truncation](#)

Microsoft Exchange Log Truncation

Microsoft Exchange is the industry's leading platform for email, calendaring, and messaging services. To protect data from undesired deletion or modification, each change that is made to a Microsoft Exchange server database is recorded in transaction logs. These logs can be replayed to recover data that was removed or changed in the database. While this approach improves data protection, it has a downside. Since the Microsoft Exchange database is constantly changing (as data is written and removed in the database), transaction logs grow over time. If not periodically removed, they will eventually fill up the disk and may crash the entire server.

NAKIVO Backup & Replication can create consistent backups of VMware and Hyper-V VMs as well as remove transaction log files of Microsoft Exchange 2013, 2016, and 2019 servers. After creating a successful backup, NAKIVO Backup & Replication connects to your Microsoft Exchange server, identifies which transaction log files have already been written to the database and removes or truncates those log files.



As a result, NAKIVO Backup & Replication creates regular, application-consistent backups of your Microsoft Exchange server and also removes the transaction log files so they don't consume all free disk space on the server.

Microsoft SQL Server Log Truncation

Any Microsoft SQL server tracks all database transactions (modifications) completed by the server and records them to the transaction logs. Transaction log files (identified with the .ldf extension) are very important, as they are used to ensure database integrity and allow restoring data by replaying the changes. However, these files grow over time and can eventually fill all the free space. This may result in the Microsoft SQL Server crash, or loss of valuable data. That is where Transaction Log Truncation might help.

On one hand, you need to keep the transaction logs, so you can recover Microsoft SQL Server data in case any data deletion, undesired modification, or corruption occurs. On the other hand, you need to remove transaction logs to save space, but without any transaction records you will be unable to successfully recover, should any unpredictable situation occur.

The best practice is to first back up the whole VMware or Hyper-V VM running Microsoft SQL Server and all log files stored therein, and then delete or truncate those files on the source VM freeing up the storage space.

NAKIVO Backup & Replication supports transaction log truncation for Microsoft SQL Server 2008 and later. The product follows the best practice of performing the log truncation process while ensuring ease of use and simplicity. NAKIVO Backup & Replication can automatically truncate transaction log files after successful VM backup and replication. All you need to do is just set it and forget it.

To free up the VM storage space, NAKIVO Backup & Replication performs the following operations:

- Backs up/replicates the entire VMware or Hyper-V VM running Microsoft SQL Server.
- After completing a successful backup/replication, identifies Microsoft SQL Server transaction log files, which were already committed to the database.
- Truncates (deletes) the committed transaction log files on the source VM, thus freeing up storage space.

Consequently, you get a VM backup/replica with all transaction log files. Even though the backed up log files can be pretty large, NAKIVO Backup & Replication easily reduces the size of the VM backup by using backup deduplication and compression features. In its turn, the original VM is left logs-free and can be recovered at a certain recovery point using the aforementioned VM backup/replica, should something go wrong.


Recovery Point Retention

After each job run, NAKIVO Backup & Replication creates a recovery point for each VM, object, instance, machine, or account in a Backup Repository. A recovery point represents the backup of the respective source as of a particular moment in time and allows you to recover individual files, application objects, or the entire VM/object/instance/machine/account from the Backup Repository.

Legacy Retention Approach

With the legacy retention method, NAKIVO Backup & Replication offers Grand-Father-Son (GFS) retention. This method allows you to save storage space while retaining the recovery points for any period that you need with the following options:

- Retain a specified number of last recovery points: after the specified number of recovery points in the backup repository is exceeded, the oldest recovery point is deleted.
- Retain one recovery point for a specified period of time: one recovery point is stored for the specified period of time, after which this recovery point is deleted.
- Make new recovery points immutable: this option sets an immutability flag on new recovery points, preventing their deletion or modification for a specified period of time.

1. Source	2. Destination	3. Schedule	4. Retention	5. Options
<div>Retention Settings</div> <div><input checked="" type="checkbox"/> Keep <input type="text" value="10"/> last recovery points</div> <div><input checked="" type="checkbox"/> Keep one recovery point per day for <input type="text" value="10"/> days</div> <div><input checked="" type="checkbox"/> Keep one recovery point per week for <input type="text" value="4"/> weeks</div> <div><input type="checkbox"/> Keep one recovery point per month for <input type="text" value="12"/> months</div> <div><input type="checkbox"/> Keep one recovery point per year for <input type="text" value="3"/> years</div> <div>Learn more</div> <div>Immutability</div> <div><input checked="" type="checkbox"/> Make new recovery points immutable for <input type="text" value="2"/> days </div>				

Schedule Retention Approach

With the schedule retention method, NAKIVO Backup & Replication allows you to set retention settings directly in the scheduling step of the job creation/editing process. This method allows you to set multiple schedules at chosen intervals for one job. These schedules can each be configured with their own retention settings with the “**Keep backups for**” option. This method is available for all backup and backup copy jobs with the exception of Oracle database backups.

☐ Do not schedule, run on demand

☒ Prioritize schedules [i](#)

(UTC+02:00, EET) Eastern European Time

Schedule #1

Name:

Type:

Repeat Every week

Days ☒ MO ☒ TU ☒ WE ☒ TH ☒ FR ☐ SA ☐ SU

[All days](#) [Work days](#) [Weekends](#)

Start at: ☐ end at:

☐ Effective from

Keep backups for days [i](#)

☐ Immutable for days [i](#)

[Add another schedule](#)

[Show calendar](#)

With schedule retention settings, you can set up a clear recovery point retention policy for each job schedule and time interval. For example, if you set one job schedule to **“Keep backups for: 3 days”** and the job runs every weekday at noon, then a recovery point created with this schedule on a Monday will expire at noon on that Thursday. To ensure timely removal, NAKIVO Backup & Replication performs hourly status checks of all recovery points and deletes those that have expired.

Note

Recovery points created with or migrated to the scheduler retention scheme are given expiration dates.

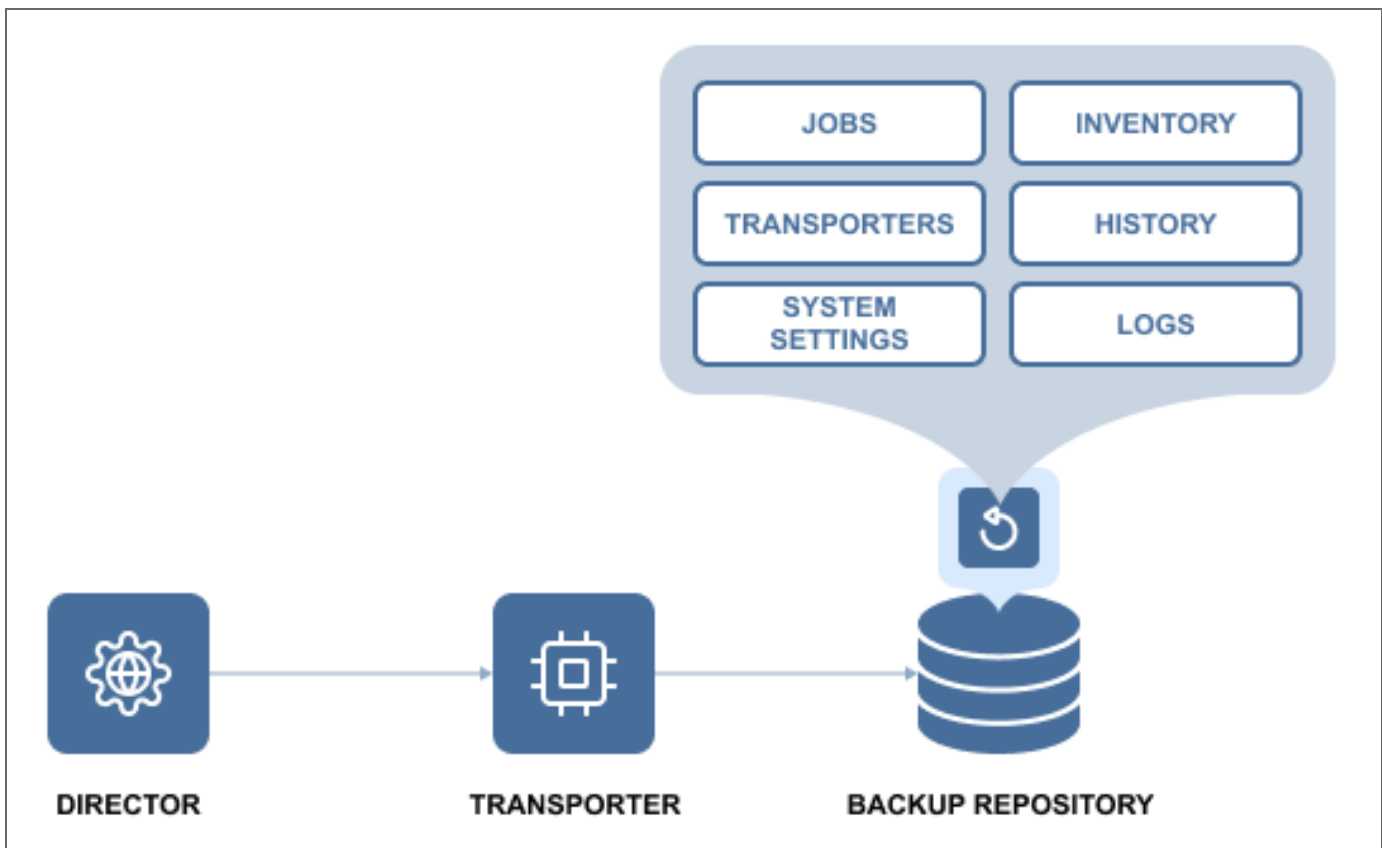
- To view the expiration dates and other details of recovery points created with this approach, refer to [“Viewing Backup Repository Details” on page 541](#).
- To learn more about how expiration dates are assigned to recovery points, refer to [this article in the Knowledge Base](#).

Self-Backup Feature

The Self-Backup feature provides automated protection of everything you have configured in NAKIVO Backup & Replication.

A truly complete data protection solution needs to back up not only your VMs, but also itself. There are good reasons for that. For example, the VM running the product may become corrupted, struck by a virus attack, or accidentally deleted. Regardless of the cause, you will need to restore the disrupted product as quickly as possible. Fortunately, a new instance of NAKIVO Backup & Replication can be installed in less than one minute. However, you will still need to restore the product configuration (such as jobs). Also, you do not want to lose the backup history. To save you time, NAKIVO Backup & Replication automatically backs up the entire configuration, including all jobs, inventory, information about connected Transporters, Backup Repositories and other.

The Self-Backup feature is enabled by default, and NAKIVO Backup & Replication sends daily self-backups to the first five backup repositories available in the product. Each self-backup is kept for five days, by default. Should you like to, you can fine-tune the backup targets, schedule, and retention policy.



If you accidentally make some undesired changes in the product, you can easily roll back to a previous system state from the backup. Migrating the system configuration to a new product instance is simple: just install a new copy of NAKIVO Backup & Replication, import a Backup Repository that contains a self-backup, and select a recovery point. The previous product configuration is restored along with all settings.

The Self-Backup feature saves you time and brings you peace of mind, ensuring reliable protection of everything you configure in NAKIVO Backup & Replication.

For information on the Self-Backup configuration, refer to [“Self-Backup” on page 352](#).

Two-Factor Authentication

NAKIVO Backup & Replication allows you to add an additional layer of security with two-factor authentication (2FA). By enabling 2FA, you add another step to the user login process to prevent malicious access to the solution and the organization’s backup data. User authentication requires entering a code generated in one of the following ways:

- A code generated by the Google Authenticator mobile app
- A code sent to the specified email address
- One of the single-use backup codes

You can find more information in the following articles:

- [“Configuring Two-Factor Authentication” on page 373](#)
- [“Logging in to NAKIVO Backup & Replication” on page 269](#)

VM Verification

VM verification is a process of checking the integrity of a backup or replica by booting a VM from a backup or starting a replica and interacting with it. With the VM verification feature, you have proof that your VM backups or replicas are usable, and can rest assured that your VMs can be recovered in case of disaster. VM backups and replicas can be corrupted or not bootable, even if the data protection software performed properly. The worst time to find out that your backup is bad is when your VM is down. If you don't have backup copies or VM replicas at an offsite location, you are left without any viable means of quickly restoring business processes.

VM verification involves the following entities:

- **Source Object:** Backup recovery point or replica recovery point which is used as a source of data for VM verification.
- **Target Object:** An entity that is subject to VM verification. It can be a replica or a temporary VM created via [Flash VM Boot](#).
- **Guest OS Agent:** An entity in the target object which allows remote interaction with the guest OS of this object (VMware Tools for VMware vSphere; Hyper-V integration services for Microsoft Hyper-V). Guest OS agent is required to be installed on the target object in order to perform VM verification.

There are two VM verification methods:

- **Boot Verification:** Verifying the target VM via starting target VM and checking whether hypervisor tools are running.
- **Screenshot Verification:** Verifying the target VM via starting the target VM and taking a screenshot of the VM screen.

To verify VMware and Hyper-V backups, NAKIVO Backup & Replication relies on the Flash VM Boot feature. After a VM backup job has completed the data transfer, the product performs the following actions:

1. Instantly runs the VM from the newly created backup (with networking turned off).
2. Waits until the OS has booted.
3. Checks if guest OS agents are run successfully (if Boot Verification is selected).
4. Makes a screenshot of a running VM (If Screenshot Verification is selected).
5. Discards the test-recovered VM.

You can view the results of the verification procedure in the Dashboard or choose to receive an email report. VM verification, being an option for the jobs listed below, can be run on demand or scheduled to run automatically, saving you time and effort. VM verification option is available for the following jobs:

- [Hyper-V VM Backup Job](#)
- [Hyper-V VM Replication Job](#)
- [Hyper-V Flash VM Boot Job](#)
- [Backup Copy Job](#)

Performance

A backup process can handle a huge amount of data, thus it is imperative to ensure that the data flow is efficient, and every resource used in the backup process is optimized. NAKIVO Backup & Replication provides the following techniques to increase performance:

- [“Advanced Bandwidth Throttling” on page 54](#)
- [“Deduplication Appliance Support” on page 61](#)
- [“Full Synthetic Data Storage” on page 63](#)
- [“Incremental Jobs” on page 65](#)
- [“Jobs and Concurrent Tasks” on page 66](#)
- [“Network Acceleration” on page 67](#)

Advanced Bandwidth Throttling

NAKIVO Backup & Replication was designed to transfer data at the maximum available speeds for the purposes of completing VM backup, replication, and recovery jobs as quickly as possible. However, if you run data protection jobs during business hours, your LAN or WAN networks risk being overloaded. This can affect the performance of applications and degrade user experience (think of email messages taking too long to be sent, excessive load times for websites, etc.). NAKIVO Backup & Replication addresses this issue with the flexible Advanced Bandwidth Throttling feature. With Advanced Bandwidth Throttling, you can set limits for your data protection jobs and make sure they don't take more bandwidth than you can afford to allocate.

Advanced Bandwidth Throttling allows you to set global rules that limit the data transfer speeds of your backup processes. Such rules can apply to different jobs and on different schedules. For instance, you can create a global rule preventing your backup jobs from consuming more than 50 MByte/s during business hours, but leave the bandwidth unrestricted for Sunday backups. You can also create bandwidth throttling rules on a per-job basis, if you want to have more granular control over the whole process. Individual limits override global rules, sparing you the need to adjust the global rule for every job.

The Advanced Bandwidth Throttling feature of NAKIVO Backup & Replication is an effective means of optimizing backup operations and controlling your network traffic. With global and individual limits on data transfer speeds, the feature can help you ensure the performance of your business applications is never affected by backup workloads – even if you have little bandwidth to spare. With bandwidth rules, usage of LAN/WAN bandwidth by NAKIVO Backup & Replication jobs may be restricted to a specific amount. For more information, refer to the following sections:

- [About Bandwidth Rules](#)
- [Distributing Bandwidth Between Tasks](#)

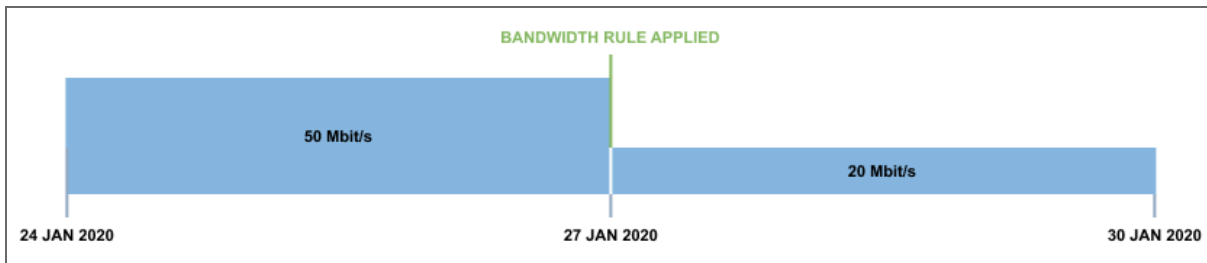
About Bandwidth Rules

A bandwidth rule specifies the bandwidth amount that can be used by one job, by multiple jobs, or by all applicable jobs.

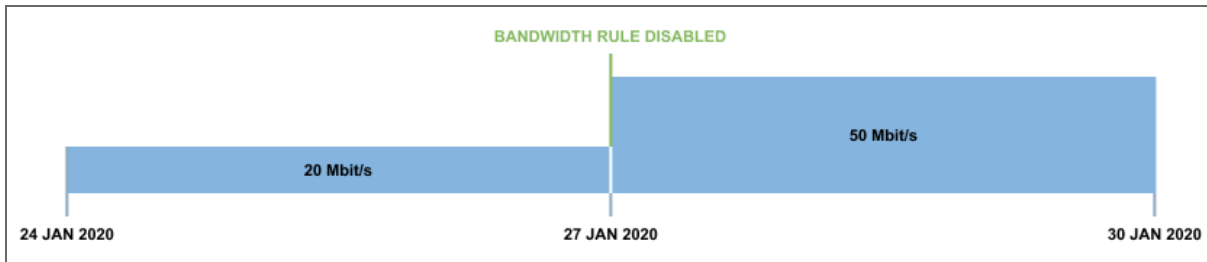
A bandwidth rule can be:

- **Global Rule** – a bandwidth rule applied to all applicable Jobs.
- **Per Job Rule** – a bandwidth rule only applied to specific Jobs.

Per Job rules have higher priority than **Global Rules**. A per job rule will be applied to the job when both the per job rule and a global rule are active for the same job. In case multiple per job rules are active for the same job, the bandwidth rule with the lowest bandwidth amount will be applied. In case there are multiple global rules – and no per job bandwidth rules, – the global rule with the lowest bandwidth amount will be applied. When a NAKIVO Backup & Replication job is running and a bandwidth rule is applied to this job, the job will get bandwidth amount that is allowed by the bandwidth rule (for example 10 Mbit/s).



When a NAKIVO Backup & Replication job is running with a bandwidth rule applied and the bandwidth rule becomes disabled for this job – and there are no other bandwidth rules applied to the job,– the job will get unlimited bandwidth.



Bandwidth rules may be always active, active on schedule, or disabled. Refer to [“Bandwidth Throttling” on page 331](#) for details.

When a job containing multiple VMs starts running with a bandwidth rule active, the rule divides bandwidth between tasks. Incremental backup tasks receive significantly less bandwidth than full backup tasks; this ensures that no tasks receive too little bandwidth to be processed in a reasonable time. When the Transporter is ready and there is enough unallocated bandwidth, the tasks start to be processed. Any change to the bandwidth amount will only be applied to the tasks not yet started for processing. Once started for processing, the tasks do not change the consumed bandwidth amount. It means there will be no dynamic change in the bandwidth amount for the tasks already being processed.

Bandwidth rules are applicable to the following types of NAKIVO Backup & Replication jobs:

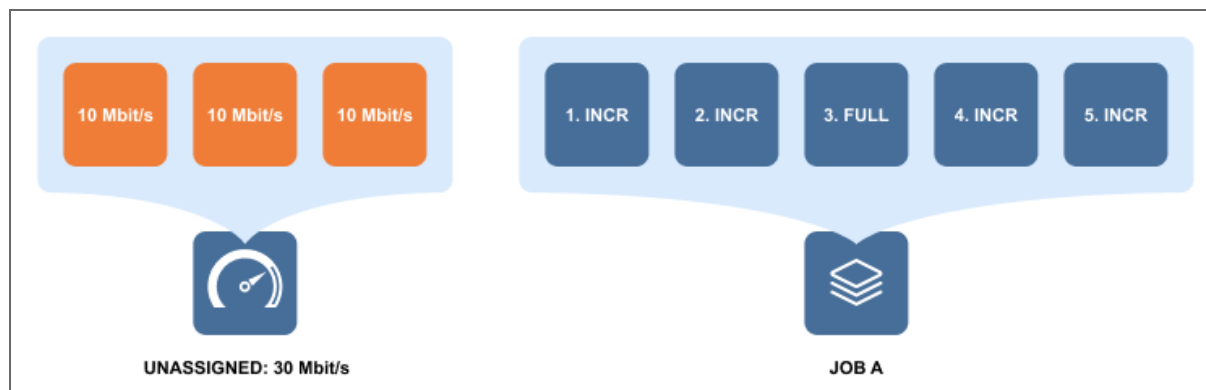
- Backup Job (except for Microsoft 365)
- Backup Copy Job
- Replication Job (except for Amazon EC2)
- Recovery Job
- Replica Failback (except for Amazon EC2)

Distributing Bandwidth Between Tasks

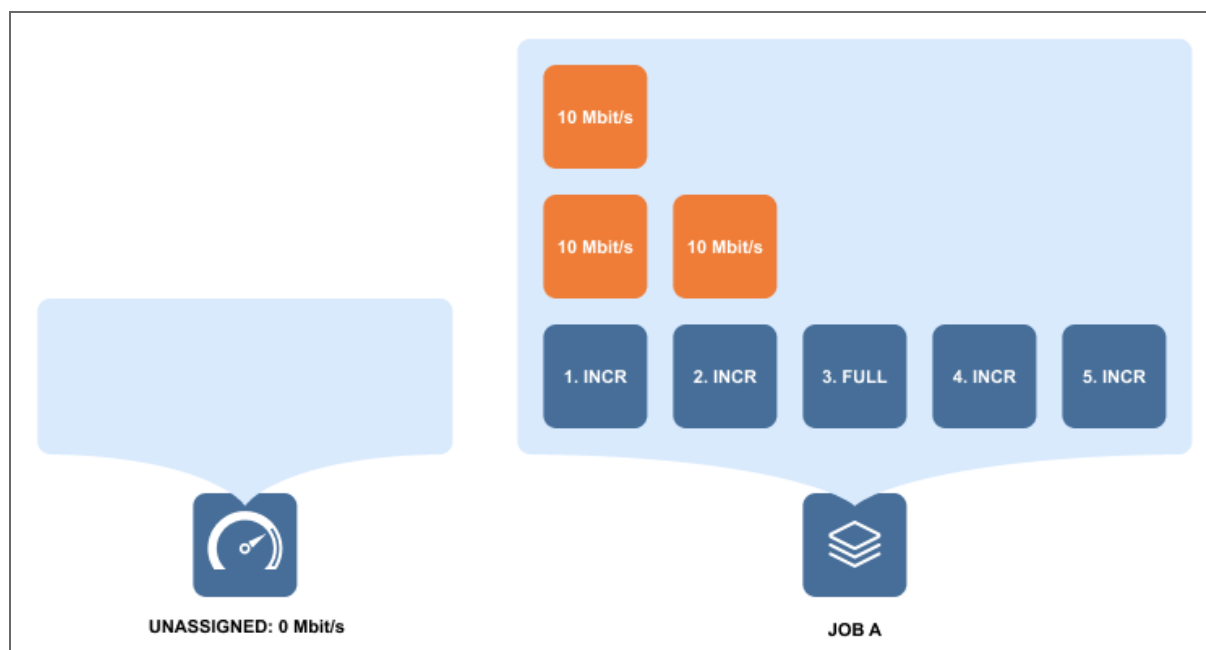
To illustrate distribution of bandwidth between tasks, one can take a backup job – Job A,– of 5 VMs; the 3rd VM backup is a full backup and the rest are incremental backups.

Job A starts running with the 30 Mbit/s bandwidth rule activated as follows:

1. The bandwidth amount is split into 3 chunks 10 Mbit/s each.



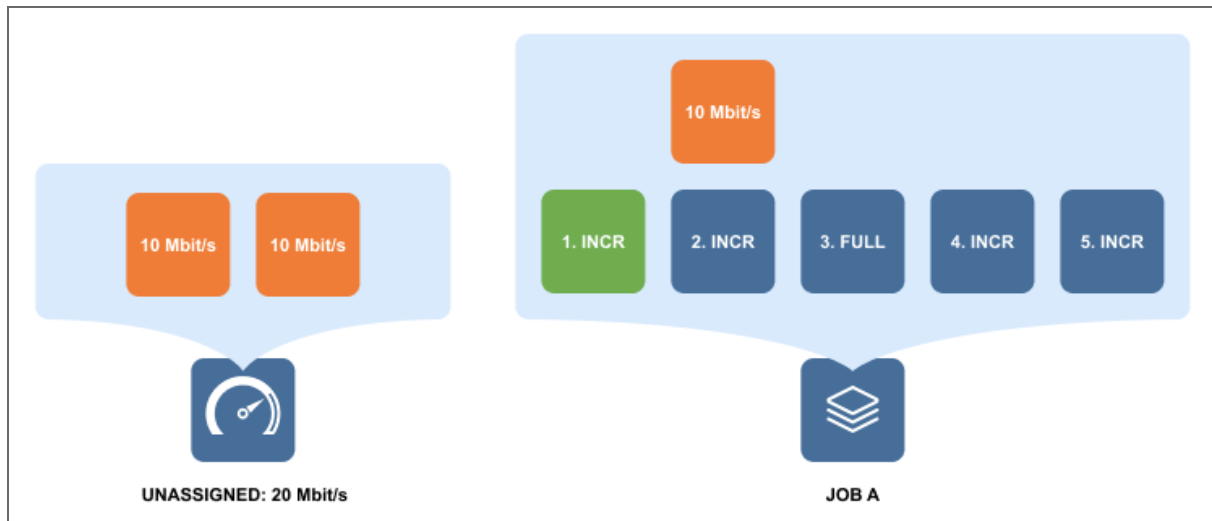
2. VM 1 and VM 2 backups receive 10 Mbit/s each. One bandwidth chunk remains unassigned since the full backup usually requires all the bandwidth to start.
3. The remaining bandwidth is distributed from the start of the queue, so VM 1 backup receives additional 10 Mbit/s.
4. VM 1 backup and VM 2 backup start running.



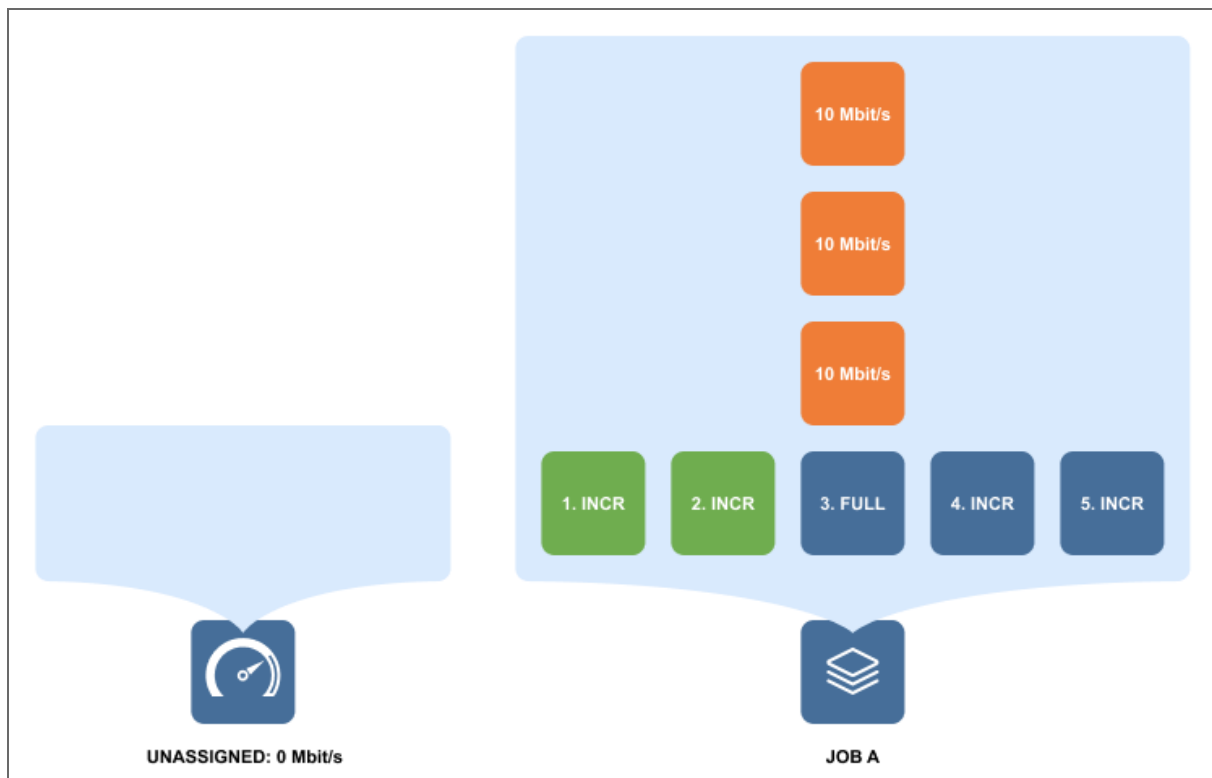
Note

The Transporter can process a [limited number](#) of concurrent tasks.

5. When VM 1 backup finishes execution, it frees two bandwidth chunks 10 Mbit/s each. However, VM 3 full backup still cannot start because it requires all the available bandwidth to start running. Hence, these two bandwidth chunks are left idle.

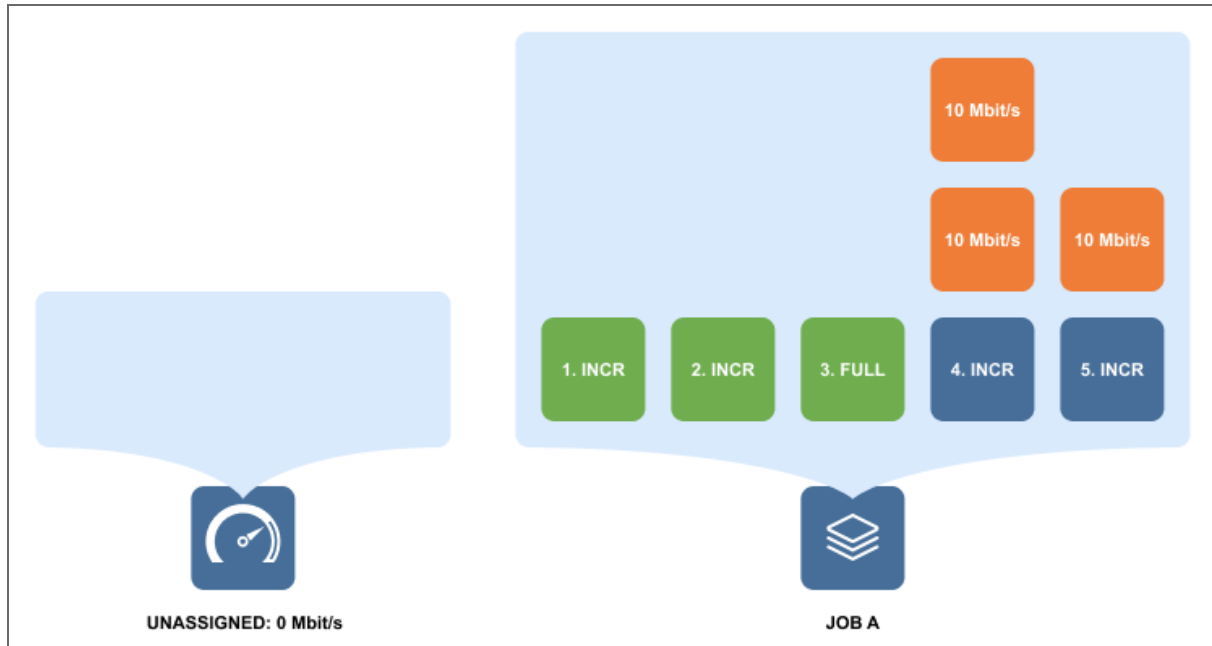


6. When VM 2 backup finishes running, it frees another bandwidth chunk, and full backup of VM 3 starts running with all the bandwidth assigned.



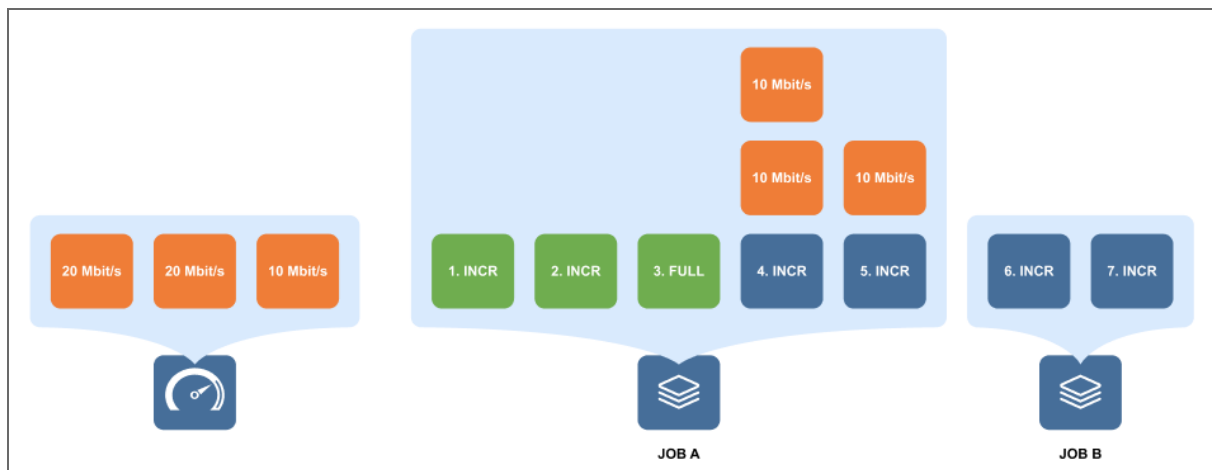
7. When full backup of VM 3 is finished, three bandwidth chunks are now available for the two remaining VM backups.

8. VM 4 backup receives the 20 Mbit/s bandwidth in total and VM 5 backup receives a 10 Mbit/s bandwidth chunk.

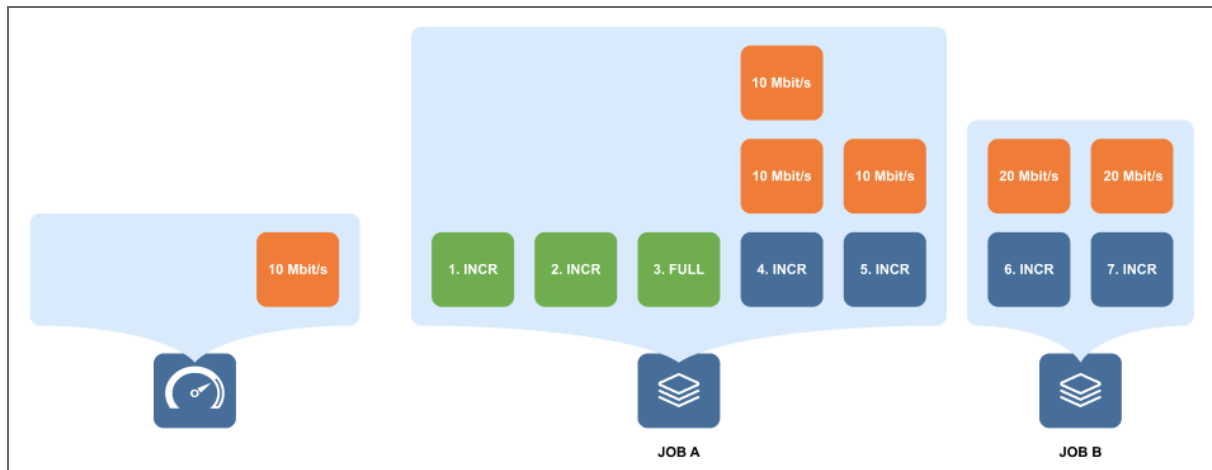


When the rule changes the bandwidth to 80 Mbit/s and is also activated for another Job B consisting of two VM incremental backups, the Transporter starts distributing bandwidth as follows:

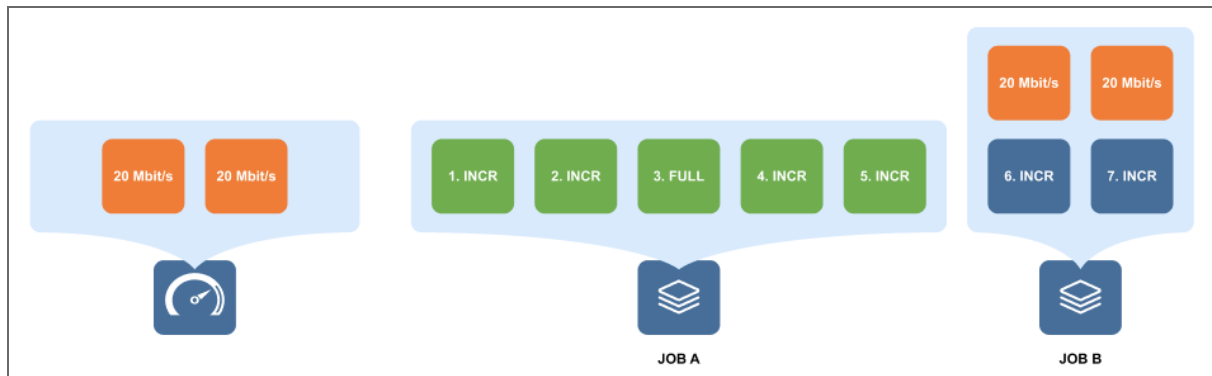
1. The 80 Mbit/s amount is split into 4 chunks of 20 Mbit/s.



2. VM 6 backup and VM 7 backup of Job B receive a 20 Mbit/s bandwidth chunk each and start running, with 10 Mbit/s remaining unassigned.

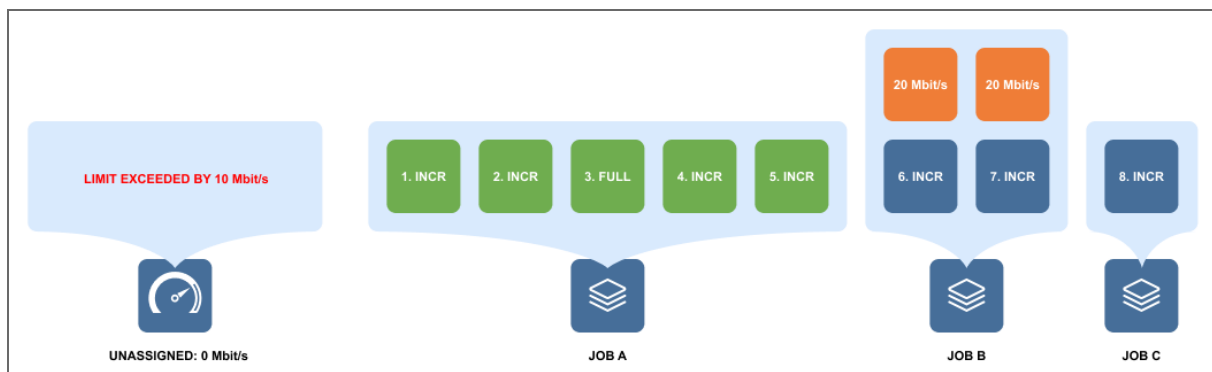


- When VM 4 backup and VM 5 backup of Job A are finished, two 20 Mbit/s bandwidth chunks are freed. However there are no queued tasks to assign them to, so the bandwidth is left idle.



When the bandwidth rule changes the bandwidth amount back to 30 Mbit/s and is also activated for another Job C consisting of one VM incremental backup, the Transporter starts distributing bandwidth as follows:

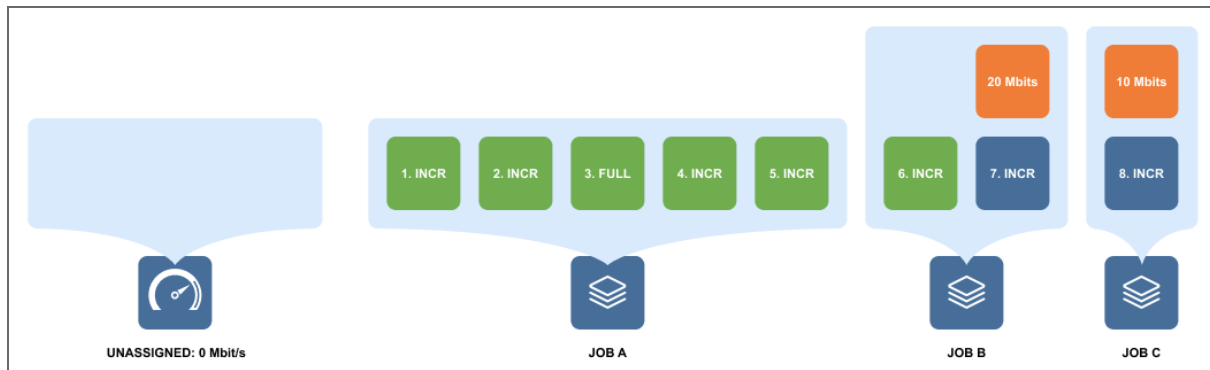
- The 30 Mbit/s amount is split into three chunks of 10 Mbit/s.
- The currently running tasks occupy 40 Mbit/s of bandwidth, which is three 10 Mbit/s bandwidth chunks and one 10 Mbit/s bandwidth chunk over the limit. Therefore, there is no free bandwidth for VM 8 backup of Job C to use.



Note

Jobs and tasks may wait for a long time until bandwidth is available for them to start.

3. When VM 6 backup is finished, freeing up 20 Mbit/s of bandwidth, of which 10 Mbit/s was exceeding the 30 Mbit/s limit, VM 8 backup of Job C starts executing using another 10 Mbit/s bandwidth chunk.



Deduplication Appliance Support

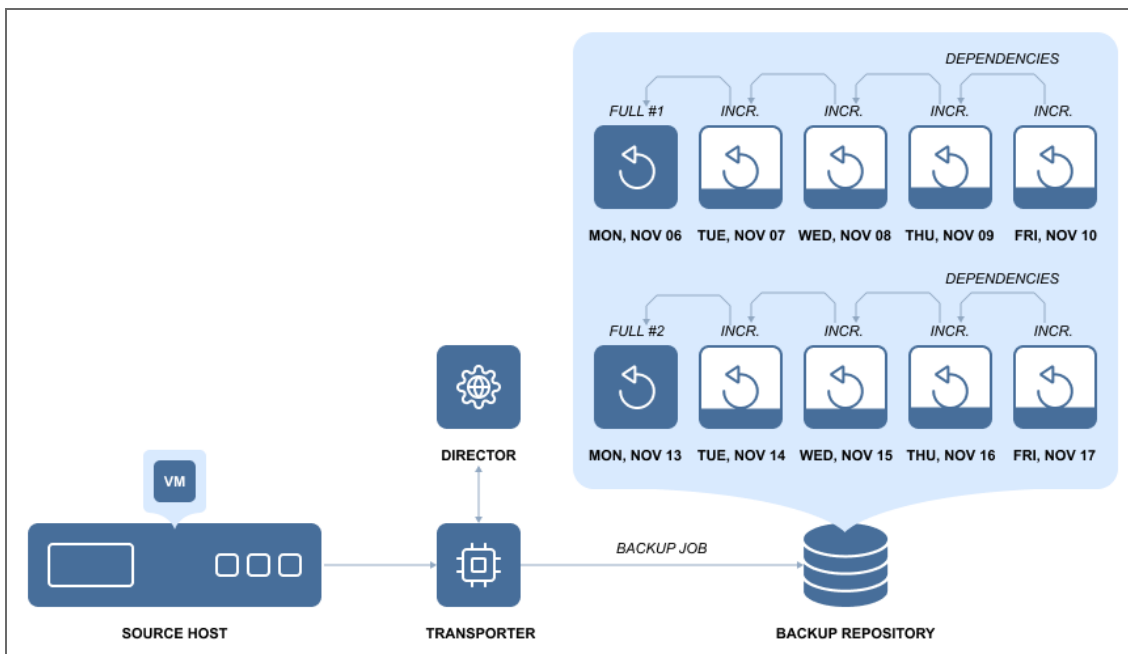
Deduplication appliances are solutions that implement specialized data reduction techniques to eliminate duplicate copies of repeated data. Deduplication appliances are leveraged across a range of data protection solutions, regardless of whether network-attached storage, disk, and/or tape is used. The biggest advantage of deduplication appliances is their ability to reduce datastore space used – sometimes by ratios of 20:1 or more.

NAKIVO Backup & Replication supports integration with deduplication appliances. For details, refer to the following sections:

- [NAKIVO Optimization for Deduplication Appliances](#)
- [Deduplication Appliance Configuration Details](#)

NAKIVO Optimization for Deduplication Appliances

NAKIVO Backup & Replication provides a special type of Backup Repository (stream repository) optimized for high performance with deduplication appliances. With this type of Backup Repository, NAKIVO Backup & Replication supports virtually any type of deduplication appliance as a primary or a secondary backup destination. The architecture of such Backup Repository is based on sequential block write operations through a restricted number of data streams and storing backup blocks in dedicated data files. Data blocks are stored in incremental backup files and full backup files. This means that the repository stores VM backup chains consisting of periodic full backups and several increments between these full backups.



In terms of integration with deduplication appliances, a stream repository:

- Creates fewer data streams in read/write operations during VM backup and recovery.
- Does not leverage the global data deduplication feature of NAKIVO Backup & Replication.

Deduplication Appliance Configuration Details

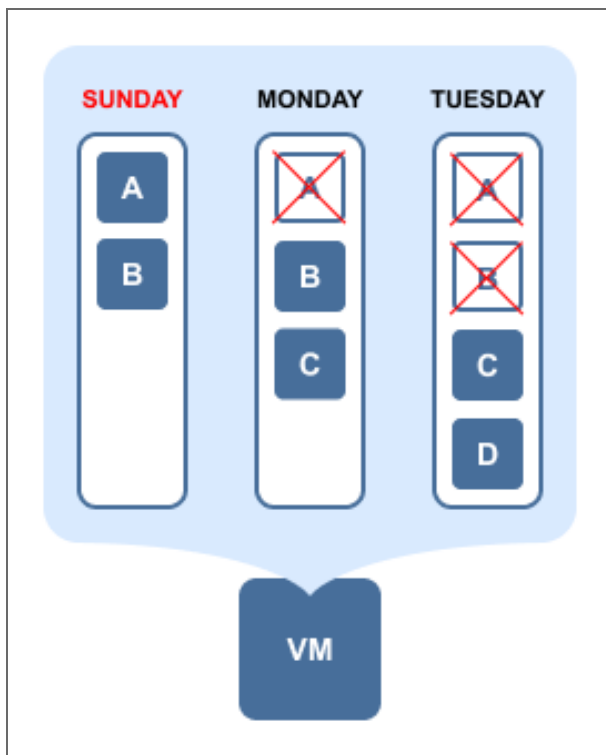
When a Backup Repository is [created](#) on a deduplication appliance, NAKIVO's built-in data deduplication functionality is disabled. Additionally, the incremental-with-full-backups option is enabled by default. This configuration ensures that no extra resources are spent for double deduplication and [reclaiming repository space](#) is not required.

Full Synthetic Data Storage

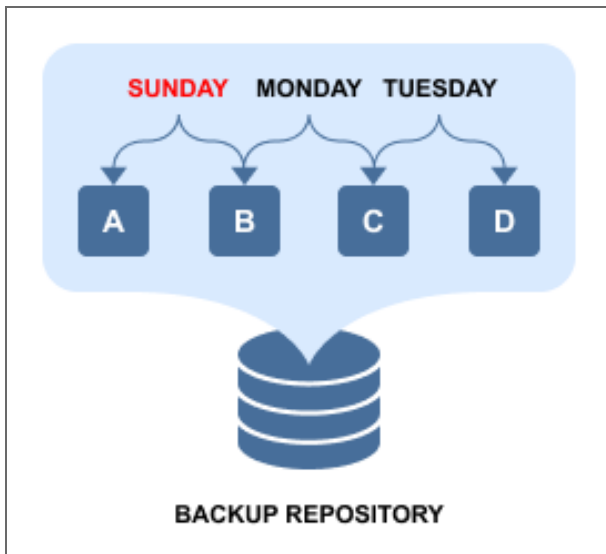
With **forever incremental** (**Store backups in separate files** option is not selected) Backup Repositories, NAKIVO Backup & Replication uses the full synthetic mode to store backups: all unique data blocks are stored in a single pool, while recovery points serve as references to the data blocks that are required to reconstruct a machine at a particular moment in time.

Example

You run the first backup of a VM on Sunday. For the sake of simplicity, let's say that the VM consists only of 2 data blocks: A and B. Then on Monday, you run an incremental backup, which finds that the block A has been deleted, but a new block C has been added. Then on Tuesday, the incremental backup finds that the block B has been deleted and a new block D has been added. Here's how the VM would look like during the three days:



And here's how the data will be stored in the **forever incremental** (**Store backups in separate files** option is not selected) **Backup Repository** if the job is set to keep 3 or more recovery points:



As you can see from above, each unique data block is stored only once to save space, while recovery points are just references to data blocks that are required to reconstruct the VM as of a particular moment in time. If, for example, you delete Monday's recovery point, then no actual data removal will occur, as its data blocks (B and C) are required for recovery points of Sunday and Tuesday. If, on the other hand, you change the recovery point retention policy to keep only the last two recovery points (Mon and Tues in our case), then only block A will be deleted, as it's not being used anywhere else.

The full synthetic data storage approach provides a number of benefits:

- **Smaller backups:** Unique data blocks are stored only once and can be referenced by multiple recovery points, as opposed to storing the same data again in different increments.
- **Faster backups:** There is no need to run full backups periodically or transform legacy increments into virtual full backups, as each recovery point already "knows" which data blocks should be used to reconstruct an entire machine.
- **Safer backups:** With a legacy incremental backup approach, losing one increment in a chain means losing the entire chain of recovery points after that increment. With NAKIVO Backup & Replication losing a data block or an increment (such as A or B in the example above) can still leave you with recoverable increments.
- **Faster recovery:** A legacy incremental backup consists of a chain of increments that you must apply one by one in order to get to a particular machine state. With NAKIVO Backup & Replication, each recovery point already "knows" which data blocks should be used to reconstruct an entire machine.

Incremental Jobs

NAKIVO Backup & Replication allows you to create incremental backup and replication jobs. For more information refer to:

- [Backup Jobs](#)
- [Replication Jobs](#)

Backup Jobs

- When a **forever incremental (Store backups in separate files)** option is not selected) Backup Repository is utilized as a destination, the full backup will be performed only on the first backup job run. All consequent job runs will send only changed data (increments) to the Backup Repository. This approach reduces backup time and network load. For example, if NAKIVO Backup & Replication determines that the amount of data that has been changed on a 100 GB VM is just 1 MB, only 1 MB of data will be transferred to the Backup Repository, but the created recovery point will reference all data blocks (from previous job runs) which are required to restore the entire 100 GB VM. With this approach, each recovery point "knows" all data blocks that are needed for recovery, so there is no need to apply increments one by one to get to a particular point or periodically transform backed up data blocks.
- When an **incremental with full backups (Store backups in separate files)** option is selected) Backup Repository is utilized as a destination, NAKIVO Backup & Replication performs a full backup on the first backup job run. Consequently, NAKIVO Backup & Replication runs incremental backups and periodically creates full backups according to the specified settings. Every VM backed up to said Backup Repository will produce full backup files and incremental backup files.

Replication Jobs

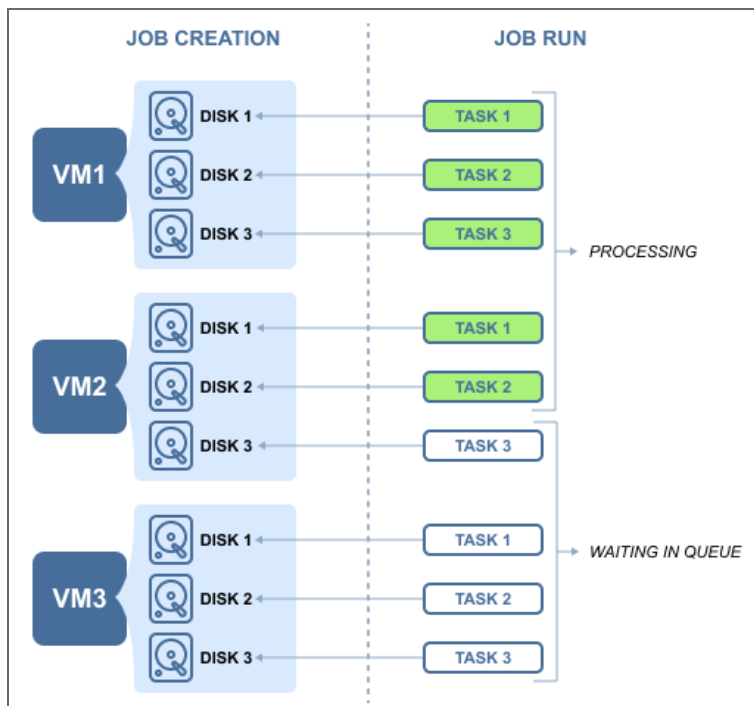
Replication jobs in NAKIVO Backup & Replication are forever incremental. This means that after the initial full replication, all subsequent job runs will send only changed data (increments) to the replica. This approach reduces the replication time and network load. For example, if NAKIVO Backup & Replication determines that the amount of changed data on a 100 GB VM constitutes just 1 MB, only 1 MB of data will be transferred to the replica VM.

Jobs and Concurrent Tasks

Job is a data protection activity that is performed by NAKIVO Backup & Replication in accordance with a distinct configuration. These are the main types of NAKIVO Backup & Replication jobs:

- Backup jobs
- Replication jobs
- Recovery Jobs

In NAKIVO Backup & Replication, a job can have one or more job objects to process. Depending on your preferences, job objects may be reordered for processing within a job. See the example below.



Each job object may consist of one or more machine disks, Oracle databases, Exchange Online mailboxes, OneDrive for Business instances or SharePoint Online sites that have to be processed within a job run. Data processing that is related to a specific VM disk or service constitutes a single task, in the scope of the corresponding job. Such tasks are processed by a [Transporter](#). For the sake of managing the load over the infrastructure, any Transporter is configured to process a limited number of concurrent tasks. When a task is processed, the Transporter starts processing another task if available. A task can be one disk, file or recovery session, Oracle database, Exchange Online mailbox, OneDrive instance, or a SharePoint Online site. By default, NAKIVO Backup & Replication is set to process 6 concurrent tasks per one Transporter. Refer to [“Editing Nodes” on page 457](#) to learn how to change the Transporter maximum load.

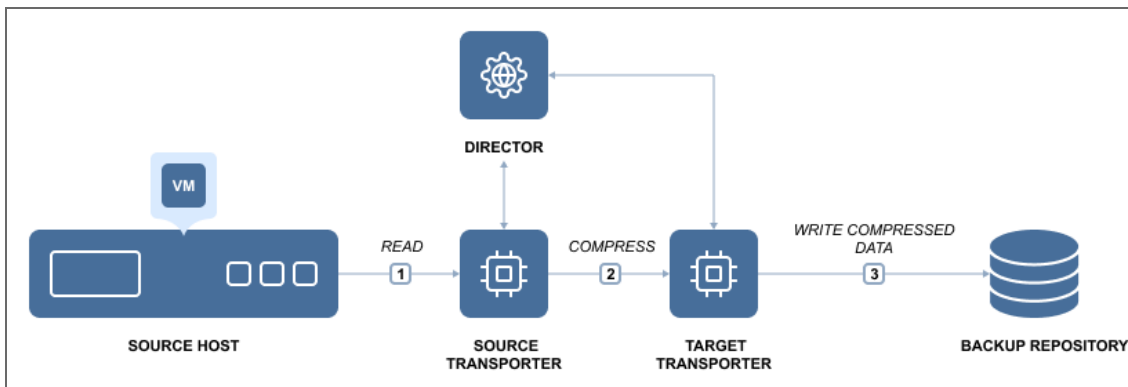
Network Acceleration

Whether you run VM backup and replication jobs during business hours or send VM backups and replicas offsite over the Internet, saving network bandwidth is of the essence. NAKIVO Backup & Replication provides the Network Acceleration feature to speed up VM backup and replication jobs, shorten backup windows, and reduce network load at the same time. With network acceleration enabled, you can increase VM backup, replication, and recovery speed by 2X in WAN and busy LAN networks.

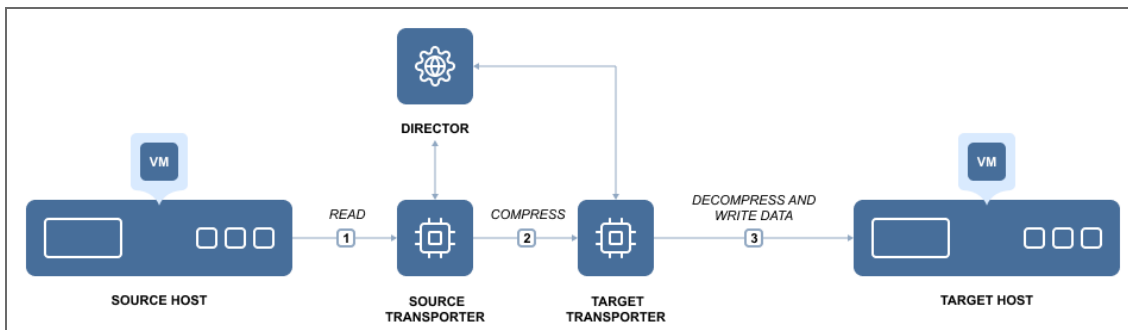
Network acceleration is achieved by the use of two instances of [Transporter](#). Transporter is the product component that performs all data protection and recovery tasks, such as backup, replication, recovery, encryption, and so on. To simplify deployment and configuration, one instance of Transporter is automatically installed with NAKIVO Backup & Replication.

To enable Network Acceleration, you just need to [install another Transporter](#) instance locally or offsite and then enable Network acceleration in your job. When the job is executed, the source Transporter will read the data, compress and optimize it, and then send the data to the target Transporter. By using Network Acceleration, you can reduce the amount of data that is transferred over the network, which also means that your jobs will complete faster.

Network Acceleration for Backup



Network Acceleration for Replication



Administration

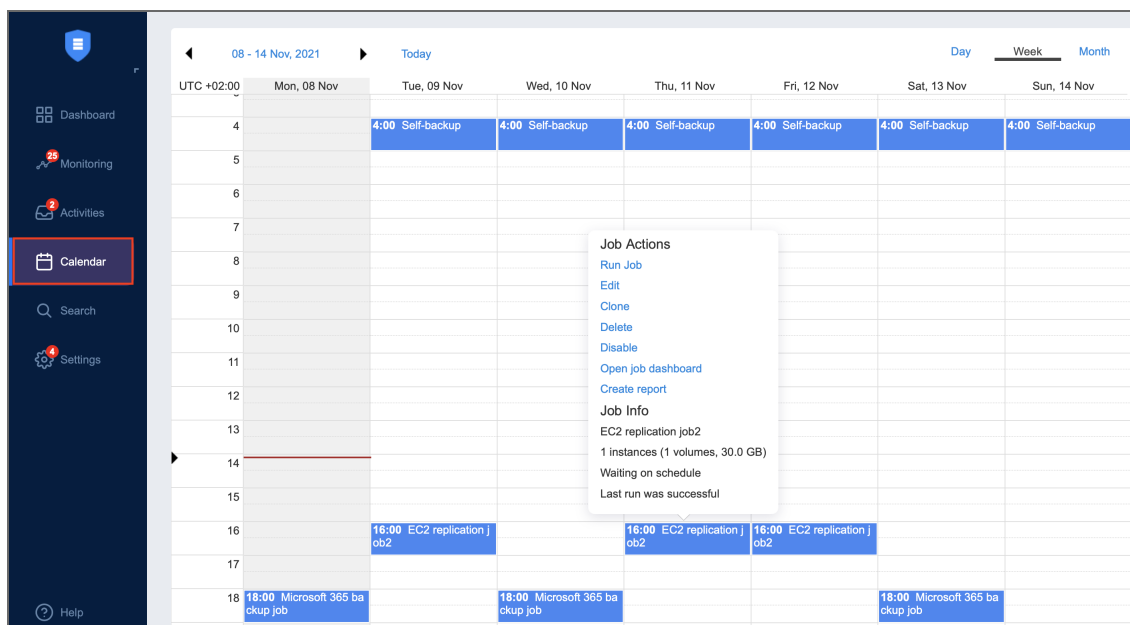
NAKIVO Backup & Replication strives to make the user experience as intuitive and easy-to-use as possible, and provides users with the following features:

- [“Calendar” on page 69](#)
- [“Global Search” on page 70](#)
- [“Policy-Based Data Protection” on page 71](#)

Calendar

Backing up VMs is a resource-intensive process, which places extra load on your infrastructure, be it VMware, Hyper-V, or AWS. This is particularly noticeable when it comes to large environments with thousands of VMs. Too many backup jobs running concurrently on the same host or on the same network may affect the performance of your virtual environment and slow down your VMs. To reduce the load on your resources, you need to carefully schedule and structure your backup jobs, to ensure the shortest backup windows possible.

Scheduling data protection jobs may be tricky in large virtual environments, where you need to fit multiple jobs into a backup window and avoid possible overlaps. To resolve this issue, NAKIVO Backup & Replication features the Calendar dashboard, which is aimed at greatly improving job scheduling. The Calendar dashboard displays all your jobs in the calendar view, the time it took different jobs to run in the past, and the predicted job duration in the future. Here you can get a bird's eye view of all your jobs, and you can easily find open time slots for new jobs, which you can create right in the dashboard. You can also visit past jobs to view the status and details of the jobs that have been completed and drill down to their details. The Calendar dashboard has an intuitive interface and navigation, similar to those of the most popular calendar applications.



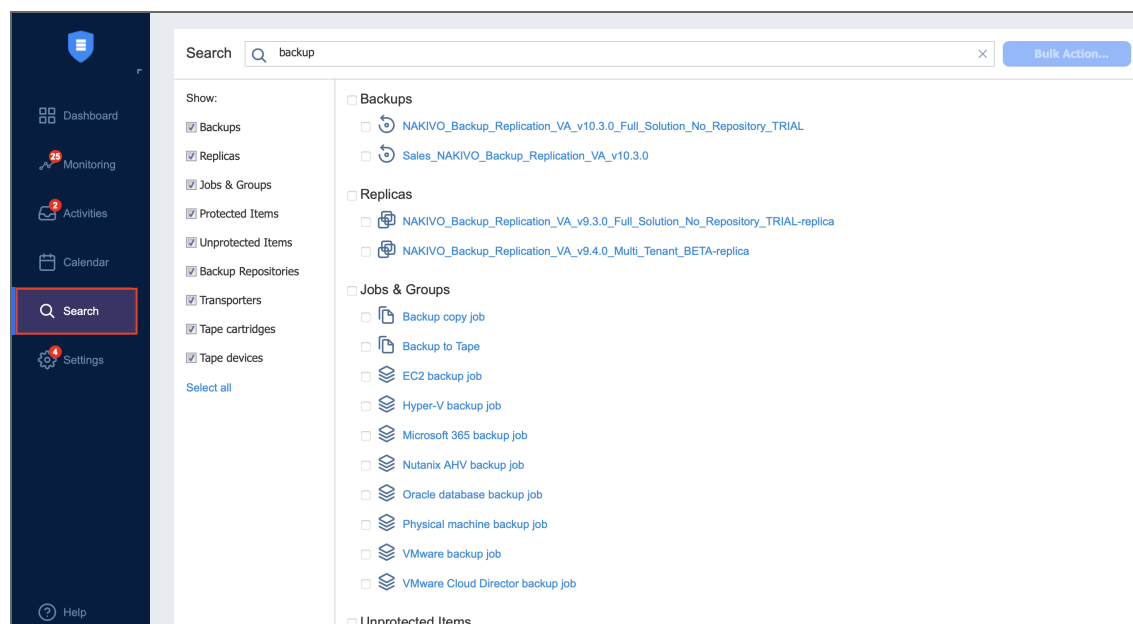
Global Search

NAKIVO Backup & Replication includes the powerful global search feature that allows you to find any item quickly by entering the name of the item (or part of the name) into the search box. You can refine the search results by using filters (for example, choose to view only VM backups). In addition, you can select items in the search results and instantly perform mass actions on them, such as creating a new job for unprotected VMs or adding items to an existing job. The ability to perform such actions simplifies the management of your backup infrastructure.

With the global search feature, you can:

- **Search:** Instantly search for VMs, backups, replicas, jobs, groups, Backup Repositories, Transporters, tape cartridges, and tape devices.
- **Filter:** Choose to view a subset of results – for example, unprotected VMs only.
- **Get information:** View item details, such as size, host, datastores, networks, and protection status.
- **Act:** After finding what you were looking for, you can take an action – add multiple unprotected VMs to a job, start a recovery, run a job, etc.

The global search feature in NAKIVO Backup & Replication is an easy-to-use tool that helps you manage large backup infrastructures and saves you time.



Policy-Based Data Protection

Policy-Based Data Protection relieves you of the need to chase new VMs or changes in your infrastructure. Once a policy is created, all the matching VMs are protected automatically. Whenever a VM's status changes, the policy recognizes this change and excludes or adds the VM to jobs accordingly. The feature is designed to reduce complexity and add more flexibility to data protection processes such as backup, replication, or backup copy. You can set rules based on the VM name, tag, size, location, VM configuration, power state, or any combination of these parameters. A newly-created VM or instance is automatically added to data protection jobs if they match your policy rules; you don't have to keep track of all the changes in your infrastructure or manually manage data protection for new VMs. You can add as many new VMs and instances as you need because NAKIVO Backup & Replication can automatically protect all of them for you, as long as you have policy-based jobs in place.

This functionality can be a great time-saver if your virtualized infrastructure is actively expanding, includes numerous VMs and instances, or has a complex multilayer architecture. The Policy-Based Data Protection feature contributes greatly to the overall usability of NAKIVO Backup & Replication, making it an even more efficient data protection tool. Policies can be created for VM backup, replication, and backup copy jobs in just a few steps. Simply select the criteria (e.g., a VM's name, size, tag, etc.), enter the necessary search parameters, and have all the matching items included in the job automatically. For instance, you can choose to back up all VMware VMs tagged "Accounting" which exceed 100 GB in size and have more than 2 GB of allocated RAM. Once the policy has been created, NAKIVO Backup & Replication recognizes newly added VMs or instances with the same characteristics and automatically includes them into the existing job.

Refer to the following topics to know how to use the feature:

- [“Managing Job Policies” on page 309](#)
- [“Managing Policy Rules” on page 312](#)

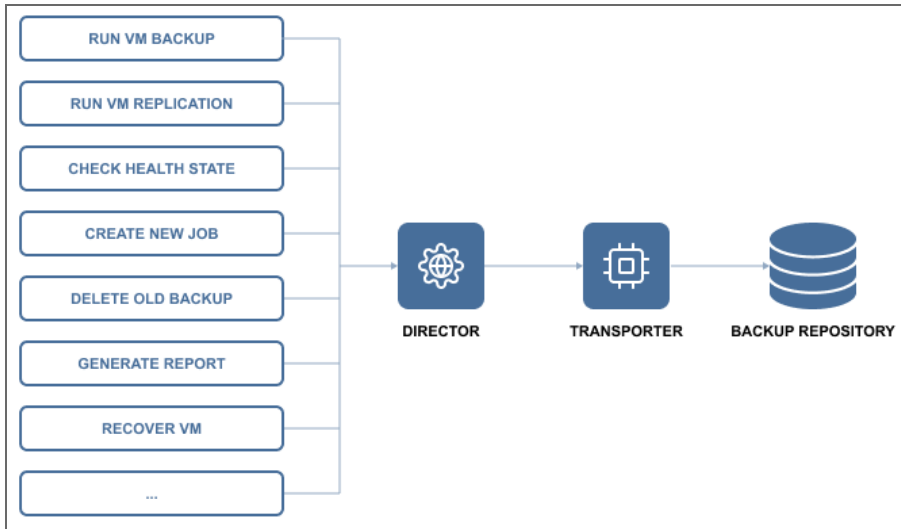
Automation

The following features help users eliminate repetitive routine work and automate their activities:

- [“HTTP APIs” on page 73](#)
- [“Job Chaining” on page 74](#)
- [“Pre and Post Job Scripts” on page 75](#)

HTTP APIs

NAKIVO Backup & Replication provides a simple HTTP API that lets you automate and orchestrate VM backup, replication, and recovery tasks. The API provides complete coverage of the product features, that is, you can use the API to perform all tasks that are available in the product's Web interface.



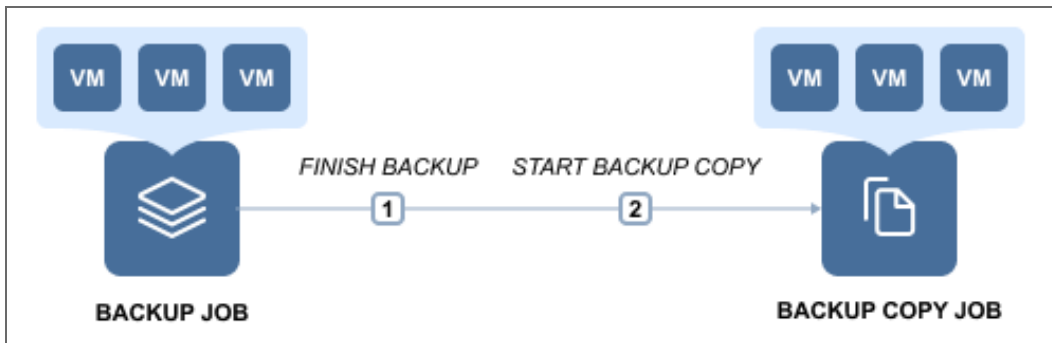
The API allows you to easily integrate NAKIVO Backup & Replication with monitoring, automation, and orchestration solutions to reduce time spent on backup management and reduce data protection costs. To speed up integration time, the API comes as part of an Integration Kit, which includes API documentation and code examples.

By using the API, you can:

- Save time on backup administration by automating the data protection process from VM provisioning to VM decommissioning.
- Ensure an uninterrupted backup process by monitoring the health status of the product components.
- Prevent failed jobs and out of space errors by monitoring backup repositories.
- Reduce storage space by automating backup decommissioning.
- Improve compliance by automating data protection reporting.
- Align data protection with your business processes by triggering VM backup and replication jobs with your orchestration and automation tools.
- Increase recovery speed by automating recovery.

Job Chaining

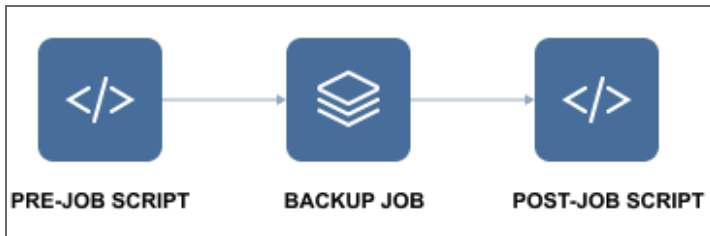
Job Chaining allows you to link jobs so that they run one directly after another. For example, you can set up a VM backup job that saves backups locally and then starts a [Backup Copy job](#) that copies the newly created backups to Amazon cloud.



You can link any type of jobs together – [backup](#), [backup copy](#), [replication](#) and [recovery](#) – and add any number of jobs to the chain. For instance, you can set up a series of backup jobs that trigger one another in the order of priority, or set up a series of Backup Copy jobs, which first send weekly backups to a DR repository and then send monthly backups to Amazon cloud for archiving.

Pre and Post Job Scripts

NAKIVO Backup & Replication provides you with the ability to run a script before a job begins (a pre-job script) and after the job has been completed (a post-job script).



By running your pre- and post- job scripts, you can do just about anything: start custom pre-freeze and post-thaw scripts on Linux systems to create [application-aware backups](#) and replicas, wake servers, establish connections, mount volumes, start and stop services, send commands to 3rd-party reporting, monitoring and automation tools, and etc.

Integration

NAKIVO Backup & Replication provides support for enterprise-grade deduplication appliances, such as EMC Data Domain and NEC HYDRAsTOR. Deduplication appliances are servers designed to reduce data size, and can be used as backup targets. Deduplication appliances operate best with sequential large block I/O from backup software. Therefore, when backing up your VMs to a deduplication appliance, it is important to make sure that the architecture of your Backup Repository is optimized for these devices and your VM backups have a large block I/O. Only by doing this, you will be able to maximize your VM backup speeds.

NAKIVO Backup & Replication offers you two different types of backup repositories to choose from:

- The regular Backup Repository, which is optimized for generic storage systems and performs **forever-incremental** (when the **Store backups in separate files** option is not enabled) VM backups along with global data deduplication and compression.
- The special Backup Repository with an architecture optimized for efficient operation on deduplication appliances. This is known as **Incremental-with-full-backups** (when the **Store backups in separate files** option is enabled during the Backup Repository creation process). The repository performs incremental-with-full VM backups, and proprietary VM backup deduplication and compression by NAKIVO Backup & Replication are turned off. The file structure is also improved, and each backup, along with its recovery points, is stored in a separate folder for easier manageability.

When tested in a customer environment on a high-end NEC HYDRAsTOR deduplication appliance, the product's special Backup Repository demonstrated a 53X boost in backup speed over the regular Backup Repository. NAKIVO Backup & Replication backed up the customer's VMs at an incredible 3.2 GByte/s. NAKIVO Backup & Replication ensures that you can use existing storage hardware while achieving top VM backup performance.

Integration with the following solutions allow NAKIVO Backup & Replication to further increase backup speed and save storage space:

- [“Active Directory” on page 77](#)
- [“EMC DD Boost” on page 78](#)
- [“HPE StoreOnce Catalyst” on page 79](#)
- [“NEC HYDRAsTOR” on page 80](#)

Active Directory

Microsoft Active Directory is a leading directory service, which provides you with the ability to authenticate and authorize users and computers in a Windows domain type network. To simplify user management, NAKIVO Backup & Replication provides integration with Microsoft Active Directory. You can easily map Active Directory groups to NAKIVO Backup & Replication user roles, which will allow domain users to log in to NAKIVO Backup & Replication with their domain credentials. With this feature, you can align NAKIVO Backup & Replication with your company's security policy and seamlessly provide Admin and Guest access to NAKIVO Backup & Replication.

For more information, refer to the following topics:

- [“Configuring Active Directory Integration” on page 380](#)
- [“Managing Active Directory Users” on page 377](#)

EMC DD Boost

The Dell/EMC Data Domain Boost technology allows for the reduction of storage consumption by up to 17X, greatly accelerating the VM backup process. The aggregate quantity of business data produced has drastically increased in recent years, which results in two major problems for modern companies. The first is the amount of storage space that backups occupy, and the second is the significant load on the production network created by backup operations, especially if they are run during business hours.

NAKIVO Backup & Replication and Dell/EMC Data Domain Boost offer a combined solution for both of these challenges. By using NAKIVO Backup & Replication along with source-side deduplication of Dell/EMC Data Domain Boost, you can perform VM backups 50% faster while reducing the size of your backups by up to 94%. This means that you can offload your network and save storage space at the same time.

For more information about the integration of NAKIVO Backup & Replication with EMC DD Boost, refer to the following articles:

- [“Storage Integration Requirements” on page 123](#)
- [Integrating with EMC DD Boost](#)
- [“Backup Repository on Deduplication Appliance” on page 513](#)

HPE StoreOnce Catalyst

HPE StoreOnce Systems from Hewlett Packard Enterprise provide a disk-based data protection platform. This platform addresses data growth by applying HPE StoreOnce deduplication software for efficient and long-term backup data retention. HPE StoreOnce Catalyst, a data protection protocol optimized for disk-based data protection, is the most efficient way to transfer data to a StoreOnce System. When using HPE StoreOnce Catalyst for your Backup Repository, you get the following advantages:

- Reduction in network bandwidth as only unique chunks of data are transferred
- Lower physical storage space requirements with data deduplication
- Better backup copy job performance between HPE StoreOnce storage devices.

Starting from NAKIVO Backup & Replication version 10.1, you can create a Backup Repository on a StoreOnce appliance with HPE StoreOnce Catalyst support. Refer to the following topics for details:

- [“Deduplication Appliance Support” on page 61](#)
- [“Storage Integration Requirements” on page 123](#)
- [“Backup Repository on Deduplication Appliance” on page 513](#)

NEC HYDRAsstor

HYDRAsstor is an award-winning product developed by the NEC Corporation. It is a disk-based grid storage platform offering long-term data retention through its maximized capacity of legacy storage solutions and scalability of performance. A HYDRAsstor storage system can be composed of multiple nodes – from one to over 100. Each node consists of standard hardware including disk drives, memory, CPU, and network interfaces. The system is integrated with the HYDRAsstor software, thus creating a single storage pool. The software incorporates multiple features of distributed storage systems. The features include content-addressable storage, variable block size, inline global data deduplication, erasure codes, data encryption, Rabin fingerprinting, and load balancing.

HYDRAsstor can be scaled from one node to 165 in a multi-rack grid appliance. Its bandwidth and capacity can be scaled separately by using different types of nodes:

- **Hybrid nodes:** add both performance and capacity.
- **Storage nodes:** add capacity.

HYDRAsstor supports online expansion with automatic data migration and zero downtime. With a standard configuration, the product provides resiliency up to 3 concurrent disk/node failures. Failures are detected automatically, and data reconstruction is also performed automatically. This means that if the time between failures is sufficient for reconstructing data, the system will withstand any number of them. For more information about NEC HYDRAsstor, refer to the [NEC official website](#).

To know more about the integration of NAKIVO Backup & Replication with NEC HYDRAsstor, refer to the following articles:

- [“Storage Integration Requirements” on page 123](#)
- [Integrating with NEC HYDRAsstor](#)
- [“Backup Repository on Deduplication Appliance” on page 513](#)

BaaS

NAKIVO Backup & Replication allows for creating and managing multiple isolated tenants within one product instance.

This section contains the following topics:

- [“Branding” on page 82](#)
- [“License Delegation” on page 83](#)
- [“MSP Console” on page 84](#)
- [“Multi-Tenancy” on page 85](#)
- [“Self-Service” on page 86](#)

Branding

Whether you plan to use NAKIVO Backup & Replication internally or provide backup/DR-as-a-Service to external customers, you may find it beneficial to align the product's look and feel with your company's brand. NAKIVO Backup & Replication provides a simple way to customize your product's interface so that it looks like an integral part of your organization. You can customize:

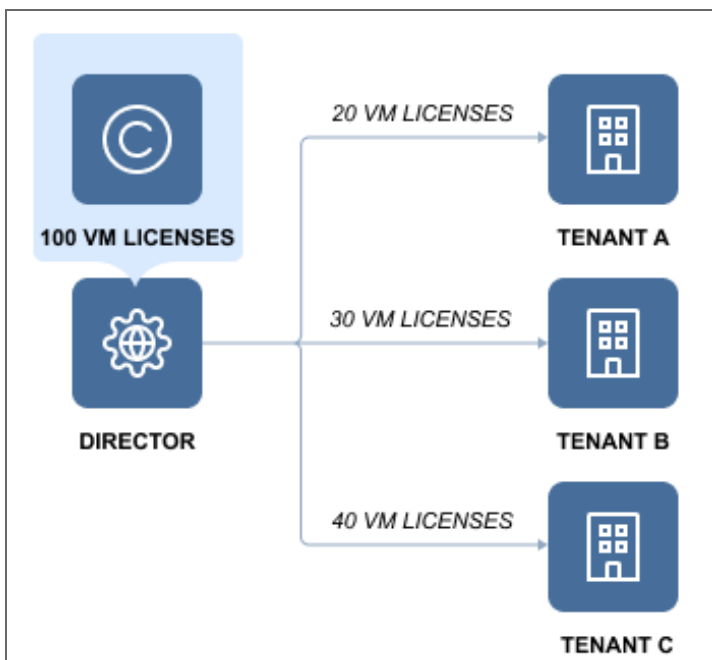
- **Product:** Product title and product logo.
- **Company information:** Company name and website URL.
- **Contact information:** Email, support email, and contact phone.

For information on branding configuration, refer to [“Branding” on page 334](#).

License Delegation

In Multi-tenant mode, NAKIVO Backup & Replication enables you to create multiple isolated tenants in a single copy of the product. The tenants can represent branch offices/departments in enterprise environments or clients in [Cloud Provider](#) environments.

Since tenants are isolated and need to have a limit as to how many licenses each of them can use, NAKIVO Backup & Replication has provided the License Delegation feature. In Multi-tenant mode, a Master Admin (tenant manager) can install one multi-socket license in the product and then assign or delegate a specific number of licenses to each tenant. For example, the Master Admin can install a 20-socket license in the Multi-tenant mode of NAKIVO Backup & Replication, and assign 3 licenses to Tenant A, 2 licenses to Tenant B, and 4 licenses to Tenant C, and let 11 licenses remain unused.



At any moment, the Master Admin can redistribute licenses: revoke any number of licenses from any tenant, which will return them to the Master License Pool, and add licenses to another tenant. The License Delegation feature makes license management simple and manageable in large and distributed environments.

MSP Console

The MSP Console feature allows users to connect their standalone instance of NAKIVO Backup & Replication to a managed service provider (MSP) and vice versa. With this feature, the standalone user is referred to as a remote tenant. Unlike local tenants in the traditional [Multi-Tenancy](#) workflow, remote tenants retain the ability to manage their resources in their data protection infrastructure. Conversely, using the MSP Console, MSPs are able to monitor a remote tenant's instance of NAKIVO Backup & Replication once a connection has been established on both sides.

To establish a connection, the MSP must first create a remote tenant account for the standalone user. The remote tenant must then use the credentials provided to connect to the MSPs instance of NAKIVO Backup & Replication.

For more information on using the MSP Console feature as a remote tenant, refer to the following topics:

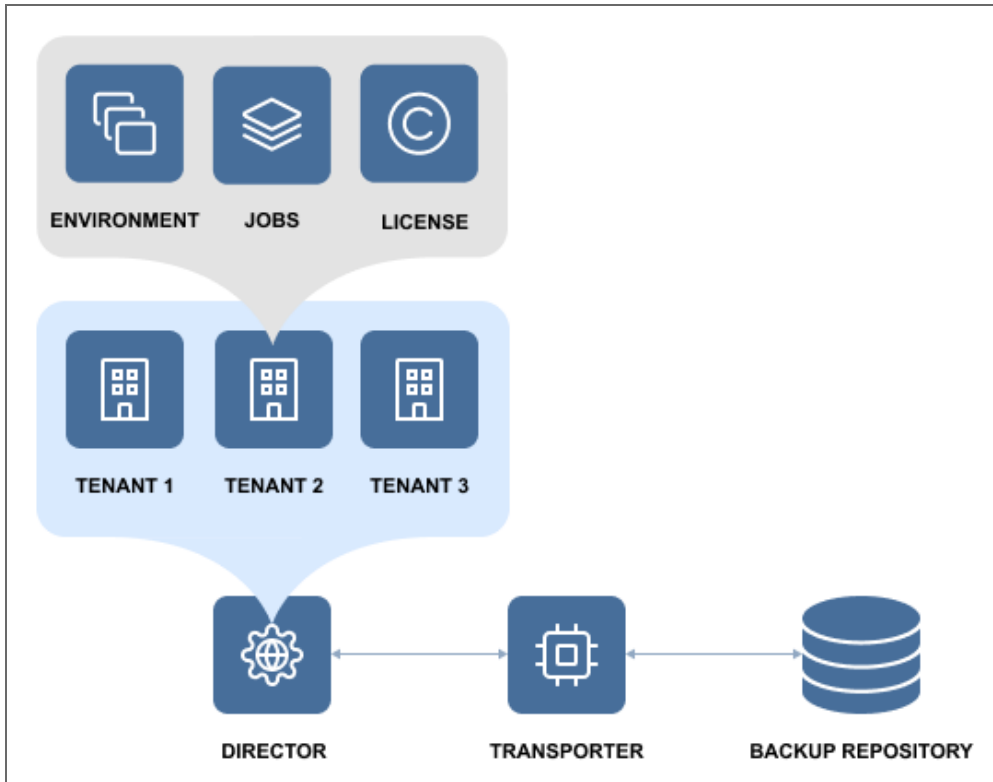
- [“MSP” on page 341](#)
- [“Adding an MSP” on page 342](#)
- [“Managing an MSP Connection” on page 343](#)

For more information on using the MSP Console feature as a managed service provider (MSP), refer to the following topics:

- [“Creating a Remote Tenant” on page 938](#)
- [“Remote Tenant Configuration” on page 940](#)
- [“Tenant Management” on page 942](#)

Multi-Tenancy

Multi-tenancy enables you to create and manage up to 1,000 isolated tenants within a single copy of the product. Tenants can represent business units, branch offices, departments, customers, and any other entities.



In Multi-tenant mode, each tenant can access their own environment through a self-service portal, and perform all data protection and recovery tasks. At the same time, tenants are isolated from each other and cannot access the environment and jobs of other tenants.

With Multi-tenancy, you can:

- Deliver Backup-as-a-Service, Replication-as-a-Service, and Disaster-Recovery-as-a-Service, for VMware, Hyper-V and AWS EC2 environments more efficiently and cost-effectively.
- Reduce complexity by managing multiple tenants in a single pane of glass.
- Offload data protection and recovery tasks to tenants.
- Reduce footprint by managing tenants in a single instance of the product.

Self-Service

In the multi-tenant mode, you can provide tenants with access to their dashboards. By default, a tenant admin account is automatically created when you [create](#) a new tenant. If you assign the **Self-service administrator** role to the tenant admin, the tenant admin has full control over all product features inside the tenant dashboard. This includes editing and updating tenant inventory, Transporters, and Backup Repositories, creating and managing jobs and groups, as well as [managing local users](#) and [user roles](#). For each tenant, one guest account can be created. The tenant guest usually has limited permissions inside the tenant.

To provide a tenant with access to the self-service interface, send them the following information:

- Link to NAKIVO Backup & Replication Director
- Tenant login
- Tenant password

NAKIVO Licensing Policy

This page offers an overview of the NAKIVO Backup & Replication licensing policy. The policy includes the licensing models for different platforms and the type of technical support provided with each model.

- [Licensing for NAKIVO Backup & Replication](#)
 - [Perpetual Licenses](#)
 - [Per-Workload Subscription Licenses](#)
 - [License Units](#)
 - [NAS File Share Backup Rules](#)
- [Licensing for Backup for Microsoft 365](#)
- [IT Monitoring Licensing](#)
- [Frequently Asked Questions](#)
- [Additional Resources](#)

Licensing for NAKIVO Backup & Replication

NAKIVO Backup & Replication is available in 5 editions with a Perpetual License or a Subscription License depending on the platform to be protected and an organization's data protection requirements.

Perpetual Licenses

Perpetual Licenses are available for virtual machines, physical machines, NAS, and Oracle Database on the following terms:

- For VMware vSphere, Microsoft Hyper-V, and Nutanix AHV virtual machines (VMs), the solution is licensed per CPU socket. That is, a license is required for each CPU socket on hosts with VMs to be backed up or replicated. Licensed sockets can be used for any of the three platforms and may be reassigned at any time.
- For physical machines, the solution is licensed per server and per workstation. Perpetual Licenses for physical machine backup (servers or workstations) are sold in bundles of 5 servers/workstations.

Note

A per-server Perpetual License cannot be used for physical workstations, and a per-workstation Perpetual License cannot be used for servers.

- It is possible to purchase a license for a single bundle of 5 physical servers in case you also purchase a license for a bundle of 10 physical workstations along with it.

- For NAS backup, the solution is licensed per terabyte (see [NAS File Share Backup Rules](#) for more details).
- For Oracle Database, the solution is licensed per database (available with the Enterprise Plus edition only).

Perpetual Licenses come with one year of Standard Support. Additional years of support can be purchased upfront. Upgrades to 24/7 Support are also available.

Note

Valid support is required to receive product updates.

See a breakdown of the different editions below. For a detailed comparison of each edition's features, refer to the Editions Comparison section on the [Pricing and Editions](#) page.

Edition	Platform	License unit limitations	Overview
Pro Essentials	VMware vSphere	Min. 2 sockets Max. 6 sockets	All the features of the Pro edition but with a limit on the number of license units (see License Units)
	Nutanix AHV		
	Microsoft Hyper-V		
	Windows/Linux Physical Machines	Min. 10 servers Max. 50 servers	
		Min. 10 workstations Max. 150 workstations	
	NAS	Min. 1 TB Max. 50 TB	
Enterprise Essentials	VMware vSphere	Min. 2 sockets Max. 6 sockets	All the features of the Enterprise edition but with a limit on the number of licensed units (see License Units)
	Nutanix AHV		
	Microsoft Hyper-V		
	Windows/Linux Physical Machines	Min. 10 servers Max. 50 servers	
		Min. 10 workstations Max. 150 workstations	
	NAS	Min. 1 TB Max. 50 TB	

Pro	VMware vSphere	No limits	Includes most product features with limitations on backup to the cloud, administrative tools, and BaaS
	Nutanix AHV		
	Microsoft Hyper-V		
	Windows/Linux Physical Machines		
	NAS		
Enterprise	VMware vSphere	No limits	Includes all product features except Oracle Database backup and a few administration features (see the Pricing and Editions page for the full list)
	Nutanix AHV		
	Microsoft Hyper-V		
	Windows/Linux Physical Machines		
	NAS		
Enterprise Plus	VMware vSphere	No limits	The most complete edition of NAKIVO Backup & Replication
	Nutanix AHV		
	Microsoft Hyper-V		
	Windows/Linux Physical Machines		
	NAS		
	Oracle Database		

Per-Workload Subscription Licenses

The Per-Workload Subscription Licenses are available for virtual machines, physical machines, NAS, and Oracle Database on the following terms:

- For VMware vSphere, Microsoft Hyper-V, Nutanix AHV, and Amazon EC2, the solution is licensed per VM/instance.
- For physical machines, the solution is licensed per 1 server or 3 workstations.
- For NAS, the solution is licensed per 0.5 terabytes (see [NAS File Share Backup Rules](#) for more details).
- For Oracle Database, the solution is licensed per database (available with the Enterprise Plus edition only).

Subscription Licenses are annual subscriptions (1 to 5 years) that are billed upfront and include 24/7 Support for the licensed period.

See a breakdown of the different editions below. For a detailed comparison of each edition's features, refer to the Editions Comparison section on the Pricing and Editions page.

Edition	Platform	License unit limitations	Overview
Pro Essentials	VMware vSphere	Min. 5 workloads Max. 50 workloads	All the features of the Pro edition but with a limit on the number of license units (see License Units)
	Nutanix AHV		
	Microsoft Hyper-V		
	Amazon EC2		
	Windows/Linux Physical Machines		
	NAS		
Enterprise Essentials	VMware vSphere	Min. 5 workloads Max. 50 workloads	All the features of the Enterprise edition but with a limit on the number of licensed units (see License Units)
	Nutanix AHV		
	Microsoft Hyper-V		
	Amazon EC2		
	Windows/Linux Physical Machines		
	NAS		
Pro	VMware vSphere	No limits	Includes most product features with limitations on backup to the cloud, administrative tools, and BaaS
	Nutanix AHV		
	Microsoft Hyper-V		
	Amazon EC2		
	Windows/Linux Physical Machines		
	NAS		

Enterprise	VMware vSphere	No limits	Includes all product features except Oracle Database backup and a few administration features (see the Pricing and Editions page for the full list)
	Nutanix AHV		
	Microsoft Hyper-V		
	Amazon EC2		
	Windows/Linux Physical Machines		
	NAS		
Enterprise Plus	VMware vSphere	No limits	The most complete edition of NAKIVO Backup & Replication
	Nutanix AHV		
	Microsoft Hyper-V		
	Amazon EC2		
	Windows/Linux Physical Machines		
	NAS		
	Oracle Database		

License Units

License units are defined differently for Perpetual Licenses and Per-Workload Subscription Licenses as shown below. In addition, there are limitations on the number of license units with the Pro Essentials and Enterprise Essentials editions.

Units for Perpetual Licenses

Platform	License Unit	Pro Essentials/Enterprise Essentials Editions Limits*
VMware vSphere	1 CPU Socket	2-6 Units (Sockets)
Microsoft Hyper-V		
Nutanix AHV		
Windows/Linux Physical Server	5 Servers	2-10 Units (10-50 Servers)
Windows/Linux Workstation	5 Workstations	2-30 Units (10-150 Workstations)

NAS File Share	1 Terabyte	1-50 Units (1-50 TB)
Oracle Database	1 Database	N/A

*A Perpetual License for Pro Essentials/Enterprise Essentials can cover up to 30 units of virtual machines, physical machines, and/or NAS combined.

Below is an example of a valid order for a single Pro Essentials/Enterprise Essentials Perpetual License that combines virtual, physical, and file share protection for a total of 30 units:

- 6 Sockets (6 units)
- 40 Physical Servers (8 units in bundles of 5)
- 40 Physical Workstations (8 units in bundles of 5)
- 8 TB of file share space (8 units)

Workloads in Per-Workload Subscription License

Platform	License Unit (Workload)	Pro Essentials/Enterprise Essentials Editions Limits
VMware vSphere	1 VM	Minimum of 5 workloads Maximum of 50 workloads
Microsoft Hyper-V		
Nutanix AHV		
Amazon EC2	1 Instance	
Windows/Linux Physical Server	1 Server	
Windows/Linux Workstation	3 Workstations	
NAS File Share	0.5 Terabyte	
Oracle Database	1 Database	

NAS File Share Backup Rules

File share backup has a few additional rules and details regarding licensing. Licenses are consumed based on the following rules:

- License consumption is calculated based on backed up source file share data, determined during each file share backup job run.

- NAKIVO Backup & Replication sums up the last-known amount of protected source data across all file share backup jobs.
- If the same file share and/or its contents are protected by multiple jobs, the source data is still summed.
- If a job run reaches or exceeds the licensed data size, the job will become disabled. It will not be possible to create new file share backup jobs, and the current job cannot be re-enabled until it is edited to exclude a sufficient amount of backup data.
- Adding shares to inventory does **not** consume licenses.
- File share backup metadata does **not** contribute to licensed file share size.

In addition, there are specific rules regarding the calculation of licenses for protected source data:

- If the total source data size is greater than zero and less than or equal to 0.5 TB, one license unit is consumed.

Note

In this section, **license unit** refers only to 0.5 TB. While file share backup is licensed per-Terabyte in a Perpetual License, license **consumption** is counted in 0.5 TB increments for both Perpetual and Per-Workload Subscription license types.

- If the total source data size exceeds 0.5 TB, the number of consumed licenses is determined as follows:
 1. The total source data size is rounded down to the nearest multiple of 0.5 TB
 2. The rounded amount is divided by 0.5 TB
 3. The resulting value is the number of licensed units consumed

Example: Total backed up source data of 1850 GB (1.85 TB) is rounded down to 1.5 TB and divided by 0.5 TB to get **3 license units consumed**.

Licensing for Backup for Microsoft 365

Backup for Microsoft 365 is licensed per user on an annual basis (1 to 3 years). A user is defined as a unique Microsoft 365 account that has access to Exchange Online, OneDrive for Business, SharePoint Online, and/or Teams. Each user is equivalent to one license unit.

Organizations may purchase a Subscription License for Backup for Microsoft 365 as a standalone offering or combine it with any existing NAKIVO Backup & Replication edition and license type (Perpetual or Per-Workload Subscription). Subscription Licenses come with 24/7 Support covering the licensed period. See the overview below of possible pairings for a Microsoft 365 Subscription License with any edition of NAKIVO Backup & Replication.

Purchased with	Support level	Coverage
----------------	---------------	----------

Perpetual License (any edition)	24/7 Support for Microsoft 365 License; Standard Support for Perpetual License	Minimum 10 license units (users) per order
	24/7 Support across the board (requires Support Upgrade for Perpetual License)	
Subscription License (any edition)	24/7 Support across the board	Minimum 10 license units (users) per order

When combining a Subscription License for Backup for Microsoft 365 with a NAKIVO Backup & Replication Perpetual License of any type, the following technical support conditions apply:

- The end date for support coverage must be the same for both licenses.
- You may upgrade Perpetual License Standard Support to 24/7 Support, or keep it at the default Standard Support.

Backup for Microsoft 365 Licensing Rules

Licenses are consumed per user based on the following rules:

- A user is considered to be one of the following:
 - A user mailbox
 - A user OneDrive
 - A user licensed in Microsoft 365 who has access to a Team that will be backed up
 - A user who has access to a site depending on the following conditions:
 - A user (including a user in groups) that has "Edit" or "Full Control" permissions for a site consumes 1 license unit.
 - For personal sites, only the owner of the personal site consumes a license unit. Other users with access to this personal site do not consume any license units.
 - A personal site owner with access to a regular site requires only one license unit.
- License units are matched to a given email account across services. If there is no matching email account, then a new license is required. For example:
 - A user with access to a SharePoint Online site who also has a mailbox under the same email account requires only one license unit.
 - If a mailbox does not correspond to a licensed email account, a separate license unit is required to back it up.
- License units are not given per SharePoint site or affected by the size of a site.
- License units are not given per Team.
- Shared mailboxes do not require a license.

- Group mailboxes do not require a license.
- Group sites do not require a license.
- Guest accounts do not require a license.
- Student users do not require a license:
 - A user that only has a [Student SKU](#) does not require a license.
 - A user with both a [Student SKU](#) and [Faculty SKU](#) requires a license.

IT Monitoring Licensing

IT Monitoring for VMware vSphere virtual machines is available with a Perpetual License (per socket) or Per-Workload Subscription License (per VM), and can be purchased separately from NAKIVO Backup & Replication. An IT Monitoring license can also be combined with an existing license of the same type and edition of NAKIVO Backup & Replication.

Perpetual Licenses for IT Monitoring

- Licensed per CPU socket: A license is required for each CPU socket on hosts with VMs to be monitored.
- Perpetual Licenses come with one year of Standard Support. Additional years of support can be purchased upfront. Upgrades to 24/7 Support are also available.

Note

Valid support is required to receive product updates.

Subscription Licenses for IT Monitoring

- Licensed per VM
- Annual subscriptions (1 to 5 years) that are billed upfront
- Include 24/7 Support for the licensed period
- License unit limits for the Pro Essentials/Enterprise Essentials editions: 5-50 workloads

If purchased together with NAKIVO Backup & Replication, the licenses for both products must have the same:

- Edition
- Number of license units (sockets or VMs)
- Support end date
- Type of support (Standard or 24/7)

Frequently Asked Questions

Q: What is a socket?

A: A socket refers to the socket on the motherboard onto which a CPU is inserted. For a Perpetual license, only the number of sockets is counted; the number of CPU cores per socket is not taken into account.

Q: Does adding another Transporter require an additional license?

A: NAKIVO Backup & Replication is not licensed per Transporter. You can install additional Transporters regardless of the licensing model (Perpetual or Subscription).

Q: Do I need to license both source and target hosts in a disaster recovery scenario?

A: Only the source side of replication requires a license. For a scenario wherein you replicate a VM from Site A, recover it in Site B, then failback to Site A, only hosts on Site A side need to be licensed.

Additional Resources

[NAKIVO Pricing & Editions](#)

[NAKIVO Customer Support Policy](#)

[NAKIVO Customer Support Agreement](#)

[End-User License Agreement](#)

Deployment

This section contains the following topics :

- [“Architecture” on page 98](#)
- [“System Requirements” on page 119](#)
- [“Installing NAKIVO Backup & Replication” on page 171](#)
- [“Updating NAKIVO Backup & Replication” on page 236](#)
- [“Uninstalling NAKIVO Backup & Replication” on page 264](#)

Architecture

- [What is NAKIVO Backup & Replication?](#)
- [Solution Components](#)

What is NAKIVO Backup & Replication?

NAKIVO Backup & Replication is an all-in-one solution designed to back up, replicate, and recover virtual machines and cloud instances. The product can also back up and recover physical machines.

Solution Components

NAKIVO Backup & Replication is a server application that can be installed on a virtual or physical machine. The application is designed to achieve top speeds for CPU and RAM to achieve the top speed of VM backup, replication, and recovery. Thus, NAKIVO Backup & Replication components should be installed on a machine designated for backup and replication so it does not interfere with the performance of other applications.

NAKIVO Backup and Replication consists of the following components:

- [“Director” on page 99](#)
- [“Transporter” on page 101](#)
- [“Backup Repository” on page 105](#)

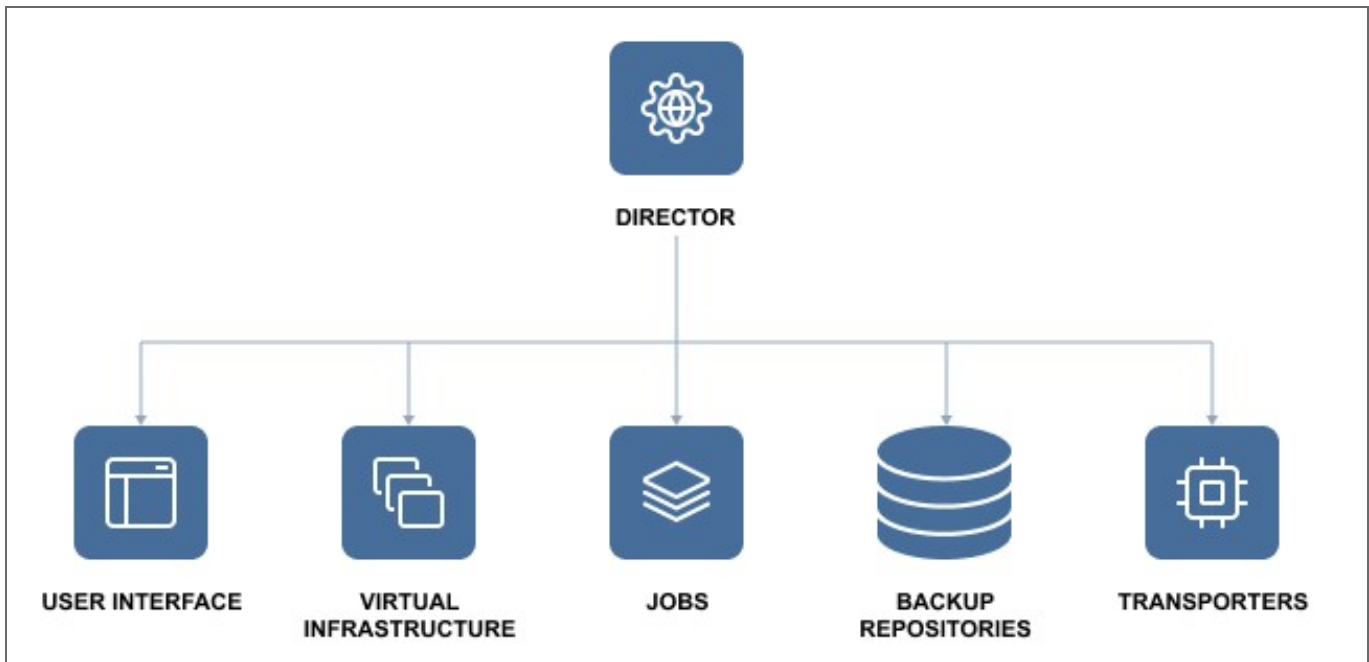
All components can be installed on a single machine or can be distributed across multiple machines and geographical locations.

Director

- [What is Director?](#)
- [How Many Directors Should be Deployed?](#)

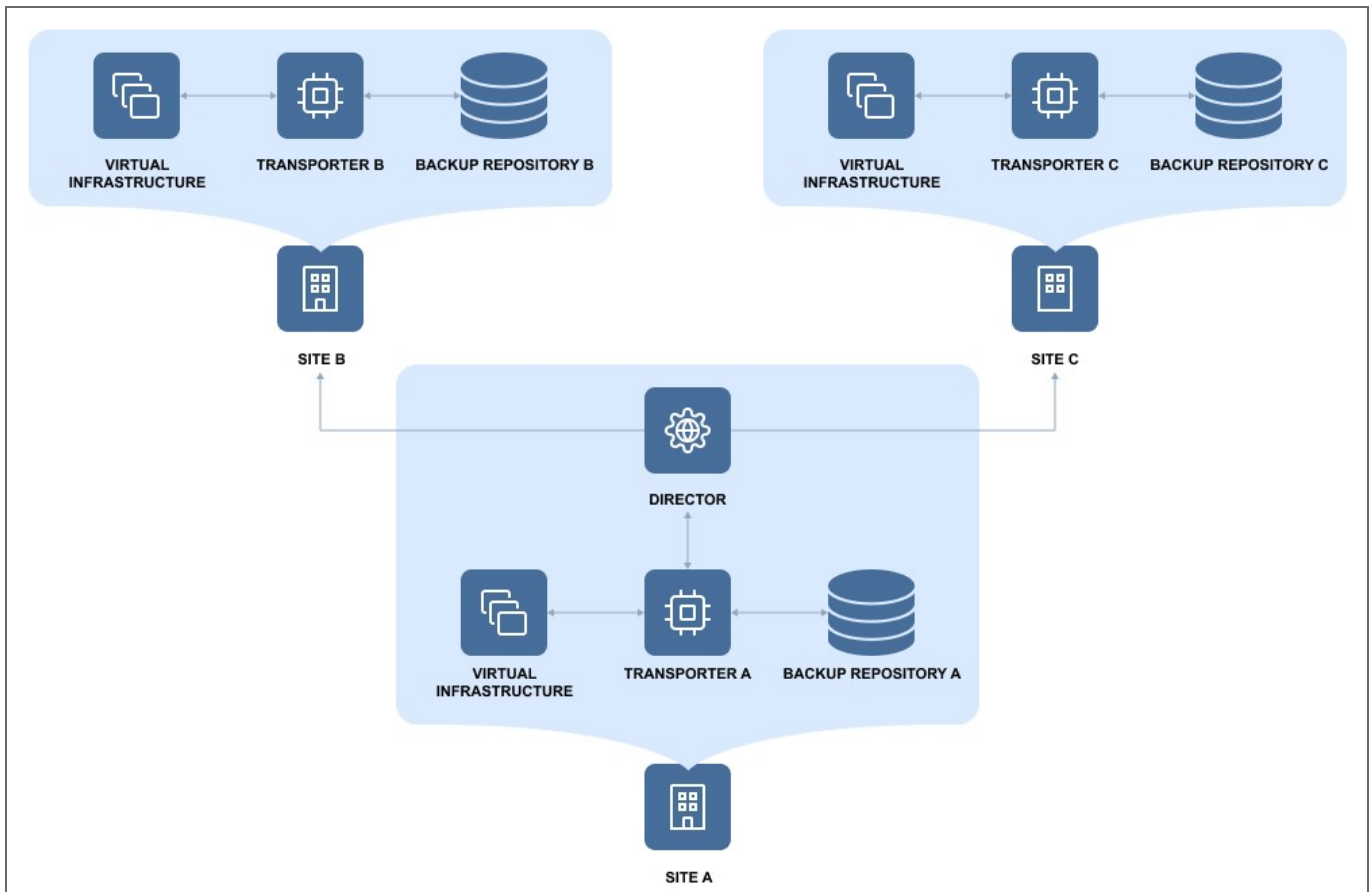
What is Director?

Director is the central management instance of the product. It provides Web interface, locates and maintains the inventory, provides users with the ability to create and run jobs, manages Backup Repositories, Transporters, and other product elements.



How Many Directors Should be Deployed

Only one instance of the Director should be installed per customer. As a central management point for data protection, one instance of the Director can manage multiple geographically distributed virtual and cloud environments, Backup Repositories, and Transporters. See the example below.

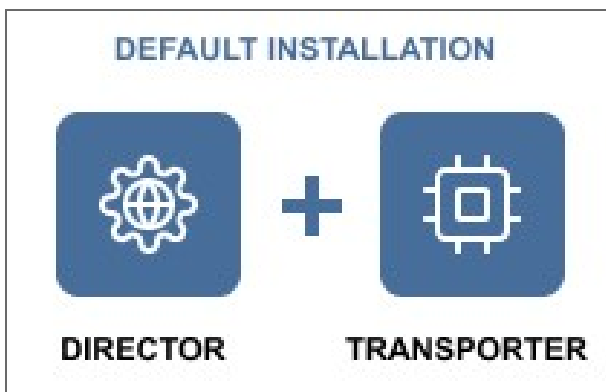


Transporter

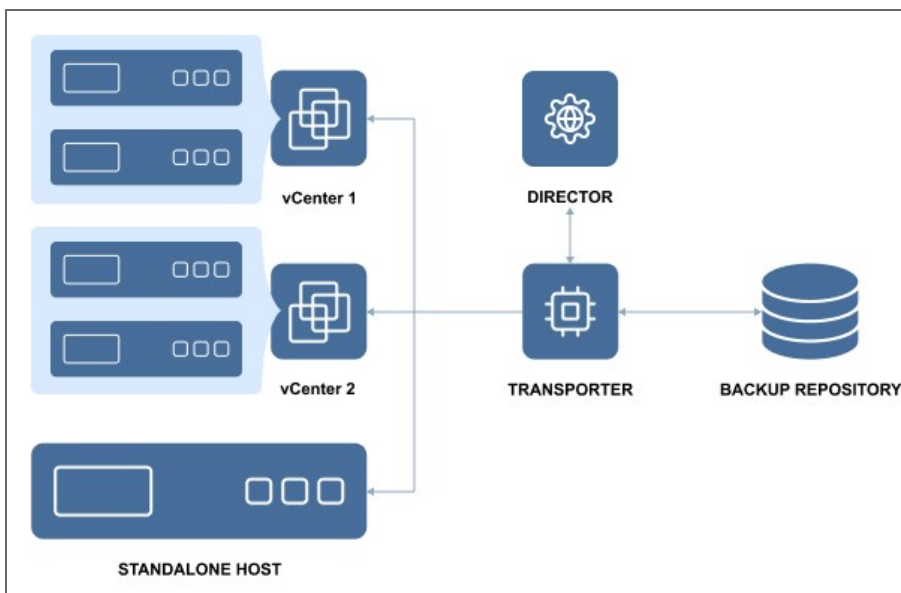
- [What is a Transporter?](#)
- [How many Transporters Should be Deployed?](#)
- [How Transporters are Selected for Jobs](#)
- [Transporter Security](#)

What is a Transporter?

The Transporter is the component of the product that does all of the heavy lifting. It performs backup, replication, and recovery, as well as data compression, deduplication, and encryption. An instance of the Transporter is automatically installed along with the Director to enable backup, replication, and recovery out of the box. The default Transporter is called "Onboard Transporter", and it must not be removed or added to the product by another Director.



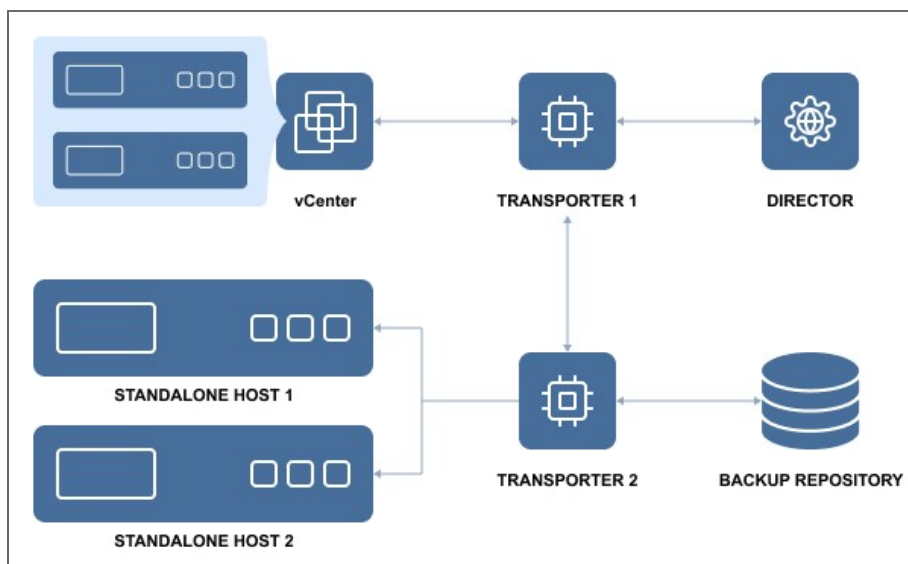
A single Transporter can back up, replicate, and recover multiple VMs and cloud instances.



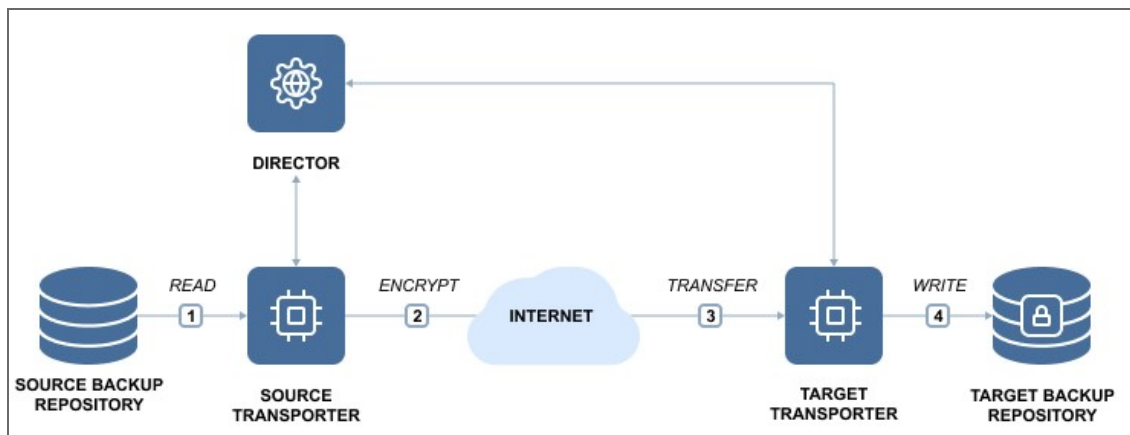
One Transporter can simultaneously process multiple source disks (6 by default) during backup, replication, and recovery. If jobs contain more disks than the Transporter is set to process simultaneously, the disks will be put in a queue and will be processed once the Transporter frees up.

How Many Transporters Should be Deployed?

In most cases, it is sufficient to deploy only one Transporter per site. In large environments, where multiple source items need to be processed simultaneously, multiple Transporters can be deployed to distribute the workload.



Deploying multiple Transporters also enables network acceleration and AES 256 encryption of traffic between a pair of Transporters. For example, if VMs are replicated over WAN between two sites, the Transporter installed in the source site can compress and encrypt data before transferring it over WAN, and the Transporter installed in the Target site can unencrypt and decompress the data prior to writing it to the target server.

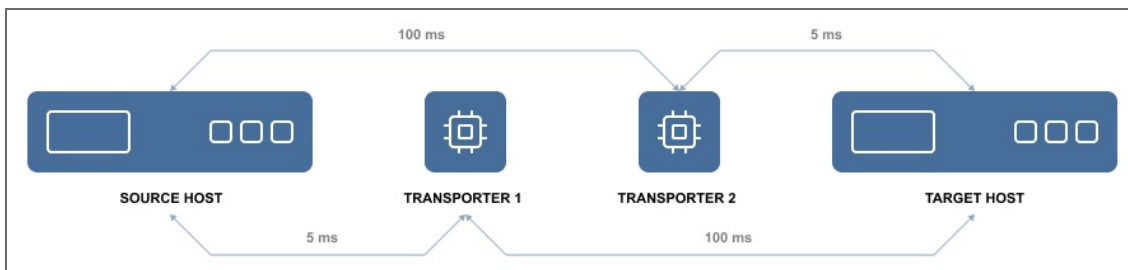


If you plan to transfer data over WAN without a VPN connection from your source site to the target site, make sure the source and target Transporters are added to the product using external IP addresses or DNS names that can be properly resolved in WAN, so that the two Transporters can connect to each other.

How Transporters are Selected for Jobs

In large and geographically distributed environments multiple Transporters can be deployed to distribute the data protection workload, optimize network traffic, and improve data transfer speeds. Thus, if more than one Transporter is deployed for NAKIVO Backup & Replication, it is important to determine which one should be used to read data from a particular source and which one should be used to write data to a target.

By default, the product automatically determines which Transporter should be used based on the proximity of a Transporter to the source or target server. The proximity is measured by using the ping round trip time.



In the example above, Transporter 1 will be selected to read data from the Source ESXi, and Transporter 2 will be selected to write data to the Target ESXi.

The Transporter selection can also be configured manually during job creation.

Transporter Security

It is possible to set a Master Password for the Transporter and use a CA certificate to make NAKIVO Backup & Replication more secure. The certificate can be set for the Onboard Transporter during the full installation of the product or for individual Transporters during Transporter-only installation, or by using the Windows Updater on Windows operating systems. The master password can be set only during the Transporter-only installation.

This option is available for the following [supported target platforms](#):

- VMware vSphere
- Microsoft Hyper-V
- Amazon EC2
- Nutanix AHV
- Supported NAS models
- Virtual Appliances
- Physical machines

To use CA certificates, make sure that they adhere to the necessary requirements. Refer to [Custom CA-Signed Certificate Compatibility](#).

Backup Repository

- [What is a Backup Repository?](#)
- [How Much Data Can Be Stored in a Backup Repository?](#)
- [How is a Backup Repository Managed?](#)

What is a Backup Repository?

A Backup Repository is a folder used by NAKIVO Backup & Replication to store backups. When you add a Backup Repository to the product, NAKIVO Backup & Replication creates a folder named “NakivoBackup” in the specified location and keeps all backed up data and Backup Repository metadata in that folder.

Important

- Do not modify or delete any files inside the “NakivoBackup” folder. Modifying or deleting any file inside the “NakivoBackup” folder may irreversibly damage an entire Backup Repository.
- To avoid disrupting NAKIVO Backup & Replication processes and data corruption, add the application to the whitelist/exclusions list of the antivirus software running on the machine on which the NAKIVO Backup Repository is set up.

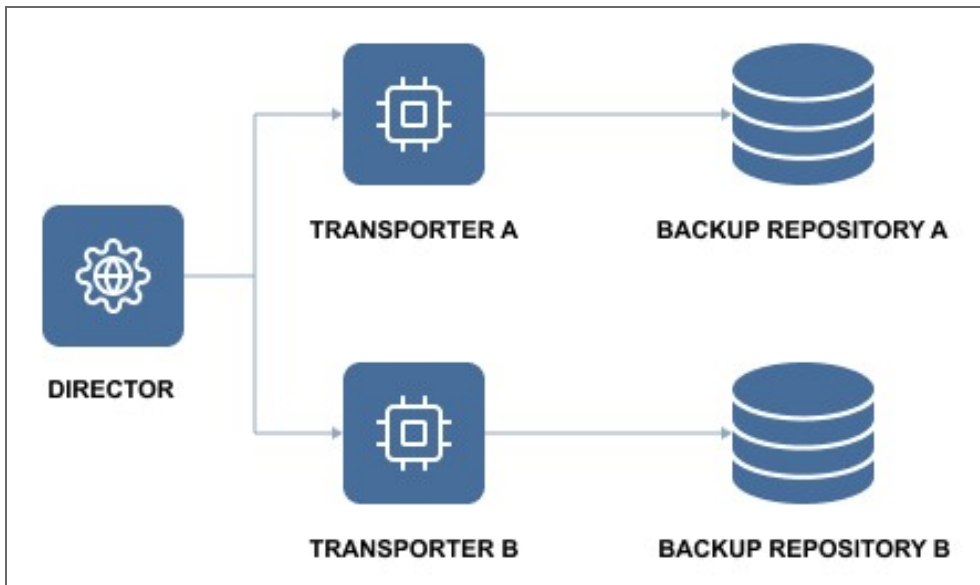
By default, a Backup Repository is created when the full solution (both Director and Transporter) is installed. The default Backup Repository is named “Onboard repository”.

How Much Data Can Be Stored in a Backup Repository?

The maximum recommended size of a Backup Repository used with NAKIVO Backup & Replication is 128 TB of data after compression and deduplication. For repositories larger than 128 TB, it is recommended to use an **Incremental with full backups** type of Backup Repository. The number of Backup Repositories per installation is unlimited. Additionally, Backup Repositories can be configured to compress and deduplicate backups at the block level to save storage space.

How is a Backup Repository Managed?

Each Backup Repository is managed by a single Transporter called an Assigned Transporter. In other words, only one Transporter can read data from and write data to a particular Backup Repository.



The Assigned Transporter is responsible for all interaction with its Backup Repository. A single Transporter can be assigned to and manage multiple Backup Repositories.

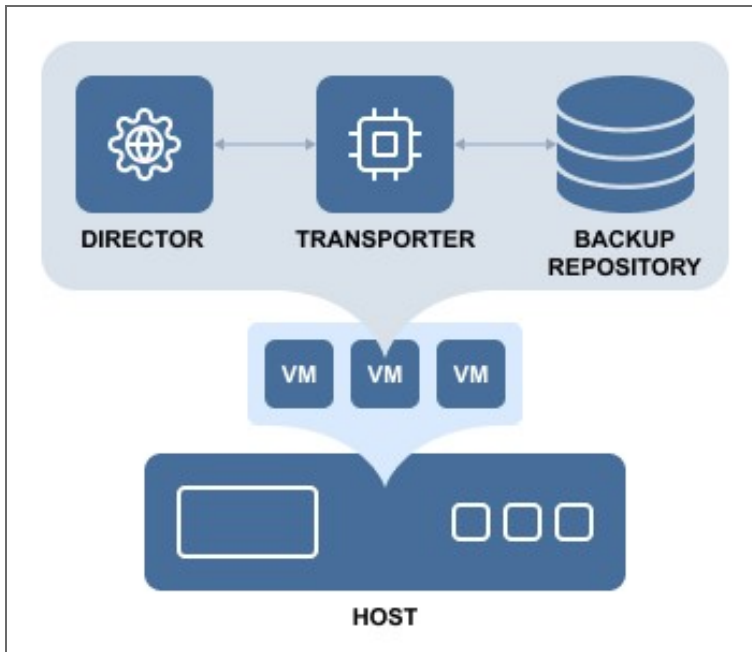
Deployment Scenarios

NAKIVO Backup & Replication is a modular solution that can be fully installed on a single machine to protect small and mid-sized environments, as well as scale out horizontally and support large distributed environments. Refer to the sections below to learn more about the product deployment scenarios.

- [“Single Site Deployment” on page 108](#)
- [“Distributed Deployment” on page 109](#)
- [“Multi-Tenant Deployment” on page 110](#)

Single Site Deployment

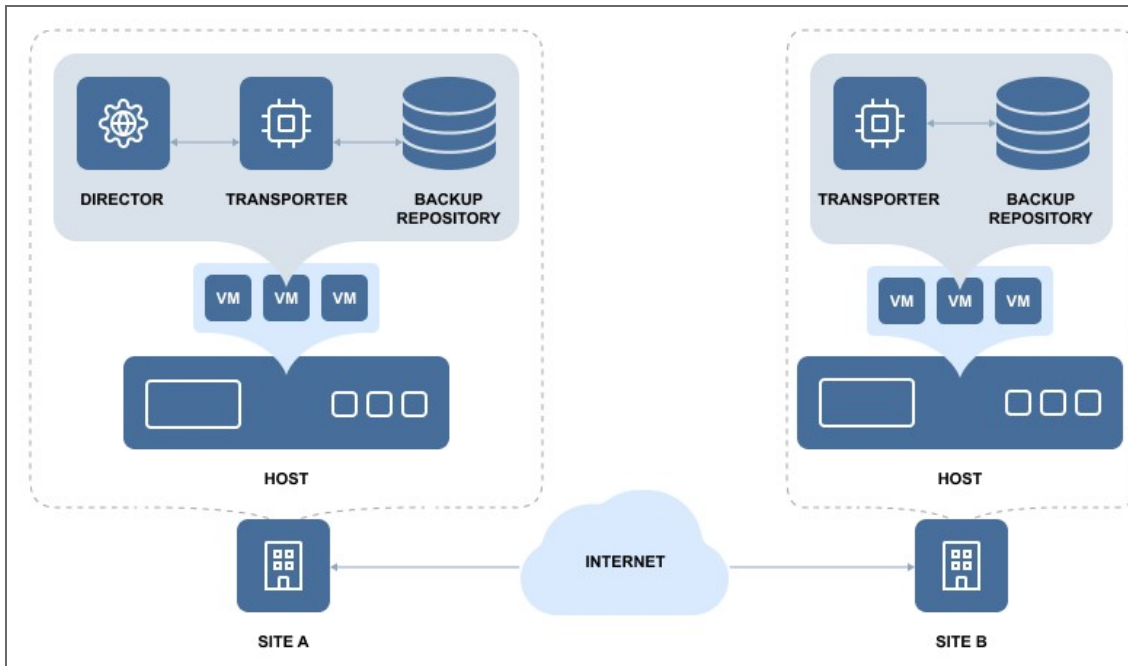
For a single site deployment, it is often sufficient to install both the Director and Transporter on a single VM/physical machine within your infrastructure.



This deployment provides you with the ability to back up, replicate, and recover multiple VMs from multiple source hosts.

Distributed Deployment

If you have multiple sites and need to back up and/or replicate over WAN, install the Director and Transporter on one site, and at least one Transporter on all other sites.



Note

Make sure the required ports are open on the appropriate endpoints. The full list of required ports can be found in [Deployment Requirements](#).

Multi-Tenant Deployment

Installation of a multi-tenant solution of NAKIVO Backup & Replication allows you to create multiple isolated tenants within a single product deployment and manage them from a single pane of glass. In the Multi-Tenant mode, tenants can access the self-service portal to offload backup, replication, and recovery tasks from the service provider.

For more information, refer to these topics:

- [“Backup from a Remote Site to a Master Site” on page 111](#)
- [“Replication from a Remote Site to a Master Site” on page 113](#)
- [“Local Backup at Remote Site” on page 115](#)
- [“Local Replication at Remote Site” on page 116](#)
- [“Backup at Master Site” on page 117](#)
- [“Replication at Master Site” on page 118](#)
- [“Multi-Tenant Mode” on page 931](#)

Backup from a Remote Site to a Master Site

- [Deployment Scenario](#)
- [Deployment Steps](#)
- [Connections](#)

Deployment Scenario

In this scenario, tenant VMs are running at remote sites and are backed up to a single master site.

Example

A service provider needs to back up customers' VMs to the service provider's datacenter so that the customers don't see each other's backups and can recover their own files and emails through a self-service interface.

Deployment Steps

To deploy the above scenario, perform the following steps:

1. Install the Director in multi-tenant mode at the master site.
2. Install at least one Transporter at the master site.
3. Install at least one Transporter at each remote site.
4. For each tenant, prepare a separate folder at the master site for creating separate Backup Repositories.

Connections

The implementation of the above scenario requires that the following connections be available:

Connection	Description
A	Connection from the machine on which the Director is installed to vCenter servers and ESXi hosts that run source VMs at remote sites. The port used for communication with vCenter servers and ESXi hosts (443 by default) is open in firewalls.
B	Connection from the machine on which the Director is installed to machines at remote sites on which Transporters are installed. The port used for communication with the Transporters (9446 by default) is open in firewalls.
C	Connection from the machine on which the Director is installed to vCenter servers and ESXi hosts at the master site where VM replicas will be created. The port used for communication with vCenter servers and ESXi hosts (443 by default) is open in firewalls.
D	Connection from the machine on which the Director is installed to the machine at the master site where the Transporter is installed. The port used for communication with the Transporters (9446 by default) is open in firewalls.
E	Connection from the machine at the Master site where the Transporter is installed to ESXi hosts at the master site where VM replicas will be created.

F	Connection from the machine at the Master site where the Transporter is installed to machines at remote sites where Transporters are installed. The ports used for data transfer between a pair of Transporters are open in firewalls.
G	At remote sites, connections from machines on which Transporters are installed to vCenter servers and ESXi hosts running source VMs.

Note

For security purposes, a VPN connection should be established between the master site and remote sites.

Replication from a Remote Site to a Master Site

- [Deployment Scenario](#)
- [Deployment Steps](#)
- [Connections](#)

Deployment Scenario

In this scenario, tenant VMs are running at remote sites and are replicated to a single master site.

Example

A service provider wants to introduce Replication-as-a-Service to customers and replicate their VMs to the service provider's datacenter.

Deployment Steps

To deploy the above scenario, perform the following steps:

1. Install the Director in multi-tenant mode at the master site.
2. Install at least one Transporter at the master site.
3. Install at least one Transporter at each remote site.
4. For each tenant, prepare a separate ESXi host that will serve as a replication target.

Connections

The implementation of the above scenario requires that the following connections be available:

Connection	Description
A	Connection from the machine on which the Director is installed to vCenter servers and ESXi hosts that run source VMs at remote sites. The port used for communication with vCenter servers and ESXi hosts (443 by default) is open in firewalls.
B	Connection from the machine on which the Director is installed to machines at remote sites on which Transporters are installed. The port used for communication with the Transporters (9446 by default) is open in firewalls.
C	Connection from the machine on which the Director is installed to vCenter servers and ESXi hosts at the master site where VM replicas will be created. The port used for communication with vCenter servers and ESXi hosts (443 by default) is open in firewalls.
D	Connection from the machine on which the Director is installed to the machine at the master site where the Transporter is installed. The port used for communication with the Transporters (9446 by default) is open in firewalls.
E	Connection from the machine at the master site where the Transporter is installed to ESXi hosts at the master site where VM replicas will be created.

F	Connection from the machine at the master site where the Transporter is installed to machines at remote sites where Transporters are installed. The ports used for data transfer between a pair of Transporters are open in firewalls.
G	At remote sites, connections from machines on which Transporters are installed to vCenter servers and ESXi hosts running source VMs.

Note

For security purposes, a VPN connection should be established between the master site and remote sites.

Local Backup at Remote Site

- [Deployment Scenario](#)
- [Deployment Steps](#)
- [Connections](#)

Deployment Scenario

In this scenario, tenant VMs are running and backed up locally at the remote sites.

Example

An Enterprise has two branch offices running VMware virtual infrastructure. The IT manager located at the headquarters is responsible for the Enterprise data protection and needs to back up VMs locally at their branch offices to ensure fast operational recovery. Employees of the branch offices should have access to their VM backups and be able to recover their files and emails.

Deployment Steps

To deploy the above scenario, perform the following steps:

1. Install the Director in multi-tenant mode at the master site.
2. Install at least one Transporter at each remote site.
3. For each tenant, prepare a separate folder at a remote site for creating a Backup Repository.

Connections

The implementation of the above scenario requires that the following connections be available:

Connection	Description
A	Connection from the machine on which the Director is installed to vCenter servers and ESXi hosts that run source VMs at remote sites. The port used for communication with vCenter servers and ESXi hosts (443 by default) is open in firewalls.
B	Connection from the machine on which the Director is installed to machines at remote sites where the Transporters are installed. The port used for communication with the Transporters (9446 by default) is open in firewalls.
C	Connection from the machines on which the Transporters are installed at remote sites to vCenter servers and ESXi hosts running source VMs.

Note

For security purposes, a VPN connection should be established between the master site and remote sites.

Local Replication at Remote Site

- [Deployment Scenario](#)
- [Deployment Steps](#)
- [Connections](#)

Deployment Scenario

In this scenario, tenant VMs are running and replicated locally at the remote sites.

Example

An Enterprise has two branch offices running VMware virtual infrastructure. The IT manager located at the headquarters is responsible for the Enterprise data protection and needs to replicate business critical VMs locally at the branch offices for high availability.

Deployment Steps

To deploy the above scenario, perform the following steps:

1. Install the Director in multi-tenant mode at the master site.
2. Install at least one Transporter at each remote site.
3. For each tenant, prepare a separate folder at the remote site for creating a Backup Repository.

Connections

The implementation of the above scenario requires that the following connections be available:

Connection	Description
A	Connection from the machine on which the Director is installed to vCenter servers and ESXi hosts that run source VMs at remote sites. The port used for communication with vCenter servers and ESXi hosts (443 by default) is open in firewalls.
B	Connection from the machine on which the Director is installed to machines at remote sites where Transporters are installed. The port used for communication with the Transporters (9446 by default) is open in firewalls.
C	Connection from the machine on which the Director is installed to vCenter servers and ESXi hosts where VM replicas will be created at remote sites. The port used for communication with vCenter servers and ESXi hosts (443 by default) is open in firewalls.
D	At remote sites, connections from machines where Transporters are installed to vCenter servers and ESXi hosts running source VMs.
E	At remote sites, connections from machines where Transporters are installed to vCenter servers and ESXi hosts where VM replicas will be created.

Note

For security purposes, a VPN connection should be established between the master site and remote sites.

Backup at Master Site

- [Deployment Scenario](#)
- [Deployment Steps](#)
- [Connections](#)

Deployment Scenario

In this scenario, tenant VMs are running at the master site and the backing up of tenant VMs is also performed at the master site.

Example

A service provider runs VMs of customer A and customer B in the service provider's datacenter. The Service Provider seeks to offer Backup-as-a-Service to both customers. The customers should be able to recover their files and emails through a self-service interface without being able to see each other's backups.

Deployment Steps

To deploy the above scenario, perform the following steps:

1. Install the Director in multi-tenant mode at the master site.
2. Install at least one Transporter at the master site.
3. For each tenant, prepare a separate folder at the master site for creating a Backup Repository.

Connections

The implementation of the above scenario requires that the following connections be available:

Connection	Description
A	Connection from the machine on which the Director is installed to the machine on which the Transporter is installed. The port used for communication with the Transporters (9446 by default) is open in firewalls.
B	Connection from the machine on which the Director is installed to vCenter servers and ESXi hosts that run source VMs. The port used for communication with vCenter servers and ESXi hosts (443 by default) is open in firewalls.
C	Connection from the machine on which the Transporter is installed to vCenter servers and ESXi hosts running source VMs.
D	Connection from the machine on which the Transporter is installed to the folders where tenant Backup Repositories will be created.

Note

For security purposes, a VPN connection should be established between the master site and remote sites.

Replication at Master Site

- [Deployment Scenario](#)
- [Deployment Steps](#)
- [Connections](#)

Deployment Scenario

In this scenario, tenant VMs are running at the Master site and the replication of tenant VMs is also performed at the Master site.

Example

A service provider runs customers' VMs in the service provider's datacenter. To ensure high availability of tenant VMs, the service provider seeks to replicate customer VMs to a different server.

Deployment Steps

To deploy the above scenario, perform the following steps:

1. Install the Director in multi-tenant mode at the master site.
2. Install at least one Transporter at the master site.
3. For each tenant, prepare a separate ESXi host that will serve as a replication target.

Connections

The implementation of the above scenario requires that the following connections be available:

Connection	Description
A	Connection from the machine on which the Director is installed to vCenter servers and ESXi hosts that run source VMs. The port used for communication with vCenter servers and ESXi hosts (443 by default) is open in firewalls.
B	Connection from the machine on which the Director is installed to the machine on which the Transporter is installed. The port used for communication with the Transporters (9446 by default) is open in firewalls.
C	Connection from the machine on which the Director is installed to vCenter servers and ESXi hosts where VM replicas will be created. The port used for communication with vCenter servers and ESXi hosts (443 by default) is open in firewalls.
D	Connection from the machine on which the Transporter is installed to vCenter servers and ESXi hosts running source VMs.
E	Connection from the machine on which the Transporter is installed to vCenter servers and ESXi hosts where VM replicas will be created.

System Requirements

Before you start using NAKIVO Backup & Replication, make sure that the servers or machines that you plan to use as backup infrastructure components meet the requirements listed in the following topics:

- [“Supported Platforms” on page 120](#)
- [“Storage Integration Requirements” on page 123](#)
- [“Deployment Requirements” on page 125](#)
- [“Feature Requirements” on page 151](#)

Supported Platforms

NAKIVO Backup & Replication provides data protection for the following platforms:

- Microsoft Server 2022, 20H2, 2019, 2016, 2012R2, 2012, 20H1 with a Hyper-V role

Notes

- To learn about the limitations of NAKIVO Backup & Replication related to supported platforms, refer to the Platform Limitations section of the latest [Release Notes](#).
- To add a supported platform to NAKIVO Backup & Replication, make sure that your system has been updated with the latest patch and all the necessary requirements are met.
- The support for sub-versions that are not stated in the user guide can be clarified with the [support](#) team.

Find the necessary requirements below:

- [Hypervisor Requirements](#)
 - [Microsoft Hyper-V](#)
- [Public Cloud Requirements](#)
- [Cloud Region Requirements](#)

Hypervisor Requirements

To provide data protection for your virtual environments, make sure the following requirements are met:

Microsoft Hyper-V

- Full GUI installation of Windows Server is required.
- Full administrative permissions are required.
- Default administrative shares must be enabled on Hyper-V hosts.
- The "File server" role must be enabled on Hyper-V hosts.
- The SMB 2 protocol should be enabled on Hyper-V hosts.

Public Cloud Requirements

Amazon S3, Backblaze, and Wasabi

Refer to [Required AWS IAM Permissions for Amazon S3, Backblaze, and Wasabi](#) for details.

Note

There is also an option for granting full IAM permissions for NAKIVO Backup & Replication.

Microsoft Azure

NAKIVO Backup & Replication supports the following storage account types:

Storage account type	Supported services	Supported access tiers
Standard general-purpose v2	Blob storage (including Data Lake Storage), Queue Storage, Table storage, and Azure Files	Hot, Cool
Standard general-purpose v1	Blob storage (including Data Lake Storage), Queue Storage, Table storage, and Azure Files	N/A

Refer to [“Configuring a Microsoft Azure Storage Account” on page 414](#) for more information.

- Debian 11.7 (64-bit)
- Debian 11.6 (64-bit)

Cloud Region Requirements

For **Amazon S3** or **Amazon EC2**, NAKIVO Backup & Replication supports the following regions:

- AWS GovCloud (US-West)
- AWS GovCloud (US-East)
- US East (Ohio)
- US East (N. Virginia)
- US West (N. California)
- US West (Oregon)
- Africa (Cape Town)
- Asia Pacific (Hong Kong)
- Asia Pacific (Hyderabad)
- Asia Pacific (Jakarta)
- Asia Pacific (Melbourne)
- Asia Pacific (Mumbai)
- Asia Pacific (Osaka)
- Asia Pacific (Seoul)
- Asia Pacific (Singapore)
- Asia Pacific (Sydney)
- Asia Pacific (Tokyo)
- Canada (Central)
- EU (Frankfurt)

- EU (Zurich)
- EU (Ireland)
- EU (London)
- EU (Milan)
- EU (Spain)
- EU (Paris)
- EU (Stockholm)
- Middle East (Bahrain)
- Middle East (UAE)
- South America (Sao Paulo)

For **Wasabi**, NAKIVO Backup & Replication supports the following regions:

- Wasabi US East 1 (N. Virginia)
- Wasabi US East 2 (N. Virginia)
- Wasabi US Central 1 (Texas)
- Wasabi US West 1 (Oregon)
- Wasabi CA Central 1 (Toronto)
- Wasabi EU West 1 (London)
- Wasabi EU West 2 (Paris)
- Wasabi EU Central 1 (Amsterdam)
- Wasabi EU Central 2 (Frankfurt)
- Wasabi AP Northeast 1 (Tokyo)
- Wasabi AP Northeast 2 (Osaka)
- Wasabi AP Southeast 1 (Singapore)
- Wasabi AP Southeast 2 (Sydney, Australia)

Storage Integration Requirements

NAKIVO Backup & Replication can be integrated with [deduplication appliances](#) including Dell EMC Data Domain, NEC HYDRAsTOR, and HP StoreOnce (Catalyst) appliances by using an **Incremental-with-full-backups** repository. Deduplication appliances are servers designed to reduce data size and can be used as backup targets. They operate best with sequential large block I/O from backup software. Therefore, when backing up to a deduplication appliance, it is important to make sure that the architecture of your Backup Repository is optimized for these devices and your backups have a large block I/O. Only by doing this will you be able to maximize your backup speed. NAKIVO Backup & Replication provides advanced integration with the following storage solutions:

- [Dell-EMC Data Domain](#)
- [NEC HYDRAsTOR](#)
- [HPE StoreOnce with Catalyst Support](#)

Dell-EMC Data Domain

Supported versions:

- Dell-EMC Data Domain 6.1 - 7.9

NEC HYDRAsTOR

Supported systems:

- NEC HYDRAsTOR v5.5.1-5.6.0
- NEC Storage HS Universal Express I/O Module Version v1.8.0-1.8.4

HPE StoreOnce with Catalyst Support

Supported versions:

- HPE StoreOnce 3.18.18
- HPE StoreOnce 4.2.3
- HPE StoreOnce 4.3.2

Integration requirements and limitations:

- NAKIVO Backup & Replication installed on Windows (x64) and Linux (x64) machines must have HPE StoreOnce Catalyst API Library.
- HPE StoreOnce Catalyst integration is not supported on devices with ARM7 and ARM64 (AArch64) processors.

Supported Maximums

StoreOnce Model	Maximum Sessions	Maximum Transporter Load	Maximum Recovery Points
VSA			
VSA Gen 4 (128+sessions)	128-256	6	7
HPE ProLiant Gen 10 (StoreOnce 4.2.3)			
3620	128	6	7
3640	192	6	14
5200	512	10	21
5250	512	10	21
5650	1024	16	30
HPE ProLiant Gen 9 (StoreOnce 3.18.18)			
3500	192	6	14
5100	320	10	14
5500	1000	16	30
6600	1024	16	30
HPE ProLiant Gen 8 (StoreOnce 3.18.18)			
4500	128	6	7
4700	192	6	14
4900	500	10	21
6500	512	10	21

Deployment Requirements

NAKIVO Backup & Replication can be deployed as a virtual appliance (VA) or installed directly onto a supported machine or network-attached storage (NAS). Below is the list of deployment requirements and performance-related recommendations.

- [Hardware](#)
 - [VM or Physical Machine](#)
 - [Network Attached Storage](#)
 - [Scalability and UI Performance](#)
- [Operating Systems](#)
- [Networking Requirements](#)
 - [Required TCP Ports](#)
 - [Network Conditions](#)
- [Web Browsers](#)

Hardware

VM or Physical Machine

NAKIVO Backup & Replication can be installed on a machine with the following minimum hardware characteristics:

Director and Onboard Transporter:

- **CPU:** x86-64, 2 cores
- **RAM:** 4 GB + 250 MB for each concurrent task
 - For SaaS Backup Repository-related activities:
 - additional 2 GB
 - additional 100 MB for each concurrent Java Transporter task
- **Free space:** 10 GB

Transporter only:

- **CPU:** x86-64, 2 cores
- **RAM:** 2 GB + 250 MB for each concurrent task
 - For SaaS Backup Repository-related activities:
 - additional 2 GB
 - additional 100 MB for each concurrent Java Transporter task
- **Free space:** 5 GB

Network Attached Storage

NAKIVO Backup & Replication can be installed on supported NAS with the following minimum hardware characteristics:

Director and Onboard Transporter:

- **CPU:** x86-64, 2 cores
- **RAM:** 1 GB
 - For SaaS Backup Repository-related activities:
 - minimum total RAM: 4 GB
 - additional 100 MB for each concurrent Java Transporter task
- **Free space:** 10 GB

Transporter only:

- **CPU:** x86-64, 2 cores
- **RAM:** 512 MB
 - For SaaS Backup Repository-related activities:
 - minimum total RAM: 4 GB
 - additional 100 MB for each concurrent Java Transporter task
- **Free space:** 5 GB

Note

[Onboard Transporters](#) installed on NAS devices with ARM CPU do not support VMware infrastructures. Refer to [Transporter Does Not Support VMware vSphere](#) for a solution.

Supported NAS Devices

- **Synology:** For a full list of supported models, refer to [“Supported Synology NAS Devices” on page 146](#)
- **QNAP:** For a full list of supported models, refer to [“Supported QNAP NAS Devices” on page 139](#)
- **ASUSTOR:** For a full list of supported models, refer to [“Supported ASUSTOR NAS Devices” on page 134](#)
- **NETGEAR:** For a full list of supported. For a full list of supporter models, refer to [“Supported NETGEAR NAS Devices” on page 136](#).
- **Western Digital:** For a full list of supported models, refer to [“Supported Western Digital NAS Devices” on page 150](#).

Generic ARM-based NAS devices

The device for installing NAKIVO Backup & Replication should meet the following requirements:

- Single-board computer with ARMv7/ARMv8 CPU (e.g. Raspberry Pi 3 Model B+)
- 32/64-bit Linux-based OS supported by NAKIVO Backup & Replication

- Minimum 16 GB of onboard memory or microSD card for OS & software installation
- RAM: minimum 512 MB for Transporter-only installation; minimum 1 GB for full installation
- Separate microSD/HDD/SSD card for Repository storage
- Open ports for Director and Transporter (see Required TCP Ports)
- Enabled SSH protocol
- Active network connection

Raspberry Pi

NAKIVO Backup & Replication can be installed on a Raspberry Pi 3 Model B+ machine with the following minimum hardware characteristics:

Director and Onboard Transporter:

- **RAM:** 1 GB + 250 MB for each concurrent task
- **Free space:** 16 GB

Transporter only:

- **RAM:** 512 MB + 250 MB for each concurrent task
- **Free space:** 16 GB

Scalability and UI Performance

For optimal user interface performance, it's important to allocate an appropriate amount of resources to your NAKIVO Backup & Replication instance. The following are the guidelines for allocating RAM to your instance based on the number of jobs created by this instance:

1. Up to 29 jobs: 2 GB of allocated RAM
2. 30–49 jobs: 4 GB of allocated RAM
3. 50–99 jobs: 8 GB of allocated RAM
4. 100–199 jobs: 16 GB of allocated RAM
5. 200+ jobs: 20 GB of allocated RAM

Note

The above guidelines refer to both active and disabled jobs.

If your instance has less than the recommended amount of allocated RAM for the respective number of jobs, consider adding more resources to the machine hosting the instance.

The machines used to open product web UI should meet the following requirements:

- **Processor:** 1.5 GHz or higher
- **RAM:** 1 GB or more
- **Display resolution:** 1366x768 pixels or higher

- **Web browser:** Mozilla Firefox or Google Chrome
- Cookies, Javascript and images must be enabled in the web browser.

Operating Systems

NAKIVO Backup & Replication can be installed on the following operating systems:

Note

- SELinux module must be disabled to install NAKIVO Backup & Replication on Linux.
- Installation on Windows Core is currently not supported.

Windows

- Microsoft Windows Server 2022 (21H2) (x64)
- Microsoft Windows Server 20H2 (x64)
- Microsoft Windows Server 2019 Standard (x64)
- Microsoft Windows Server 2016 Standard (x64)
- Microsoft Windows Server 2012 R2 Standard (x64)
- Microsoft Windows Server 2012 Standard (x64)
- Microsoft Windows 11 (x64)
- Microsoft Windows 10 Enterprise (x64)
- Microsoft Windows 10 Home (x64)
- Microsoft Windows 10 Professional (x64)
- Microsoft Windows 8 Professional (x64)

Linux

- Debian 11.7 (64-bit)
- Debian 11.6 (64-bit)
- Debian 11.5 (64-bit)
- Debian 11.4 (64-bit)
- Debian 11.3 (64-bit)
- Debian 11.2 (64-bit)
- Debian 11.1 (64-bit)
- Debian 11.0 (64-bit)
- Debian 10.13 (64-bit)
- Debian 10.12 (64-bit)
- Debian 10.11 (64-bit)
- Debian 10.10 (64-bit)
- Debian 10.9 (64-bit)

- Debian 10.8 (64-bit)
- Debian 10.7 (64-bit)
- Debian 10.6 (64-bit)
- Debian 10.5 (64-bit)
- Debian 10.4 (64-bit)
- Debian 10.3 (64-bit)
- Debian 10.2 (64-bit)
- Debian 10.1 (64-bit)
- Ubuntu 22.04 Server LTS (x64)
- Ubuntu 20.04 Server (x64)
- Ubuntu 18.04 Server (x64)
- Ubuntu 16.04 Server (x64)
- SUSE Linux Enterprise Server 15 SP4 (x64)
- SUSE Linux Enterprise Server 15 SP3 (x64)
- SUSE Linux Enterprise Server 15 SP2 (x64)
- SUSE Linux Enterprise Server 15 SP1 (x64)
- SUSE Linux Enterprise Server 12 SP5 (x64)
- SUSE Linux Enterprise Server 12 SP4 (x64)
- SUSE Linux Enterprise Server 12 SP3 (x64)
- Red Hat Enterprise Linux 9.2 (x64)
- Red Hat Enterprise Linux 9.1 (x64)
- Red Hat Enterprise Linux 9.0 (x64)
- Red Hat Enterprise Linux 8.6 (x64)
- Red Hat Enterprise Linux 8.5 (x64)
- Red Hat Enterprise Linux 8.4 (x64)
- Red Hat Enterprise Linux 8.3 (x64)
- Red Hat Enterprise Linux 8.2 (x64)
- Red Hat Enterprise Linux 8.1 (x64)
- Red Hat Enterprise Linux 8.0 (x64)
- Red Hat Enterprise Linux 7.9 (x64)
- Red Hat Enterprise Linux 7.8 (x64)
- Red Hat Enterprise Linux 7.7 (x64)
- Red Hat Enterprise Linux 7.6 (x64)
- Red Hat Enterprise Linux 7.5 (x64)
- Red Hat Enterprise Linux 7.4 (x64)
- CentOS Stream 9 (x64)

- CentOS Stream 8 (x64)
- CentOS Linux 8.4 (x64)
- CentOS Linux 8.3 (x64)
- CentOS Linux 8.2 (x64)
- CentOS Linux 8.1 (x64)
- CentOS Linux 8.0 (x64)
- CentOS Linux 7.9 (x64)
- CentOS Linux 7.8 (x64)
- CentOS Linux 7.7 (x64)
- CentOS Linux 7.6 (x64)
- CentOS Linux 7.5 (x64)
- CentOS Linux 7.4 (x64)
- CentOS Linux 7.3 (x64)
- CentOS Linux 7.2 (x64)
- CentOS Linux 7.1 (x64)
- CentOS Linux 7.0 (x64)

NAS

- ASUSTOR ADM v3.5-v4.1
- Netgear ReadyNAS OS v6.10.3
- Netgear ReadyNAS OS v6.9
- Synology DSM v6.0-v7.1.1
- QNAP QTS v4.3-v5.0
- QNAP QuTS Hero h4.5.3-v5.0
- WD MyCloud v5
- TrueNAS CORE v12-13

Supported Operating System Localizations

NAKIVO Backup & Replication can be installed on a supported OS with the following OS localization:

- English
- Italian
- German
- French
- Spanish

Networking Requirements

Required TCP Ports

NAKIVO Backup & Replication requires the following TCP ports to be open for a successful operation:

TCP Port (Default)	Where	Description
NAKIVO Backup & Replication		
4443	Director	Used to access the Director web UI. Must be opened on the Director machine.
9446	Transporter	Used by Director and Transporters to communicate with the Transporter. Must be opened on the Transporter machine.
9448 - 10000	Transporter	Used by Transporters for cross-Transporter data transfer. Must be opened on the Transporter machine.
VMware		
443	vCenter Server, ESXi host	Used by Director and Transporters to access VMware infrastructure. Must be opened on vCenter Servers and ESXi hosts.
902	ESXi host	Used by Transporters to access VMware infrastructure. Must be opened on ESXi hosts.
3260	Transporter, ESXi host	Used by Proxy Transporters to access VMware infrastructure during a Flash VM Boot. Must be opened on the Transporter machine and the ESXi host used as the target for a Flash VM Boot.
Hyper-V		
137 - 139	Hyper-V hosts	Used by Director to upload files and install configuration service. Must be opened on Hyper-V servers.
445	Hyper-V hosts	Used by Director to upload files and install configuration service.

5986 (opens automatically)	Hyper-V hosts	Used by Transporter to add a host to inventory and establish a connection with it.
9445 (opens automatically)	Hyper-V hosts	Used by Director to upload files and install configuration service. Must be opened on Hyper-V host if NAKIVO Backup & Replication is installed on a host and this host is added to inventory simultaneously.
9446 (opens automatically)	Hyper-V hosts	Used by Director and Transporters to communicate with the Transporter. Must be opened on Used by Transporters for cross-Transporter data transfer. Must be opened on the Transporter machine. the Transporter machine.
9448 -10000 (opens automatically)	Hyper-V hosts	Used by Transporters for cross-Transporter data transfer. Must be opened on the Transporter machine.
Physical machine (Windows)		
445	Windows machine	Used by Director to upload files and install configuration service via SMB.
9446 (opens automatically)	Windows machine	Used to create the Transporter installed by default.
Physical machine (Linux)		
22	Linux machine	Used by Director to access a Linux physical machine via SSH.
9446 (opens automatically)	Linux machine	Used to create the Transporter installed by default.

Network Conditions

NAKIVO Backup & Replication has been tested to work in the following minimal network conditions:

- **Latency (RTT):** Up to 250 ms
- **Packet loss:** Up to 1 %
- **Bandwidth:** 1 Mb/s or higher
- **ICMP ping traffic:** It should be allowed on all hosts on which NAKIVO Backup & Replication components are installed as well as on all source and target hosts.

Web Browsers

NAKIVO Backup & Replication user interface can be accessed through the following web browsers:

- Google Chrome: Version 80
- Mozilla Firefox: Version 74

Supported ASUSTOR NAS Devices

NAKIVO Backup & Replication supports the following ASUSTOR NAS devices :

Director and Onboard Transporter

- AS3102T
- AS3102T v2
- AS3104T
- AS3202T
- AS3204T
- AS3204T v2
- AS4002T
- AS4004T
- AS5202T
- AS5304T
- AS5002T
- AS5004T
- AS5008T
- AS5010T
- AS6102T
- AS6104T
- AS6302T
- AS5102T
- AS5104T
- AS5108T
- AS5110T
- AS6202T
- AS6204T
- AS6208T
- AS6210T
- AS6404T
- AS6204RS / AS6204RD
- AS-609RS / AS-609RD
- AS7004T
- AS7008T
- AS7010T
- AS6212RD
- AS7009RD / AS7009RDX
- AS7012RD / AS7012RDX
- AS-602T
- AS-604RS / AS-604RD
- AS-604T

- AS-606T
- AS-608T
- AS6508T
- AS6510T
- AS7110T
- AS6602T
- AS6604T
- AS7116RDX
- AS7112RDX
- AS1102T
- AS1104T
- AS3302T
- AS3304T
- AS6504RD
- AS6504RS
- AS6512RD
- AS6508T
- AS6510T
- AS7110T
- AS6602T
- AS6604T
- AS7116RDX
- AS7112RDX

Transporter Only

- AS1002T
- AS1002T v2
- AS1004T
- AS1004T v2

For minimum hardware requirements, refer to [“Network Attached Storage” on page 126](#).

Supported NETGEAR NAS Devices

NAKIVO Backup & Replication supports the following NETGEAR NAS devices:

Director and Onboard Transporter

- RN51600
- RN51661D
- RN51661E
- RN51662D
- RN51662E
- RN51663D
- RN51663E
- RN51664E
- ReadyNAS 524X
- ReadyNAS 526X
- ReadyNAS 528X
- ReadyNAS 626X
- ReadyNAS 628X
- RN716X
- RN628X
- RN626X
- RN528X
- RN526X
- RN524X
- RN31600
- RN31661D
- RN31661E
- RN31662D
- RN31662E
- RN31663D
- RN31663E
- RN31664E
- ReadyNAS 422
- ReadyNAS 424
- ReadyNAS 426
- ReadyNAS 428
- RN516
- RN426
- RN424
- RN422
- RN31400
- RN31421D

- RN31441D
- RN31441E
- RN31442D
- RN31442E
- RN31443D
- RN31443E
- RN316
- RN31200
- RN31211D
- RN31212D
- RN31221D
- RN31221E
- RN31222D
- RN31222E
- RN31223D
- RN314
- RN312
- RN322121E
- RN322122E
- RN322123E
- RN322124E
- RN32261E
- RN32262E
- RN32263E
- RN4220S
- RN4220X
- RN422X122
- RN422X123
- RN422X124
- RN422X62E
- RN422X63E
- RN422X64E
- RR2304
- RN21241D
- RN21241E
- RN21243D
- RN21243E
- RN3130
- RN31342E
- RN3138
- RN3220
- RR2312
- RR3312

- RN4220
- RR4312X
- RR4312S
- RR4360X
- RR4360S
- RN202
- RN204
- RN212
- RN214
- RN2120

Transporter Only

- RN102
- RN10200
- RN10211D
- RN10221D
- RN10222D
- RN10223D
- RN104
- RN10400
- RN10421D
- RN10441D
- RN10442D
- RN10443D

For minimum hardware requirements, refer to [“Network Attached Storage” on page 126](#)

Supported QNAP NAS Devices

NAKIVO Backup & Replication supports the following QNAP NAS Devices:

Director and Onboard Transporter

- HS-251+
- HS-453DX
- TS-251
- TS-251+
- TS-251A
- TS-251B
- TS-253Be
- TS-328
- TS-332X
- TS-351
- TS-431P
- TS-431P2
- TS-431X
- TS-431X2
- TS-431XeU
- TS-432XU
- TS-432XU-RP
- TS-451
- TS-451+
- TS-451A
- IS-400 Pro
- IS-453S
- TBS-453A
- TBS-453DX
- TS-128A
- TS-131P
- TS-231P
- TS-231P2
- TS-253 Pro
- TS-253A
- TS-253B
- TS-228A
- TS-451U
- TS-453 mini
- TS-453 Pro
- TS-453A
- TS-453B

- TS-453Be
- TS-453Bmini
- TS-453BT3
- TS-453BU
- TS-453BU-RP
- TS-453U
- TS-453U-RP
- TS-463U
- TS-463U-RP
- TS-463XU
- TS-463XU-RP
- TS-473
- TS-563
- TS-653 Pro
- TS-653A
- TS-653B
- TS-653B
- TS-673
- TS-677
- TS-832X
- TS-832XU
- TS-832XU-RP
- TS-853 Pro
- TS-853A
- TS-853BU
- TS-853BU-RP
- TS-853U
- TS-853U-RP
- TS-863U
- TS-863U-RP
- TS-863XU
- TS-863XU-RP
- TS-873
- TS-873U
- TS-873U-RP
- TS-877
- TS-877XU
- TS-877XU-RP
- TS-883XU
- TS-883XU-RP
- TS-932X
- TS-963X
- TS-977XU

- TS-977XU-RP
- TS-983XU
- TS-983XU-RP
- TS-1232XU
- TS-1232XU-RP
- TS-1253BU
- TS-1253BU-RP
- TS-1253U
- TS-1253U-RP
- TS-1263U-RP
- TS-1263U
- TS-1263XU
- TS-1263XU-RP
- TS-1273U
- TS-1273U-RP
- TS-1277
- TS-1277XU-RP
- TS-1283XU-RP
- TS-1635AX
- TS-1673U
- TS-1673U-RP
- TS-1677X
- TS-1677XU-RP
- TS-1683XU-RP
- TS-1685
- TS-2477XU-RP
- TS-2483XU-RP
- TVS-463
- TVS-471
- TVS-472XT
- TVS-473e
- TVS-473
- TVS-663
- TVS-671
- TVS-672XT
- TVS-673
- TVS-673e
- TVS-682
- TVS-682T
- TVS-863
- TVS-863+
- TVS-871
- TVS-871T

- TVS-871U-RP
- TVS-872XT
- TVS-872XU
- TVS-872XU-RP
- TVS-873e
- TVS-873
- TVS-882
- TVS-882T
- TVS-882ST2
- TVS-882BR
- TVS-882BRT3
- TVS-882ST3
- TVS-951X
- TVS-972XU
- TVS-972XU-RP
- TVS-1271U-RP
- TVS-1272XU-RP
- TVS-1282
- TVS-1282T
- TVS-1282T3
- TVS-1582TU
- TVS-1672XU-RP
- TVS-2472XU-RP
- SS-EC1279U-SAS-RP
- SS-EC1879U-SAS-RP
- SS-EC2479U-SAS-RP
- TDS-16489U
- TES-3085U
- TES-1885U
- TS-EC880U
- TS-EC880U R2
- TS-EC1280U
- TS-EC1280U R2
- TS-EC1680U
- TS-EC1680U R2
- TS-EC2480U
- TS-EC2480U R2
- TVS-EC880
- TVS-EC1080
- TVS-EC1080+
- TVS-EC1280U-SAS-RP
- TVS-EC1580MU-SAS-RP
- TVS-EC1680U-SAS-RP

- TVS-EC1680U-SAS-RP R2
- TVS-EC2480U-SAS-RP
- TVS-EC2480U-SAS-RP R2
- TVS-EC2480U-SAS-RP R2
- TVS-EC1580MU-SAS-RP R2
- TVS-EC1280U-SAS-RP R2
- TDS-16489U-SE1-R2
- TDS-16489U-SE2-R2
- TDS-16489U-SF2-R2
- TDS-16489U-SF3-R2
- TS-2888X-W2195-512G
- TS-2888X-W2195-256G
- TS-2888X-W2195-128G
- TS-2888X-W2175-512G
- TS-2888X-W2175-256G
- TS-2888X-W2175-128G
- TS-2888X-W2145-512G
- TS-2888X-W2145-256G
- TS-2888X-W2145-128G
- TS-2888X-W2133-64G
- TS-2888X-W2123-32G
- ES2486dc
- TS-1886XU-RP
- TS-230
- TS-251C
- TS-251D
- TS-253D
- TS-451DeU
- TS-453D
- TS-653B
- TS-653D
- TS-h1277XU-RP
- TS-h1283XU-RP
- TS-h977XU-RP
- TVS-472XT-PT
- TVS-672N
- TVS-872N
- TVS-EC2480U-SAS-RP-R2
- TS-431P3
- TS-231P3
- TS-431X3
- TS-h686-D1602
- TS-h886-D1622

- TS-873AU
- TS-873AU-RP
- TS-1273AU-RP
- TS-1673AU-RP
- TS-932PX
- GM-1001
- TS-432PXU
- TS-432PXU-RP
- TS-832PXU
- TS-832PXU-RP
- TS-1232PXU-RP
- TS-451D2
- TS-h2490FU-7232P-64G
- TS-h2490FU-7302P-128G
- TS-h1886XU-RP
- TS-h1683XU-RP
- TS-h2483XU-RP
- TVS-h1288X
- TVS-h1688X
- TS-h973AX-8G
- TS-h973AX-32G
- TS-832PX
- TS-h3088XU-RP-W1270-64G
- TS-h3088XU-RP-W1250-32G
- TS-453DU-4G
- TS-473A
- TS-673A
- TS-873A
- TS-EC879U-RP
- TS-831X-4G
- TS-831X-8G
- TS-831X-16G
- TS-EC879U-RP
- TS-h987XU-RP
- TS-h3077AFU
- TS-h1277AXU-RP
- TS-h1677AXU-RP
- TVS-h674T
- TVS-h874T
- TBS-574TX
- TS-AI642
- TS-855X

Transporter Only

- TS-131P
- TS-231P
- TS-431P
- TS-431X

For minimum hardware requirements, refer to [“Network Attached Storage” on page 126](#).

Supported Synology NAS Devices

NAKIVO Backup & Replication supports the following Synology NAS devices:

Director and Onboard Transporter

- FS3017
- FS2017
- FS1018
- RS18017xs+
- RS18016xs+
- RS10613xs+
- RS4017xs+
- RS3618xs
- RS3617xs+
- RS3617RPxs
- RS3617xs
- RS3614xs+
- RS3614RPxs
- RS3614xs
- RS3413xs+
- RS3412RPxs
- RS3412xs
- RS3411RPxs
- RS3411xs
- RS2818RP+
- RS2418RP+
- RS2418+
- RS2416RP+
- RS2416+
- RS2414RP+
- RS2414+
- RS2212RP+
- RS2212+
- RS2211RP+
- RS2211+
- RS1619xs+
- RS1219+
- RS818RP+
- RS818+
- RS816
- RS815RP+
- RS815+

- RS815
- RS814RP+
- RS814+
- RS814
- RS812RP+
- RS812+
- RS810RP+
- RS810+
- RC18015xs+
- DS3617xs
- DS3615xs
- DS3612xs
- DS3611xs
- DS3018xs
- DS2415+
- DS2413+
- DS2411+
- DS2015xs
- DS1819+
- DS1817+
- DS1817
- DS1815+
- DS1813+
- DS1812+
- DS1618+
- DS1517+
- DS1517
- DS1515+
- DS1515
- DS1513+
- DS1512+
- DS1511+
- DS918+
- DS916+
- DS718+
- DS716+II
- DS716+
- DS715
- DS713+
- DS712+
- DS710+
- DS418
- DS418play

- DS418j
- DS416
- DS416play
- DS415+
- DS414
- DS412+
- DS411+II
- DS411+
- DS218+
- DS218
- DS218play
- DS216+II
- DS216+
- DS216play
- DS215+
- DS214+
- DS118
- DS116
- DS1019+
- DS2419+
- DS420+
- DS420j
- DS620slim
- DS720+
- DS920+
- FS3400
- FS3600
- FS6400
- RS819
- RS820+
- RS820RP+
- SA3200D
- SA3400
- SA3600
- DS1520+
- DS1621+
- DS1621xs+
- DS1821+
- DS220
- RS1221+
- RS1221RP+
- RS2421+
- RS2421RP+

- RS4021xs+

Transporter Only

- RS217
- RS214
- DS416slim
- DS416j
- DS414slim
- DS414j
- DS218j
- DS216
- DS216j
- DS215j
- DS214
- DS213j
- DS115
- DS114
- DS220j
- DS419slim

Important

For minimum hardware requirements, refer to [“Network Attached Storage” on page 126](#).

Supported Western Digital NAS Devices

NAKIVO Backup & Replication supports the following Western Digital NAS devices for Director and Onboard installation:

- MyCloud DL2100
- MyCloud DL4100
- MyCloud PR2100
- MyCloud PR4100

For minimum hardware requirements, refer to [“Network Attached Storage” on page 126](#).

Feature Requirements

Some NAKIVO Backup & Replication features require certain conditions in order to function properly. To learn about the limitations of NAKIVO Backup & Replication, refer to the Feature Limitations section of the latest [Release Notes](#). The requirements for product features are listed below.

- [Auto-Update](#)
- [File Recovery](#)
- [File Share Backup](#)
- [Object Recovery and Log Truncation for Microsoft Exchange Server](#)
- [Object Recovery and Log Truncation for Microsoft SQL Server](#)
- [Object Recovery for Microsoft Active Directory](#)
- [Site Recovery](#)
- [Cross-Platform Recovery](#)
- [App-Aware Mode](#)
- [Encrypted Backup Repository](#)
- [Native Tape Support](#)
- [Backup Immutability](#)
- [VM Limitation for Multi-Tenancy](#)
- [Permanent VM Agent](#)
- [External Database](#)
- [Generic S3-Compatible Object Storage](#)
- [Merge Jobs](#)
- [MSP Console](#)
- [Backup Malware Scan](#)

Auto-Update

Auto-update is available for instances of NAKIVO Backup & Replication installed on the following operating systems:

- Linux
- Windows

Note

Auto-update is not supported for NAS systems.

Auto-update is available for the following types of Transporters:

- Auto-injected Transporters on Linux (includes physical Transporters)
- Manually installed Transporters on Linux
- Auto-injected Transporters on Windows (includes Hyper-V and physical Transporters)
- Manually installed Transporters on Windows
- Auto-injected Transporters in AWS (Linux)
- Auto-injected Transporter in VMware (Linux)

Note

Manually installed Transporters on Linux and Windows must be v10.8 or newer to support auto-update.

Before initiating an auto-update, make sure that the following conditions are met:

- If updating a manually installed Transporter on Linux or Windows, make sure that you have configured a **Master Password** for the Transporter in the [Managing Credentials](#) menu.
- At least 1 GB of free space is available on the machine on which the full solution is installed.
- If you have a perpetual license, your Maintenance & Support period is active. You can verify this on the product [Licensing](#) page.

File Recovery

Recovered files can be downloaded or sent via email. They can also be recovered to a server or file share. Before using the feature, make sure the following packages and services are installed/running either on the (proxy) transporter or target server depending on the selected recovery method:

Microsoft Windows

- Net Security package should be installed
- Microsoft iSCSI Initiator service should be installed and running
- *net.exe* utility should be installed
- SMB 2/CIFS File Sharing Support feature should be turned on
- PowerShell should be version 2.0 or above
- PowerShell ISE should be available

Ubuntu Linux

- *openssh-server* package should be installed
- *sshd* service should be running
- *parted* utility should be installed
- *fdisk* utility should be installed
- *open-iscsi* package should be installed
- *iscsiadm* utility should be installed

- *iscsid* utility should be installed
- *iscsid* service should be running (for v16.04 and v18.04)
- *iscsi_tcp* module should be installed
- *SELinux* service should be disabled

SUSE Linux Enterprise Server (SLES)

- *openssh-server* package should be installed
- *sshd* service should be running
- *parted* utility should be installed
- *fdisk* utility should be installed
- *open-iscsi* package should be installed
- *iscsiadm* utility should be installed
- *iscsid* utility should be installed
- *iscsid* service should be running (for v12)
- *iscsi_tcp* module should be installed
- *SELinux* service should be disabled

Red Hat Enterprise Linux (RHEL)

- *openssh-server* package should be installed
- *sshd* service should be running
- *parted* utility should be installed
- *fdisk* utility should be installed
- *iscsi-initiator* package should be installed
- *iscsiadm* utility should be installed
- *iscsid* utility should be installed
- *iscsid* service should be running
- *iscsi_tcp* module should be installed
- *SELinux* service should be disabled

Note

File recovery is not supported for 4K sector size drives and datastores. Refer to [How to Check Drive and Datastore Sector Size](#) for more information.

Below are the requirements which must be met for each recovery method.

Downloading Files to Browser or Sending Files via Email

The following file systems are supported:

- If the Transporter assigned to the backup repository is installed on Windows:
 - NTFS
 - FAT32
 - ReFS
- If the Transporter assigned to the backup repository is installed on Linux:
 - NTFS
 - FAT32
 - EXT3
 - EXT4
 - XFS
- For the ReiserFS file system, it is necessary to install the *linux-image-extra-virtual* package for Ubuntu.:

```
apt-get -y install linux-image-extra-virtual
```

- Linux VMs where Transporter is deployed should have the *lvm2* package installed to allow mounting LVM volumes.
- The *ntfs-3g* package should be installed along with Transporter on Linux to allow recognizing NTFS partitions.

Recovering Files to Server

To recover files to a server, make sure you meet the following requirements:

Supported OS

- **Windows**
 - Windows Server 2022 (21H2) (x64)
 - Windows Server 20H2 (20H2) (x64)
 - Microsoft Windows Server 2022 (x64)
 - Microsoft Windows Server 2019 Standard (x64)
 - Microsoft Windows Server 2016 Standard (x64)
 - Microsoft Windows Server 2012 R2 Standard (x64)
 - Microsoft Windows Server 2012 Standard (x64)
 - Microsoft Windows 11 (21H2) (x64)
 - Microsoft Windows 11 (x64)
 - Windows 10 Enterprise (20H2 / 21H1 / 21H2) (x64)
 - Microsoft Windows 10 Home (x64)
 - Microsoft Windows 10 Professional (x64)
 - Microsoft Windows 8 Professional (x64)

- **Linux**

- Debian 11.7 (64-bit)
- Debian 11.6 (64-bit)
- Debian 11.5 (64-bit)
- Debian 11.4 (64-bit)
- Debian 11.3 (64-bit)
- Debian 11.2 (64-bit)
- Debian 11.1 (64-bit)
- Debian 11.0 (64-bit)
- Debian 10.13 (64-bit)
- Debian 10.12 (64-bit)
- Debian 10.11 (64-bit)
- Debian 10.10 (64-bit)
- Debian 10.9 (64-bit)
- Debian 10.8 (64-bit)
- Debian 10.7 (64-bit)
- Debian 10.6 (64-bit)
- Debian 10.5 (64-bit)
- Debian 10.4 (64-bit)
- Debian 10.3 (64-bit)
- Debian 10.2 (64-bit)
- Debian 10.1 (64-bit)
- Ubuntu 22.04 Server LTS (x64)
- Ubuntu 20.04 Server (x64)
- Ubuntu 18.04 Server (x64)
- Ubuntu 16.04 Server (x64)
- SUSE Linux Enterprise Server 15 SP4 (x64)
- SUSE Linux Enterprise Server 15 SP3 (x64)
- SUSE Linux Enterprise Server 15 SP2 (x64)
- SUSE Linux Enterprise Server 15 SP1 (x64)
- SUSE Linux Enterprise Server 12 SP5 (x64)
- SUSE Linux Enterprise Server 12 SP4 (x64)
- SUSE Linux Enterprise Server 12 SP3 (x64)
- Red Hat Enterprise Linux 9.2 (x64)
- Red Hat Enterprise Linux 9.1 (x64)
- Red Hat Enterprise Linux 9.0 (x64)

- Red Hat Enterprise Linux 8.6 (x64)
- Red Hat Enterprise Linux 8.5 (x64)
- Red Hat Enterprise Linux 8.4 (x64)
- Red Hat Enterprise Linux 8.3 (x64)
- Red Hat Enterprise Linux 8.2 (x64)
- Red Hat Enterprise Linux 8.1 (x64)
- Red Hat Enterprise Linux 8.0 (x64)
- Red Hat Enterprise Linux 7.9 (x64)
- Red Hat Enterprise Linux 7.8 (x64)
- Red Hat Enterprise Linux 7.7 (x64)
- Red Hat Enterprise Linux 7.6 (x64)
- Red Hat Enterprise Linux 7.5 (x64)
- Red Hat Enterprise Linux 7.4 (x64)
- CentOS Stream 9 (x64)
- CentOS Stream 8 (x64)
- CentOS Linux 8.4 (x64)
- CentOS Linux 8.3 (x64)
- CentOS Linux 8.2 (x64)
- CentOS Linux 8.1 (x64)
- CentOS Linux 8.0 (x64)
- CentOS Linux 7.9 (x64)
- CentOS Linux 7.8 (x64)
- CentOS Linux 7.7 (x64)
- CentOS Linux 7.6 (x64)
- CentOS Linux 7.5 (x64)
- CentOS Linux 7.4 (x64)
- CentOS Linux 7.3 (x64)
- CentOS Linux 7.2 (x64)
- CentOS Linux 7.1 (x64)
- CentOS Linux 7.0 (x64)

TCP Ports

Connection to the following TCP ports should be allowed by the firewall of the target system:

- 22 – Used by SSH for secure logins, file transfers (scp, sftp) and port forwarding.
- 9445 – Used by NAKIVO Backup & Replication to communicate with the VM.
- 10000 – Used by NAKIVO Backup & Replication for iSCSI communication.

Note

ICMP Ping traffic should be allowed by the firewall of the target system.

Permissions

The following permissions for Microsoft Windows VMs should be granted:

- Users should be members of a local Administrators group.
- Users should have access to default administrative shares.
- Users should have permissions to access the corresponding folder\file.
- Users should have executive permissions for running some utilities, for example, `net . exe` utility.
- User Account Control (UAC) remote restrictions should be disabled for some Microsoft Windows versions.
- Users should have permissions to "Log on as a batch job".

The following permissions and settings should be set up for Linux VMs:

- Users should belong to the `sudo` group to complete recovering files to server successfully.
- Users should have executive permissions for running some utilities, for example, `/sbin/parked`, `/sbin/fdisk`, `/sbin /iscsiadm`, `/sbin/iscsid`.
- PasswordAuthentication should be set to "yes".
- Provide special permissions to NAKIVO recovery service. For more details, refer to [Required Permissions for Linux Recovery Server](#).

Recovering Files to File Share

The following file share types are supported:

- NFS
- CIFS

The target share must have one of the following protocols installed:

- NFS 3.x
- SMB 2.x
- SMB 3.x

To recover file/folder attributes or encrypted files, the machine on which the Transporter is installed, recovery share, and backed up machine must have the same OS capabilities and file system type. To avoid potential issues while conducting file recovery, ensure the following:

- If the target is an NFS file share, check that `nfs-utils` is installed.
- If the target is a CIFS share, add a localhost domain to the user credentials (e.g. `localhost\Administrator`).

File Share Backup

The following requirements must be met to use the feature:

- File shares must be located on a NAS, Windows Server, or Linux Server that supports the NFS or CIFS/SMB protocol.
- Read permission is required to back up the file shares.
- Read/write permission is required to restore to a file share.
- To use NFS file shares with Windows, NFS client feature must be enabled.
- File shares with the following protocols are supported:
 - NFS 3.x
 - SMB 2.x
 - SMB 3.x
- The following operating systems do **not** support any NFS Server versions:
 - Windows 7
 - Windows 8.1
 - Windows 10

Object Recovery and Log Truncation for Microsoft Exchange

To successfully perform object recovery and log truncation for Microsoft Exchange, make sure you meet the following requirements:

Supported Microsoft Exchange versions

NAKIVO Backup & Replication supports the following versions of Microsoft Exchange for object recovery and log truncation:

- Microsoft Exchange 2019
- Microsoft Exchange 2016
- Microsoft Exchange 2013

Permissions

The following requirements should be met for log truncation:

- Selected users should have permissions to "Log on as a batch job".
- Active Directory Module For Windows PowerShell must be installed.
- The VM must be accessible over network.
- The following user permissions should be provided:
 - If NAKIVO Backup & Replication uses the administrator user account, it should belong to the following groups:
 - Administrators
 - Domain Users

- Organization Management
- If NAKIVO Backup & Replication uses accounts other than the `administrator` user account:
 - The user should belong to the following groups:
 - Administrators
 - Domain Users
 - Organizational Management
 - The user should have the Full control permission granted for the folder in which the Exchange database is located.

Services and Settings

NAKIVO Backup & Replication requires PowerShell v2 or later to be available on the Microsoft Exchange machine.

- VMware VM must be running on VMware ESXi 5.0 and later.
- VMware Tools or Hyper-V Integration Services must be running on VMware or Hyper-V VMs correspondingly.

Object Recovery and Log Truncation for Microsoft SQL Server

To successfully perform object recovery and log truncation for a Microsoft SQL Server, you must meet general requirements as well as requirements for object recovery and log truncation.

General Requirements

To successfully perform object recovery and log truncation for a Microsoft SQL Server, make sure you meet the following general requirements:

Supported Versions of Microsoft SQL Server

NAKIVO Backup & Replication supports the following versions of Microsoft SQL Server for object recovery and log truncation:

- Microsoft SQL Server 2022
- Microsoft SQL Server 2019
- Microsoft SQL Server 2017
- Microsoft SQL Server 2016
- Microsoft SQL Server 2014
- Microsoft SQL Server 2012

Permissions

- A user logging in to Microsoft SQL Server must have a `sysadmin` role.
- The user running Microsoft SQL Service should have permissions to "Log on as a batch job".

Services and Settings

- NAKIVO Backup & Replication requires PowerShell v2 or later.
- VMware Tools or Hyper-V Integration Services must be running on VMware or Hyper-V VMs correspondingly.
- `sqlcmd` utility must be installed on the machine running Microsoft SQL server.
- Ports 137-139 must be opened for `cifs`.
- The SMB 2 protocol should be enabled.

Requirements for Microsoft SQL Server Object Recovery

- The user running Microsoft SQL service must have executive permissions to the `Data` folder and all other folders in which the databases are located.
- If "Rename recovered item if such item exists" option is selected during the recovery, NAKIVO Backup & Replication skips keys, constraints, indexes, and statistical properties when recovering a table to an original location.
- If "Overwrite the original item if such item exists" option is chosen, all the above properties are preserved. Tables that contain a foreign key cannot be recovered with this option.
- Full administrative permissions are required.
- Default administrative shares must be enabled.
- The "File server" role must be enabled.
- Ports 445 and 9445 must be opened on the instance.

Requirements for Microsoft SQL Server Log Truncation

- VMware VM must be running on VMware ESXi 5.0 and later.
- System databases are skipped during the log truncation.
- Databases with the "Simple" recovery model are skipped during the log truncation.
- A database must be in the "online" state.
- The SMB 2 protocol should be enabled.

Object Recovery for Microsoft Active Directory

Supported Versions

NAKIVO Backup & Replication supports the following versions of Microsoft Active Directory for objects recovery:

- Windows Server 2022 (21H2)
- Windows Server 20H2 (20H2)
- Windows Server 2019
- Windows Server 2016

- Windows Server 2012 R2
- Windows Server 2012

Requirements for Object Recovery for Microsoft Active Directory

- The ISCI Initiator service must be running on the recovery server.
- The vc_redist.x86.exe (v.2015) file must be installed on the recovery server.
- Active Directory Web Services must be running.
- Port 5000 must not be blocked by other services and must be opened in the firewall of AD.
- Active Directory Module For Windows PowerShell must be installed.

Site Recovery

To successfully perform a site recovery, make sure you meet the following requirements:

Run Script Action

The list of supported operating systems where the Run Script action may be run can be found in the Recovering Files to Server subsection above.

TCP ports

Connection to the following TCP ports should be allowed by the firewall of the target system:

- 22 – Used by SSH for secure logins, file transfers (scp, sftp) and port forwarding.
- 9445 – Used by NAKIVO Backup & Replication to communicate with the VM.

Note

ICMP ping traffic should be allowed by the firewall of the target system.

Required permissions for Microsoft Windows VMs:

- Users should be members of a local Administrators group.
- Users should have access to default administrative shares.
- Users should have permissions to access the corresponding folder/file.
- User Account Control (UAC) remote restrictions should be disabled for some Microsoft Windows versions.
- Users should have permissions to "Log on as a batch job".

Services and Settings

- For Windows source VMs, the SMB 2 / CIFS File Sharing Support feature should be turned on.
- For Linux VMs, users should belong to the `sudo` group.
- VMware Tools or Hyper-V Integration Services must be running on VMware or Hyper-V VMs, respectively.

Cross-Platform Recovery

The following scenarios are supported if a VM is [exported from backup](#) and imported into a different hypervisor:

Source Platforms	Target Platforms		
	VMware vSphere 7	Microsoft Hyper-V 2016/2019/20H1/2022	Nutanix AHV 5.10/5.15
VMware vSphere 7	<ul style="list-style-type: none"> • Windows Server 2016 • Windows Server 2019 • Windows Server 20H1 • Windows Server 2022 • Ubuntu Server 18.04 • RHEL 7.4 • CentOS 7.0 	<ul style="list-style-type: none"> • Windows Server 2016 • Windows Server 2019 • Windows Server 20H1 • Ubuntu Server 18.04 • RHEL 7.4 • CentOS 7.0 	<ul style="list-style-type: none"> • Windows Server 2016 • Windows Server 2019 • Windows Server 20H1 • Windows Server 2022 • Ubuntu Server 18.04 • RHEL 7.4 • CentOS 7.0
Microsoft Hyper-V 2016/2019/20H1/2022	<ul style="list-style-type: none"> • Windows Server 2016 • Windows Server 2019 • Windows Server 20H1 • Windows Server 2022 • Ubuntu Server 18.04 • RHEL 7.4 • CentOS 7.0 	<ul style="list-style-type: none"> • Windows Server 2016 • Windows Server 2019 • Windows Server 20H1 • Windows Server 2022 • Ubuntu Server 18.04 • RHEL 7.4 • CentOS 7.0 	<ul style="list-style-type: none"> • Windows Server 2016 • Windows Server 2019 • Windows Server 20H1 • Windows Server 2022 • Ubuntu Server 18.04 • RHEL 7.4 • CentOS 7.0

Physical Machines	<ul style="list-style-type: none"> • Windows Server 2016 • Windows Server 2019 • Windows Server 20H1 • Windows Server 2022 • Ubuntu Server 18.04 • RHEL 7.4 • CentOS 7.0 	<ul style="list-style-type: none"> • Windows Server 2016 • Windows Server 2019 • Windows Server 20H1 • Windows Server 2022 • Ubuntu Server 18.04 • RHEL 7.4 • CentOS 7.0 	<ul style="list-style-type: none"> • Windows Server 2016 • Windows Server 2019 • Windows Server 20H1 • Windows Server 2022 • Ubuntu Server 18.04 • RHEL 7.4 • CentOS 7.0
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* To run a VM with RHEL 7 on Microsoft Hyper-V 2016/2019, the following option must be configured in grub boot parameters:

```
ata_piix.prefer_ms_hyperv=0
```

As an alternative, the source machine can be pre-configured with the command below:

```
mkinitrd -f -v --with=hid-hyperv --with=hv_utils --with=hv_vmbus --with=hv_storvsc --with=hv_netvsc /boot/initramfs-$(uname -r).img $(uname -r)
```

App-aware Mode

To enable application awareness for source objects, make sure the following requirements are met:

Microsoft Hyper-V

- Target system must be in the running state and custom OS quiescing must be enabled for it.
- Only the following target systems are supported for custom OS quiescing:
 - Windows Server 2012 Standard (x64)
 - Windows Server 2012 R2 Standard (x64)
 - Windows Server 2019 Standard (x64)
- Connection between the product and target system should be established.
- Refer to the Knowledge Base [article](#) for more details.

Encrypted Backup Repository

To enable encryption, the following requirements should be met:

- The Transporter assigned to the encrypted backup repository must be installed on Ubuntu, SLES or RHEL. Currently, Transporters installed on other Linux versions, Windows, and NAS do not support this feature.
- For certain SLES and RHEL versions, only full device/partition encryption is available. [Learn more](#).

The following platforms are supported:

- VMware vSphere (including Free ESXi)
- Physical machines (Windows, Linux)
- NAS systems

Requirements

To use Direct Connect, the Transporter must be installed on one of the following operating systems:

- Windows
- Linux
- NAS

Direct Connect supports the following Nodes:

- Onboard Transporter
- Installed service
- VMware vSphere appliance

Note

Direct Connect is not supported for Onboard Transporters located on NAS devices.

The following deployment scenarios are supported:

- Director and Transporter(s) installed at the MSP's site and more than one Direct Connect Transporter installed at each tenant site.
- Primary repository at the tenant's site (managed by one of the tenant's Transporters) and a secondary repository at the MSP's site.
- Backup Export
- Site Recovery

Native Tape Support

NAKIVO Backup & Replication supports tape environments with the following configurations:

- Robotic tape libraries and standalone devices of LTO3 and later generations.
- AWS Storage Gateway service with a Tape Gateway that functions as a Virtual Tape Library (VTL).
- Only VTLs connected to Linux are currently supported.
- The gateway VM deployed on-premises needs to have the following minimum resources:

- **CPU:** x86-64, 4+ cores
- **RAM:** 16+ GB
- **Free Space:** 80 GB
- According to the [requirements for Amazon EC2 instances](#), when deploying the gateway on Amazon EC2, the instance size should be at least 2xlarge for the compute-optimized instance family.
- The instance type should be c4 or c5 instance types. The 2xlarge instance size or higher can be chosen to meet the required RAM requirements.
- All physical tape cartridges must have barcodes.
- Installation is supported on all Windows OS and Linux OS, as listed on the [Supported Platforms](#) page.
- Installation on NAS OS is not supported.
- The "mtx" and "lsscsi" utilities need to be installed on the Linux transporter server in order to detect the tape library changer.

Backup Immutability

To make backups immutable in Backup Repositories located in **Amazon S3**, **generic S3-compatible storage**, or **Wasabi**, the following options must be enabled for the buckets where the repository is located:

- Object Lock
- Versioning

To make backups immutable in Backup Repositories located in **Backblaze B2 Cloud Storage**, File Lock (also known as Object Lock) must be enabled.

To make backups immutable in Backup Repositories located in **Azure Blob Storage**, the following options must be selected for the Azure storage account or container:

- Enable version-level immutability support
- Enable versioning for blobs

Notes

- Disable Object Lock retention mode and retention period for the Amazon S3 or Wasabi bucket where the repository is located, as retention settings are set in NAKIVO Backup & Replication during job creation.
- Backing up to Wasabi with Object Lock enabled may take longer compared to when Object Lock is disabled.
- Backup Immutability is not supported for encrypted Backup Repositories.

To enable immutability for **Local Folder** type of Backup Repository, the following conditions must be met:

- Target file system must support extended attributes modified by **chattr** and **setfattr** commands.
- The Backup Repository type must be **Local Folder**.

- The Backup Repository must have **Store backups in separate files** selected.

For the feature to be available on the FreeNAS/TrueNAS, the following 2 settings must be configured:

- *allow_chflags = yes*
- *seclabel = 0*

Note

Only Linux OS and NAS OS specified in [system requirements](#) are supported.

VM Limitation for Multi-Tenancy

The feature is only available if a license with Socket limit mode is installed.

The following hypervisors are supported:

- VMware vSphere
- VMware Cloud Director
- Microsoft Hyper-V
- Nutanix AHV
- **CPU:** x86-64, 4+ cores
- **RAM:** 8 GB
- **Disk Free Space:** 5 GB

Permanent VM Agent

VM agents are available for the following platforms:

- VMware vSphere
- Microsoft Hyper-V
- Amazon EC2
- Nutanix AHV

VM agents support the following features:

- OS quiescing
- File recovery to source

VM agents can be used in the Windows and Linux operating systems listed in [this section of Deployment Requirements](#).

External Database

The following external databases are supported:

- PostgreSQL v10-15

The following system requirements apply to the machine housing the external database:

- **CPU:** x86-64, 4+ cores
- **RAM:** 4-8+ GB
- **Free Space:** 50 GB
- **OS:** Windows and Linux [operating systems](#).

Notes

- Using SSD is highly recommended.
- The external database can be created on a physical machine or VM or stored in a container.
- Database migration is supported for both the single-tenant and multi-tenant modes of the solution. However, only the Master Admin can perform database migration in multi-tenant mode.
- All tenants share the same database server after the migration, but each tenant has a separate database.
- All tenant databases must be the same type as the database of the Master Admin.
- Some NAS devices may already contain the PostgreSQL as inbox package.

Generic S3-Compatible Object Storage

The following vendors for generic S3-compatible object storage are currently supported:

- MinIO
- Ceph
- Cloudian
- C2 Object Storage
 - Note that only the following regions are supported:
 - eu-001
 - eu-002
 - us-001
 - us-002
 - tw-001
- SeaGate LyveCloud
 - Note that only the following regions are supported:
 - us-east-1
 - us-west-1

Notes

- This list only contains vendors that were specifically tested and will be updated as NAKIVO continues to test more vendors.
- Immutability is supported only if object lock and S3 versioning are enabled on the vendor side and are supported by vendor APIs.
- Some S3-compatible vendors not listed above may be supported if they use the applicable APIs. The list of APIs used by NAKIVO Backup & Replication for generic S3-compatible object storage functionality can be found [here](#).

Merge Jobs

The feature supports the following types of jobs:

- Backup
- Backup copy
- Replication

Job merging can be performed in the following cases:

- Both source and target jobs are of the same type and platform.
- The source job is in an idle state.

Job merging cannot be performed in the following cases:

- One of the selected jobs is a backup copy job with the destination set to tape.
- The target job uses the **Policies** view.
- The Transporter selection settings of the target job cannot be applied to the source job objects.
- Both source and target jobs contain or reference the same workload.

MSP Console

To use the **MSP Console** feature, the managed service provider (MSP) needs to configure the following TCP ports:

- **MSP Director port:** This is the TCP port used by the Director for the MSP's instance of NAKIVO Backup & Replication. By default, this is TCP port 4443. The MSP must provide a remote tenant with their Director port number [during configuration](#). The remote tenant needs to enter this port number when [adding the MSP](#).
- **Listening port:** Additionally, the MSP must have a port open for listening to the remote tenant. By default, TCP port 6702 is used. The MSP may change the listening port used by changing the `system.msp.console.listening.port` parameter in [Expert settings](#).

Backup Malware Scan

The following recovery jobs with image-based backups are supported:

- VMware vSphere VM recovery
- Microsoft Hyper-V VM recovery
- Nutanix AHV VM recovery
- VMware Cloud Director recovery
- Physical Machine recovery
- Flash VM boot recovery
- Universal object recovery

The scan server must adhere to the following requirements:

General:

- A supported version of antivirus software must be installed on the scan server.
- Antivirus software must be running on the scan server. The antivirus services must be started after installation.
- The firewall must be disabled on the scan server.
- Special [permissions](#) must be configured for NAKIVO Backup & Replication recovery service.
- iSCSI must be available on the scan server.
- TCP port 9445 must not be blocked.

Linux OS:

- SSH using port 22 must be enabled on the scan servers using Linux OS.
- SELinux service must be disabled on the scan servers using Linux OS.
- The NTFS-3G package must be enabled on the scan servers using Linux OS.
- The following antivirus software is supported:
 - Clam AV:
 - Version clamav-0.99.0 or higher
 - Must support the command line: *clamscan --infected --recursive %path%*
 - Make sure to install and run Clam AV on Linux server.
 - See more details [here](#)
 - Sophos Protection:
 - Version 1.1.8 or higher
 - Must support the command line: *avscanner %path% --scan-archives*
 - Sophos AV software is limited to the specific [Linux operating systems](#).
 - See more details [here](#)

Windows OS:

- SMB must be enabled on the scan servers using Windows OS.
- The following antivirus software is supported:
 - Microsoft Windows Defender:
 - Antimalware Client Version: 4.10.14393 or higher
 - Engine Version: 1.1.12805 or higher
 - Must support the command line: *Scan -ScanType %type% -File %path% -DisableRemediation -BootSectorScan*
 - See more details [here](#)
 - ESET NOD32 Antivirus:
 - Version 14.2.24 or higher
 - Must support the command line: *%path% /clean-mode=None /no-symlink*
 - See more details [here](#)
 - Kaspersky Internet Security:
 - Version 2015 (15.0) or higher
 - Must support the command line: *scan %path% -i0*
 - Make sure to turn off firewall in the settings of this antivirus software.
 - See more details [here](#)
 - Sophos Intercept X:
 - Version 2.0.20 or higher
 - Must support the command line: *scan --noui --expand_archives %path%*
 - See more details [here](#)

Notes

- Antivirus software on Windows OS cannot scan Linux OS backups.
- Scanning process may not detect malware if the antivirus software has the run-time (real-time) protection enabled.

Installing NAKIVO Backup & Replication

Refer to the sections below to learn how to install NAKIVO Backup & Replication:

- [“Deploying VMware Virtual Appliance” on page 172](#)
- [“Deploying Nutanix AHV Virtual Appliance” on page 179](#)
- [“Deploying Amazon Machine Image in Amazon EC2” on page 187](#)
- [“Installing on Windows” on page 190](#)
- [“Installing on Linux” on page 201](#)
- [“Installing on Synology NAS” on page 210](#)
- [“Installing on QNAP NAS” on page 217](#)
- [“Installing on Western Digital NAS” on page 227](#)
- [“Installing on ASUSTOR NAS” on page 222](#)
- [“Installing on NETGEAR ReadyNAS” on page 229](#)
- [“Installing on Generic ARM-Based Device” on page 232](#)
- [“Installing on FreeNAS/TrueNAS” on page 232](#)
- [“Installing on Raspberry Pi” on page 235](#)

Deploying VMware Virtual Appliance

- [Deploying Virtual Appliance with vSphere Web Client](#)
- [Virtual Appliance OS, Credentials, and Security](#)
- [Web Interface Login](#)

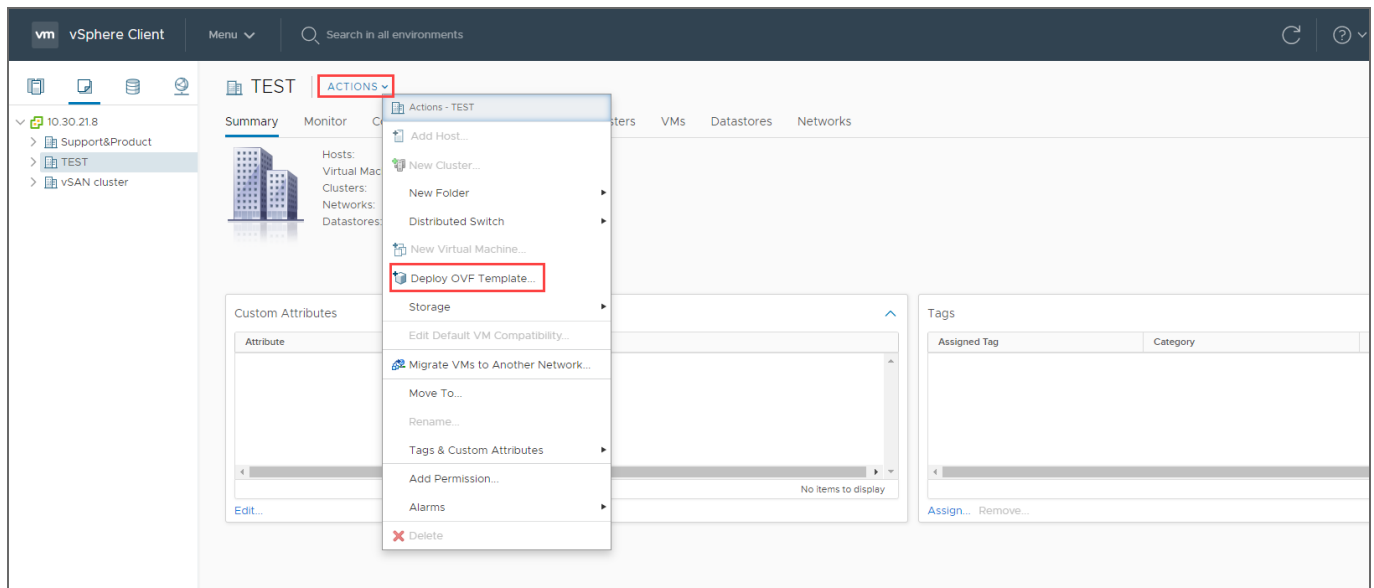
NAKIVO Backup & Replication offers the following VA deployment options:

- Full Solution
- Full Solution without Backup Repository
- Transporter-only
- Transporter with Backup Repository
- Multi-tenant Director

The Virtual Appliance (VA) has two disks: the first (30 GB) contains a Linux OS with NAKIVO Backup & Replication, and the second (500 GB) is used as a Backup Repository. If you deploy the Virtual Appliance disks using the **Thin Provision** option, then the disks will not reserve space on your datastore and will only consume space when actual data (such as your backups) is written to disks.

Deploying Virtual Appliance with vSphere Web Client

1. [Download NAKIVO Backup & Replication VA.](#)
2. Log in to your vSphere vCenter with the vSphere Web Client.
3. Select **Deploy OVF Template** from the **ACTIONS** menu. Note that the Client Integration Plug-in must be installed to enable OVF functionality.



4. On the **Select an OVF template** page of the **Deploy OVF Template** wizard, select **Local file** and upload the VA file (.ova) you've downloaded. Click **Next**.

Deploy OVF Template

1 Select an OVF template
2 Select a name and folder
3 Select a compute resource
4 Review details
5 Select storage
6 Ready to complete

Select an OVF template

Select an OVF template from remote URL or local file system
Enter a URL to download and install the OVF package from the Internet, or browse to a location accessible from your computer, such as a local hard drive, a network share, or a CD/DVD drive.
☐ URL
☒ Local file

NAKIVO_Backup_Replication_VA_v10.8.0_Full_Solution_BETA.ova

- On the **Select a name and folder** page, specify a unique name and target location for the Virtual Appliance. Click **Next**.

Deploy OVF Template

1 Select an OVF template
2 Select a name and folder
3 Select a compute resource
4 Review details
5 Select storage
6 Ready to complete

Select a name and folder

Specify a unique name and target location
Virtual machine name:

Select a location for the virtual machine.

☒ 10.84.84.10

☒ vSAN Datacenter

- On the **Select a computer resource** page, select the resource pool within which you would like to deploy the Virtual Appliance and click **Next**.

Deploy OVF Template

- Select an OVF template
- Select a name and folder
- Select a compute resource**
- Review details
- Select storage
- Ready to complete

Select a compute resource

Select the destination compute resource for this operation

vSAN Datacenter

- vSAN Cluster**

Compatibility

✓ Compatibility checks succeeded.

CANCEL
BACK
NEXT

7. On the **Review details** page, review the template details and click **Next**.

Deploy OVF Template

- Select an OVF template
- Select a name and folder
- Select a compute resource
- Review details**
- License agreements
- Select storage
- Select networks
- Ready to complete

Review details

⚠ The certificate is not trusted.

Publisher	SSL.com Code Signing Intermediate CA RSA RI (Invalid certificate)
Product	NAKIVO Backup and Replication
Version	10.8.0
Vendor	NAKIVO, Inc.
Description	Ubuntu 22.04 Server VA with NAKIVO Backup and Replication 10.8.0b preinstalled VA login: nkvuser VA password: QExS-6b%3D
Download size	1.6 GB
Size on disk	3.4 GB (thin provisioned) 530.0 GB (thick provisioned)

CANCEL
BACK
NEXT

8. On the **License agreements** page, read the end-user license agreement (EULA). If you agree to its terms, select **I accept all license agreements** and then click **Next**.

Deploy OVF Template

1 Select an OVF template
2 Select a name and folder
3 Select a compute resource
4 Review details
5 License agreements
6 Select storage
7 Select networks
8 Ready to complete

License agreements

The end-user license agreement must be accepted.
Read and accept the terms for the license agreement.

END USER LICENSE AGREEMENT (EULA)
(03/12/2018)

BY OPENING THE PACKAGE, INSTALLING, PRESSING "AGREE", OR "YES", OR "ACCEPT", OR USING THE PRODUCT, THE ENTITY OR INDIVIDUAL ENTERING INTO THIS AGREEMENT AGREES TO BE BOUND BY THE FOLLOWING TERMS. YOU ALSO ACKNOWLEDGE THAT YOU HAVE READ AND ACCEPTED OUR PRODUCT PRIVACY POLICY www.nakivo.com/support/privacy-policy/. IF YOU DO NOT AGREE WITH ANY OF THESE TERMS OR OUR PRIVACY POLICY, DO NOT INSTALL OR USE THE PRODUCT, PROMPTLY RETURN THE PRODUCT TO NAKIVO OR YOUR NAKIVO RESELLER. IF YOU REJECT THIS AGREEMENT, YOU WILL NOT ACQUIRE ANY LICENSE TO USE THE PRODUCT.

This Agreement ("Agreement") is between the entity or individual entering into this Agreement ("Customer") and the NAKIVO Entity for the applicable Territory as described in Section 19 ("NAKIVO"). In addition to the restrictions imposed under this Agreement, any other usage restrictions contained in the Product installation instructions or release

CANCEL
BACK
NEXT

9. On the **Select storage** page, select a datastore in which you would like to keep the Virtual Appliance disk, virtual disk format (*Thin Provisioning* is recommended), VM storage policy and click **Next**.

Deploy OVF Template

1 Select an OVF template
2 Select a name and folder
3 Select a compute resource
4 Review details
5 License agreements
6 Select storage
7 Select networks
8 Ready to complete

Select storage

Select the storage for the configuration and disk files
☐ Encrypt this virtual machine (Requires Key Management Server)
Select virtual disk format As defined in the VM storage policy
VM Storage Policy Management Storage policy - Thin
☐ Disable Storage DRS for this virtual machine

	Name	Storage Compatibility	Capacity	Provisioned	Free	Type	Plac
<input checked="" type="radio"/>	vsanDatastore	Compatible	19.65 TB	1.72 TB	19.12 TB	vSAN	Loc
<input type="radio"/>	CosmoTemplates (1)	Incompatible	27.97 TB	171.84 GB	27.82 TB	NFS v4.1	Loc
<input type="radio"/>	CosmoTemplates (...)	Incompatible	27.97 TB	154.58 GB	27.82 TB	NFS v4.1	Loc
<input type="radio"/>	CosmoTemplates (...)	Incompatible	27.97 TB	154.58 GB	27.82 TB	NFS v4.1	Loc
<input type="radio"/>	Datastore	Incompatible	19.75 GB	1.41 GB	18.34 GB	VMFS 6	Loc
<input type="radio"/>	Ds251GB	Incompatible	250.75 GB	973 MB	249.8 GB	VMFS 5	Loc
<input type="radio"/>	IT-Share	Incompatible	13.96 TB	824.63 GB	13.16 TB	NFS v3	Loc
<input type="radio"/>	Local 10.84.0.172	Incompatible	244.5 GB	1.41 GB	243.09 GB	VMFS 6	Loc

CANCEL
BACK
NEXT

Important

If you use thick provisioning instead of thin provisioning, keep in mind that NAKIVO Backup & Replication can take up to 0,5 TB of data. Check to see if it is 0,5 TB by default for all cases.

10. On the **Select networks** page, select a network to which the Virtual Appliance will be connected. Opting for a network with DHCP and Internet access is recommended. Click **Next**.

Deploy OVF Template

- Select an OVF template
- Select a name and folder
- Select a compute resource
- Review details
- License agreements
- Select storage
- Select networks**
- Ready to complete

Select networks

Select a destination network for each source network.

Source Network	Destination Network
10.84.0.0	Management Network

1 item

IP Allocation Settings

IP allocation: Static - Manual

IP protocol: IPv4

CANCEL
BACK
NEXT

- On the **Ready to complete** page, review the summary of the setups you have configured and click **Finish** to complete deployment.

Deploy OVF Template

- Select an OVF template
- Select a name and folder
- Select a compute resource
- Review details
- License agreements
- Select storage
- Select networks
- Ready to complete**

Ready to complete

Review your selections before finishing the wizard

Select a name and folder

Name: NAKIVO_Backup_Replication_VA_v10.8.0_Full_Solution_TRIAL

Template name: NAKIVO_Backup_Replication_VA_v10.8.0_Full_Solution_TRIAL

Folder: vSAN Datacenter

Select a compute resource

Resource: vSAN Cluster

Review details

Download size: 1.6 GB

Select storage

Size on disk: 530.0 GB

Storage mapping: 1

All disks: Policy: Management Storage policy - Thin; Datastore: vsanDatastore; Format: As defined in the

CANCEL
BACK
FINISH

After the Virtual Appliance is deployed, you may need to [configure](#) it.

Important

If you plan to expose the Virtual Appliance to the Internet, change the default credentials and set up a login and password for the Web interface

Virtual Appliance OS, Credentials, and Security

The appliance runs Ubuntu 22.04, 64-bit. Use the following credentials to log in to the appliance:

- Username:** nkuser
- Password:** QExS-6b%3D

For the versions of NAKIVO Backup & Replication older than 7.2, the password is `root`.

Important

- If you plan to expose the Virtual Appliance to the Internet, change the default VA credentials and set up a login and password for the Web interface.
- It is recommended to run an update on all packages in your Virtual Appliance at least once a month.

To enable [Backup Immutability](#) for **Amazon S3**, **Wasabi**, **Azure Blob Storage**, **Backblaze B2 Cloud Storage**, or **Local Folder** types of [Backup Repository](#) deployed as part of virtual appliance, NAKIVO Backup & Replication does the following:

- Creates a new user for all administrative needs and adds it to the *sudo* group
- Disables root user
- Changes default SSH port to 2221
- Configure the following kernel parameters via **sysctl.conf**:
 - Limits network-transmitted configuration for IPv4/IPv6
 - Prevents the common 'syn flood attack'
 - Turns on source IP address verification
 - Prevents a cracker from using a spoofing attack against the IP address of the server
 - Logs several types of suspicious packets, such as spoofed packets, source-routed packets, and redirects
 - Configures swap. Sets **vm.swappiness** to 15
 - Sets **kernel.unprivileged_bpf_disabled** to 1
 - Sets **kernel.core_pattern** to **/tmp/%e.%p.core**
 - Sets **kernel.core_uses_pid** to 1
 - Sets **kernel.dmesg_restrict** to 1
 - Sets **kernel.kptr_restrict** to 2
 - Sets **kernel.sysrq** to 0
- Secures */tmp* and */var/tmp*
- Secures Shared Memory
- Installs and configures **fail2ban**

Notes

- After **fail2ban** is installed on the hardened VA, the user IP may be banned for 10 minutes if mistakes have been made during the login procedure.
- Any additional packages installed manually on the system may cause a security breach.

Web Interface Login

Open the following URL to access the product's web interface of the VA: `https://Appliance_VM_IP:4443`.

Refer to the [Getting Started](#) section to better understand how to continue working with NAKIVO Backup & Replication.

Deploying Nutanix AHV Virtual Appliance

- [Deploying Nutanix AHV Virtual Appliance](#)
- [Virtual Appliance OS, Credentials, and Security](#)
- [Web Interface Login](#)

Deploying Nutanix AHV Virtual Appliance

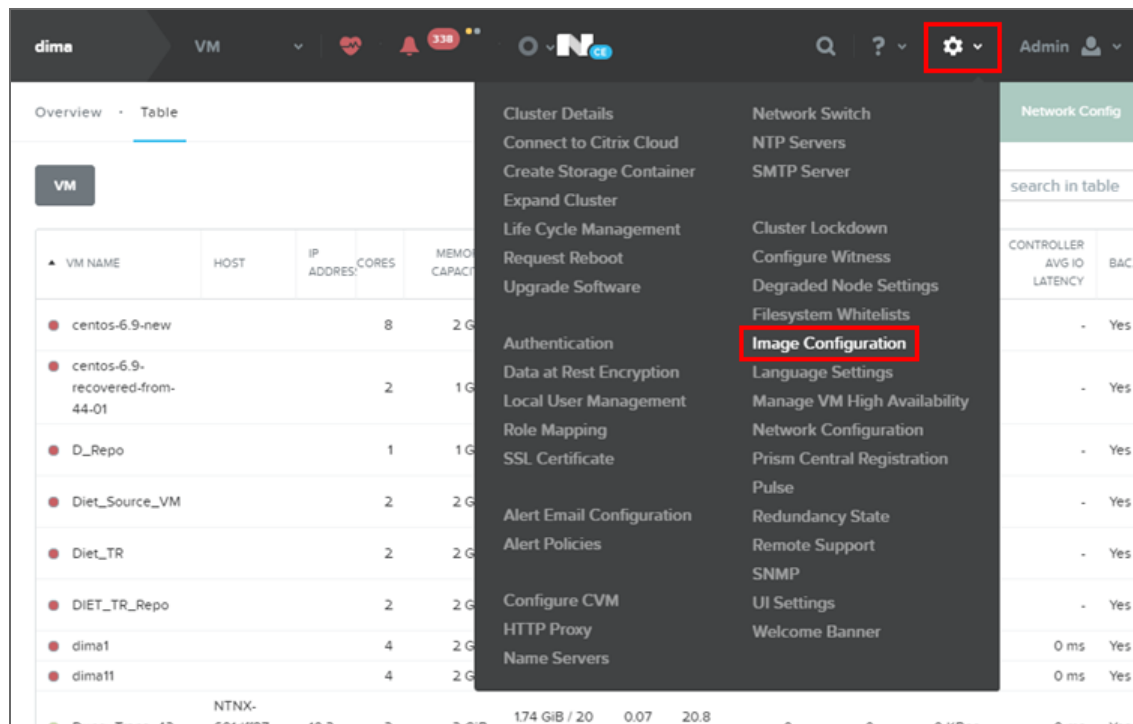
The NAKIVO Backup & Replication instance must be deployed in a Nutanix AHV cluster in order to enable backup and recovery functions.

NAKIVO Backup & Replication offers the following solutions:

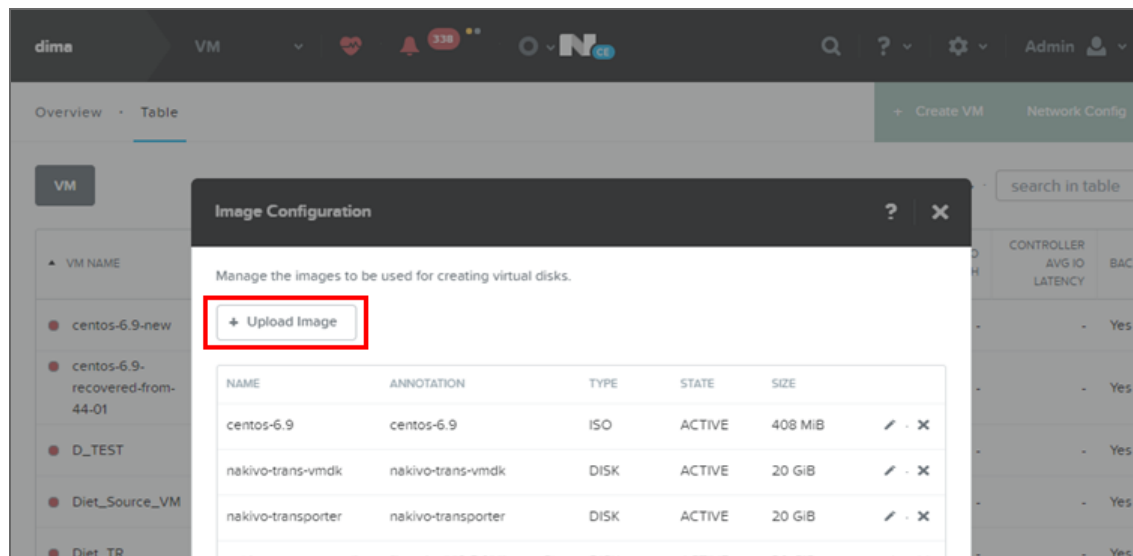
- Full Solution (Single Tenant) - requires a 100 GB thin provisioned disk
- Transporter-only - requires a 20 GB thin provisioned disk

To deploy a virtual appliance via the Nutanix Prism application, follow the steps below:

1. Download the .VMDK file with a full or transporter-only image from the Nakivo website and store it locally.
2. Log in to the Prism console.
3. From the **Configurations** menu, select **Image Configuration**.



4. In the **Image Configuration** dialog, click **Upload Image**.



5. In the **Create Image** dialog, fill in the following options:

- **Name:** Enter a name for the new image.
- **Image Type:** From the drop-down list, select **DISK**.
- **Storage Container:** Select the storage container you wish to use from the drop-down list. The list includes all storage containers created for this cluster. If there are no storage containers currently available, a **Create Storage Container** link is displayed.
- **Image Source:** Click the **Upload a file** radio button to upload a file from your workstation. Click

the **Choose File** button and then select the file to upload from the file search window.

The 'Create Image' dialog box is open, showing the following fields:

- NAME: NAKIVO Backup & Replication Transporter
- ANNOTATION: (empty)
- IMAGE TYPE: DISK
- STORAGE CONTAINER: DM-test
- IMAGE SOURCE: Upload a file (selected)

The 'Choose file' button is highlighted, and the file 'transporter-nutanix-linux.vmdk' is shown below it. The background shows a list of VMs.

6. When all fields are correct, click the **Save** button.

After the file uploading completes, the **Create Image** window closes and the **Image Configuration** window reappears with the new image present in the list.

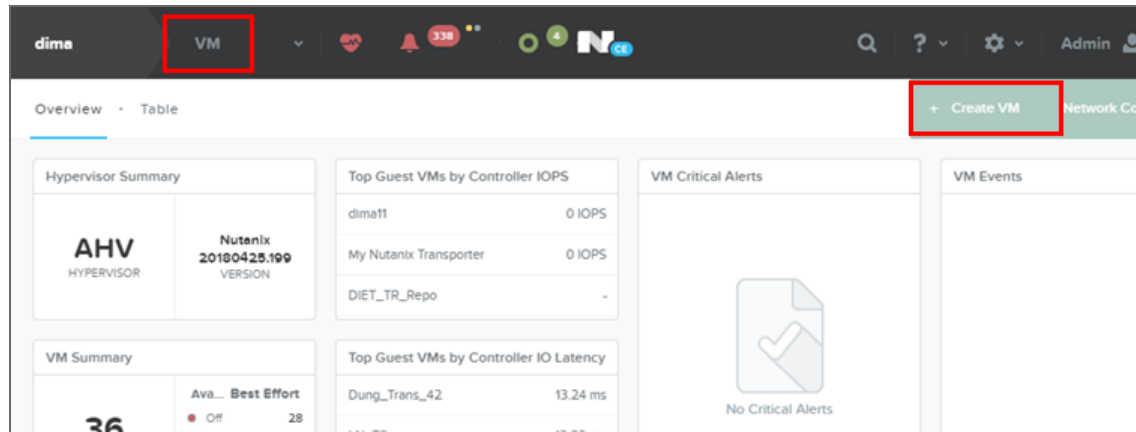
The 'Image Configuration' window is open, showing a table of images. The new image 'NAKIVO Backup & R...' is highlighted with a red box.

NAME	ANNOTATION	TYPE	STATE	SIZE	
centos-6.9	centos-6.9	ISO	ACTIVE	408 MiB	✎ ✕
NAKIVO Backup & R...		DISK	ACTIVE	20 GiB	✎ ✕
nakivo-trans-vmdk	nakivo-trans-vmdk	DISK	ACTIVE	20 GiB	✎ ✕
nakivo-transporter	nakivo-transporter	DISK	ACTIVE	20 GiB	✎ ✕

Note

Make sure the status of the disk is **Active** before proceeding to the next step.

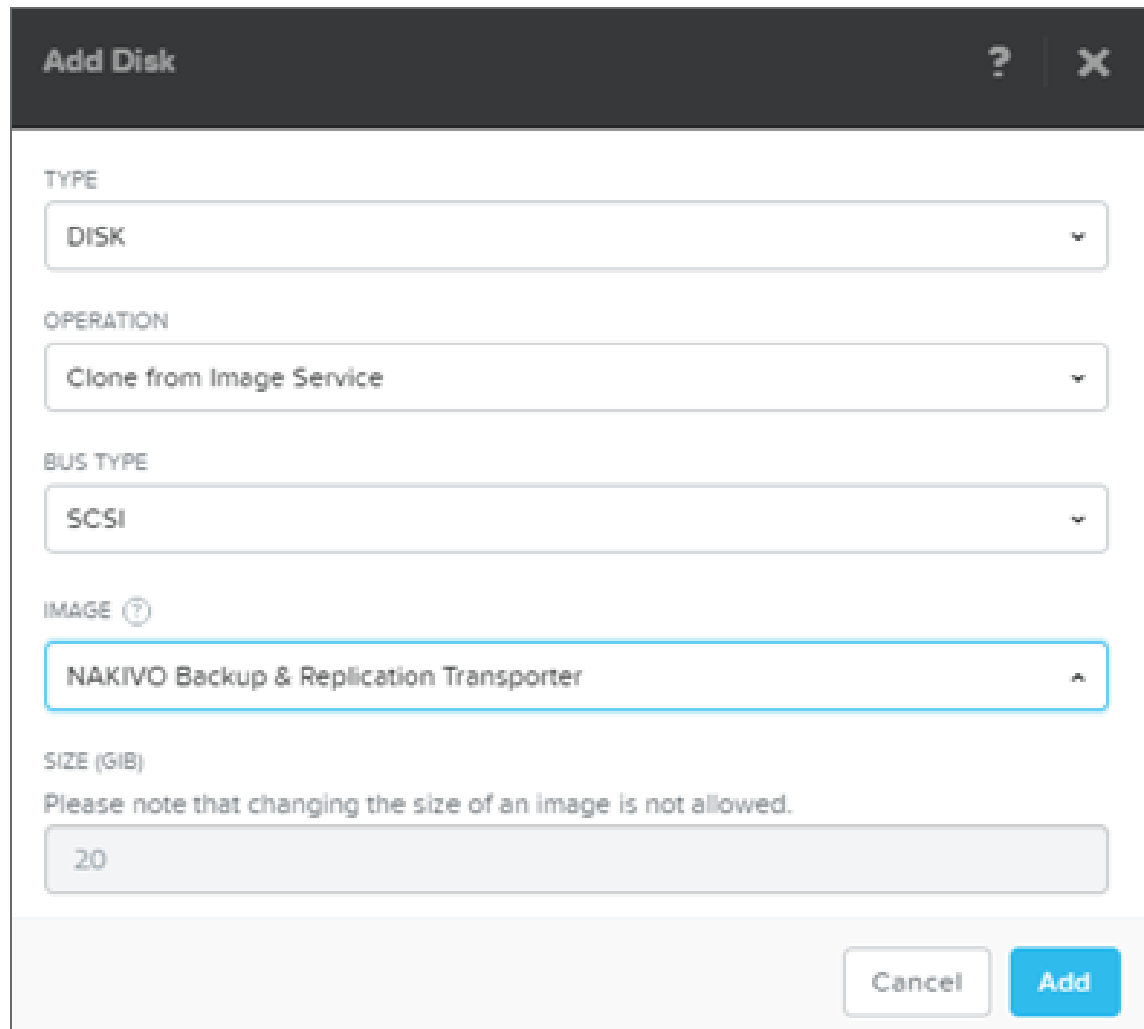
7. Close the **Image Configuration** window, go to the **VM** view and click **Create VM**.



8. In the **Create VM** dialog, fill in the following options:

- **Name:** Enter a name for the VM.
- **vCPU(s):** Enter the number of virtual CPUs to allocate to this VM (minimum 1).
- **Number of Cores per vCPU:** Enter the number of cores assigned to each virtual CPU (minimum 2).
- **Memory:** Enter the amount of memory (in GBs) to allocate to this VM (minimum 4 GB + 250 MB for each concurrent job for full solution/minimum 2 GB + 250 MB for each concurrent job Transporter-only solution).
- In the **Disk** section, click **Add New Disk**, and specify the following settings in the **Add Disk** dialog:
 - a. **Type:** Select **Disk**.
 - b. **Operation:** Select **Clone from Image Service**.
 - c. **Bus Type:** Select **SCSI**.

- d. **Image:** Select your uploaded image from the list.



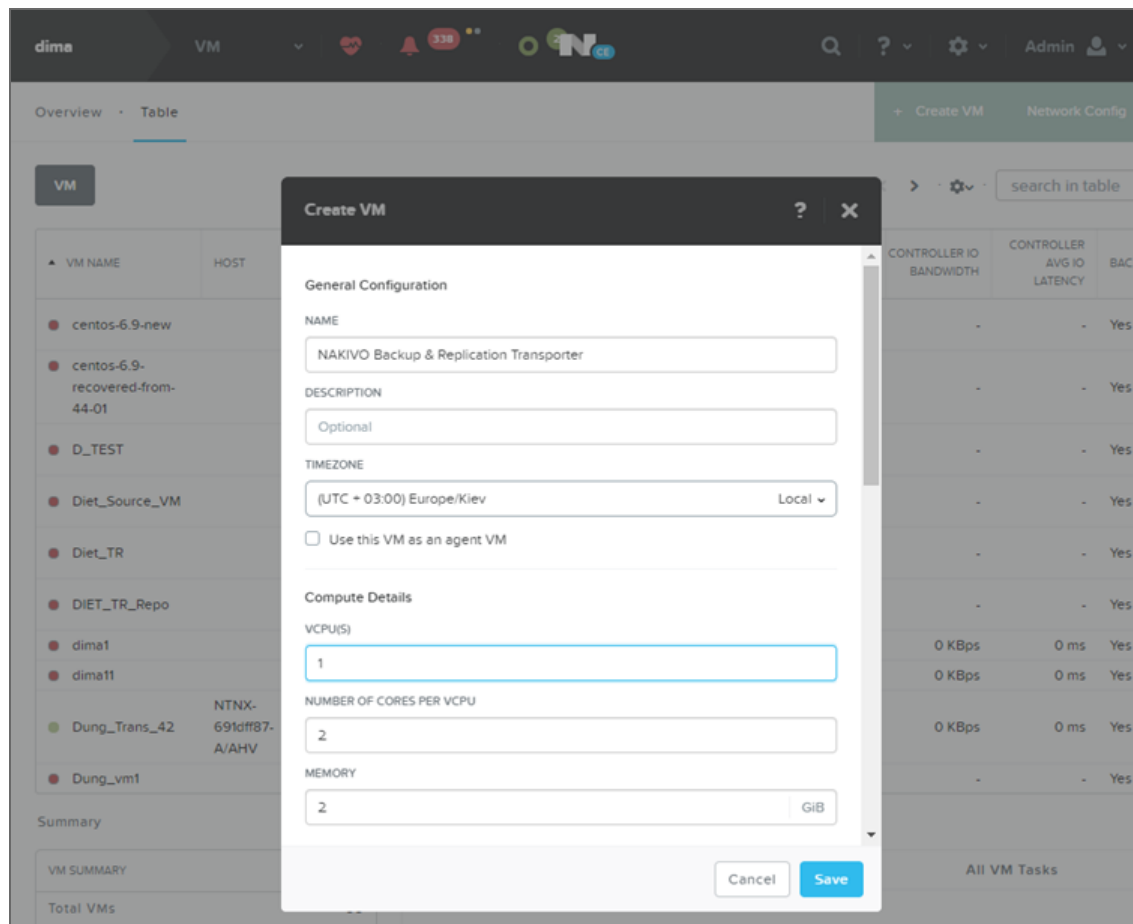
The screenshot shows a modal window titled "Add Disk" with a dark header bar containing a question mark icon and a close button (X). The main content area is white and contains several configuration fields:

- TYPE:** A dropdown menu with "DISK" selected.
- OPERATION:** A dropdown menu with "Clone from Image Service" selected.
- BUS TYPE:** A dropdown menu with "SCSI" selected.
- IMAGE ?**: A dropdown menu with "NAKIVO Backup & Replication Transporter" selected. This field is highlighted with a blue border.
- SIZE (GIB)**: A text input field containing the value "20". Above this field is a note: "Please note that changing the size of an image is not allowed."

At the bottom right of the dialog, there are two buttons: "Cancel" (light gray) and "Add" (blue).

- In the **Network Adapters (NIC)** section, click **Add New NIC** and select an available VLAN from the list.

9. Click **Save**.



10. Wait until the process of VM creation is complete and locate your newly-created VM on the list.
11. Select your VM and click **Power On**.

The screenshot shows the NAKIVO VM management interface. The top navigation bar has a 'VM' tab selected. Below it, the 'Table' view displays a list of VMs. The VM 'NAKIVO Backup & Replication Transporter' is highlighted with a red box. Below the table, the 'Power on' button is also highlighted with a red box.

VM NAME	HOST	IP ADDRESS	CORES	MEMORY CAPACITY	STORAGE	CPU USAGE	MEMORY USAGE	CONTROLLER READ IOPS	CONTROLLER WRITE IOPS	CONTROLLER IO BANDWIDTH	CONTROLLER AVG IO LATENCY	BACK...	FLASH MODE
DungN_pausedVM	NTNX-691dfff87-A/AHV		1	1 GiB	- / 0 GiB	0.2%	0%	0	0	0 KBps	0 ms	Yes	No
DY-test01			1	2 GiB	0 GiB / 10 GiB	-	0%	-	-	-	-	Yes	No
killtest			1	1 GiB	0 GiB / 20 GiB	0%	0%	-	-	-	-	Yes	No
LN_TS	NTNX-691dfff87-A/AHV	10.30...	2	2 GiB	3.34 GiB / 20 GiB	0.08%	21.02%	0	0	0 KBps	0 ms	Yes	No
My Nutanix Transporter	NTNX-691dfff87-A/AHV	192.1...	2	2 GiB	2.85 GiB / 40 GiB	0.03%	18.87%	0	0	0 KBps	0 ms	Yes	No
NAKIVO Backup & Replication Transporter			2	2 GiB	10.8 MiB / 20 GiB	-	0%	-	-	-	-	Yes	No
nakivo-transporter-8.5			2	2 GiB	1.77 GiB / 20 GiB	0%	0%	-	-	-	-	Yes	No
NBR		172.1...	2	2 GiB	- / 100 GiB	-	0%	-	-	-	-	Yes	No
NBR Full	NTNX-691dfff87-A/AHV	192.1...	2	2 GiB	2.26 GiB / 100 GiB	0.13%	81.29%	0	0	3 KBps	2.5 ms	Yes	No
nguyen-trans-44-01-recovered			2	2 GiB	2.58 GiB / 23 GiB	0%	0%	-	-	-	-	Yes	No

Below the table, the 'Power on' button is highlighted with a red box.

12. After the Virtual Appliance is deployed and powered on, you may need to [configure](#) it.

Virtual Appliance OS, Credentials, and Security

The appliance runs Ubuntu 22.04, 64-bit. Use the following credentials to log in to the appliance:

- **Username:** nkuser
- **Password:** QExS-6b%3D

For the versions of NAKIVO Backup & Replication older than 7.2, the password is `root`.

Important

- If you plan to expose the Virtual Appliance to the Internet, change the default VA credentials and set up a login and password for the Web interface.
- It is recommended to run an update on all packages in your Virtual Appliance at least once a month.

To enable [Backup Immutability](#) for **Amazon S3**, **Wasabi**, **Azure Blob Storage**, **Backblaze B2 Cloud Storage**, or **Local Folder** types of [Backup Repository](#) deployed as part of virtual appliance, NAKIVO Backup & Replication does the following:

- Creates a new user for all administrative needs and adds it to the `sudo` group
- Disables root user
- Changes default SSH port to 2221
- Configure the following kernel parameters via **sysctl.conf**:

- Limits network-transmitted configuration for IPv4/IPv6
- Prevents the common 'syn flood attack'
- Turns on source IP address verification
- Prevents a cracker from using a spoofing attack against the IP address of the server
- Logs several types of suspicious packets, such as spoofed packets, source-routed packets, and redirects
- Configures swap. Sets **vm.swappiness** to 15
- Sets **kernel.unprivileged_bpf_disabled** to 1
- Sets **kernel.core_pattern** to **/tmp/%e.%p.core**
- Sets **kernel.core_uses_pid** to 1
- Sets **kernel.dmesg_restrict** to 1
- Sets **kernel.kptr_restrict** to 2
- Sets **kernel.sysrq** to 0
- Secures */tmp* and */var/tmp*
- Secures Shared Memory
- Installs and configures **fail2ban**

Notes

- After **fail2ban** is installed on the hardened VA, the user IP may be banned for 10 minutes if mistakes have been made during the login procedure.
- Any additional packages installed manually on the system may cause a security breach.

Web Interface Login

Open the following URL to access the product's web interface of the VA: `https://Appliance_VM_IP:4443`.

Refer to [“Getting Started” on page 268](#) to better understand how to continue working with NAKIVO Backup & Replication.

Deploying Amazon Machine Image in Amazon EC2

You can deploy NAKIVO Backup & Replication as a pre-configured Amazon Machine Image (AMI) in Amazon EC2. After you complete the [download form](#), you get a link to the AWS marketplace page where you can download the AMI.

Configuring AMI Parameters

Configure the following AMI parameters:

1. **Instance Type:** More powerful instances can process tasks faster and run more tasks simultaneously. The minimum requirement for NAKIVO Backup & Replication is the t2.micro instance type; the t2 medium instance type is recommended.
2. **Instance Details:** Assign a public IP to the instance if you wish to access the instance over the internet.
3. **Security Group:** Use the "All Traffic" rule or create a set of rules listed below:

Type	Port Range	Source	Description
SSH	2221	0.0.0.0/0	Enables remote SSH access to the instance
Custom TCP	80	0.0.0.0/0	Enables access to the web interface
Custom TCP	443	0.0.0.0/0	Required for local Transporter import
Custom TCP	902	0.0.0.0/0	Required for local Transporter import
Custom TCP	4443	0.0.0.0/0	Enables access to the web interface
Custom TCP	9446	0.0.0.0/0	Enables access to a remote Transporter
Custom TCP	9448-10000	0.0.0.0/0	Enables access to a remote Transporter
All ICMP	0-65535	0.0.0.0/0	Enables access to a remote Transporter

Note

Older AMIs may still use SSH Port 22 instead of 2221.

4. **Key pair:** Select an existing key pair or create a new key pair for your instance. If you select an existing key pair, make sure you have access to the private key file.

Note

The AMI deliverable uses Ubuntu 22.04 OS and a standalone EC2 instance with a Director and Transporter. Instead of the default system user **ubuntu**, the AMI uses the username **nkvuser**.

Refer to [“Getting Started” on page 268](#) to better understand how to continue working with NAKIVO Backup & Replication.

Security

The security of your backups can be significantly improved with [“Backup Immutability” on page 38](#). For this feature to be available, the backups must be stored in the **Amazon S3, Wasabi, Azure Blob Storage, Backblaze B2 Cloud Storage**, or **Local Folder** types of Backup Repository deployed via AWS AMI on your EC2 instance.

To enable Backup Immutability for a **Local folder** type of [“Backup Repository” on page 105](#) deployed via an AMI, NAKIVO Backup & Replication does the following:

- Creates a new user for all administrative needs and adds it to the *sudo* group
- Disables root user
- Changes default SSH port to 2221
- Configures the following kernel parameters via **sysctl.conf**:
 - Limits network-transmitted configuration for IPv4/IPv6
 - Prevents the common 'syn flood attack'
 - Turns on source IP address verification
 - Prevents a cracker from using a spoofing attack against the IP address of the server
 - Logs several types of suspicious packets, such as spoofed packets, source-routed packets, and redirects
 - Configures swap. Sets **vm.swappiness** to 15
 - Sets **kernel.unprivileged_bpf_disabled** to 1
 - Sets **kernel.core_pattern** to **/tmp/%e.%p.core**
 - Sets **kernel.core_uses_pid** to 1
 - Sets **kernel.dmesg_restrict** to 1
 - Sets **kernel.kptr_restrict** to 2
 - Sets **kernel.sysrq** to 0
- Secures */tmp* and */var/tmp*
- Secures Shared Memory
- Installs and configures **fail2ban**
- Uninstalls **multipath**
- Disables **snappd**
- Installs the following packets:
 - **nfs-common**
 - **ecryptfs-utils**
 - **cryptsetup**

Notes

- After **fail2ban** is installed on the hardened AMI, the user IP may be banned for 10 minutes if mistakes have been made during the login procedure.
- Any additional packages installed manually on the system may cause a security breach.
- It is possible to ping a hardened AMI.

Installing on Windows

NAKIVO Backup & Replication offers the following installation options for Windows machines:

- Full Solution
- Transporter-Only Solution
- Multi-Tenant Solution

After successful product installation, refer to the [Getting Started](#) section to learn how to continue working with NAKIVO Backup & Replication.

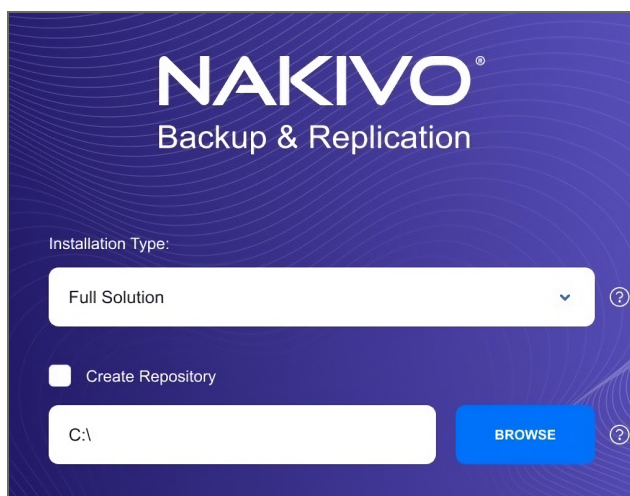
- [Installing Full Solution on Windows](#)
- [Installing Transporter-Only on Windows](#)
- [Installing Full Solution in Multi-Tenant Mode on Windows](#)
- [Silent Installation](#)

Installing Full Solution on Windows

To install NAKIVO Backup & Replication with default options, simply run the NAKIVO Backup & Replication installer for Windows and click **Install**. This will install all product components ([Director](#), [Transporter](#), and [Backup Repository](#)) and you will be able to use all product features after installation.

1. Set the installation options as follows:

- **Installation type:** Leave the **Full solution** option selected to install the key product components (Director and Transporter)
- **Create repository:** Leave the checkbox selected to create a Backup Repository on the machine on which NAKIVO Backup & Replication is installed.
- Optionally, click **Browse** and select a folder to change the default location of the Backup Repository.



2. Click **MORE OPTIONS** to set up more installation options:

- **Installation path:** The location where NAKIVO Backup & Replication will be installed. If you want to change the default path to NAKIVO Backup & Replication, click **Browse** and select a new location.
- **Director Web UI port:** The default port that will be used to connect to the Web UI of NAKIVO Backup & Replication. Make sure that the port you specify is open in your firewall.
- **Transporter port:** The default port that will be used by the Director to communicate with the Onboard Transporter. Make sure that the port you specify is open in your firewall.
- **Transporter certificate:** This allows you to use a CA Certificate. Enter the path to the folder containing the certificate file in the field.

Note

- When the checkbox is not selected, NAKIVO Backup & Replication automatically installs a self-signed certificate.
- It is possible to install a CA-signed certificate for the Transporter by conducting silent installation using the command-line arguments passed to the installer:

- Use the following command for Windows OS:

```
installer.exe --cert C:\certificate.pem --eula-accept
```

The short option for the Windows OS command is the following:

```
installer.exe -ct C:\certificate.pem -ea
```

- Use the following command for Linux OS:

```
installer.sh --cert /tmp/certificate.pem --eula-accept
```

- **Send daily support bundles during evaluation:** When this option is selected, NAKIVO Backup & Replication automatically creates, encrypts, and uploads support bundles once a day to a NAKIVO support server during the evaluation period. The NAKIVO support team may use this information to improve the product experience and may be able to identify and resolve product issues faster.

3. **I accept the License Agreement:** Select this option to confirm that you have read and agreed to the License Agreement.
4. Click **Install**.

▼ MORE OPTIONS

Installation Path:

C:\Program Files\NAKIVO Backup & Replicat BROWSE

Director Web UI Port: 4443

Transporter Port: 9446 ?

☐ Transporter certificate:

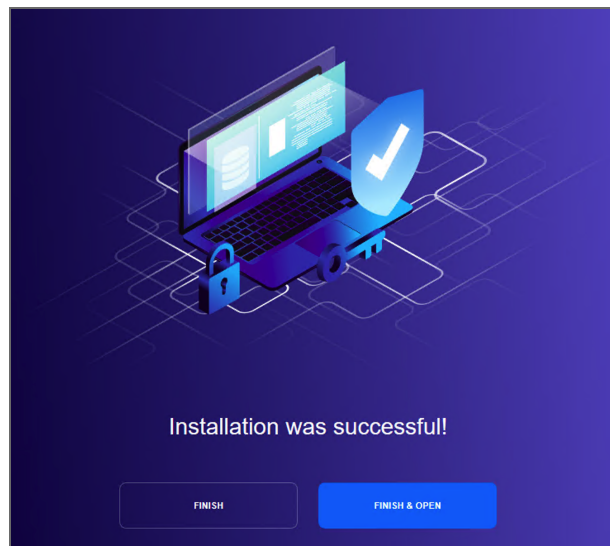
BROWSE ?

☒ Send daily support bundles during evaluation ?

☒ I accept the [License Agreement](#)

INSTALL

- Click **Finish** to complete the installation process or **Finish & Open** to complete installation and start using NAKIVO Backup & Replication.



- To prevent unauthorized access to the product, create your user account. For more details, refer to [“Logging in to NAKIVO Backup & Replication” on page 269](#).

Installing Transporter-Only on Windows

If you have already installed the full solution (both Director and Transporter) and wish to deploy an additional Transporter, run the NAKIVO Backup & Replication installer for Windows and follow the steps below:

Transporter Installation Prerequisites

Prior to installing the Transporter, make sure the following prerequisites are met:

- Make sure the machine on which you plan to install the Transporter has a connection to the relevant items below:
 - The machine on which the Director is installed.
 - VMware/Hyper-V/Nutanix AHV servers on which you plan to back up or replicate VMs (provided that you plan to retrieve VM data using the Transporter you are about to install)
 - Machines on which you have installed other Transporters (provided that you plan to set up data transfer between an existing Transporter and the one you are about to install)
 - Backup Repository (provided that you plan to assign the Transporter you are about to install to a Backup Repository)
 - VMware/Hyper-V/Nutanix AHV servers which you plan to use as a destination for replicated VMs (provided that you plan to write data to the target servers and datastores using the Transporter you are about to install)
- For VMware/Hyper-V/Nutanix AHV servers discovered with DNS names, make sure those DNS names can be resolved on the machine on which to install the Transporter.

Transporter Installation Process

1. Run the NAKIVO Backup & Replication installer.
2. Choose **Transporter only** from the **Installation type** drop-down list.

The screenshot shows the NAKIVO Backup & Replication installer window. The title bar is dark blue with the NAKIVO logo and 'Backup & Replication' text. Below the title, there is a section for 'Installation Type:' with a dropdown menu set to 'Transporter only'. To the right of the dropdown is a question mark icon. Below this, there is a checkbox labeled 'Create repository' which is currently unchecked. Underneath the checkbox is a text input field containing 'C:\' and a blue 'BROWSE' button to its right, with a question mark icon. Below the 'BROWSE' button is a checked checkbox labeled 'Master password' and a corresponding password input field with masked characters. At the bottom left, there is a link that says 'MORE OPTIONS' with a downward arrow.

3. Optionally, you can select the **Master password** checkbox and enter the password that will be used to generate a pre-shared key and secure the Transporter.

Note

- The master password must adhere to the following requirements:
 - Minimal length - 5 characters.
 - Maximum length - 50 characters.
- The master password can be set and re-set manually by running the command on the machine housing the Transporter. Follow these steps:
 - Enter the following command `bhsvc -b P@ssword123`
 - [Restart](#) the Transporter service.

4. Click **MORE OPTIONS** and set up the following:

- **Installation path:** The location where the Transporter will be installed. If you want to change the default path to the Transporter installation folder, click **Browse** and select a new location.
- **Transporter port:** The default port that will be used by the Director to communicate with the Onboard Transporter. Make sure that the port you specify is open in your firewall.
- **Transporter certificate:** This allows you to use a CA Certificate. Enter the path to the folder containing the certificate file in the field.

Note

- When the checkbox is not selected, NAKIVO Backup & Replication automatically installs a self-signed certificate.
- It is possible to set up a master password and CA-signed certificate for the Transporter by conducting silent installation using the command-line arguments passed to the installer:

- Use the following command for Windows OS:

```
installer.exe --cert C:\certificate.pem --master-pass  
P@ssword123 --eula-accept
```

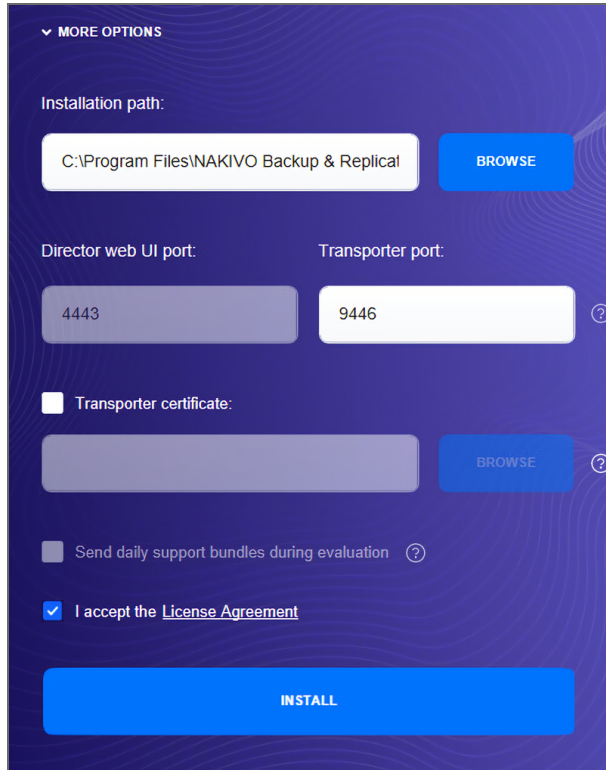
The short option for the Windows OS command is the following:

```
installer.exe -ct C:\certificate.pem -b P@ssword123 -ea
```

- Use the following command for Linux OS:

```
installer.sh --cert /tmp/certificate.pem -b P@ssword123 -  
-eula-accept
```

- **Send daily support bundles during evaluation:** If this option is selected, NAKIVO Backup & Replication will automatically create, encrypt, and upload support bundles once a day to a NAKIVO support server during the evaluation period. NAKIVO Support team may use this information to improve the product experience and may be able to identify and resolve product issues faster.
5. **I accept the License Agreement:** Select this option to confirm that you have read and agreed to the License Agreement.
 6. Click **Install**.



The screenshot shows the 'MORE OPTIONS' section of the NAKIVO Backup & Replication installer. It features several configuration fields: 'Installation path' with a text box containing 'C:\Program Files\NAKIVO Backup & Replical' and a 'BROWSE' button; 'Director web UI port' with a text box containing '4443'; 'Transporter port' with a text box containing '9446' and a help icon; 'Transporter certificate' with an unchecked checkbox, a text box, a 'BROWSE' button, and a help icon; 'Send daily support bundles during evaluation' with an unchecked checkbox and a help icon; and 'I accept the License Agreement' with a checked checkbox. A large blue 'INSTALL' button is at the bottom.

▼ MORE OPTIONS

Installation path:

C:\Program Files\NAKIVO Backup & Replical **BROWSE**

Director web UI port: 4443

Transporter port: 9446 ?

☐ Transporter certificate:

BROWSE ?

☐ Send daily support bundles during evaluation ?

☒ I accept the [License Agreement](#)

INSTALL

7. When the installation is complete the **Transporter installation was successful** notification appears.



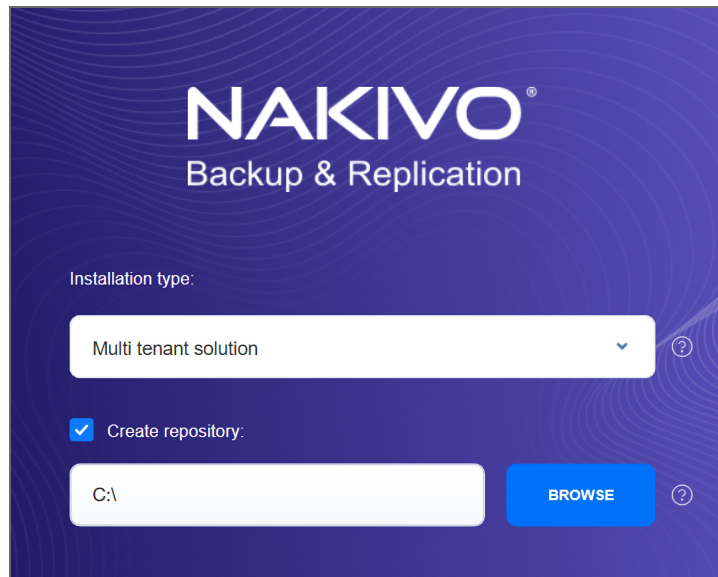
8. [Add the Transporter](#) to NAKIVO Backup & Replication.

Installing Full Solution in Multi-Tenant Mode on Windows

To install the full solution in [multi-tenant mode](#) on a Windows OS, run the NAKIVO Backup & Replication installer for Windows and follow the steps below:

1. Set the installation options as follows:
 - **Installation type:** Select the **Multi tenant solution** option from the **Installation type** drop-down list.
 - **Create repository:** Leave the checkbox selected to create a Backup Repository on the machine on which NAKIVO Backup & Replication is installed.

- Optionally, click **Browse** and select a folder to change the default location of the Backup Repository.



2. Click **MORE OPTIONS** to set up more installation options:

- **Installation path:** The location where NAKIVO Backup & Replication will be installed. If you want to change the default path to the product, click **Browse** and select a new location.
- **Director Web UI port:** The default port that will be used to connect to the Web UI of NAKIVO Backup & Replication. Make sure that the port you specify is open in your firewall.
- **Transporter port:** The default port that will be used by the Director to communicate with the Onboard Transporter. Make sure that the port you specify is open in your firewall.
- **Transporter certificate:** This allows you to use a CA Certificate. Enter the path to the folder containing the certificate file in the field.

Note

- When the checkbox is not selected, NAKIVO Backup & Replication automatically installs a self-signed certificate.
- It is possible to install a CA-signed certificate for the Transporter by conducting silent installation using the command-line arguments passed to the installer:
 - Use the following command for Windows OS:

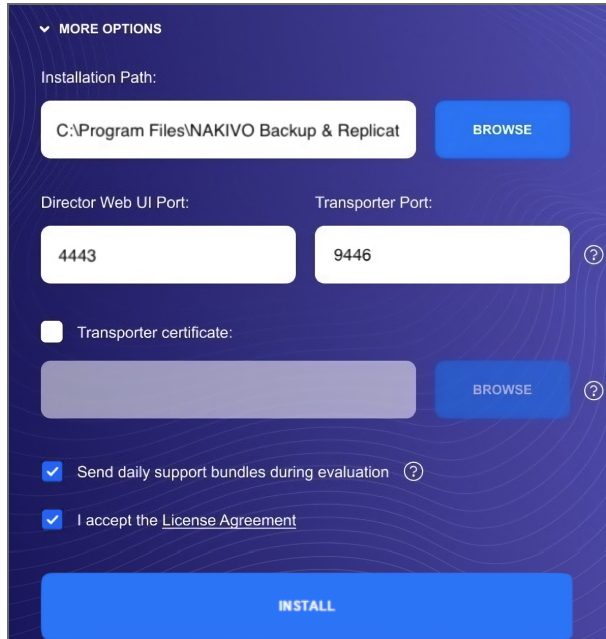
```
installer.exe --cert C:\certificate.pem --eula-accept
```

 The short option for the Windows OS command is the following:

```
installer.exe -ct C:\certificate.pem -ea
```
 - Use the following command for Linux OS:

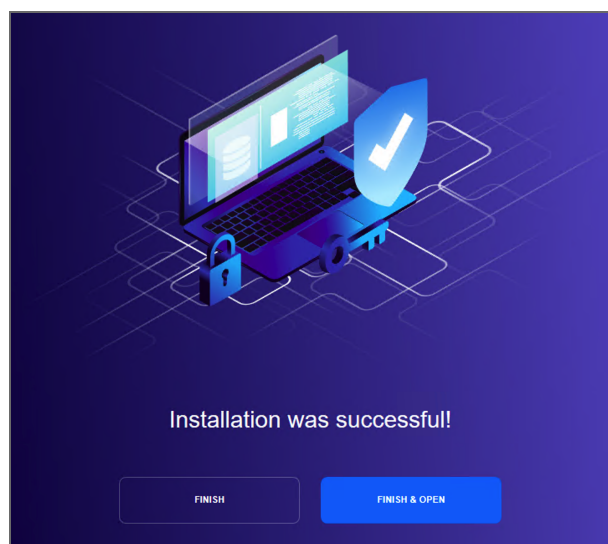
```
installer.sh --cert /tmp/certificate.pem --eula-accept
```

- **Send daily support bundles during evaluation:** When this option is selected, NAKIVO Backup & Replication automatically creates, encrypts, and uploads support bundles once a day to a NAKIVO support server during the evaluation period. The NAKIVO support team may use this information to improve the product experience and may be able to identify and resolve product issues faster.
3. **I accept the License Agreement:** Select this option to confirm that you have read and agreed to the License Agreement.
 4. Click **Install**.



The screenshot shows the 'MORE OPTIONS' section of the NAKIVO Backup & Replication installer. It includes fields for 'Installation Path' (set to C:\Program Files\NAKIVO Backup & Replicat) with a 'BROWSE' button, 'Director Web UI Port' (4443), and 'Transporter Port' (9446) with a help icon. There is an unchecked checkbox for 'Transporter certificate' with a 'BROWSE' button and help icon. Two checked checkboxes are present: 'Send daily support bundles during evaluation' and 'I accept the License Agreement'. A large blue 'INSTALL' button is at the bottom.

5. Click **Finish** to complete the installation process or **Finish & Open** to complete installation and start using NAKIVO Backup & Replication.



Note

The onboard backup repository for the Master Tenant is automatically created after the installation.

6. Create an account by completing the form. For details, refer to [“Logging in to NAKIVO Backup & Replication” on page 269](#).

Credentials are not required to log in as Master Admin after installation. However, the default credentials are required to log into the product after the first tenant is created. To log in as Master Admin, specify “admin” as the username and leave the password field empty. You can [change credentials](#) in the product configuration.

Silent Installation on Windows

You can install NAKIVO Backup & Replication in silent mode via a command line by running the following command: **installer.exe -f --eula-accept**. This installs all product components (Director, Transporter, and Backup Repository), and you will be able to use all product features after installation.

The following arguments are available:

Argument	Description
-h	Display the list of available arguments without starting the installation.
--eula-accept, -ea	Indicates that you have read and agree to the End User License Agreement .
-f	Performs the silent installation of the full solution (Director and Transporter).
-t	Performs the silent installation of Transporter only.
-m	Performs the silent installation of the full solution in multi-tenant mode.
-u	Performs the silent update of the installed product components.
--release-notes, -n	Indicates the user has read the release notes for the new release during an update.
-sii	Performs the silent install or update ignoring the single installer instance check.

Argument	Description
--ignore-pre-install-action-failures, -ipiaf	All pre-install action failures are ignored.
--cert	Allows to set up a custom Transporter certificate.
--master-pass (short version: -b)	Allows to set up a custom master password for the Transporter.

Installing on Linux

- [Linux Installation Prerequisites](#)
- [Silent Installation on Linux](#)
- [Installing Full Solution on Linux](#)
- [Installing Transporter on Linux](#)
 - [Transporter Installation Prerequisites](#)
 - [Transporter Installation](#)
- [Installing Full Solution in Multi-Tenant Mode on Linux](#)

Linux Installation Prerequisites

In order to install and use NAKIVO Backup & Replication on a Linux OS, make sure the following requirements are met:

- On Ubuntu and SLES, the following packages must be installed:
 - cifs-utils
 - open-iscsi
 - ntfs-3g
- On RedHat Enterprise Linux, the following packages must be installed:
 - cifs-utils
 - iscsi-initiator-utils
 - ntfs-3g
 - tar

Silent Installation on Linux

You can install NAKIVO Backup & Replication in silent mode via a command line. To install the full solution, simply run the following command: `installer.sh -f --eula-accept` This will install all product components ([Director](#), [Transporter](#), [Backup Repository](#)) and you will be able to use all product features after installation.

The following arguments are available:

Argument	Description
-h, -help, help	Display the list of available arguments without starting the installation.
--eula-accept, -ea	Indicates that you have read and agree to the End User License Agreement .
-f	Shall perform the silent installation of the full solution (Director and Transporter).

Argument	Description
-t	Shall perform the silent installation of Transporter only.
-m	Shall perform the silent installation of the full solution in multi-tenant mode .
-u	Shall perform the silent update of the installed product components.
-e	Shall install Transporter on Amazon EC2, or update Transporter installed on Amazon EC2. Refer to Updating on Amazon EC2 for details.
-a	Shall enable uploading support bundles to support team server (Call Home). Refer to System Settings for details.
-y	Shall accept limitations silently.
-i <install_path>	Shall install to the specified installation path.
-d <director_port>	Shall provide a custom Director port.
-p <transporter_port>	Shall provide a custom Transporter port.
-r <port1>-<port2>	Shall provide a custom transporter data ports range.
-C	Shall suppress creating the repository.
-c <repo_path>	Shall create the repository. The <repo_path> parameter is optional.
--rt <repo_type>	Shall create a repository of the specified type. The <repo_type> parameter may accept the following values: 1 – "Forever incremental with deduplication"; 2 – "Forever incremental without deduplication"; 3 – "Incremental with full backups (deduplication devices)".
--rc <compress_level>	Shall specify the repository compression level. The parameter may accept the following values: Disabled; Fast; Medium; Best. Refer to Creating Backup Repositories for details.
--pnp-cleanup	Shall clean up the database of the device manager for the Linux kernel.
--cert	Allows to set up a custom Transporter certificate.
--master-pass (short version: -b)	Allows to set up a custom master password for the Transporter.

Installing Full Solution on Linux

Follow the steps below to install all components of NAKIVO Backup & Replication (both Director and Transporter) on a Linux OS:

1. Upload the installer file to the machine on which you want to install NAKIVO Backup & Replication in the *binary transfer mode*. For example:
 - [Upload the installer from a Windows-based machine.](#)
 - Upload the product from a Linux-based machine: run the following command: `wget 'server_ip/shared/NAKIVO_Backup_&_Replication_TRIAL.sh'`
2. Log in to the Linux machine and allow the execution of the installer file.
For example: `chmod +x NAKIVO_Backup_&_Replication_TRIAL.sh`
3. Execute the installer file with root privileges.
For example: `sudo ./NAKIVO_Backup_&_Replication_TRIAL.sh`
4. Review the license agreement (press **Space** to go to the next page of the agreement). If you agree to the terms of the license agreement, press "Y" and then press **Enter**.
5. Type "S" to install the full solution and press **Enter**.
6. Optionally, you can install CA Transporter certificate. Enter the path to the folder containing the certificate file and press **Enter**.

Notes

- If no path to the CA certificate was provided, NAKIVO Backup & Replication automatically installs a self-signed certificate.
 - It is possible to set up CA-signed certificate for the Transporter by conducting silent installation using the command-line arguments passed to the installer. Use the following command:
`installer.sh --cert /tmp/certificate.pem --eula-accept`
7. Specify the installation path for the product: Press **Enter** to accept the default installation path `"/opt/nakivo"` or enter a custom path and press **Enter**.
 8. Specify the Director HTTPS port (which will be used to access the Web UI of NAKIVO Backup & Replication): Press **Enter** to accept the default port `"4443"` or enter a custom port number and press **Enter**. Make sure the port you specify is open in your firewall.
 9. Specify whether to allow the product to automatically send support bundles to a NAKIVO server during the evaluation period (Call Home). If this option is enabled, NAKIVO Backup & Replication will automatically create, encrypt, and upload support bundles once a day to a NAKIVO support server during the evaluation period. NAKIVO Support team may use this information to improve the product experience and will be able to identify and resolve product issues faster.
 10. Specify the Transporter port (which will be used to connect to the Transporter that is installed by default with the Director): Press **Enter** to accept the default port `"9446"` or enter a custom port number (1 to 65535) and press **Enter**. Make sure the port you specify is open in your firewall.

11. Specify a range of port numbers (from 1 to 65535) that will be used to transfer data by the Onboard Transporter (default are 9448-10000). The range you specify should contain at least 100 ports. Make sure that the ports you specify are open in your firewall.
12. Specify a path to the default Backup Repository: Press **Enter** to accept the default path `"/opt/nakivo/repository"` or enter a custom path and press **Enter** to begin the installation process.

After the installation is complete, you can log in to NAKIVO Backup & Replication by opening the following URL in your web browser: `https://machine_IP_or_DNS:director_https_port`

By default, login name and password are not required to access NAKIVO Backup & Replication. To prevent unauthorized access to the product, you can set up credentials in Configuration.

Installing Transporter on Linux

If you have already installed the full solution (both Director and Transporter) and want to deploy an additional Transporter, run the NAKIVO Backup & Replication installer for Windows and follow the steps below:

Transporter Installation Prerequisites

Prior to installing a Transporter, make sure the following prerequisites are met:

1. Make sure the machine on which you plan to install the Transporter has a connection to the relevant items below:
 - The machine on which the Director is installed
 - VMware/Hyper-V servers on which you plan to back up or replicate VMs (if you plan to retrieve VM data using the Transporter you are about to install)
 - Machines on which you have installed other Transporters (if you plan to set up data transfer between an existing Transporter and the one you are about to install)
 - Backup repository (if you plan to assign the Transporter you are about to install to a Backup Repository)
 - VMware/Hyper-V servers which you plan to use as a destination for replicated VMs (if you plan to write data to the target servers and datastores using the Transporter you are about to install)
2. If you have discovered VMware/Hyper-V servers using DNS names, make sure those DNS names can be resolved on the machine on which you plan to install the Transporter.

Transporter Installation

1. Upload the installer file to the machine on which you wish to install NAKIVO Backup & Replication in the *binary transfer mode*. For example:
 - [Upload the installer from a Windows-based machine.](#)
 - Upload the product from a Linux-based machine: run the following command: `wget 'server_ip/shared/NAKIVO_Backup_&_Replication_TRIAL.sh'`

2. Allow the execution of the installer file. For example: `chmod +x NAKIVO_Backup_&_Replication_TRIAL.sh`
3. Execute the installer file with root privileges. For example: `sudo ./NAKIVO_Backup_&_Replication_TRIAL.sh`
4. Review the license agreement (press **Space** to go to the next page of the agreement). If you agree to the terms of the license agreement, press "Y" and then press **Enter**.
5. Type "T" to install only the Transporter and press **Enter**.

Note

Alternatively, you can use the **-t** argument to install the Transporter silently:

```
sudo ./NAKIVO_Backup_&_Replication_TRIAL.sh -t
```

6. Optionally, enter the master password that will be used to generate a pre-shared key and secure the Transporter and then press **Enter**.

Notes

- The master password must adhere to the following requirements:
 - Minimal length - 5 characters.
 - Maximum length - 50 characters.
 - The master password can be set and re-set manually by following these steps:
 1. Switch to root using the following command:

```
sudo -i
```
 2. [Stop](#) the Transporter service.
 3. Go to the transporter folder with the following command:

```
cd /opt/nakivo/transporter
```
 4. Run the following command to set the master password:

```
./bhsvc -b P@ssword123
```
 5. [Restart](#) the Transporter service.
7. Specify the installation path for the product: Press **Enter** to accept the default installation path `"/opt/nakivo"` or enter a custom path and press **Enter**.
 8. Optionally, you can install CA Transporter certificate. Enter the path to the folder containing the certificate file and press **Enter**.

Notes

- If no path to the CA certificate was provided, NAKIVO Backup & Replication automatically installs a self-signed certificate.
- It is possible to set up a master password and a CA-signed certificate for the Transporter by conducting silent installation using the command-line arguments passed to the installer. Use the following command:

```
installer.sh --cert /tmp/certificate.pem -b P@ssword123 --eula-accept
```

9. Specify the Transporter port (used to connect to the Transporter): Press **Enter** to accept the default port "9446" or enter a custom port number and press **Enter** to begin the installation process. Make sure the port you specify is open in your firewall.

After the installation is complete, [add the Transporter](#) to NAKIVO Backup & Replication.

Installing Full Solution in Multi-Tenant Mode on Linux

Follow the steps below to install the full solution in multi-tenant mode on a Linux OS:

1. Upload the installer file to the machine on which you want to install NAKIVO Backup & Replication in the *binary transfer mode*. For example:
 - [Upload the installer from a Windows-based machine](#).
 - Upload the product from a Linux-based machine: run the following command: `wget 'server_ip/shared/NAKIVO_Backup_&_Replication_TRIAL.sh'`
2. Log in to the Linux machine and allow the execution of the installer file.
For example: `chmod +x NAKIVO_Backup_&_Replication_TRIAL.sh`
3. Execute the installer file with root privileges.
For example: `sudo ./NAKIVO_Backup_&_Replication_TRIAL.sh`
4. Review the license agreement (press **Space** to go to the next page of the agreement). If you agree to the terms of the license agreement, press "Y" and then press **Enter**.
5. Type "M" to install the Director in Multi-tenant mode and press **Enter**.

Note

Alternatively, you can use the **-m** argument to install the solution in multi-tenant mode silently:

```
sudo ./NAKIVO_Backup_&_Replication_TRIAL.sh -m
```

6. Optionally, you can install CA Transporter certificate. Enter the path to the folder containing the certificate file and press **Enter**.

Notes

- If no path to the CA certificate was provided, NAKIVO Backup & Replication automatically installs a self-signed certificate.
- It is possible to set up CA-signed certificate for the Transporter by conducting silent installation using the command-line arguments passed to the installer. Use the following command:

```
installer.sh --cert /tmp/certificate.pem --eula-accept
```

7. Specify the installation path for the product: Press **Enter** to accept the default installation path `"/opt/nakivo"` or enter a custom path and press **Enter**.

8. Specify the Director HTTPS port (which will be used to access the Web UI of NAKIVO Backup & Replication): Press **Enter** to accept the default port “4443” or enter a custom port number and press **Enter**. Make sure the port you specify is open in your firewall.
9. Specify whether to allow the product to automatically send support bundles to a NAKIVO server during the evaluation period. If this option is enabled, NAKIVO Backup & Replication will automatically create, encrypt, and upload support bundles once a day to a NAKIVO support server during the evaluation period. NAKIVO Support team may use this information to improve the product experience and will be able to identify and resolve product issues faster.
10. Specify the Transporter port (which will be used to connect to the Transporter that is installed by default with the Director): Press **Enter** to accept the default port “9446” or enter a custom port number (1 to 65535) and press **Enter**. Make sure the port you specify is open in your firewall.
11. Specify a range of port numbers (from 1 to 65535) that will be used to transfer data by the Onboard Transporter (default are 9448-10000). The range you specify should contain at least 100 ports. Make sure that the ports you specify are open in your firewall.
12. The onboard backup repository for the Master Tenant is automatically created after the installation.
13. Specify a path to the default backup repository: Press **Enter** to accept the default path `/opt/nakivo/repository` or enter a custom path and press **Enter** to begin the installation process.

Note

The onboard backup repository for the Master Tenant is automatically created after the installation.

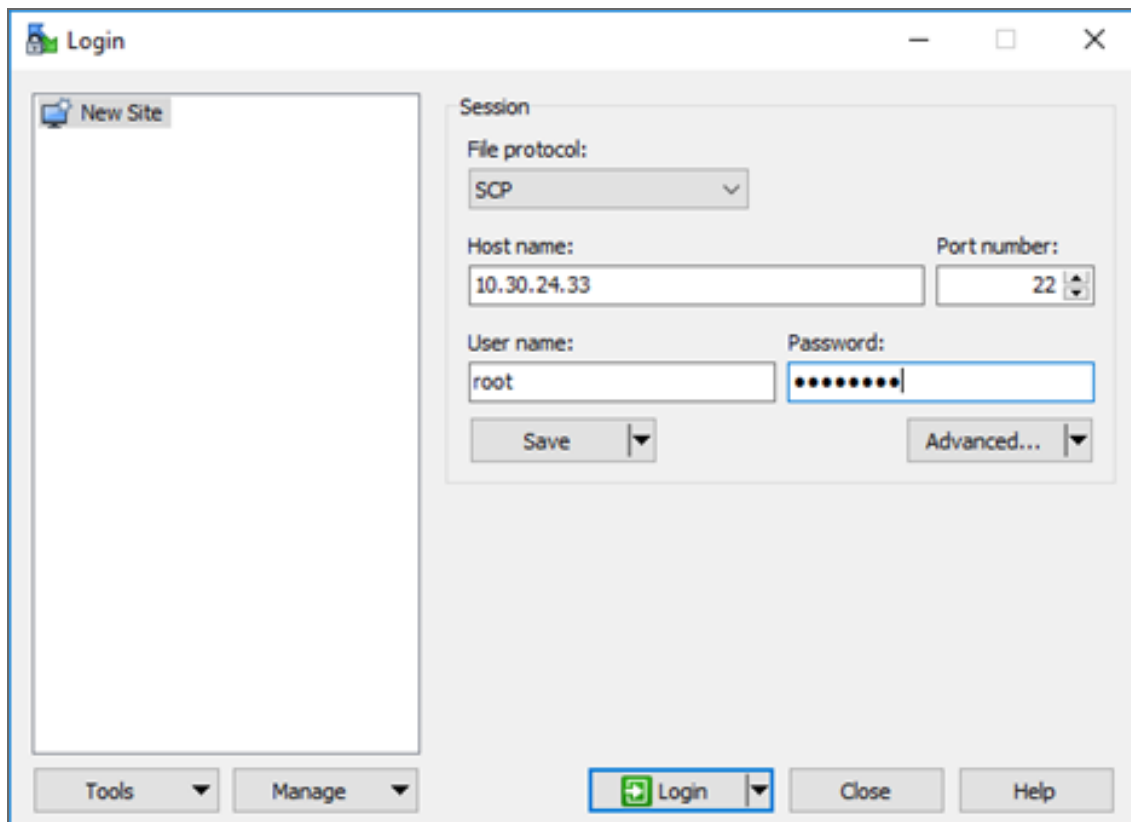
After the installation is complete, you can log in to NAKIVO Backup & Replication by going to the following URL in your web browser: `https://machine_IP_or_DNS:director_https_port`.

Refer to [“Getting Started” on page 268](#) to know how to continue working with NAKIVO Backup & Replication.

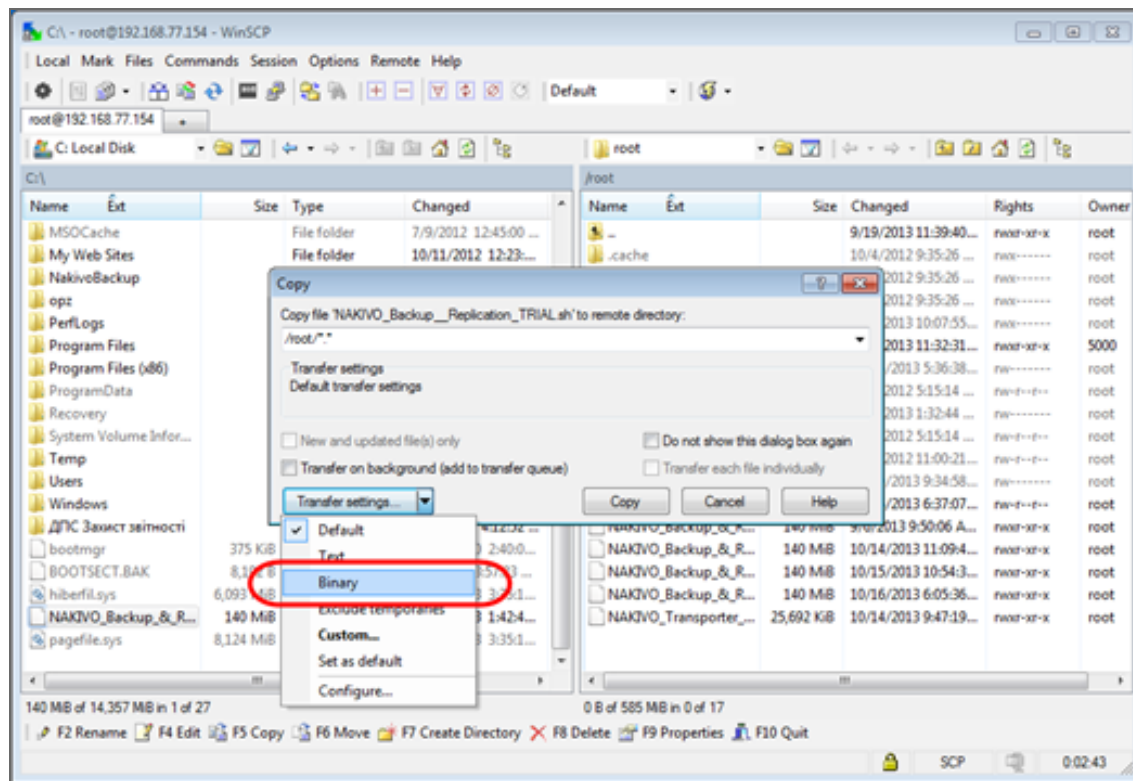
Uploading Installer from Windows Machine to Linux Machine

To upload the installer from a Windows-based machine, follow the steps below:

1. Download the free WinSCP client from <http://winscp.net>, install, and run it.
2. Choose **SCP** from the **File protocol** list.
3. Specify the IP address or the hostname of the Linux machine on which you would like to install the product in the **Host name** field.
4. Specify the username and password to the Linux machine in the appropriate boxes.
5. Leave other options as is and click **Login**.



6. Click **Yes** in the dialog box that opens.
7. In the left pane, find the folder that contains the Linux installer, in the right pane, go up to the root folder.
8. Drag and drop the installer from left to the right pane.
9. Choose **Binary** from the **Transfer settings** drop-down list in the Copy dialog box that opens.



10. Click **Copy**.

Installing on Synology NAS

NAKIVO Backup & Replication can be installed directly on a [supported Synology NAS](#) to create your own, high-performance backup appliance. With the appliance, all VM data protection components are unified in a single system that is fast to deploy and easy to manage, while also not consuming your environment's valuable resources. Moreover, you are getting an all-in-one backup hardware, backup software, backup storage, and data deduplication in a single box. This results in a zero VMware footprint, less power and cooling, less required maintenance, time, money, and – most of all – higher VM backup performance. You can install a Synology package with either all NAKIVO Backup & Replication components ([Director](#), [Transporter](#), [Backup Repository](#)) or a Transporter only. The product can be installed via Package Center or manually. For more details, refer to the corresponding topics below:

- [“Installing on Synology NAS via Package Center” on page 211](#)
- [“Installing on Synology NAS Manually” on page 213](#)

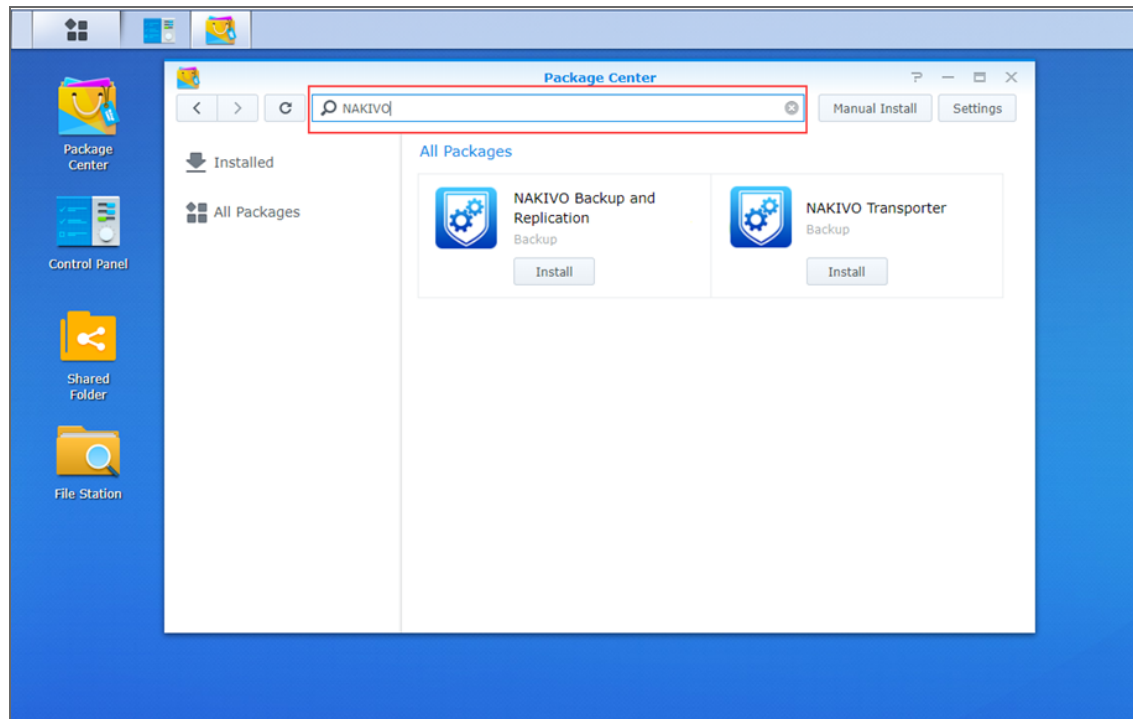
Note

A pre-shared key is not created during Transporter-only installation. When adding this Transporter to NAKIVO Backup & Replication, filling out the master password field is not required. The master password can be manually set and reset later. For details, refer to [“Installed Service” on page 439](#).

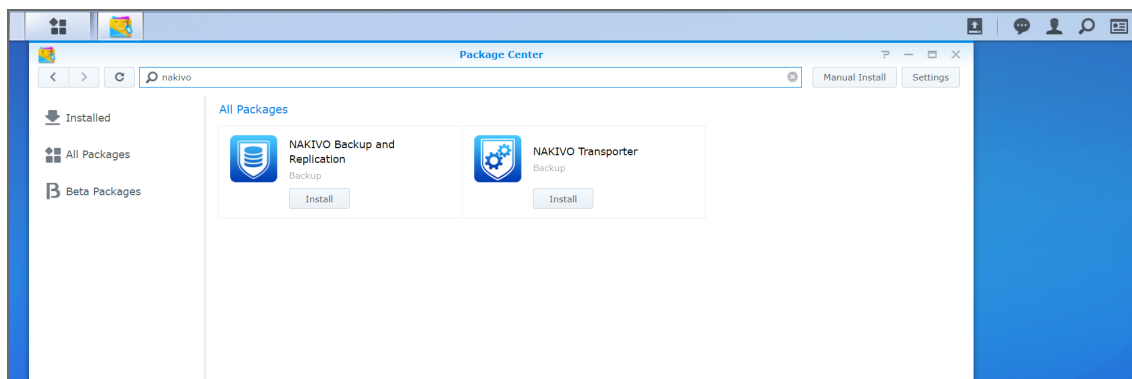
Installing on Synology NAS via Package Center

To automatically install a NAKIVO Backup & Replication application on a Synology NAS, do the following:

1. Log in to your Synology account and open **Package Center** in the management interface.
2. Use the search box to find NAKIVO Backup & Replication packages.

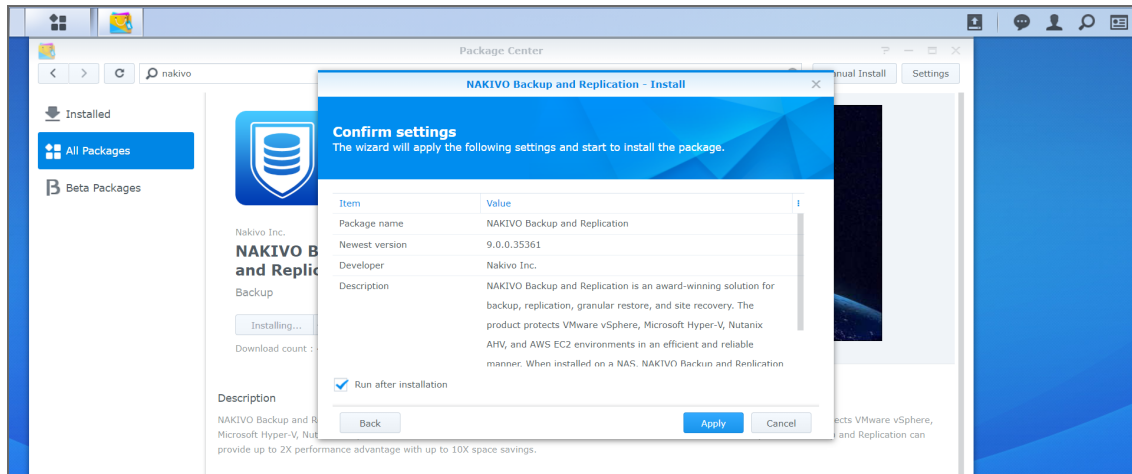


3. Click **Install** on one of the following:
 - **NAKIVO Backup and Replication** to install all product components.
 - **NAKIVO Transporter** to install a Transporter only.



4. Select the **I accept the terms of the license agreement** checkbox and click **Next**.

5. In the **Confirm settings** dialog box, click **Apply**.



Refer to [“Getting Started” on page 268](#) to better understand how to continue working with NAKIVO Backup & Replication.

Installing on Synology NAS Manually

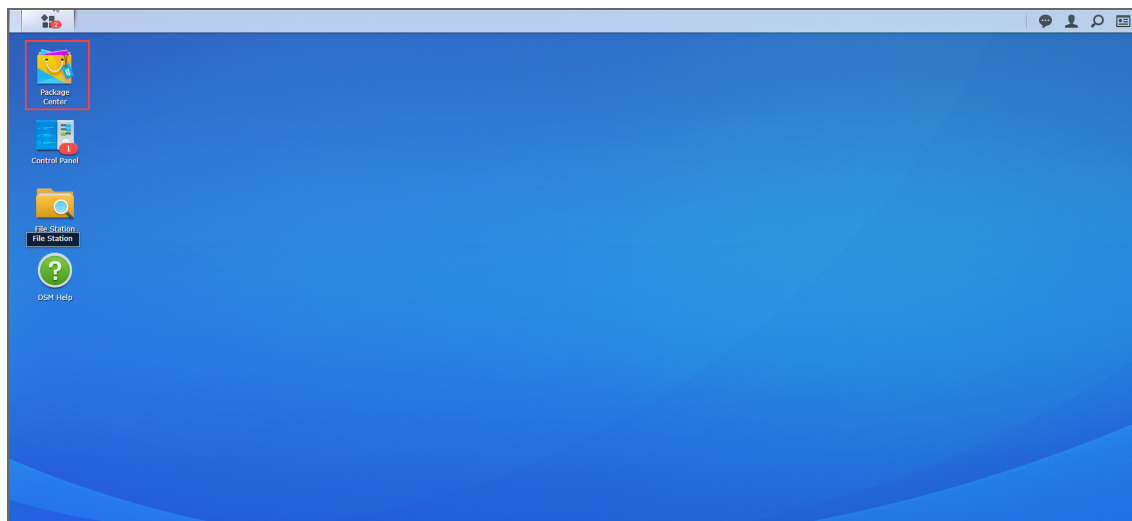
If for any reason installation of NAKIVO Backup & Replication via Package Center is not available for your Synology NAS, you can install it manually.

The following packages are available for manual installation:

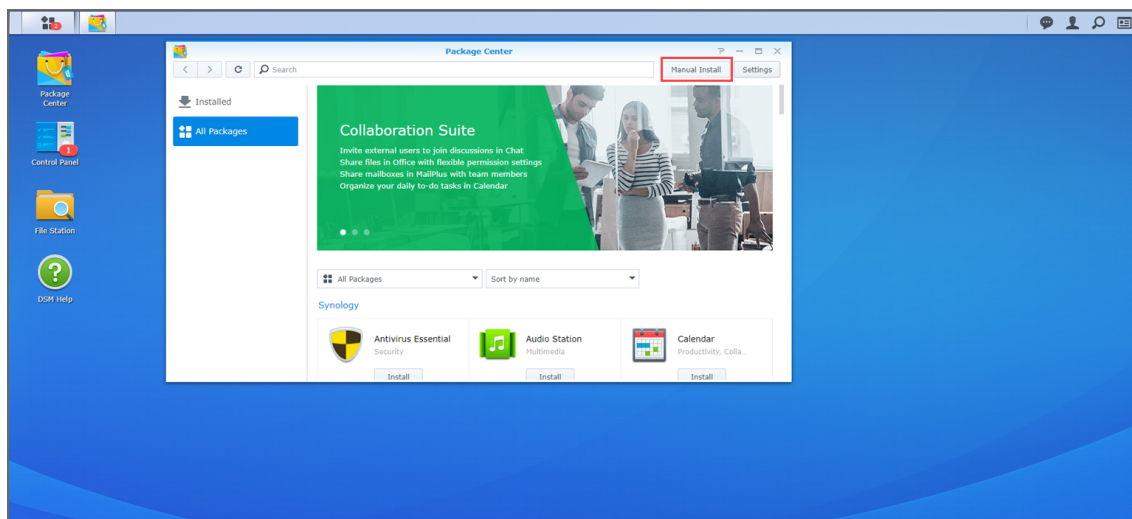
- Synology package
- Synology Transporter package
- Synology ARM package
- Synology ARM Transporter package

To manually install NAKIVO Backup & Replication on a Synology NAS, do the following:

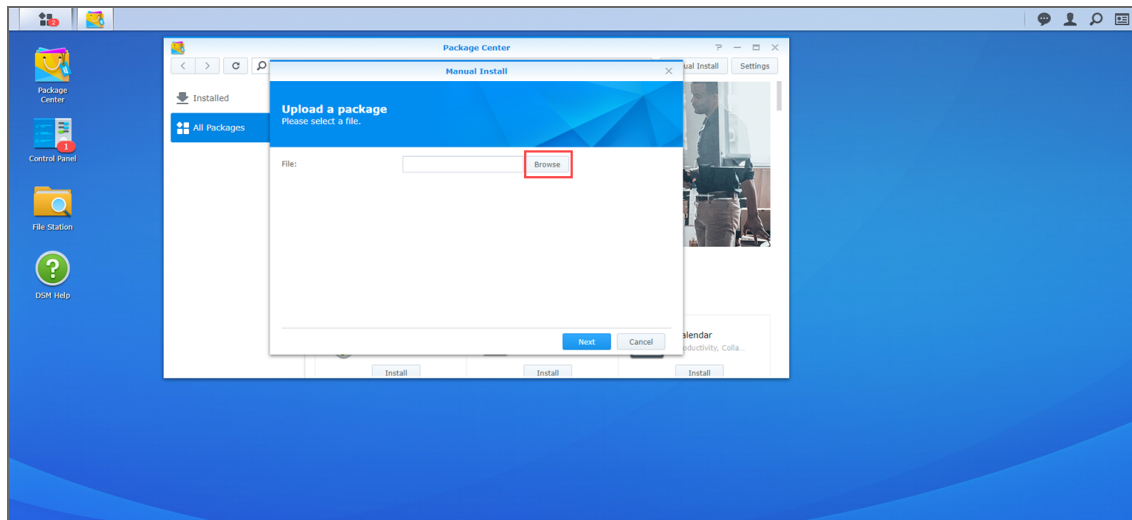
1. Download a [Synology NAS package](#).
2. Log in to your Synology account and open the **Package Center** in the management interface.



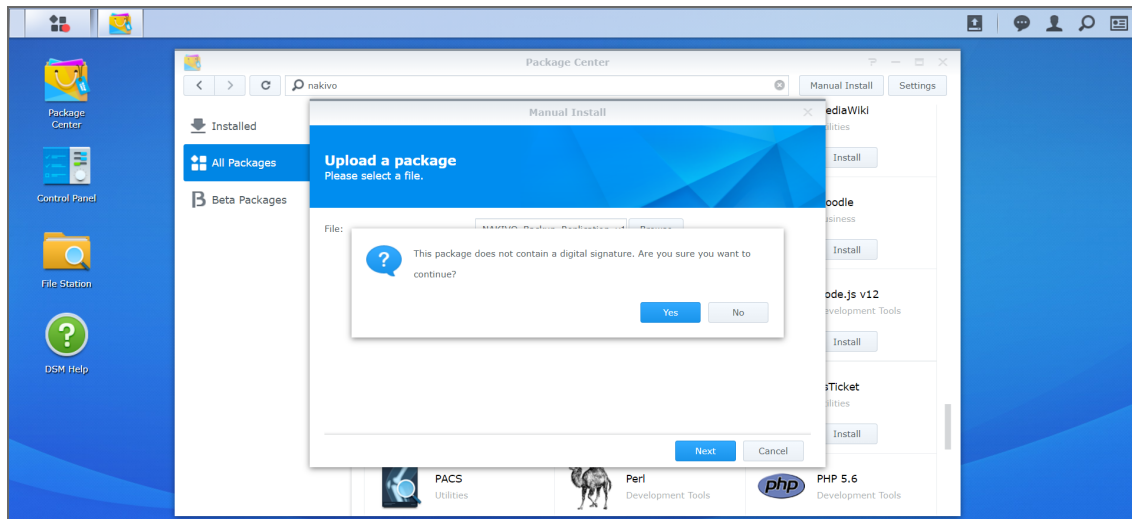
3. Click **Manual Install**.



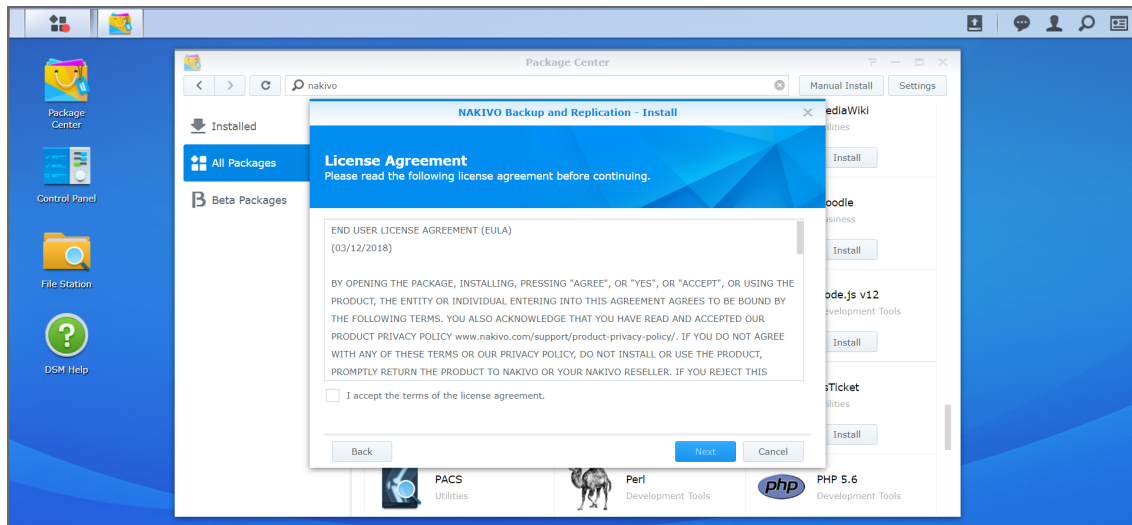
- Click **Browse**, navigate to the Synology NAS package that you have downloaded, select it, and click **Open**.



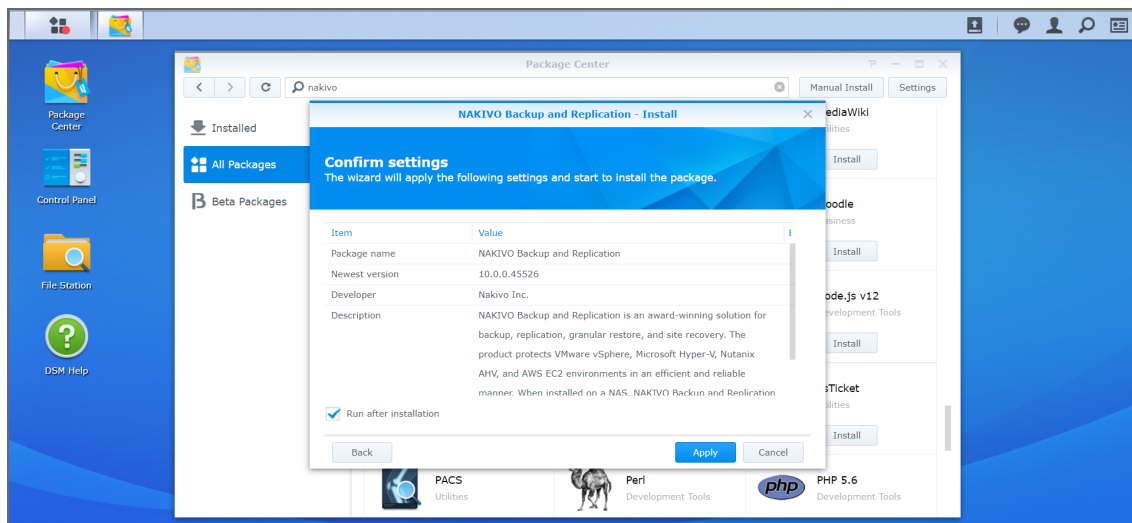
- Click **Yes** to proceed.



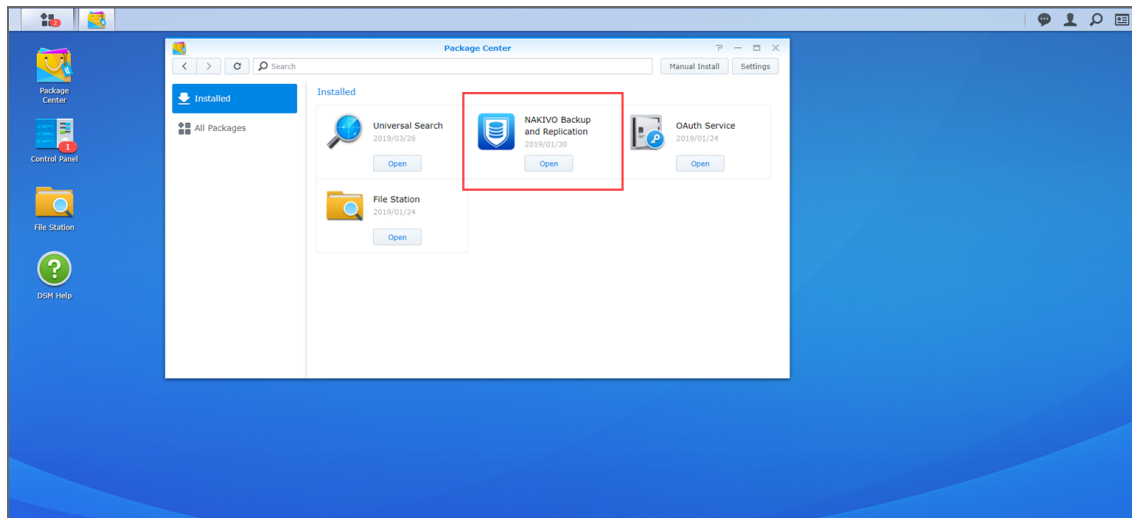
- After reading through the License Agreement, check **I accept the terms of the license agreement** and click **Next**.



7. Optionally check **Run after installation** to start NAKIVO Backup & Replication immediately after the install process is finished. Click **Apply**.



8. Now NAKIVO Backup & Replication is installed on your NAS. To open the NAKIVO Backup & Replication Web interface, go to the following address in your web browser: `https://NAS_IP_address:4443`, or click the NAKIVO Backup & Replication icon in the main menu of the NAS.



Refer to [“Getting Started” on page 268](#) to better understand how to continue working with NAKIVO Backup & Replication.

Installing on QNAP NAS

You can install a QNAP package with either all NAKIVO Backup & Replication components ([Director](#), [Transporter](#), [Backup Repository](#)) or a Transporter only.

NAKIVO Backup & Replication can be installed directly on a [supported QNAP NAS](#) to create your own, high-performance backup appliance. With this appliance, all VM data protection components are unified in a single system that is quick to deploy and easy to manage, while also not consuming your environment's valuable resources. Moreover, you are getting an all-in-one backup hardware, backup software, backup storage, and data deduplication in a single box. This results in a zero VMware footprint, less power and cooling, less required maintenance, time, money, and – most of all – higher VM backup performance.

You can install NAKIVO Backup & Replication either via QNAP store or manually.

- [“Installing on QNAP NAS via QNAP Store” on page 218](#)
- [“Installing on QNAP NAS Manually” on page 220](#)

Note

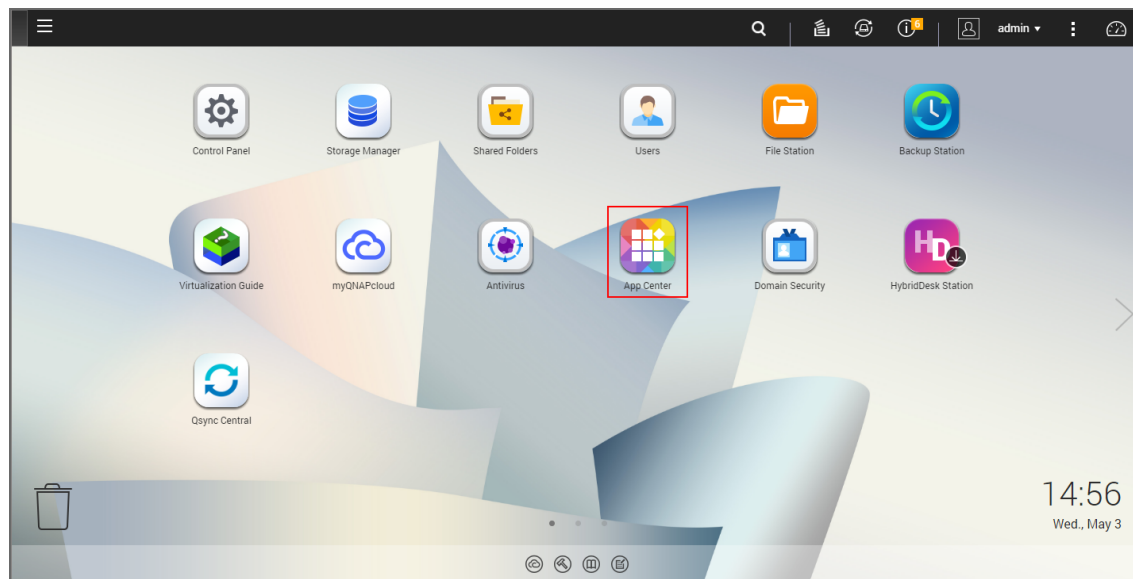
A pre-shared key is not created during Transporter-only installation. When adding this Transporter to NAKIVO Backup & Replication, filling out the master password field is not required. The master password can be manually set and reset later. For details, refer to [“Installed Service” on page 439](#).

Installing on QNAP NAS via QNAP Store

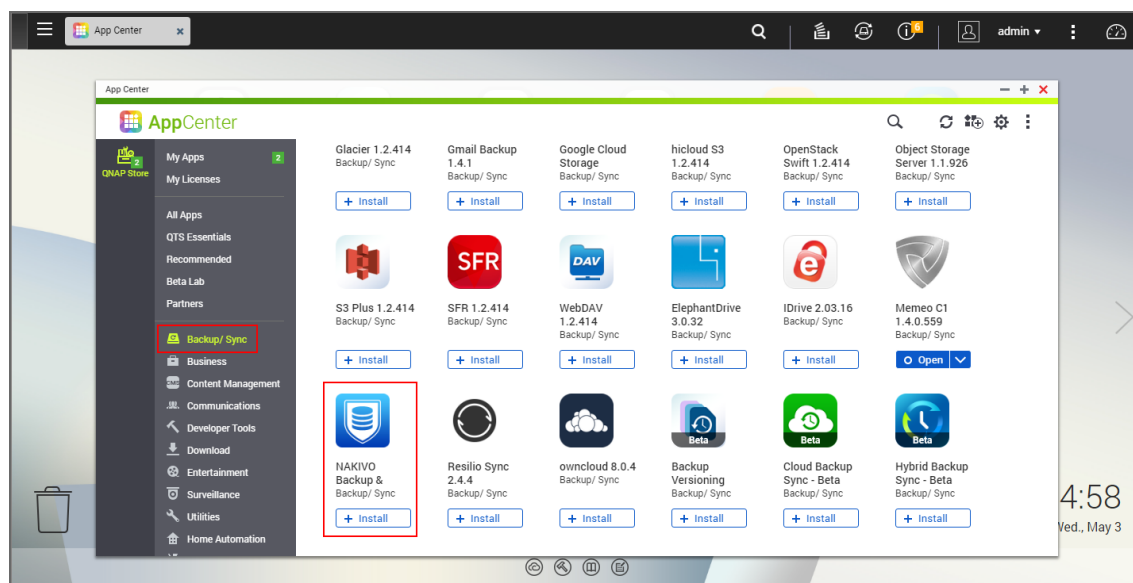
Check to see if your NAS model is [supported](#) before you begin installing NAKIVO Backup & Replication on a QNAP NAS.

To install NAKIVO Backup & Replication take the following steps:

1. Open the QNAP Desktop in your browser by entering the IP address of your QNAP NAS.



2. Go to **App Center**.
3. Select the **Backup/Sync** category and locate NAKIVO Backup & Replication. Alternatively, you can use the search bar at the top of the App Center window. Click on the magnifying glass icon and enter 'Nakivo'.



4. Click **Install**.
5. Wait till the installation is completed.

By default, NAKIVO Backup & Replication interface is available by the IP address of your QNAP NAS on the port 4443: `https://<IP_address_of_QNAP_NAS>:4443`.

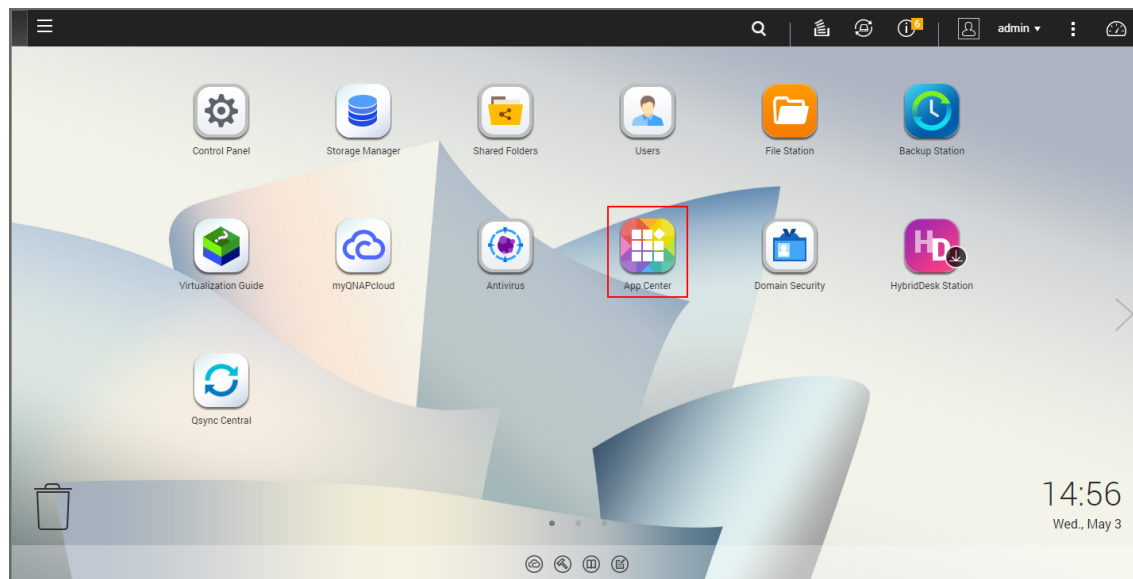
Refer to [“Getting Started” on page 268](#) to know how to continue working with NAKIVO Backup & Replication.

Installing on QNAP NAS Manually

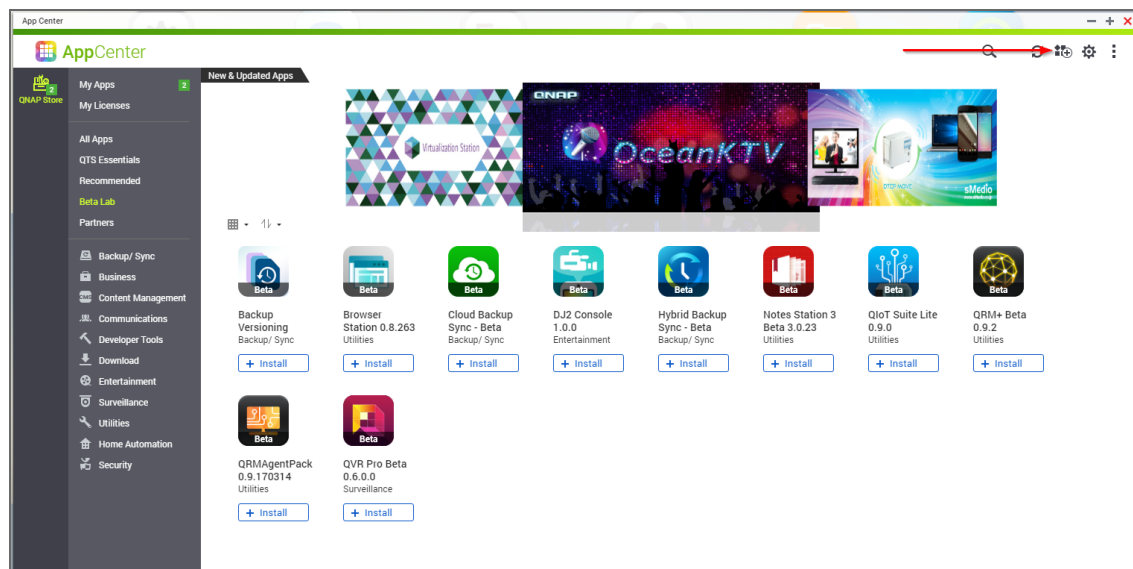
Before you begin installing NAKIVO Backup & Replication on a NAS, make sure your NAS model is [supported](#) and you have downloaded the installer (.qpkg file) for QNAP NAS.

To install NAKIVO Backup & Replication on a NAS:

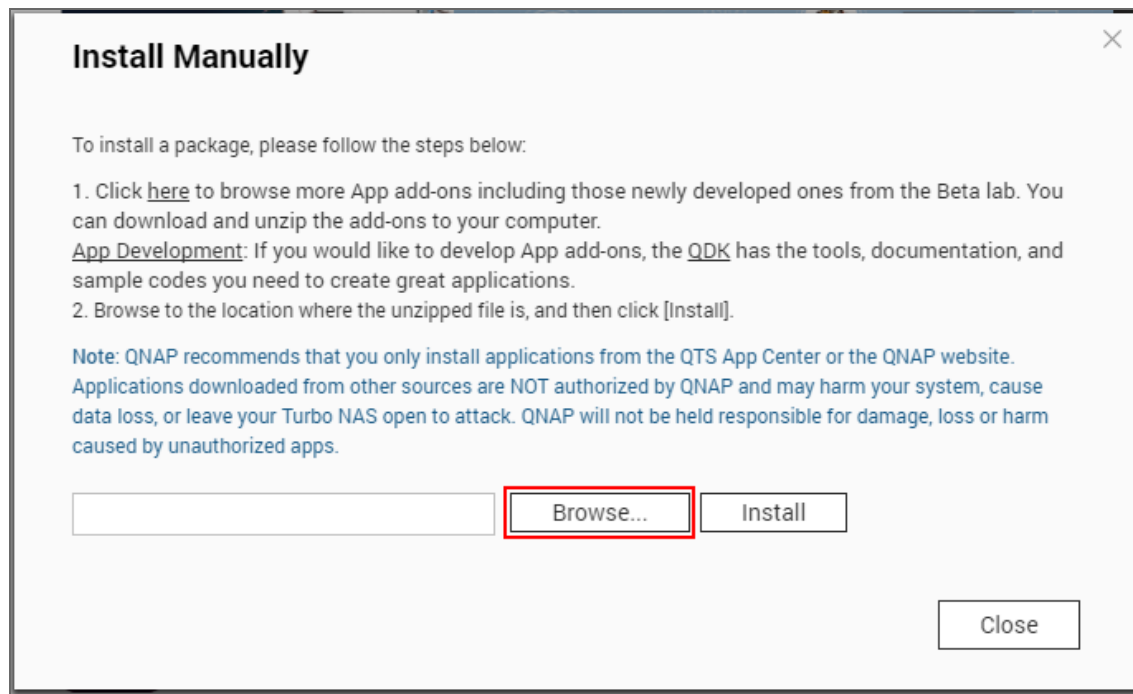
1. Open the QNAP Desktop in your browser by entering the IP address of your QNAP NAS.



2. Go to **App Center**.
3. Click the **Install Manually** icon.



4. Click **Browse** in the window that appears and locate the installer (.qpkg file) on your computer.



5. Click **Install**.

6. Wait until the installation is complete.

By default, NAKIVO Backup & Replication interface is available at the IP address of your QNAP NAS on the port 4443: `https://<IP_address_of_QNAP_NAS>:4443`.

Refer to [“Getting Started” on page 268](#) to better understand how to continue working with NAKIVO Backup & Replication.

Installing on ASUSTOR NAS

You can install an ASUSTOR package with either all NAKIVO Backup & Replication components ([Director](#), [Transporter](#), [Backup Repository](#)) or a Transporter only.

NAKIVO Backup & Replication can be installed directly on a [supported ASUSTOR NAS](#) to create your own, high-performance backup appliance. With the appliance, all VM data protection components are unified in a single system that is fast to deploy and easy to manage, while also not consuming your environment's valuable resources. Moreover, you are getting an all-in-one backup hardware, backup software, backup storage, and data deduplication in a single box.

- [“Installing on ASUSTOR NAS via App Central” on page 223](#)
- [“Installing on ASUSTOR NAS Manually” on page 225](#)

Note

A pre-shared key is not created during Transporter-only installation. When adding this Transporter to NAKIVO Backup & Replication, filling out the master password field is not required. The master password can be manually set and reset later. For details, refer to [“Installed Service” on page 439](#).

Installing on ASUSTOR NAS via App Central

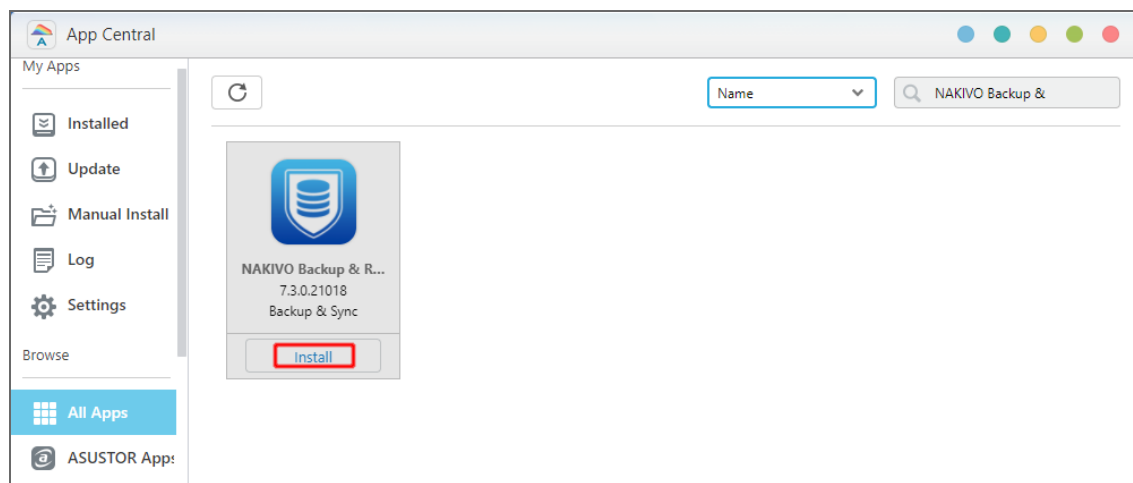
Before you begin installing NAKIVO Backup & Replication on a NAS make sure your NAS model is [supported](#).

To install NAKIVO Backup & Replication on ASUSTOR NAS via App Central:

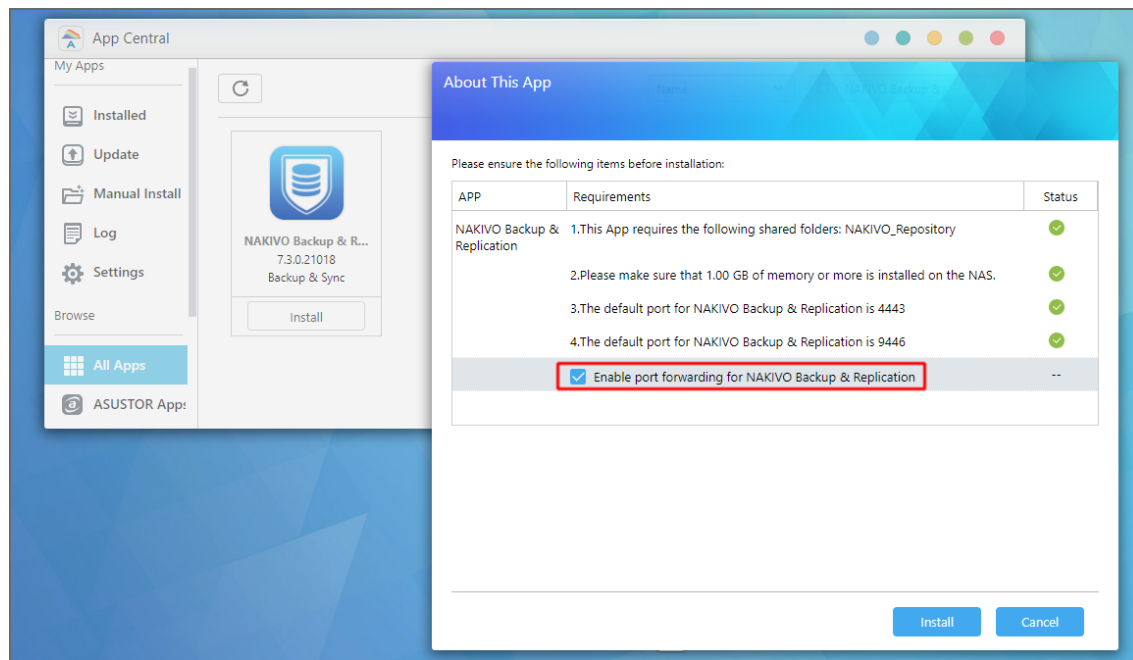
1. Open the ASUSTOR Desktop in your browser by entering the IP address of your ASUSTOR NAS.



2. Go to **App Central**.
3. Go to **Browse > All Apps**.
4. Find **NAKIVO Backup & Replication** in the store. Alternatively, enter **Nakivo** in the search box.
5. Click **Install**.



6. In the **About This App** dialog box that opens, select **Enable port forwarding for NAKIVO Backup & Replication** and then click **Install**.



7. Wait until the installation is complete.

By default, the NAKIVO Backup & Replication interface is available at the IP address of your ASUSTOR NAS on the port 4443: `https://<IP_address_of_ASUSTOR_NAS>:4443`.

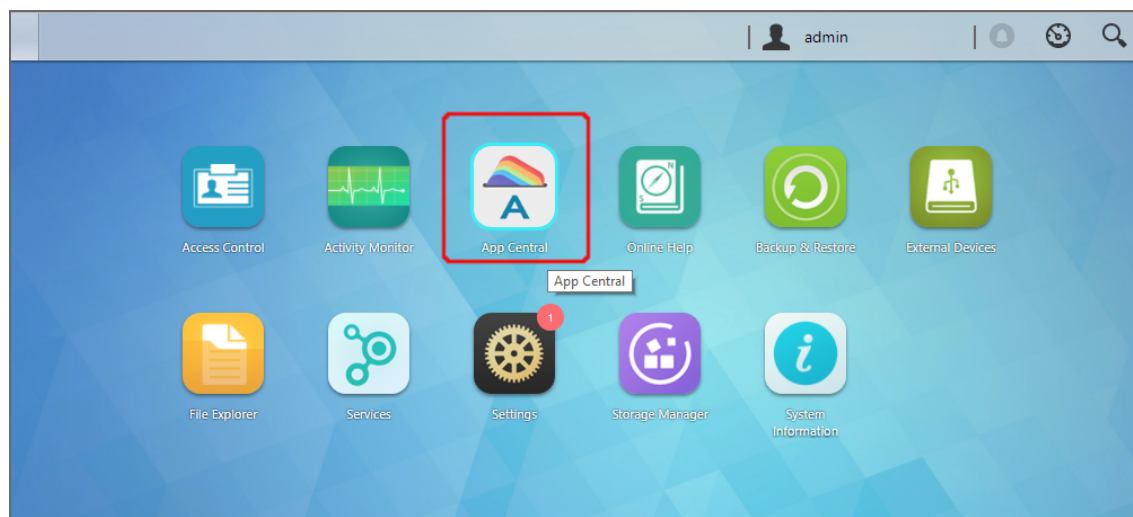
Refer to [“Getting Started” on page 268](#) to understand better how to continue working with NAKIVO Backup & Replication.

Installing on ASUSTOR NAS Manually

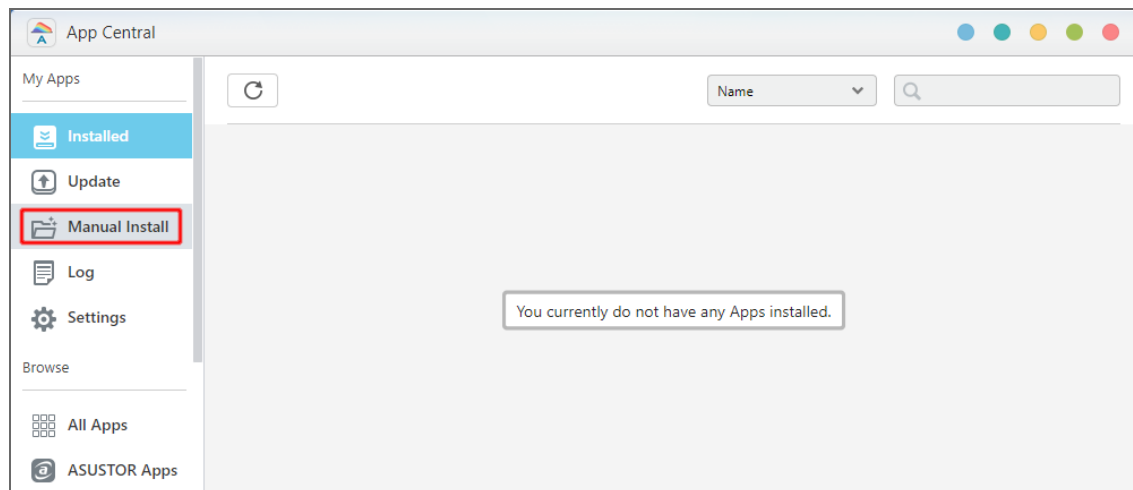
Before you begin installing NAKIVO Backup & Replication on a NAS, make sure your NAS model is [supported](#) and you have downloaded an installer (.apk file) for ASUSTOR NAS.

To manually install NAKIVO Backup & Replication on ASUSTOR NAS:

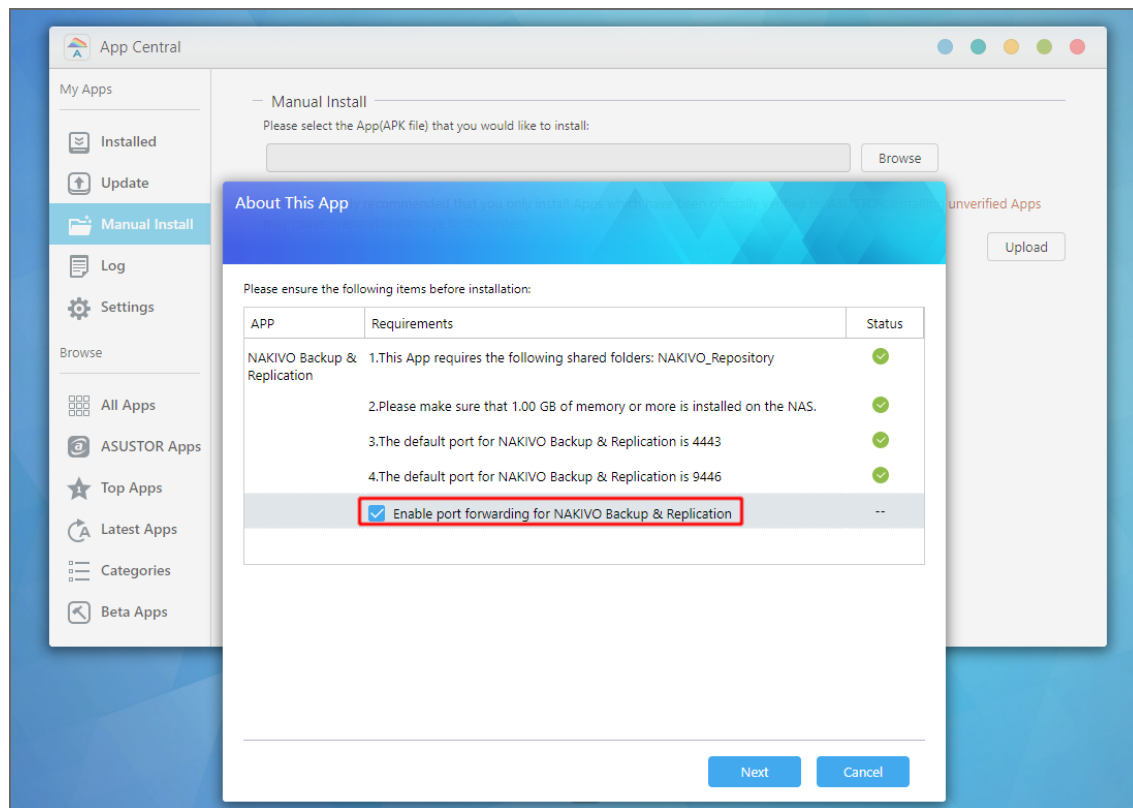
1. Open the ASUSTOR Desktop in your browser by entering the IP address of your ASUSTOR NAS.
2. Go to **App Central**.



3. Click **Manual Install**.



4. Click **Browse**. In the dialog box that opens, locate the installer (.apk file) on your computer.
5. Click **Upload**.
6. In the **About This App** dialog box that opens, check **Enable port forwarding for NAKIVO Backup & Replication**.



7. Click **Next**.
8. In the warning dialog box that opens, select **I understand the risks associated with installing unverified apps**.
9. Click **Install**.
10. Wait until the installation is complete.

By default, the NAKIVO Backup & Replication interface is available at the IP address of your ASUSTOR NAS on the port 4443: `https://<IP_address_of_ASUSTOR_NAS>:4443`.

Refer to [“Getting Started” on page 268](#) to understand better how to continue working with NAKIVO Backup & Replication.

Installing on Western Digital NAS

You can install a Western Digital MyCloud package with either all NAKIVO Backup & Replication components ([Director](#), [Transporter](#), [Backup Repository](#)) or a Transporter only. The following packages are available:

- Western Digital MyCloud DL2100 package
- Western Digital MyCloud DL2100 Transporter package
- Western Digital MyCloud DL4100 package
- Western Digital MyCloud DL4100 Transporter package
- Western Digital MyCloud PR2100 package
- Western Digital MyCloud PR 2100 Transporter package
- Western Digital MyCloud PR 4100 package
- Western Digital MyCloud PR 4100 Transporter package

NAKIVO Backup & Replication can be installed directly on a Western Digital MyCloud NAS to create your own, high-performance backup appliance. With this appliance, all VM data protection components are unified in a single system that is quick to deploy and easy to manage, while also not consuming your environment's valuable resources. Moreover, you are getting an all-in-one backup hardware, backup software, backup storage, and data deduplication in a single box. This results in a zero VMware footprint, less power and cooling, less required maintenance, time, money, and – most of all – higher VM backup performance. NAKIVO Backup & Replication is installed on a NAS hard drive (not on the NAS Flash memory), so if you remove the hard drive from the NAS you will also remove the product from it.

Note

A pre-shared key is not created during Transporter-only installation. When adding this Transporter to NAKIVO Backup & Replication, filling out the master password field is not required. The master password can be manually set and reset later. For details, refer to [“Installed Service” on page 439](#).

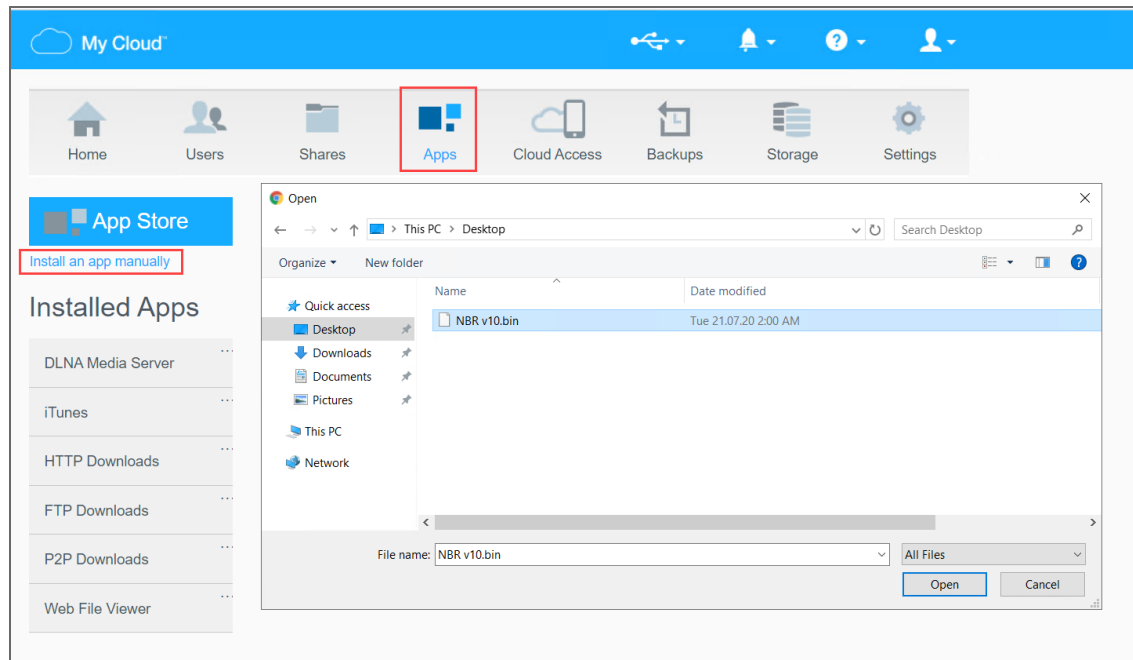
Prior to installing NAKIVO Backup & Replication onto a Western Digital MyCloud NAS device, make sure the following requirements have been met:

1. Your Western Digital MyCloud NAS model is [supported](#) by NAKIVO Backup & Replication.
2. You have access to the NAS **My Cloud** Dashboard.
3. You have NAKIVO Backup & Replication installer for Western Digital NAS available on your computer.

Follow the steps below to install NAKIVO Backup & Replication on a Western Digital MyCloud NAS device:

1. On the **My Cloud** dashboard, click **Apps**. The list of installed NAS applications opens on the left side of the page.

2. Above the list of NAS installed applications, click **Install an app manually**. The **File Upload** dialog opens.



3. In the **File Upload** dialog, navigate to your copy of NAKIVO Backup & Replication installer and click **Open**. The installation progress bar opens.
4. When the installation finishes successfully, a dialog box opens with a message informing you about it. Click **OK** to close the dialog box.

After the installation is complete, NAKIVO Backup & Replication will appear in the list of installed NAS applications. To access the product, do either of the following:

- Open the `https://<NAS_IP>:4443` address in your browser.
- In the list of installed NAS applications, click **NAKIVO Backup & Replication** and then click **Configure**.

Refer to [“Getting Started” on page 268](#) to better understand how to continue working with NAKIVO Backup & Replication.

Installing on NETGEAR ReadyNAS

You can install the NETGEAR package that includes all NAKIVO Backup & Replication components ([Director](#), [Transporter](#), [Backup Repository](#)) or the NETGEAR Transporter package.

NAKIVO Backup & Replication can be installed directly on a [supported](#) NETGEAR ReadyNAS to create your own high-performance backup appliance. With the appliance, all VM data protection components are unified in a single system that is fast to deploy and easy to manage, while also not consuming your environment's valuable resources. Moreover, you are getting an all-in-one backup hardware, backup software, backup storage, and data deduplication in a single box. For installation instructions, refer to the following topics:

- [“Installing on NETGEAR ReadyNAS via Available Apps” on page 230](#)
- [“Installing on NETGEAR ReadyNAS Manually” on page 231](#)

Note

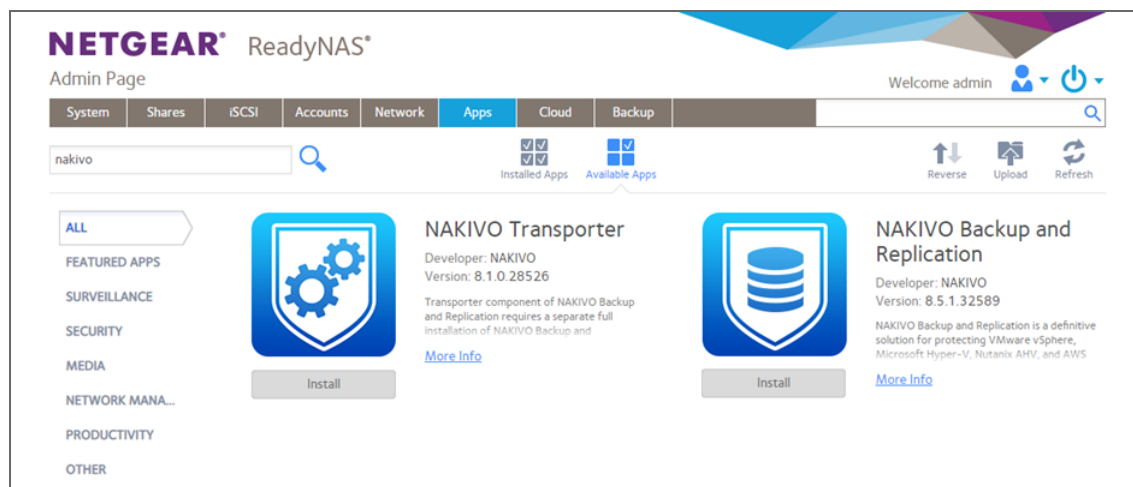
A pre-shared key is not created during Transporter-only installation. When adding this Transporter to NAKIVO Backup & Replication, filling out the master password field is not required. The master password can be manually set and reset later. For details, refer to [“Installed Service” on page 439](#).

Installing on NETGEAR ReadyNAS via Available Apps

Before you begin installing NAKIVO Backup & Replication or NAKIVO Transporter on a NETGEAR ReadyNAS device, please check if your NETGEAR ReadyNAS model is [supported](#).

To install NAKIVO Backup & Replication or NAKIVO Transporter, take the following steps:

1. Open the NETGEAR ReadyNAS **Admin Page** in your browser by entering the IP address of your NAS.
2. Go to **Apps** -> **Available Apps**.
3. Find **NAKIVO Backup & Replication** or **NAKIVO Transporter** in the list of available applications.
Alternatively, you can enter NAKIVO to the filtering box in the upper left corner of the **Admin Page**.
4. Click the **Install** button below the corresponding item.



Note

Make sure that only one instance of the NAKIVO solution - either Full Product or Transporter-only - is installed on the device concurrently. Having both products installed at once may lead to incorrect operation.

5. Wait until the installation is completed.

By default, the **NAKIVO Backup & Replication** interface is available at the IP address of your NETGEAR ReadyNAS on the port 4443: `https://<IP_address_of_NETGEAR_ReadyNAS>:4443`.

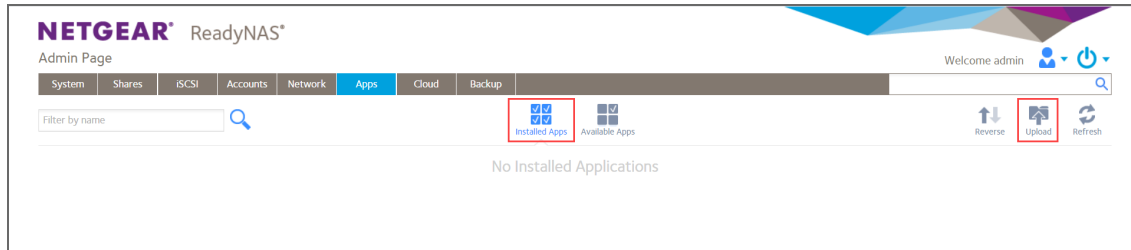
Refer to [“Getting Started” on page 268](#) to know how to continue working with NAKIVO Backup & Replication.

Installing on NETGEAR ReadyNAS Manually

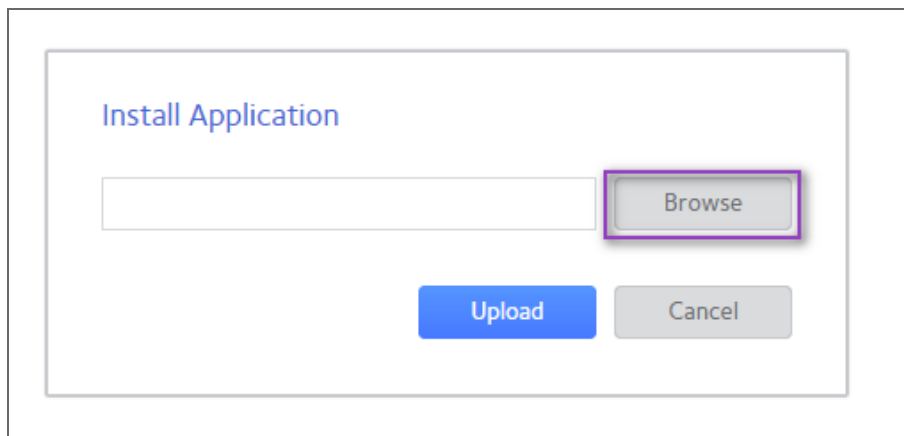
Before you begin installing NAKIVO Backup & Replication or NAKIVO Transporter on a NETGEAR ReadyNAS device, make sure your NAS model is [supported](#) and you have downloaded a relevant installer (.deb file) for NETGEAR ReadyNAS.

To install NAKIVO Backup & Replication or NAKIVO Transporter, take the following actions:

1. Open the NETGEAR ReadyNAS **Admin Page** in your browser by entering the IP address of your NAS.
2. Go to **Apps** and click **Upload**.



3. The **Install Application** dialog box opens. Click **Browse**.



4. In the dialog box that opens, locate the downloaded installer (.deb file) and then click **Upload**.
5. Wait until the installation has been completed.

Note

Make sure that only one instance of the NAKIVO solution - either Full Product or Transporter-only - is installed on the device concurrently. Having both products installed may lead to incorrect operations.

By default, NAKIVO Backup & Replication interface is available at the IP address of your NETGEAR ReadyNAS on the port 4443: `https://<IP_address_of_>:4443`.

Refer to [“Getting Started” on page 268](#) to understand better how to continue working with NAKIVO Backup & Replication.

Installing on Generic ARM-Based Device

NAKIVO Backup & Replication can be deployed on ARMv7/ARMv8 computers by downloading and running an appropriate script within a Linux-based OS [supported](#) by NAKIVO Backup & Replication.

1. Download a package suitable for your setup from the [downloads page](#).
2. Upload the installer file to the machine on which you wish to install NAKIVO Backup & Replication in the binary transfer mode. For example:
 1. [Upload the installer from a Windows-based machine](#)
 2. Upload the product from a Linux-based machine: run the following command: `wget 'server_ip/shared/NAKIVO Backup_&_Replication v8.5.0.30224 Installer-NAS-ARM-TRIAL.sh'`
3. Log in to the Linux machine and allow for the execution of the installer file.

Example

```
chmod +x ./NAKIVO Backup_&_Replication v8.5.0.30224 Installer-NAS-ARM-TRIAL.sh
```

4. Execute the installer file with root privileges.

Example

```
sudo ./NAKIVO Backup_&_Replication v8.5.0.30224 Installer-NAS-ARM-TRIAL.sh
```

5. Accept the License Agreement by typing [Y] and hit Enter. You can review the license agreement by typing [R]. Rejecting [N] the license agreement will terminate the installation process and the product will not be installed.
6. The system will notify you when the installation is successfully completed.

```
YOU AGREE THAT YOU HAVE READ THIS AGREEMENT AND INTEND TO BE BOUND, AS IF YOU HAD SIGNED THIS AGREEMENT IN WRITING. I
F YOU ARE ACTING ON BEHALF OF AN ENTITY, YOU WARRANT THAT YOU HAVE THE AUTHORITY TO ACCEPT THE TERMS OF THIS AGREEMEN
T FOR SUCH ENTITY.
Type 'Y' to accept the license agreement and continue,
    'N' to not accept the license,
    'R' to review the license agreement.
Do you agree to the terms of this agreement [Y/N/R]? y
Installing Director...
Installing Transporter...
Applying configuration...
Registering Director service...
Starting Director service...
NAKIVO Backup & Replication installed successfully.
pi@raspberrypi:~ $
```

Refer to [“Getting Started” on page 268](#) to better understand how to continue working with NAKIVO Backup & Replication.

Installing on FreeNAS/TrueNAS

Make sure the following prerequisites are met:

- You have access to the FreeNAS/TrueNAS system.
- Your FreeNAS/TrueNAS system meets [system requirements](#) for installing NAKIVO Backup & Replication.

- The `iocage` jail/container manager is installed on your FreeNAS/TrueNAS system. Refer to the [iocage README page](#) for a description.
- A storage pool is created on your FreeNAS/TrueNAS system. Make sure the pool has enough storage for all NAKIVO Backup & Replication functionality. Refer to [FreeNAS User Guide](#) for more details on creating storage pools.
 - To create local Repository on FreeNAS/TrueNAS local storage outside the jail, make sure you use the following [mount points](#):
 Source: `/mnt/share/`
 Destination: `/mnt/test/iocage/jails/nbr/root/usr/repo`

Notes

- The `repo` is an empty folder created by the user.
- The path for adding a repository on NAKIVO Backup & Replication is `/usr/repo`.
- Make sure to check limitations for FreeNAS/TrueNAS [here](#).

Follow the steps below to install NAKIVO Backup & Replication on a FreeNAS/TrueNAS system:

1. Log in to the FreeNAS/TrueNAS system via SSH.
2. Go to the `tmp` folder: `cd /tmp`
3. Download the necessary `json` file:
 - for the full NAKIVO Backup & Replication installation on a TrueNAS v12.2 and v13:
`wget https://github.com/NAKIVO/iocage-plugin-nbr/raw/master/nbr.json`
 - for the full NAKIVO Backup & Replication installation on a FreeNAS v11.3:
`wget https://github.com/NAKIVO/iocage-plugin-nbr/raw/11.3-RELEASE/nbr.json`
 - for the NAKIVO Backup & Replication Transporter installation on a TrueNAS v12.2 and v13:
`wget https://github.com/NAKIVO/iocage-plugin-nbr-transporter/raw/master/nbr-transporter.json`
 - for the NAKIVO Backup & Replication Transporter installation on a FreeNAS v11.3:
`wget https://github.com/NAKIVO/iocage-plugin-nbr-transporter/raw/11.3-RELEASE/nbr-transporter.json`

Note

If a utility for downloading files like `wget` or `curl` is missing on your FreeNAS/TrueNAS system, you can first download the necessary file to your local machine and then upload it to FreeNAS with a third-party tool like WinSCP or FileZilla.

4. Install NAKIVO Backup & Replication with the `iocage` jail/container manager:

Note

Make sure that the jail IP address is not the IP address of your FreeNAS/TrueNAS system.

- For the full NAKIVO Backup & Replication installation on a FreeNAS/TrueNAS:
`iocage fetch -P nbr.json vnet="off" ip4="inherit" ip4_addr="em0|x.x.x.x/24"`
- For the NAKIVO Backup & Replication Transporter installation on a FreeNAS/TrueNAS:
`iocage fetch -P nbr-transporter.json vnet="off" ip4="inherit" ip4_addr="em0|x.x.x.x/24"`

5. For the NAKIVO Backup & Replication Transporter installation, add the Transporter to the Director. Refer to [Adding Installed Transporters](#) for details.

Installing on Raspberry Pi

NAKIVO Backup & Replication can be installed on a Raspberry Pi computer.

- For system requirements, refer to [“Generic ARM-based NAS devices” on page 126](#) .
- For the installation procedure, refer to [“Installing on Generic ARM-Based Device” on page 232](#) .

Refer to [“Getting Started” on page 268](#) to better understand how to continue working with NAKIVO Backup & Replication.

Updating NAKIVO Backup & Replication

NAKIVO Backup & Replication automatically checks for updates once each day. If an update is available, a notification is displayed in the product web interface. Click the notification link to view information about the update.

Starting from v8.5, a full solution of the NAKIVO Backup & Replication installed on Windows or Linux can be updated automatically. Should you find that product auto updating is not supported or there are some network issues, you can update the product manually. For more details, refer to the corresponding articles below.

To manually update any copy of NAKIVO Backup & Replication, go to the download page with updaters.

To update your copy of the product to a newer version, you need to download an appropriate updater and run it on:

- Each machine on which you have additionally installed the [Transporter](#).
- The machine on which the [Director](#) is installed.

Refer to the following topics for more information:

- [“Software Update” on page 356](#)
- [“Updating Virtual Appliance” on page 237](#)
- [“Updating on Windows” on page 242](#)
- [“Updating on Linux” on page 244](#)
- [“Updating on Synology NAS” on page 245](#)
- [“Updating on Western Digital NAS” on page 248](#)
- [“Updating on Amazon EC2” on page 249](#)
- [“Updating on QNAP NAS” on page 255](#)
- [“Updating on ASUSTOR NAS” on page 258](#)
- [“Updating on NETGEAR ReadyNAS” on page 260](#)
- [“Updating on FreeNAS/TrueNAS” on page 262](#)
- [“Updating on Generic ARM-Based Device” on page 262](#)

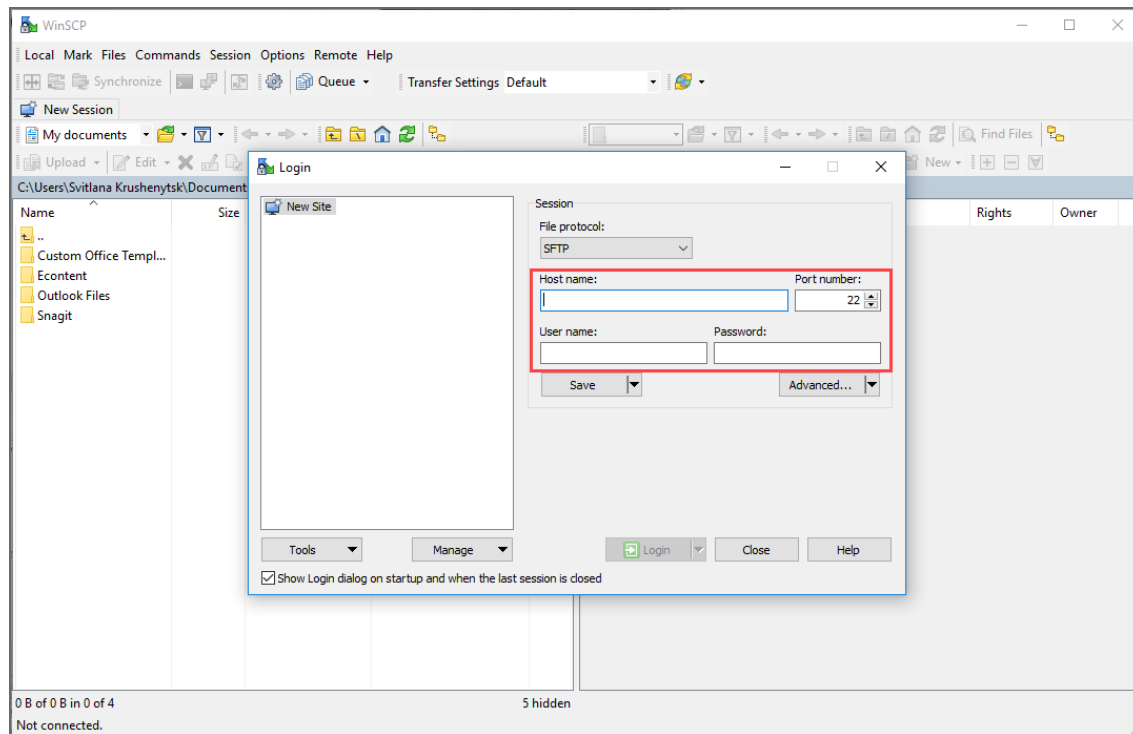
Updating Virtual Appliance

Prior to updating your virtual appliance (VA):

1. Make sure that no jobs or repository maintenance tasks are running in the product.
2. Create a snapshot of the VA to revert to the previous version in case any failure occurs.

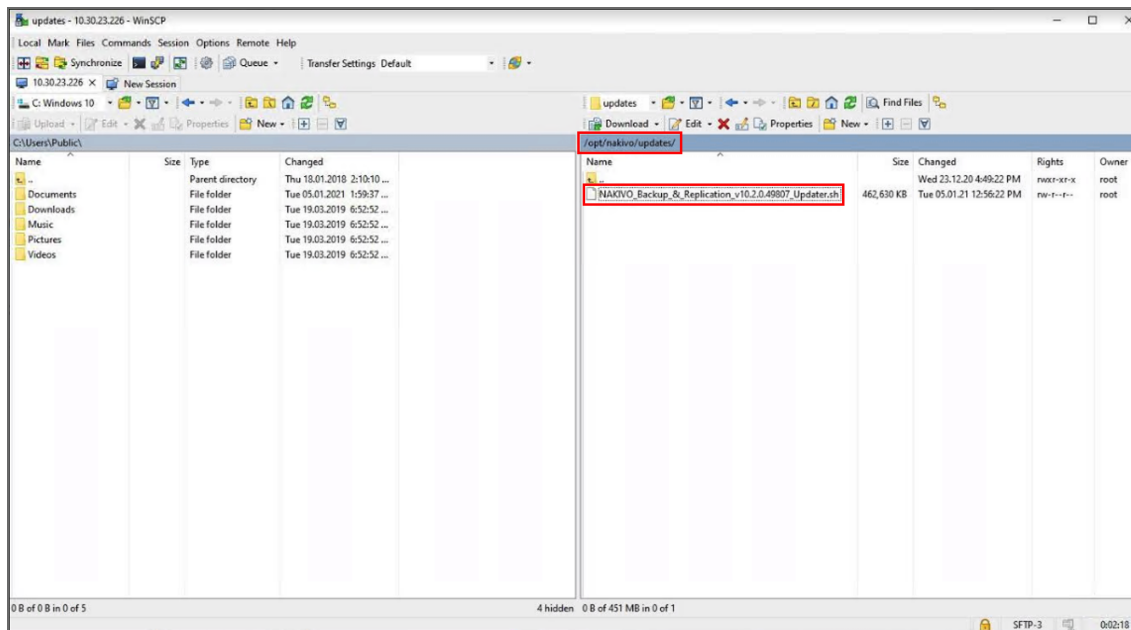
Follow the steps below to update your VA:

1. Using SSH client, log in to the VA that needs to be updated.

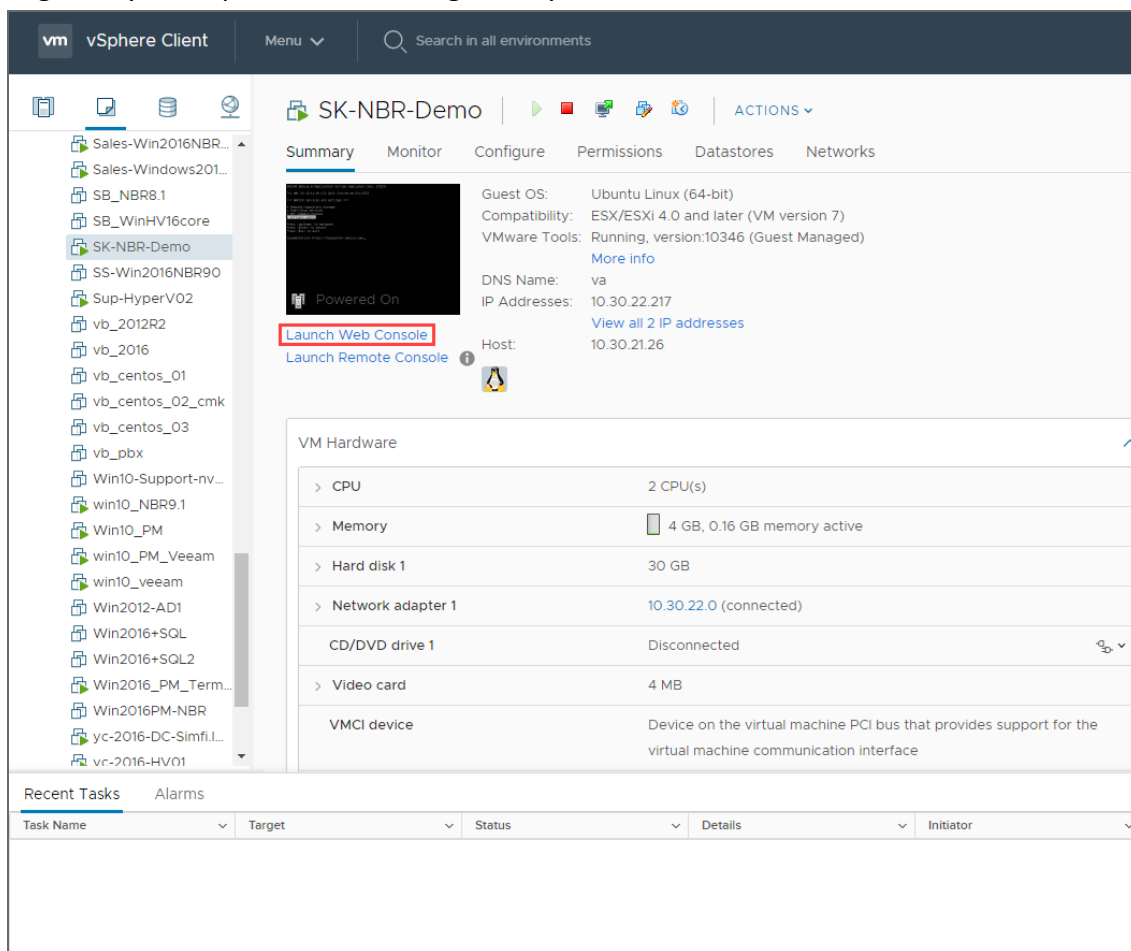


2. Download the latest *VA and Linux updater* from www.nakivo.com/resources/download/update/.

3. Change the directory to `/opt/nakivo/updates` and locate the updater.



4. Log out from the SSH client.
5. Log in to your vSphere client, navigate to your VA and click **Launch Web Console**.



6. Do one of the following depending on the NAKIVO Backup & Replication version you use:

- For the product Version 8.1 and above:

1. In the VA menu, select **Manage NAKIVO services** and press **Enter**.

```
NAKIVO Backup & Replication Virtual Appliance (rev. 27323)
Fri Mar 20 12:54:52 UTC 2020 [+00:00:00 Etc/UTC]
Installed components: Director, Transporter

To access the Web Interface, please open https://10.30.21.129:4443 in your web browser.
You can discover this Transporter in the Web Interface under Configuration > Transporters.

* Network settings
* Security settings
* Time and time zone
* System performance
* Manage NAKIVO services
* Exit to system console

Press <Up/Down> to navigate
Press <Enter> to select

Documentation: https://helpcenter.nakivo.com/
```

2. In the menu that opens, select **Software update** and press **Enter**.

```
NAKIVO Backup & Replication Virtual Appliance (rev. 27323)
Fri Mar 20 12:11:02 UTC 2020 [+00:00:00 Etc/UTC]

=== NAKIVO services and settings ===

* Onboard repository storage
* Start/Stop services
* APT command console
* Software update

Press <Up/Down> to navigate
Press <Enter> to select
Press <Esc> to exit

Documentation: https://helpcenter.nakivo.com/
```

3. Select the updater that you have downloaded and press **Enter**.

```
NAKIVO Backup & Replication Virtual Appliance (rev. 46186)
```

```
Tue Jan 5 12:01:40 UTC 2021 [+00:00:00 Etc/UTC]
```

```
=== Software update ===
```

```
Updates directory: /opt/nakivo/updates
```

```
Available updates:
```

```
* NAKIVO_Backup_&_Replication_v10.2.0.49807_Updater.sh
```

```
Press <Up/Down> to navigate
```

```
Press <F5> to refresh
```

```
Press <Enter> to select
```

```
Press <Del> to delete
```

```
Press <Esc> to exit
```

```
Documentation: https://helpcenter.nakivo.com/
```

4. Review the End User License Agreement. Press **Space** to go to the bottom of it. If you agree to the terms of the agreement, type **Y** and then press **Enter** to begin the update process.

```
machine, such as a Unix or Intel based server. A mainframe machine would be an individual mainframe
computer having single or multiple processors or engines.

"Enterprise" is the environment consisting of all hardware owned or leased by Customer in the Territ
ory.

b. LICENSE RESTRICTIONS. The following restrictions apply to certain Products. Each "NAKIVO Backup &
Replication" License is limited for use per CPU - Subcapacity or per Computer - Subcapacity.

c. UNITS OF MEASUREMENT. The following units of measurement apply to certain Products.

per CPU - Full Capacity: A license is required for the total number of active, physical CPUs in each
Computer upon which the Product is performing backup or replication tasks, either remotely or local
ly. "CPU" means a physical processor or central unit in a designated Computer containing the logic c
ircuitry that performs the instructions of a Computer's programs and refers to the "socket" which ca
n contain one or more processor cores.

per CPU - Subcapacity: A license is required for all active, physical CPUs upon which the Product is
performing backup or replication tasks, either remotely or locally. "CPU" means a physical processo
r or central unit in a designated Computer containing the logic circuitry that performs the instruct
ions of a Computer's programs and refers to the "socket" which can contain one or more processor cor
es.

per Computer - Full Capacity: A license is required for all active Computers (either virtual or phys
ical) upon which the Product is upon which the Product is performing backup or replication tasks, ei
ther remotely or locally.

per Computer - Subcapacity: A license is required for all active Computers upon which the Product is
performing backup or replication tasks, either remotely or locally.

YOU AGREE THAT YOU HAVE READ THIS AGREEMENT AND INTEND TO BE BOUND, AS IF YOU HAD SIGNED THIS AGREEM
ENT IN WRITING. IF YOU ARE ACTING ON BEHALF OF AN ENTITY, YOU WARRANT THAT YOU HAVE THE AUTHORITY TO
ACCEPT THE TERMS OF THIS AGREEMENT FOR SUCH ENTITY.
Type 'Y' to accept the license agreement and continue,
'N' to not accept the license,
'R' to review the license agreement.
Do you agree to the terms of this agreement [Y/N/R]? Y_
```

- For earlier product versions:
 1. In the VA menu, select **Software update** and press **Enter**.
 2. Select the updater that you have downloaded and press **Enter**.
 3. Review the End User License Agreement. Press **Space** to go to the bottom of it. If you agree to the terms of the agreement, type **Y** and then press **Enter** to begin the update process.
- 7. When the update process is complete, a message will appear to inform you about it. Exit the VA console.
- 8. Update all machines on which you have deployed an additional [Transporter](#).

Note

Updating your VA with versions prior to the previous major version (for example, updating VA version 6.1 to version 9.0) is prohibited. Please update your VA to the next major version first.

Updating on Windows

If auto-update within the NAKIVO Backup & Replication interface is not supported, follow the steps below to update the product manually:

1. Download the latest Windows updater from www.nakivo.com/resources/download/update/.
2. Make sure that no jobs or repository maintenance tasks are running in the product.
If NAKIVO Backup & Replication is installed on a VM, create a snapshot of the VM before updating the product.
3. Run the updater on the machine on which the Director is installed, and also on all machines on which you have additionally deployed a Transporter.
4. Optionally, you can select the **Master password** checkbox and enter the password that will be used to generate a pre-shared key and secure the Transporter. This option is available only for the Transporter-only update.

Notes

- The master password must adhere to the following requirements:
 - Minimal length - 5 characters.
 - Maximum length - 50 characters.
 - The master password can be set and re-set manually by running the command on the machine housing the Transporter. Follow these steps:
 - Enter the following command `bhsvc -b P@ssword123`
 - [Restart](#) the Transporter service.
5. Optionally, you can select the **Transporter certificate** checkbox. This allows you to use a CA Certificate. Enter the path to the folder containing the certificate file in the field.

Notes

- When the checkbox is not selected, NAKIVO Backup & Replication automatically installs a self-signed certificate.
 - If the **Transporter Certificate** checkbox is not selected, a warning window appears prompting you to install it. Click **Continue** to proceed.
6. Click **Update**.
 7. When the update is complete, click **Finish**.
 8. If you have entered the new master password on step 4, do the following:
 - a. Go to **Settings > Transporters** and click on the Transporter you have changed the master password for.
 - b. Select **Edit**.
 - c. Enter the new master password and click **Connect**.
 - d. The **Certificate Acceptance** dialog box appears. Verify the certificate details, and click **Accept**.

- e. Click **Apply** to save the changes.
- f. Click on the sameTransporter once again and select **Refresh** to refresh the Transporter.

Updating on Linux

If updating on a Linux OS within the NAKIVO Backup & Replication interface is not supported, follow the steps below to update the product manually:

1. Download the latest Linux/VA updater from www.nakivo.com/resources/download/update/.
2. Upload the updater to the machine on which the Director is installed.

Important

Make sure you are using the *binary transfer mode* when uploading the updater to the machine with a Linux OS. For example:

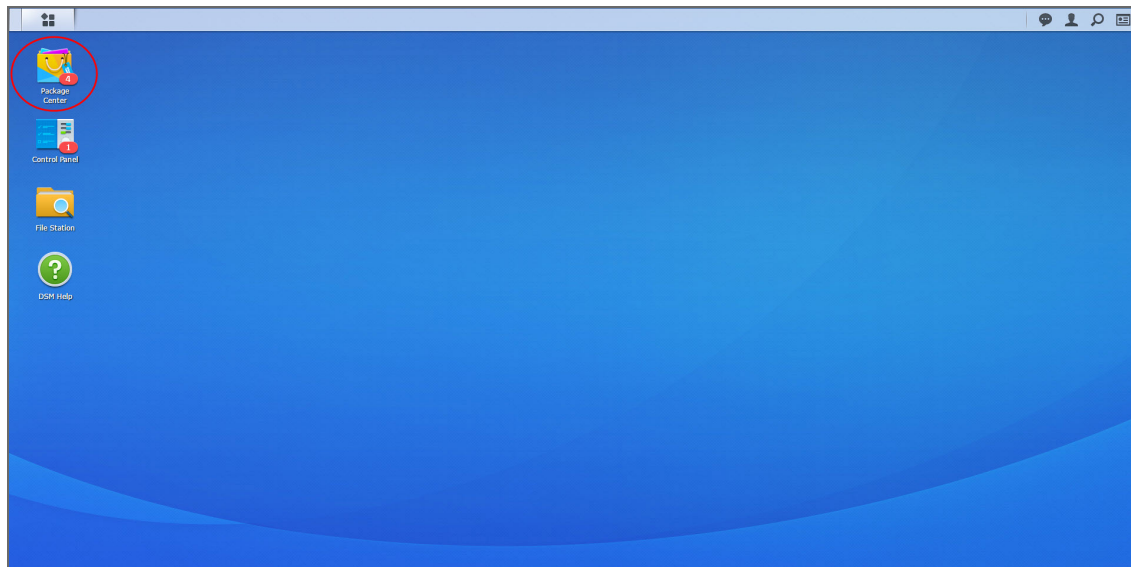
- [Upload the installer from a Windows-based machine](#)
 - Upload the product from a Linux-based machine: run the following command: `wget 'server_ip/shared/NAKIVO_Backup_Replication_vX.X.X_Updater.sh'`
3. Log in to the Linux machine and allow the execution of the updater file. For example: `chmod +x NAKIVO_Backup_Replication_vX.X.X_Updater.sh`
 4. Make sure that no jobs or repository maintenance tasks are running in the product.
If NAKIVO Backup & Replication is installed on a VM, create a snapshot of the VM prior to updating the product.
 5. Run the updater file with root privileges. For example: `sudo ./NAKIVO_Backup_Replication_vX.X.X_Updater.sh`
 6. Review the license agreement (press **Space** to go to the next page of the agreement). If you agree to the terms of the license agreement, press “Y” and then press **Enter**.
 7. Enter the “Y” key and then press **Enter** to confirm that you wish to stop the services and begin the update process.
 8. Update all machines on which you have additionally deployed a [“Transporter” on page 101](#).

Updating on Synology NAS

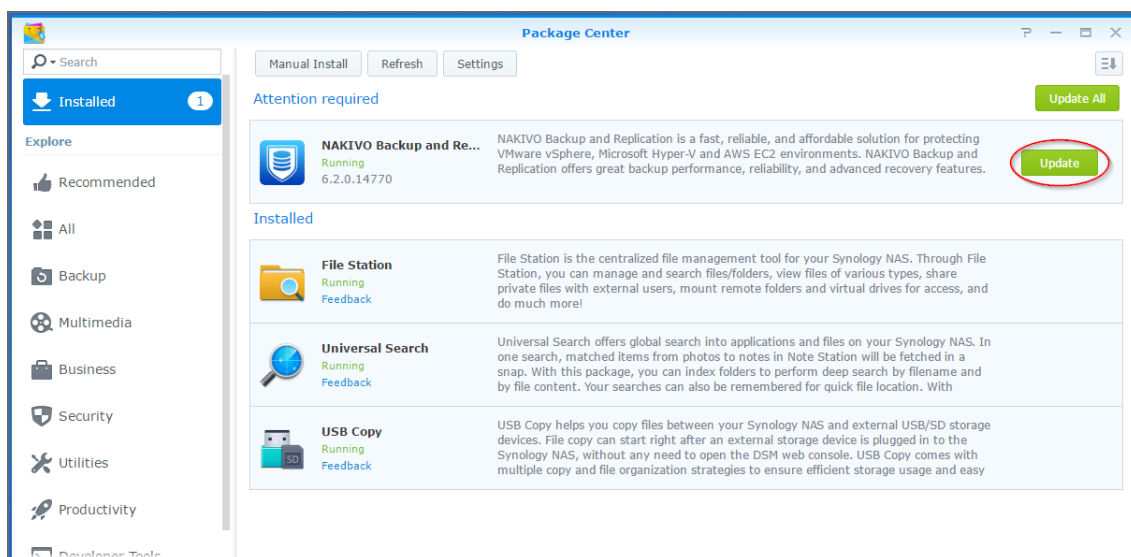
- [Updating via Synology Package Center](#)
- [Updating Manually](#)

Updating via Synology Package Center

1. Make sure that no jobs or repository maintenance tasks are running in the product.
2. In the Synology NAS management interface, open the **Package Center**.



3. Go to the **Installed** section.
4. If there is a new version of NAKIVO Backup & Replication available, you will see an **Update** button.



5. Click **Update**.

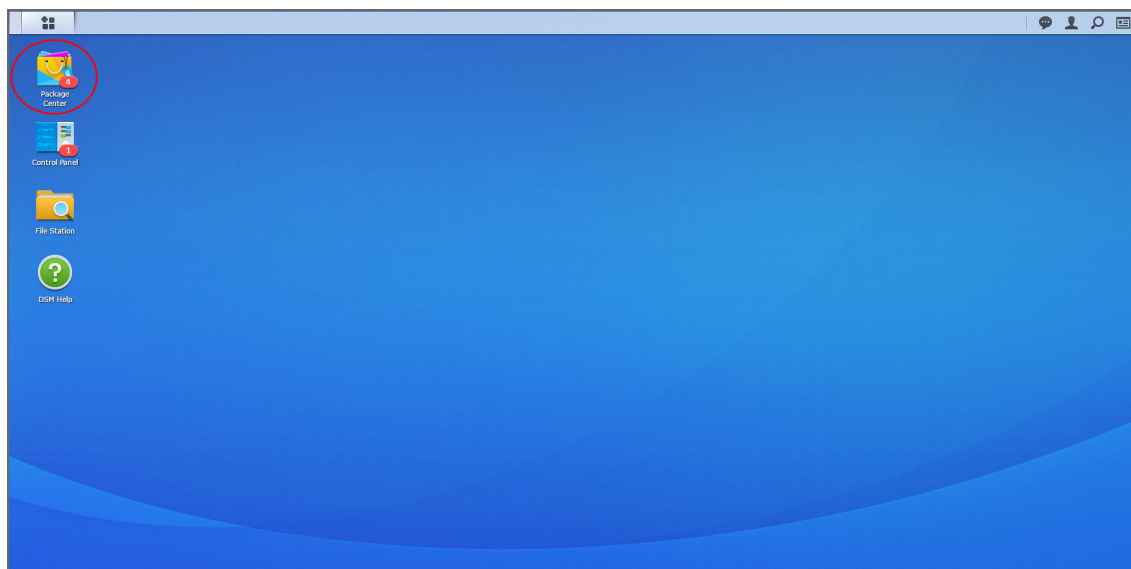
6. Wait until the update is complete.
7. Repeat these steps on all Synology NAS where you have also installed a Transporter.

Note

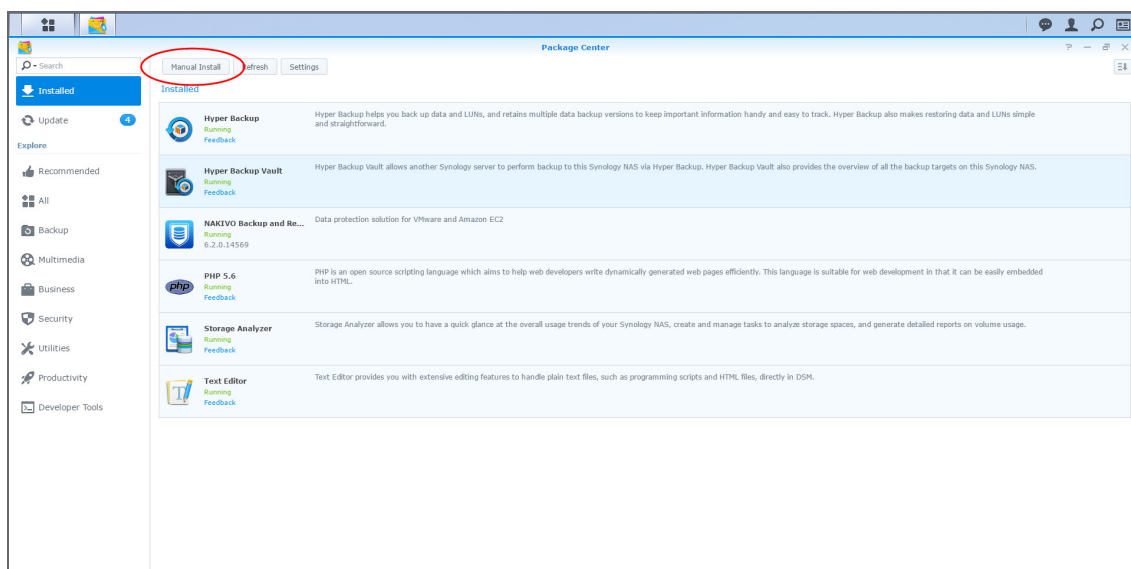
If the latest version of NAKIVO Backup & Replication is not available in the **Synology Package Center**, you may update manually by following the instructions in this Knowledge Base article.

Updating Manually

1. Download the latest Synology NAS updater from www.nakivo.com/resources/download/update/.
2. Make sure that no jobs or repository maintenance tasks are running in the product.
3. In the Synology NAS management interface, open the **Package Center**.



4. Click **Manual Install**.



5. Click **Browse**, navigate to the Synology NAS package that you have downloaded, select it, and click **Open**.
 6. Click **Next**. the package is uploaded to your NAS.
 7. Click **Apply**.
 8. Run an appropriate updater on all machines on which you have also installed a Transporter.
- Now, NAKIVO Backup & Replication has been updated.

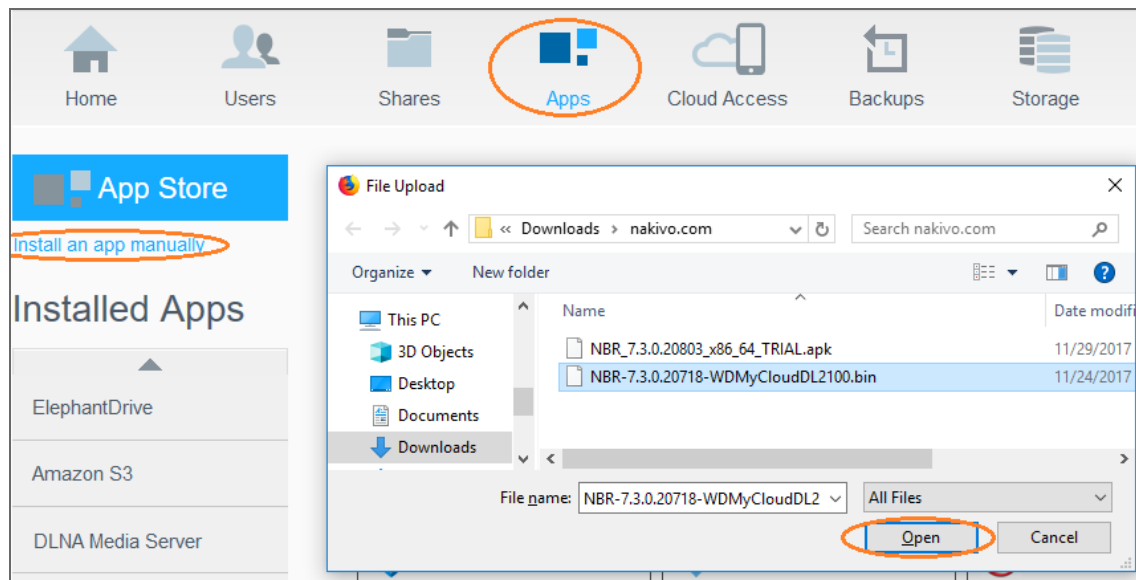
Updating on Western Digital NAS

Prior to updating NAKIVO Backup & Replication on Western Digital MyCloud NAS, make sure the following requirements have been met:

- You have access to the Western Digital NAS MyCloud Dashboard.
- NAKIVO Backup & Replication installer is available for your Western Digital NAS.

Please follow the steps below to update NAKIVO Backup & Replication on a Western Digital MyCloud NAS device:

1. Make sure that no jobs or repository maintenance tasks are running in the product.
2. In the **My Cloud** Dashboard, click **Apps**. The list of installed NAS applications opens on the left side of the page.
3. Above the list of NAS installed applications, click **Install an app manually**. The **File Upload** dialog opens.
4. In the **File Upload** dialog, navigate to your copy of the NAKIVO Backup & Replication installer for Western Digital NAS and click **Open**. The update progress bar opens.



5. Once the update has successfully finished, a dialog box opens with a message including said information. Click **OK** to close the dialog box.

Updating on Amazon EC2

The main installation of NAKIVO Backup & Replication (Director and Transporter) must be updated the way it is done on [Linux](#).

Notes

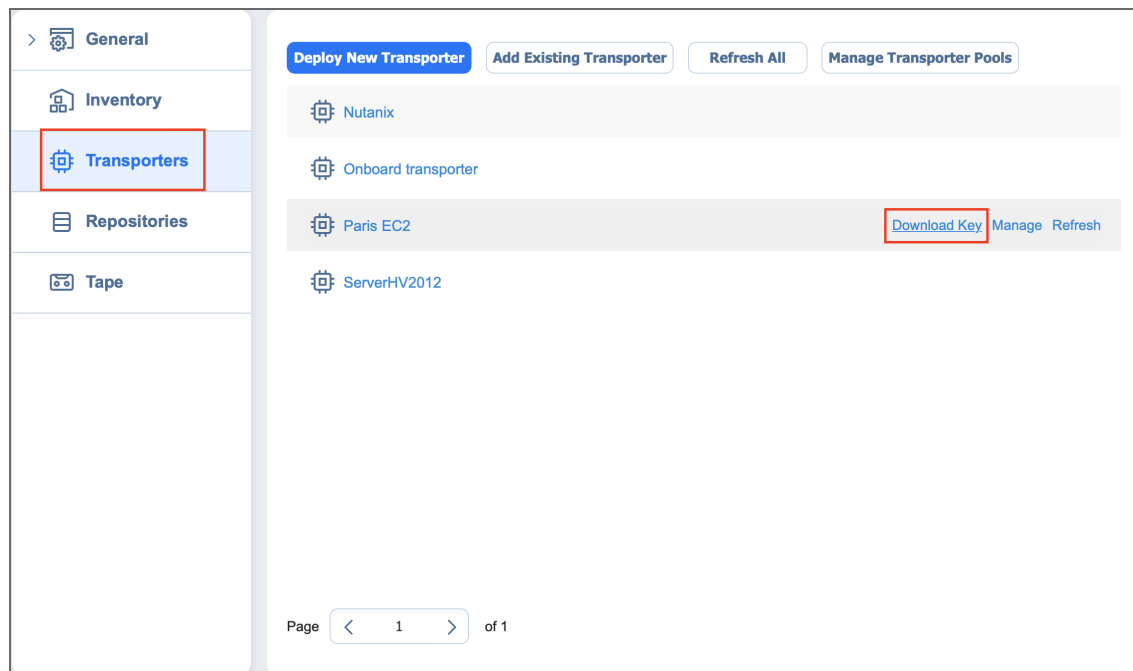
- You have to apply the **-e** argument for executing the installer, in order to avoid changing the Amazon EC2 Transporter with the regular Linux Transporter. Refer to “[Installing on Linux](#)” on page 201 for a description of the available arguments.
- Only the main installation of NAKIVO Backup & Replication needs to be updated manually. Transporters installed on Amazon EC2 instances are updated automatically.

Connecting to an Amazon EC2 Instance from Windows

You can use the following free tools to connect to your Amazon EC2 instance:

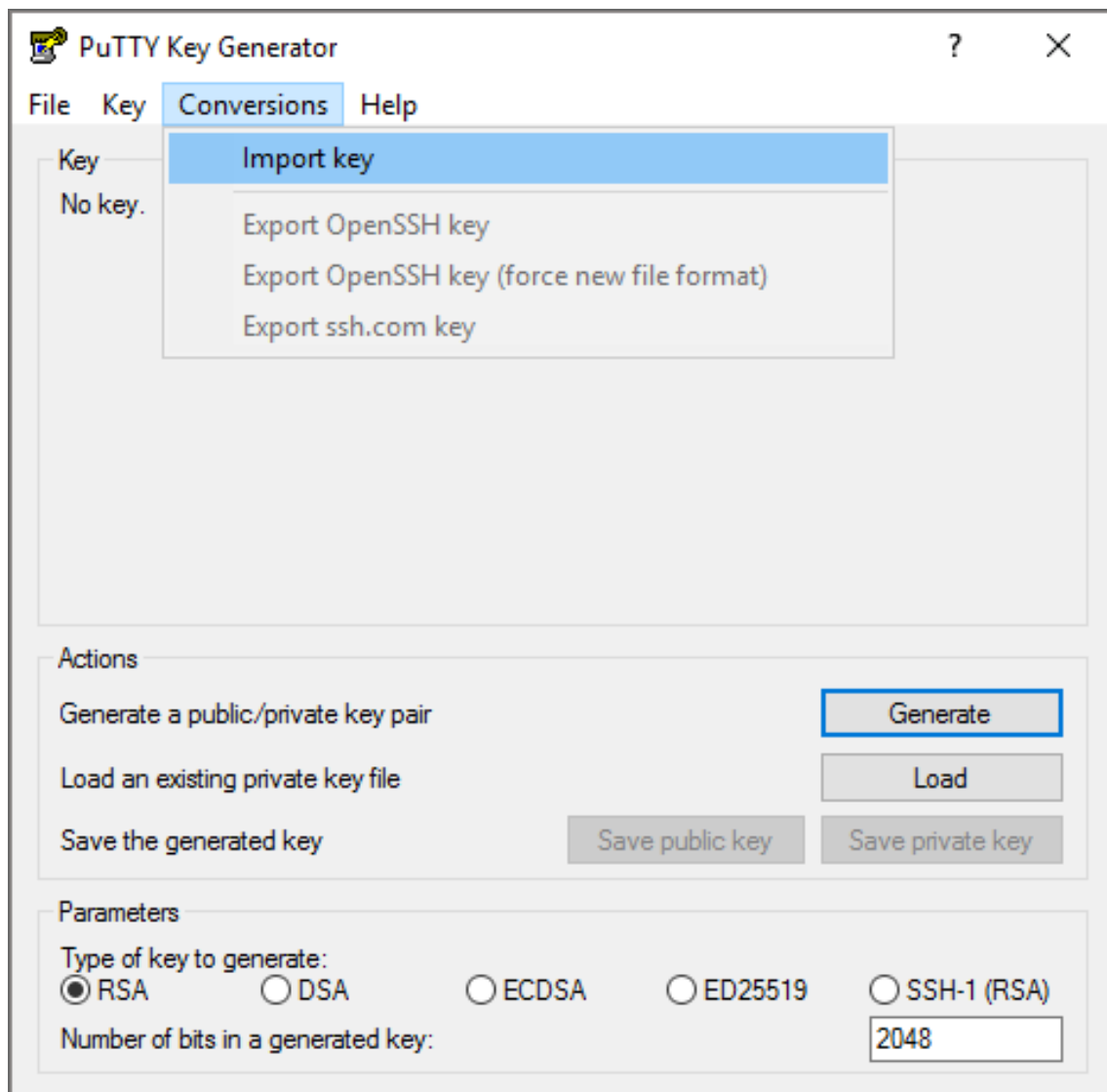
- [WinSCP](#) to upload the installer file.
- [PuTTYgen tool](#) to convert the private key.
- [PuTTY tool](#) to connect to an Amazon instance securely.

1. Log in to NAKIVO Backup & Replication.
2. Go to **Settings > Transporters**.
3. Download the keys of your Amazon instance.

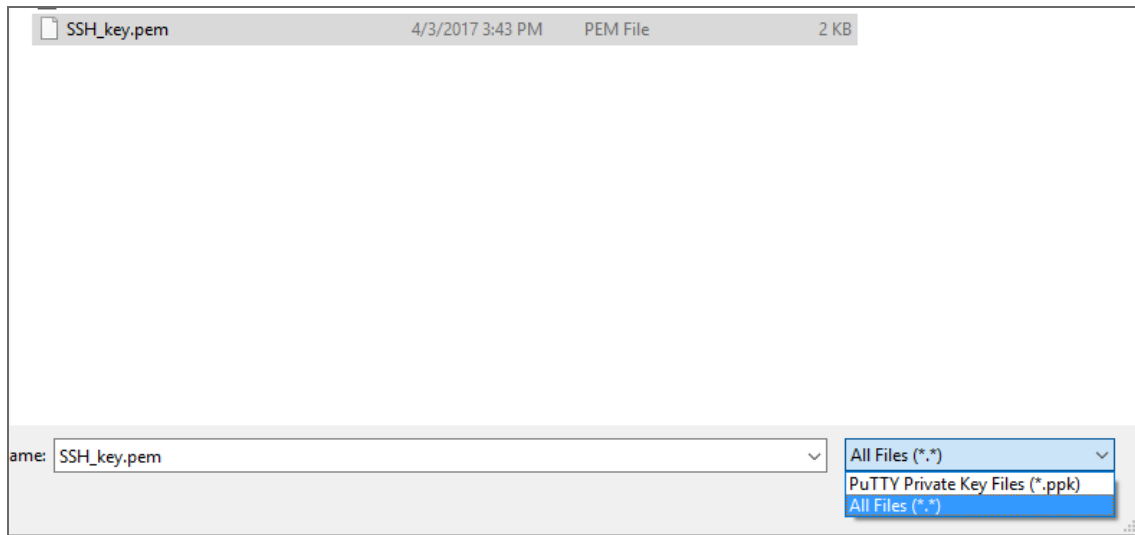


4. Click on the Transporter to view its details. Copy or remember the IP-address/hostname of the Amazon instance.
5. Unzip the folder with the key.
6. Convert the key using PuTTYgen:

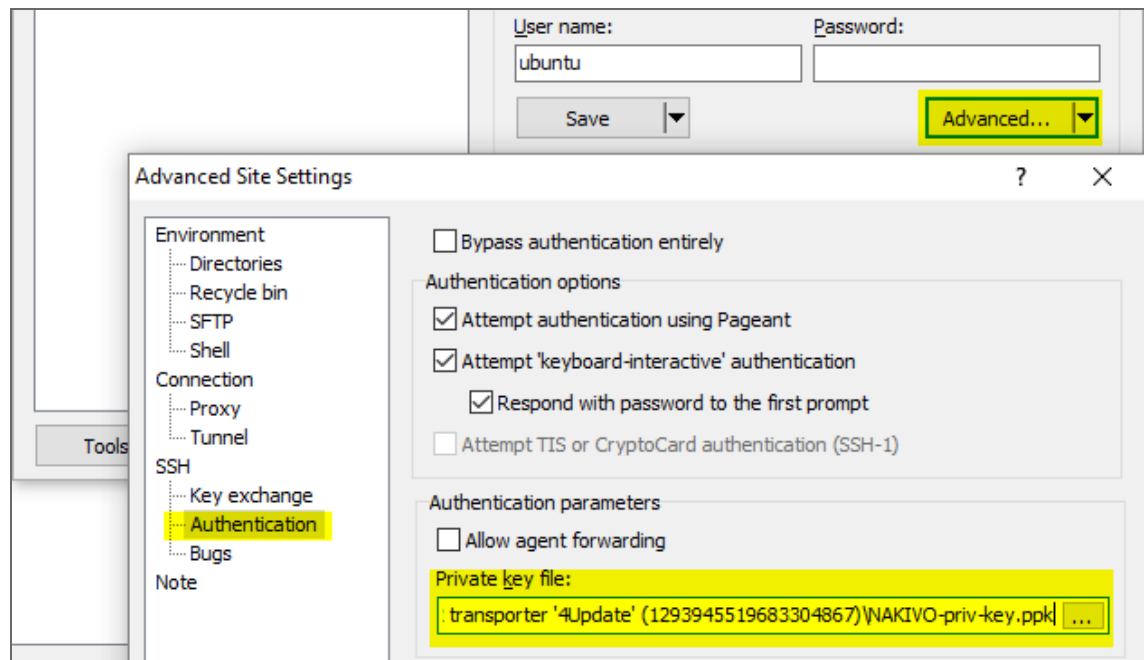
1. In PuTTYgen menu, go to *Conversions > Import*.



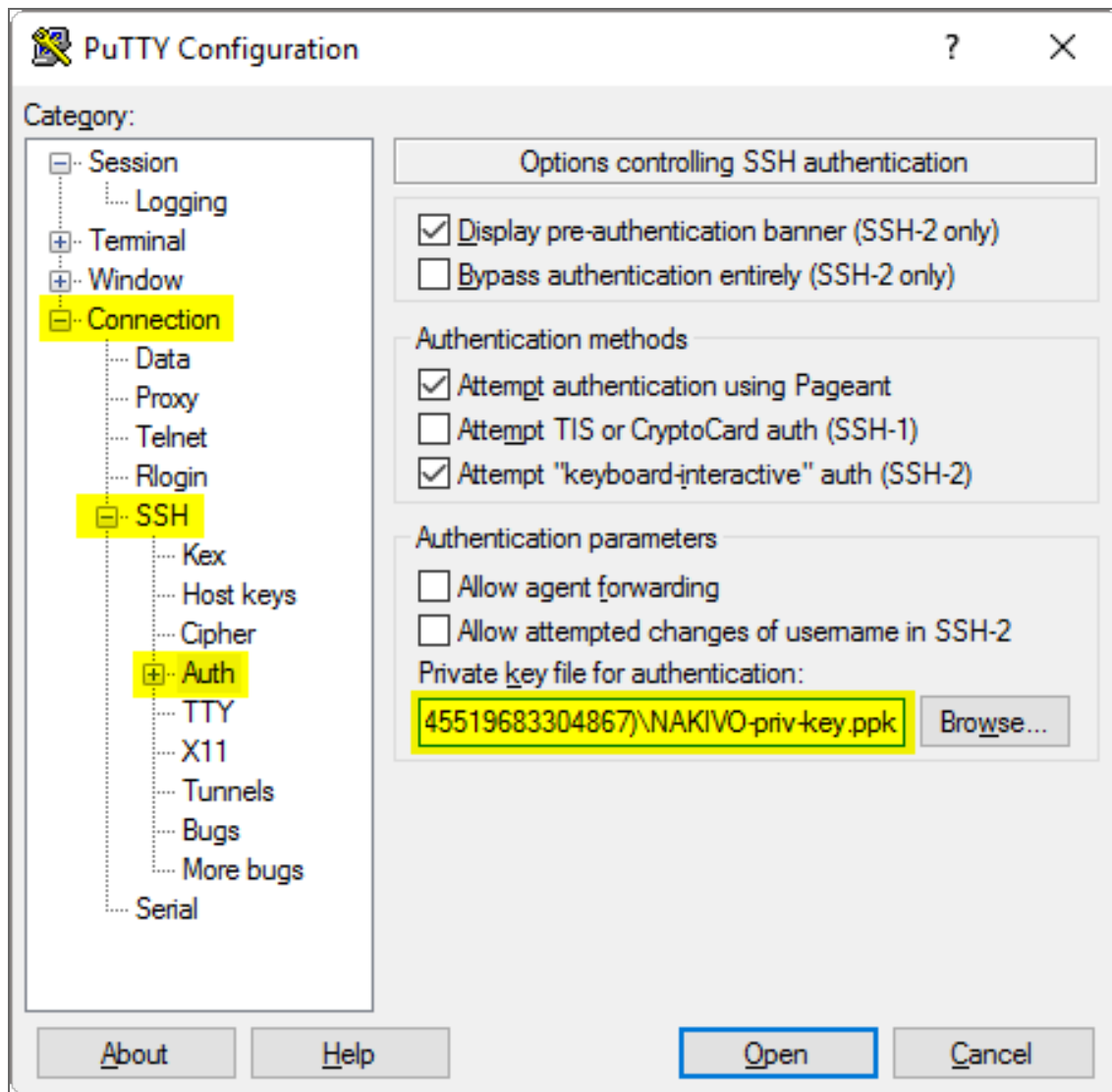
2. Locate the `SSH_key.pem` you just downloaded and unzipped. If you don't see it in the **Open...** dialogue box, change the file type to **All files**.



3. Click on **Save private key**. If PuTTYgen asks you to save the key without a passphrase, click **Yes**.
7. Open WinSCP.
8. Create a new session:
 - a. Add the hostname or IP address of your Amazon instance you received on step 4 into the **Host Name** box.
 - b. In the **Username** box, enter `nkvsuser`.
 - c. Leave the **Password** box empty.
 - d. Add the private key to WinSCP:
 1. Click the **Advanced...** button.
 2. The **Advanced Site Settings** dialog box opens. Go to *SSH > Authentication > Private key file:* and select the key file you generated on step 6.



3. Click **OK**.
- e. Click **Login**.
- f. Upload the updater file.
- g. Open PuTTY.
- h. Enter the IP-address or hostname of the Amazon EC2 instance.
- i. Go to *Connection > SSH > Auth* and add the private key in *Private key file for authentication:* box.



- j. Click **Open**.
- k. In the command line prompt that opens: log in to the Amazon EC2 instance:
 1. For **login**, enter `nkvuser`.
 2. For **password**, leave a blank line.
9. Update NAKIVO Backup & Replication following the [instructions](#).

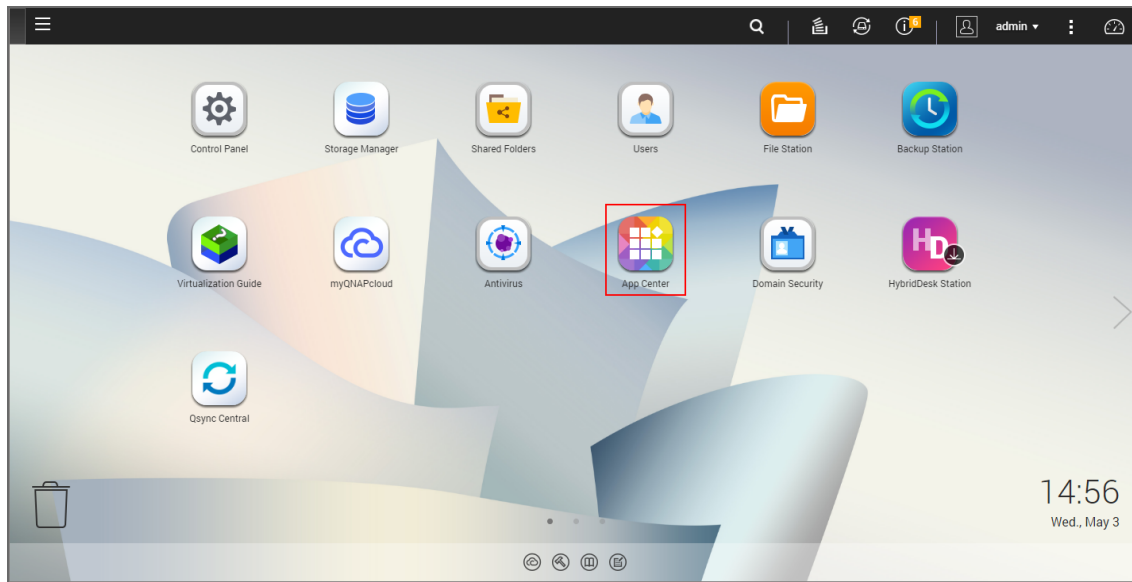
Updating on QNAP NAS

You can update NAKIVO Backup & Replication via QNAP AppCenter or manually. Refer to the following subtopics for details:

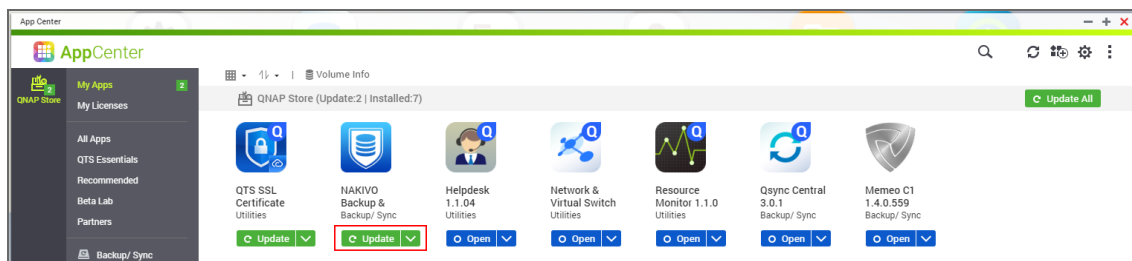
- [Updating via QNAP AppCenter](#)
- [Updating Manually](#)

Updating via QNAP AppCenter

1. Open the QNAP Desktop in your browser by entering the IP address of your QNAP NAS.



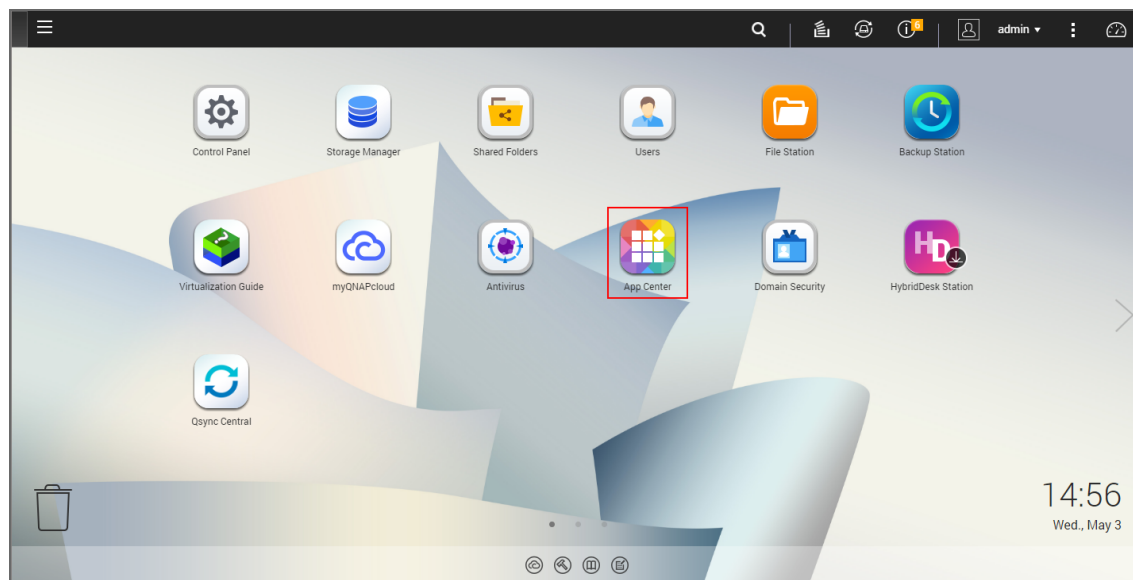
2. Make sure that no jobs or repository maintenance tasks are running in the product.
3. Go to **App Center**.
4. Select the *Backup/Sync* category and find NAKIVO Backup & Replication. Alternatively, use the search box at the top of the App Center window: click on the magnifier icon and enter "Nakivo".
5. If the new version of NAKIVO Backup & Replication is available in the QNAP App Center, you will see a green **Update** button.



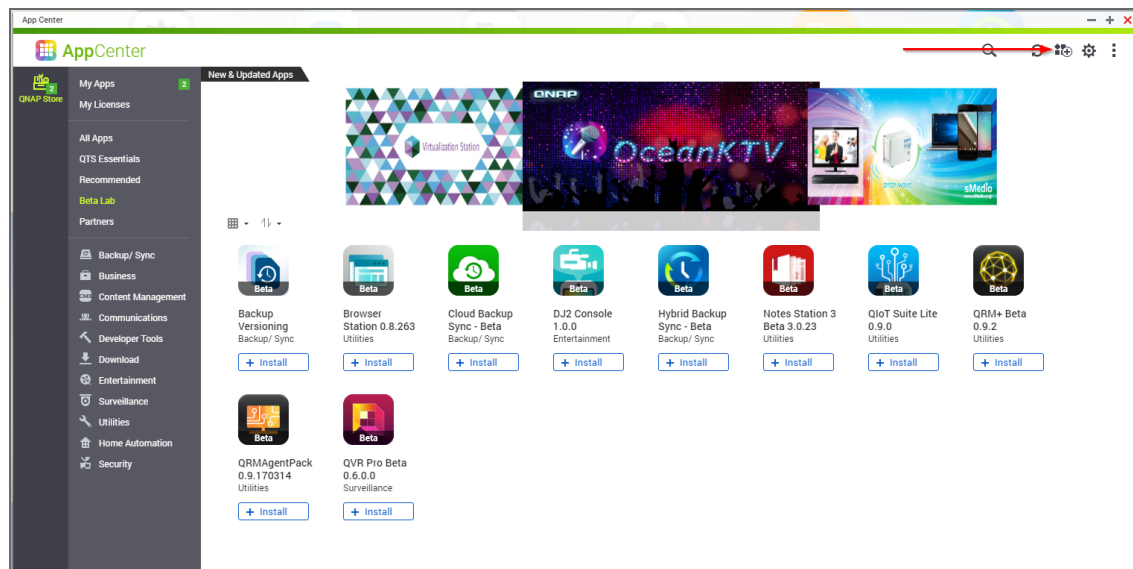
6. Click the **Update** button and wait till update finishes.

Updating Manually

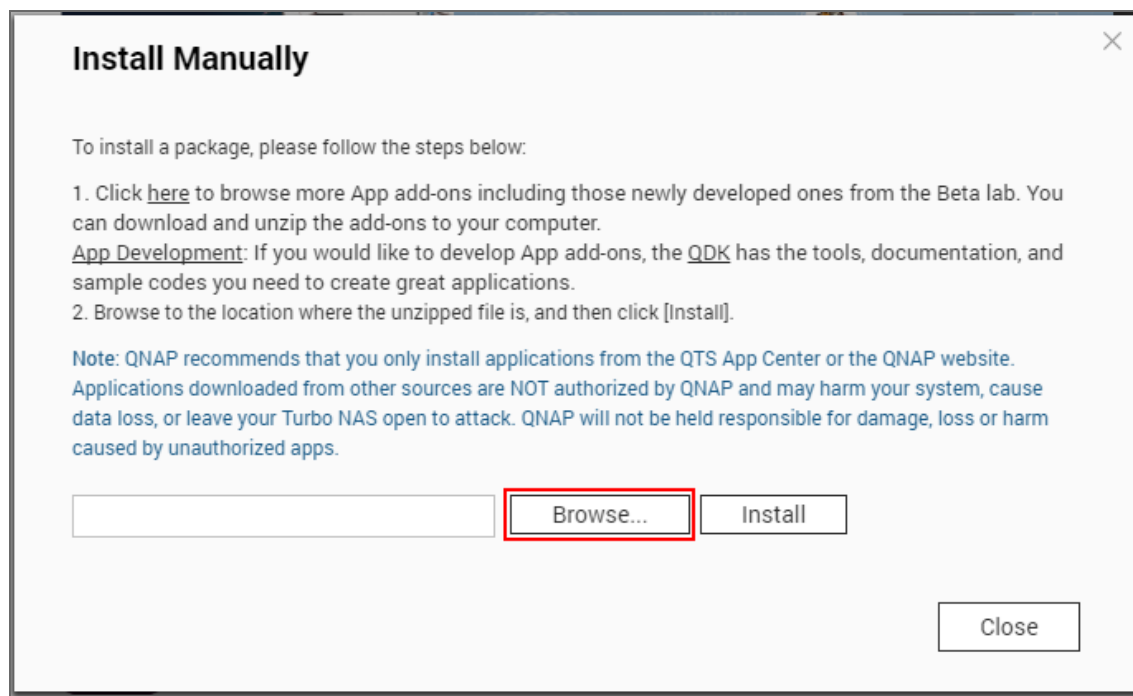
1. Download the update package from www.nakivo.com/resources/download/update/
2. Open the QNAP Desktop in your browser by entering the IP address of your QNAP NAS.



3. Go to **App Center**.
4. Click the **Install Manually** icon.



5. Click **Browse**. In the window appears, locate the installer (.qpkg file) on your computer.



6. Click **Install**.
7. Wait until the update process is finished.

Updating on ASUSTOR NAS

- [Updating on ASUSTOR NAS Manually](#)
- [Updating on ASUSTOR NAS via App Central](#)

Updating on ASUSTOR NAS Manually

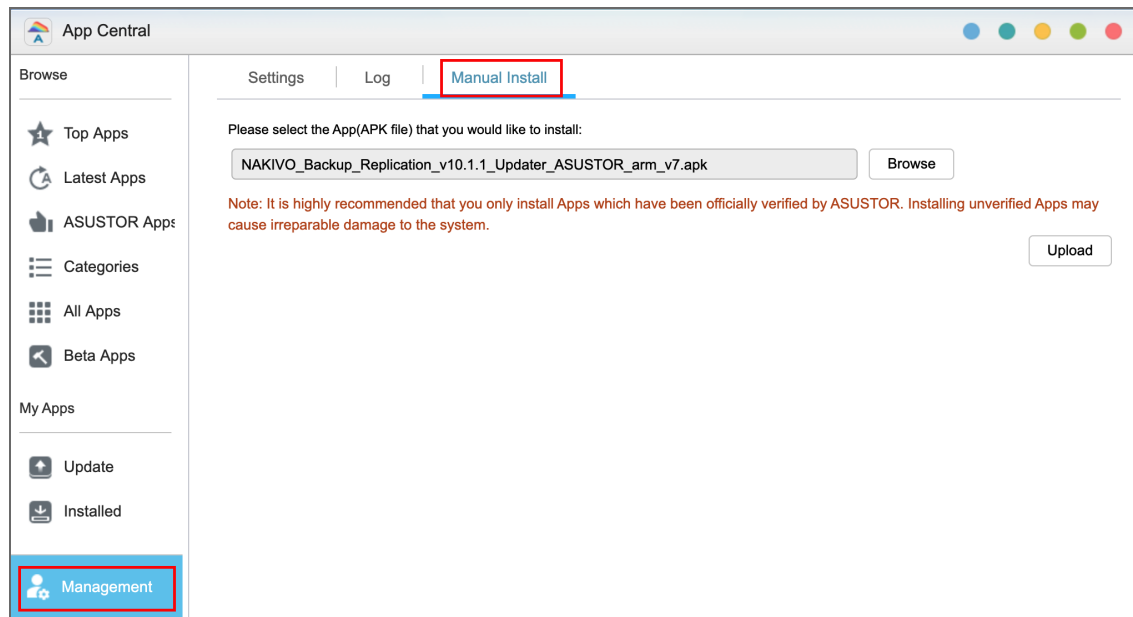
Prior to updating NAKIVO Backup & Replication on ASUSTOR NAS manually, make sure the following requirements are met:

- You have access to the ASUSTOR NAS.
- NAKIVO Backup & Replication installer is available for your ASUSTOR NAS.

Follow the steps below to update NAKIVO Backup & Replication on ASUSTOR NAS manually:

1. Make sure that no jobs or repository maintenance tasks are running in the product.
2. Open the **App Central** from the ASUSTOR NAS **Desktop**.
3. Click **Management** in the bottom left corner and click **Manual Install**.
4. The **Manual Install** pane opens to the right of the **App Central**. Click **Browse**.
5. The **Open** dialog box opens. Locate your copy of NAKIVO Backup & Replication installer for ASUSTOR NAS and click the **Open** button.
6. The **Open** dialog closes, and the **Upload** button becomes enabled. Click the **Upload** button.
7. When the upload finishes, the **About This App** dialog opens. If you are sure the requirements are met, click the **Next** button.
8. The **About This App** dialog opens a message asking you to review the summary of the NAKIVO Backup & Replication update. Select the checkbox **I understand the risks associated with installing unverified Apps** and click **Install**.
9. The **About This App** dialog closes, and the **Installed** pane of the **App Central** opens.

10. Wait until the update of NAKIVO Backup & Replication is complete.



Updating on ASUSTOR NAS via App Central

Follow the steps below to update NAKIVO Backup & Replication on ASUSTOR NAS via App Central:

1. Open the **App Central** from the ASUSTOR NAS **Desktop**.
2. In the **Browse** menu to the left, click **All Apps**. The list of applications available in the **App Central** opens in the right pane.
3. In the search box in the upper right corner of the pane, enter "Nakivo". Installations of the NAKIVO Backup & Replication application that are available at App Central are now displayed.
4. Click the **Update** button below the required NAKIVO Backup & Replication application to start uploading the update.
5. When the update is uploaded successfully, the **About This App** dialog opens. Click the **Update** button if you are sure that all the requirements are met.
6. The **About This App** dialog closes, and the **Installed** pane of the **App Central** opens. Wait until the update of the NAKIVO Backup & Replication is completed.

Updating on NETGEAR ReadyNAS

- [Updating on NETGEAR ReadyNAS Manually](#)
- [Updating on NETGEAR ReadyNAS via Available Apps](#)

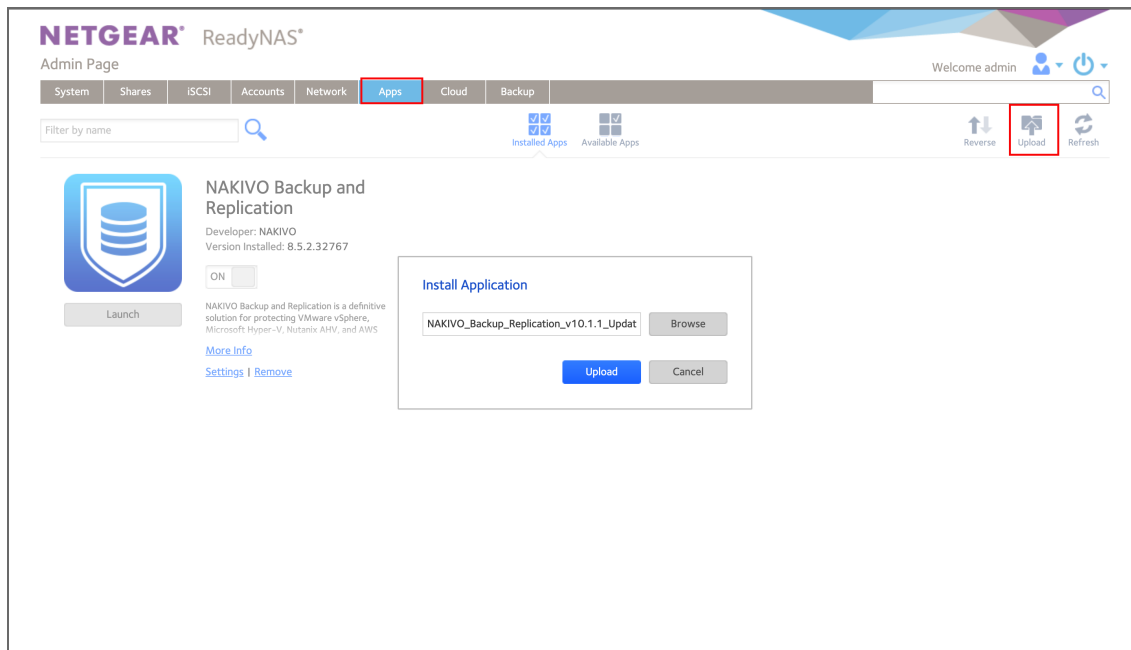
Updating on NETGEAR ReadyNAS Manually

Prior to updating NAKIVO Backup & Replication on NETGEAR ReadyNAS manually, make sure the following requirements have been met:

- You have access to the NETGEAR ReadyNAS.
- NAKIVO Backup & Replication update is available for your NETGEAR ReadyNAS.

Follow the steps below to update NAKIVO Backup & Replication on NETGEAR ReadyNAS manually:

1. Make sure that no jobs or repository maintenance tasks are running in the product.
2. Open the NETGEAR ReadyNAS **Admin Page** in your browser by entering the IP address of your NAS.
3. Go to **Apps** and click **Upload**.
4. The **Install Application** dialog box opens. Click **Browse**.
5. In the dialog box that opens, locate the downloaded installer (.deb file) and then click **Upload**.
6. Wait until the update is completed.



Updating on NETGEAR ReadyNAS via Available Apps

Prior to updating NAKIVO Backup & Replication on NETGEAR ReadyNAS via Available Apps, make sure that you have access to NETGEAR ReadyNAS.

Follow the steps below to update NAKIVO Backup & Replication on NETGEAR ReadyNAS via Available Apps:

1. Open the NETGEAR ReadyNAS **Admin Page** in your browser by entering the IP address of your NAS.
2. Go to **Apps > Available Apps**.
3. Find **NAKIVO Backup & Replication** in the list of available applications. Alternatively, enter NAKIVO to the filtering box in the upper left corner of the **Admin Page**.
4. If a new version of NAKIVO Backup & Replication is available in the NETGEAR **Available Apps**, the **Update** button will be available below the application item. Click the **Update** button.
5. Wait until the update is complete.

Updating on Generic ARM-Based Device

If [auto updating of NAKIVO Backup & Replication](#) is not supported, follow the steps below to update the product on a Generic ARM-based device manually:

1. Download the latest Generic ARM-based NAS updater from www.nakivo.com/resources/download/update/.
2. Upload the updater to the machine on which the Director is installed.

Important

Make sure you are using the *binary transfer mode* when uploading the updater to the machine with a Linux OS. For example:

- [Upload the installer from a Windows-based machine](#)
 - Upload the product from a Linux-based machine: run the following command: `wget 'server_ip/shared/NAKIVO_Backup_Replication_vX.X.X_Updater.sh'`
3. Log in to the Generic ARM-based NAS machine and allow the execution of the updater file. For example: `chmod +x NAKIVO_Backup_Replication_vX.X.X_Updater.sh`
 4. Make sure that no jobs or repository maintenance tasks are running in the product.
If NAKIVO Backup & Replication is installed on a VM, create a snapshot of the VM prior to updating the product.
 5. Execute the updater file with root privileges. For example: `sudo ./NAKIVO_Backup_Replication_vX.X.X_Updater.sh`
 6. Review the license agreement (press **Space** to go to the next page of the agreement). If you agree to the terms of the license agreement, press “Y” and then press **Enter**.
 7. Press the “Y” key and then press **Enter** to confirm that you wish to stop the services and begin the update process.
 8. Update all machines on which you have additionally deployed a [Transporter](#).

Updating on FreeNAS/TrueNAS

Prerequisites:

- You are logged in to the FreeNAS/TrueNAS system with the FreeNAS/TrueNAS GUI.
- The **Shell** button is enabled in the interface.

Follow the steps below to update NAKIVO Backup & Replication on your FreeNAS/TrueNAS system:

1. Make sure that no jobs or repository maintenance tasks are running in the product.
2. Navigate to the **Jails** page of the FreeNAS/TrueNAS GUI and click the jail of the NAKIVO Backup & Replication plugin to select it.
3. Click the **Shell** button to open a web shell.

4. In the web shell prompt, download the latest Virtual Appliance and Linux updater from the [NAKIVO Backup & Replication Update](#) page with the `curl` command. For example:

```
curl -O https://d96i82q710b04.cloudfront.net/res/product/NAKIVO_Backup_Replication_vX.X.X.XXXXX_Updater.sh
```

5. Change the updater file permission with the `chmod` command:

```
chmod +x NAKIVO_Backup_&_Replication_vX.X.X.XXXXX_Updater.sh
```

6. Run the updater in silent mode:

```
./NAKIVO_Backup_&_Replication_vX.X.X.XXXXX_Updater.sh -y -u --eula-accept
```

Uninstalling NAKIVO Backup & Replication

- [Uninstalling on Windows](#)
- [Uninstalling on Linux or Generic ARM-based NAS](#)
 - [Uninstalling Director and Onboard transporter on Linux or Generic ARM-Based NAS](#)
 - [Uninstalling Transporter on Linux or Generic ARM-Based NAS](#)
- [Uninstalling on Synology NAS](#)
- [Uninstalling on Western Digital NAS](#)
- [Uninstalling on QNAP NAS](#)
- [Uninstalling on ASUSTOR NAS](#)
- [Uninstalling NETGEAR ReadyNAS](#)
- [Terminating on Amazon EC2](#)
- [Uninstalling on FreeNAS](#)

Uninstalling on Windows

To uninstall NAKIVO Backup & Replication, run the uninstaller:

1. Go to **Start -> Control Panel** and run **Programs and Features**.
2. Select **NAKIVO Backup & Replication** and click **Uninstall**.
3. In the **NAKIVO Backup & Replication Uninstallation** wizard, click **Uninstall**.
4. Click **Close** when the uninstallation process is completed.

Uninstalling on Linux or Generic ARM-based NAS

Refer to the sections below to learn how to uninstall NAKIVO Backup & Replication on a Linux OS or a generic ARM-based NAS.

Uninstalling Director and Onboard Transporter on Linux or Generic ARM-based NAS

To uninstall the Director and Onboard Transporter, which is installed with the Director by default, follow the steps below:

1. Run the "uninstall" script which is located in the Director folder inside the product installation folder. If the product is installed in the default location, run: `/opt/nakivo/director/uninstall`
2. Enter "U" and then press **Enter** to confirm uninstalling the application.

Uninstalling Transporter on Linux or Generic ARM-based NAS

To uninstall the Transporter, follow the steps below:

1. Run the "uninstall" script which is located in the transporter folder inside the product installation folder. If the product is installed in the default location, run: `/opt/nakivo/transporter/uninstall`
2. Enter "U" and then press **Enter** to confirm uninstalling the application.

Uninstalling on Synology NAS

Follow the steps below to uninstall NAKIVO Backup & Replication on a Synology NAS:

1. In the Synology NAS management interface, open the **Package Center**.
2. Click NAKIVO Backup & Replication.
3. Choose **Uninstall** from the **Actions** list.
4. Click **OK** in the message box that opens to confirm that you wish to uninstall the application.

When the uninstallation process is completed, NAKIVO Backup & Replication will be removed from the list of installed applications.

Uninstalling on Western Digital NAS

Follow the steps below to uninstall NAKIVO Backup & Replication on a Western Digital NAS:

1. Open the NAS My Cloud Dashboard and click **Apps**.
2. In the **Installed Apps** list, select NAKIVO Backup & Replication.
3. The NAKIVO Backup & Replication item opens to the right of the installed applications list. Click the **Uninstall** button.
4. The **Uninstall NAKIVO Backup and Replication** dialog opens. Click **OK** to confirm that you wish to uninstall the application and delete all application data and settings.
5. The **Updating** progress bar opens. Wait until the uninstallation completes.

When the uninstallation process is completed, NAKIVO Backup & Replication will be removed from the list of installed applications.

Uninstalling on QNAP NAS

Follow the steps below to uninstall NAKIVO Backup & Replication on a QNAP NAS:

1. Open the QNAP NAS Desktop and click **App Center**.
2. The **App Center** dialog opens. In the **My Apps** list, locate the NAKIVO Backup & Replication application and open the list of applicable actions by clicking the drop-down button.
3. In the list of applicable actions, click **Remove**.
4. In the dialog that opens, click **OK** to confirm removing the application and application-relevant user data.
5. Wait until the uninstallation is complete.

When the uninstallation process is completed, NAKIVO Backup & Replication will be removed from the list of installed applications.

Uninstalling on ASUSTOR NAS

Follow the steps below to uninstall NAKIVO Backup & Replication on a QNAP NAS:

1. Open the ASUSTOR NAS Desktop and click **App Central**.
2. In the list of installed applications, locate NAKIVO Backup & Replication, select it and then click the **Remove** button.
3. In the dialog that opens, click **OK** to confirm that you wish to remove the application.
4. The **Removing** progress bar opens. Wait until the uninstallation is completed.

When the uninstallation process is completed, NAKIVO Backup & Replication will be removed from the list of installed applications.

Uninstalling on NETGEAR ReadyNAS

Follow the steps below to uninstall NAKIVO Backup & Replication on NETGEAR ReadyNAS:

1. Open the NETGEAR ReadyNAS **Admin Page** and go to **Apps > Installed Apps**.
2. Locate **NAKIVO Backup & Replication** in the list of available applications. Alternatively, enter NAKIVO to the filtering box in the upper left corner of the **Admin Page**.
3. Click the **Remove** button below the application item.
4. The **Confirm Deletion** dialog box opens. Click **Yes** to confirm that you wish to uninstall NAKIVO Backup & Replication on NETGEAR ReadyNAS.
5. Wait until the uninstallation is completed.

When the uninstallation process is completed, NAKIVO Backup & Replication will be removed from the list of installed applications.

Terminating on Amazon EC2

Follow the steps below to terminate NAKIVO Backup & Replication that is launched as an Amazon EC2 instance:

1. Open AWS Management Console and go to **EC2 Dashboard**.
2. In the **Instances** menu, click **Instances**.
3. In the list of instances, locate the necessary NAKIVO Backup & Replication instance and select it.
4. In the **Actions** menu, go to **Instance State** and click **Terminate**.
5. In the **Terminate Instances** dialog, click **Yes, Terminate** to confirm that you wish to terminate your instance of NAKIVO Backup & Replication.
6. Wait until the instance is terminated.

In about 60 minutes, the terminated NAKIVO Backup & Replication instance will be removed from the list of Amazon EC2 instances.

Uninstalling on FreeNAS

Uninstalling a plugin deletes the associated FreeNAS jail because it is no longer required. Before uninstalling NAKIVO Backup & Replication, make sure that there is no data or configuration in the jail that needs to be saved.

Follow the steps below to uninstall NAKIVO Backup & Replication on a FreeNAS:

1. Log in to the FreeNAS system using the FreeNAS GUI.
2. In the left pane of the FreeNAS GUI, click **Plugins -> Installed**.
3. A list of installed plugins opens. For the desired NAKIVO plugin, click the **Options** button and then **Delete**.
4. The **Delete** dialog opens asking to confirm the operation. Click **Delete**.

When the uninstall process is completed, NAKIVO Backup & Replication will be removed from the list of installed plugins.

Getting Started

When deployed, NAKIVO Backup & Replication is ready for use. The topics below will provide you with information on how to start working with the application.

- [“Logging in to NAKIVO Backup & Replication” on page 269](#)
- [“First Steps with NAKIVO Backup & Replication” on page 275](#)
- [“Web Interface Components” on page 278](#)
- [“Managing Jobs and Activities” on page 287](#)

Logging in to NAKIVO Backup & Replication

- [Getting to the Login Page](#)
- [Creating a User Account](#)
- [Changing Password](#)
- [Default Password in Amazon EC2](#)
- [Passing Verification](#)

Getting to the Login Page

To go to the NAKIVO Backup & Replication login page, open the following URL in your web browser: `https://machine_IP_or_DNS:4443`.

Note

If you selected a custom HTTPS port during installation, replace 4443 with the custom value.

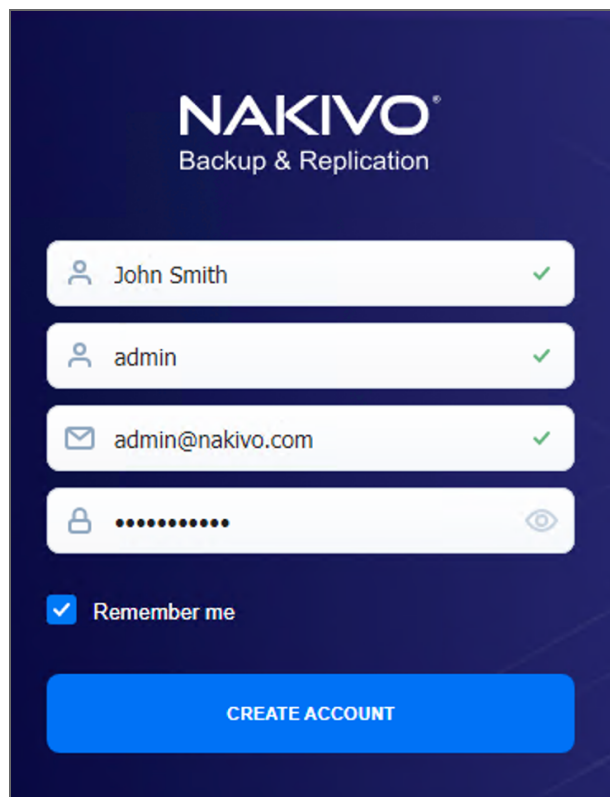
Creating a User Account

When you open the NAKIVO Backup & Replication login page for the first time, you are prompted to create a new user account. This user account is the admin account to be used to access your instance of NAKIVO Backup & Replication. Fill out the fields in the form:

1. **Name:** Provide your real name.
2. **Username:** Enter an admin username to log in to NAKIVO Backup & Replication.
3. **Email:** Provide an email.
4. **Password:** Enter a password.
5. Optionally, you can select **Remember me** to save your credentials.
6. Click **CREATE ACCOUNT**.

Note

If NAKIVO Backup & Replication is deployed in an Amazon EC2 instance, you will first be prompted to enter the Amazon EC2 instance ID.

The image shows a dark blue login and account creation interface for NAKIVO Backup & Replication. At the top, the NAKIVO logo is displayed in white, with 'Backup & Replication' written below it. Below the logo, there are four input fields, each with a green checkmark on the right side, indicating successful validation. The first field is for the name 'John Smith' with a person icon. The second field is for the username 'admin' with a person icon. The third field is for the email 'admin@nakivo.com' with an envelope icon. The fourth field is for the password, shown as a series of dots, with a lock icon on the left and an eye icon on the right. Below these fields is a checkbox labeled 'Remember me' which is checked. At the bottom, there is a large blue button with the text 'CREATE ACCOUNT' in white capital letters.

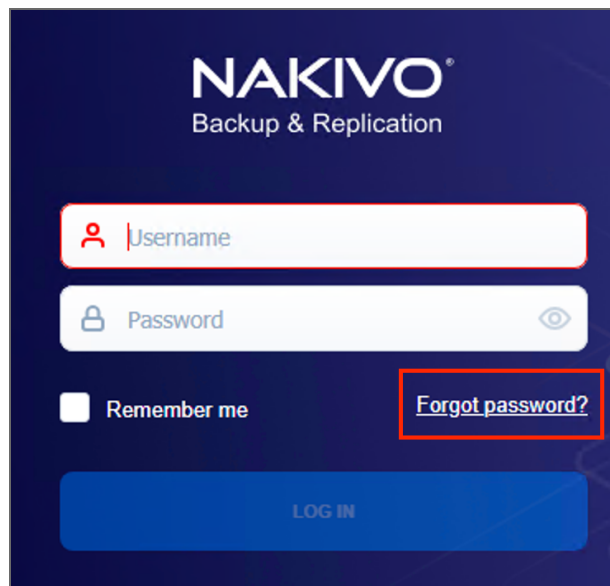
NAKIVO Backup & Replication opens in your browser displaying the configuration wizard. Refer to [First Steps with NAKIVO Backup & Replication](#) to learn how to start using NAKIVO Backup & Replication.

To log out, click **Logout** in the bottom left corner.

Changing Password

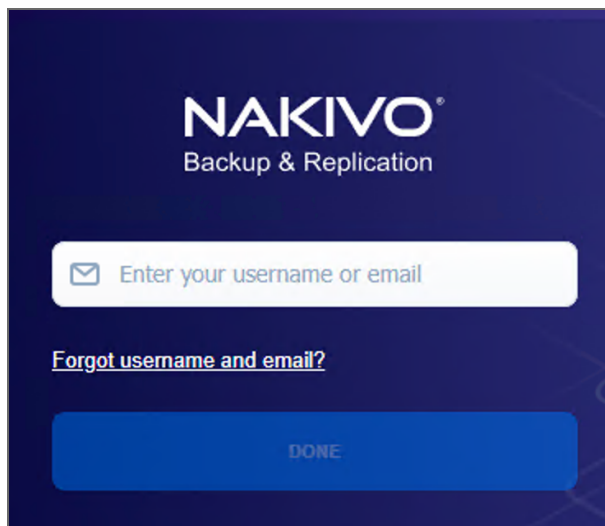
If you forget the password used to log in to NAKIVO Backup & Replication, you can restore it by following the steps below:

1. Go to NAKIVO Backup & Replication login page.
2. Click the **Forgot password** link.

The image shows the login interface for NAKIVO Backup & Replication. At the top, the NAKIVO logo is displayed above the text "Backup & Replication". Below this, there are two input fields: the first is labeled "Username" with a red outline, and the second is labeled "Password" with a red outline and an eye icon to its right. Under the password field, there is a "Remember me" checkbox and a link labeled "Forgot password?" which is also highlighted with a red outline. At the bottom, there is a large blue button labeled "LOG IN".

3. Do one of the following:

- If you have set up [email settings](#) in NAKIVO Backup & Replication, enter your email address and click **Done**.

The image shows the email entry interface for NAKIVO Backup & Replication. At the top, the NAKIVO logo is displayed above the text "Backup & Replication". Below this, there is a single input field with an envelope icon and the placeholder text "Enter your username or email". Under this field, there is a link labeled "Forgot username and email?". At the bottom, there is a large blue button labeled "DONE".

A temporary password, which is a security string, is sent to your inbox. Enter this password the next time you log in to your NAKIVO Backup & Replication instance. Once you are logged in, it's recommended that you change the temporary password for your user account. To change the temporary password:

- a. Click **Logout** in the bottom left corner.
- b. Select **Profile**.
- c. Click **Change password**.
- d. In the dialog box that opens, fill out the following fields:
 - **Current password**: Enter the temporary password that you received to your inbox.
 - **New password**: Enter a new password.

- **Repeat new password:** Enter the new password again.
- e. Click **Change**.

You can also change your temporary password in **Settings>General>Users and Roles**

- If you have not set up email settings in NAKIVO Backup & Replication:
 - a. Enter your username and click **Done**.
 - b. Go to the product installation folder and locate the "forgot_password.txt" file.

Important

For security reasons, only a root user (Linux) or a member of the Administrators group (Windows) is allowed to access the installation folder and the "forgot_password.txt" file.

- c. Paste the security string from the file in the appropriate field.
- d. Click **Done**.

Notes

- If you are using a Virtual Appliance (VA), go to the VA console, then go to the command line and enter: `cat /opt/nakivo/director/forgot_password.txt` The security string will be displayed on the screen. You can copy and paste it into the web interface.
- If you are using a NAS, open an SSH connection to your device and read the forgot_password.txt file in the following folders:
 - For ASUSTOR NAS: `/usr/local/AppCentral/NBR`
 - For NETGEAR NAS: `/apps/nbr`
 - For QNAP NAS: `/share/CACHEDEV1_DATA/.qpkg/NBR`
 - For Raspberry PI: `/opt/nakivo/director`
 - For Synology NAS: `/volume1/@appstore/NBR`
 - For Western Digital NAS: `/mnt/HD/HD_a2/Nas_Prog/NBR`
- To learn how to open an SSH connection to your NAS device and read text files, refer to the NAS vendor documentation.

Default Password in Amazon EC2

If you have deployed NAKIVO Backup & Replication as an Amazon machine image in Amazon EC2, use the following default credentials to log in:

- **Username:** admin
- **Password:** The password is the ID of the NAKIVO Backup & Replication instance in Amazon EC2.

Passing Verification

If two-factor authentication was configured, verification needs to be passed after entering the credentials to access your NAKIVO Backup & Replication instance. This can be done in one of the following ways:

- Google Authenticator code from the mobile app
- A code sent to the specified email address
- One of the single-use backup codes

If Two-factor authentication was enabled but never configured, it must be configured now. Do the following:

1. Click **Continue**.
2. Optionally, click on the **change your email** link to enter the new email address for the user. Select **Continue** to proceed.
3. Enter the verification code that was sent to the specified email and click **Continue**. Optionally, click **Resend email** in case you did not receive it.
4. Optionally, enter the alternative email address that can be used in case the primary one becomes unavailable, and select **Continue**. Alternatively, select **Skip this step**.
5. If you have entered the alternative email address for the previous step, enter the verification code that was sent to the specified email, and click **Continue**. Optionally, click **Resend email** in case you did not receive it.
6. Follow instructions on screen to download and install Google Authenticator, and click **Continue**.
7. Add your NAKIVO Backup & Replication user account to Google Authenticator. Use one of the following methods:
 - Select **Scan QR Code** option and scan the QR code in the popup window.
 - Select **Enter a Code** option and follow the instructions to enter the shown code into the Google Authenticator app.
8. Enter the 6-digit verification code from Google Authenticator into the field. Note that the verification code is time-based. Click **Continue** to proceed.

9. A pairing key is displayed which can be used to add multiple devices to your account.

Important

It is highly recommended that you save the pairing key or write it down.

You have the following options:

- Optionally, click on the **Copy the key** link to copy your key and save it for future use.
 - Optionally, click on the **Download pairing information** link to download and save instructions on how to use the pairing key.
 - Click **Continue** when you're done.
10. Four backup codes are displayed on the next page. These one-time codes can be used to log in when you are unable to provide a verification code. Click on the **Save as PDF** link to download and save these codes in PDF format or write them down. Click **Continue**.
 11. Enter one of the backup codes in the next popup window to confirm that you have saved them, and click **Finish**.

Google Authenticator Verification

If you have selected the **Google Authenticator** verification method on the [Managing Two-Factor Authentication](#) page, do one of the following:

- Enter the verification code from Google Authenticator into the field, and click **Proceed**.
- Enter one of the one-time backup codes.
- Click **More verification options** to use email verification.

Email Verification

If you have selected the **Email** verification method on the [Managing Two-Factor Authentication](#) page, do one of the following:

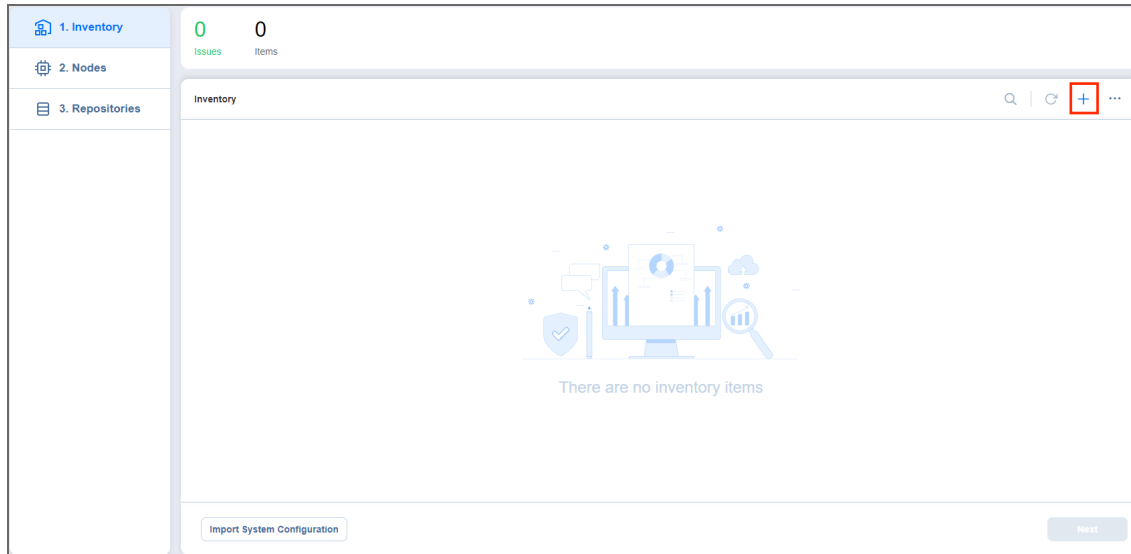
- Select one of the email addresses verified previously, and click **SEND VERIFICATION CODE**. Then click **OK**.
- Enter one of the one-time backup codes.
- Alternatively, click **More verification options** to choose a different email for verification.

First Steps with NAKIVO Backup & Replication

When you log in to NAKIVO Backup & Replication for the first time, the initial configuration wizard opens.

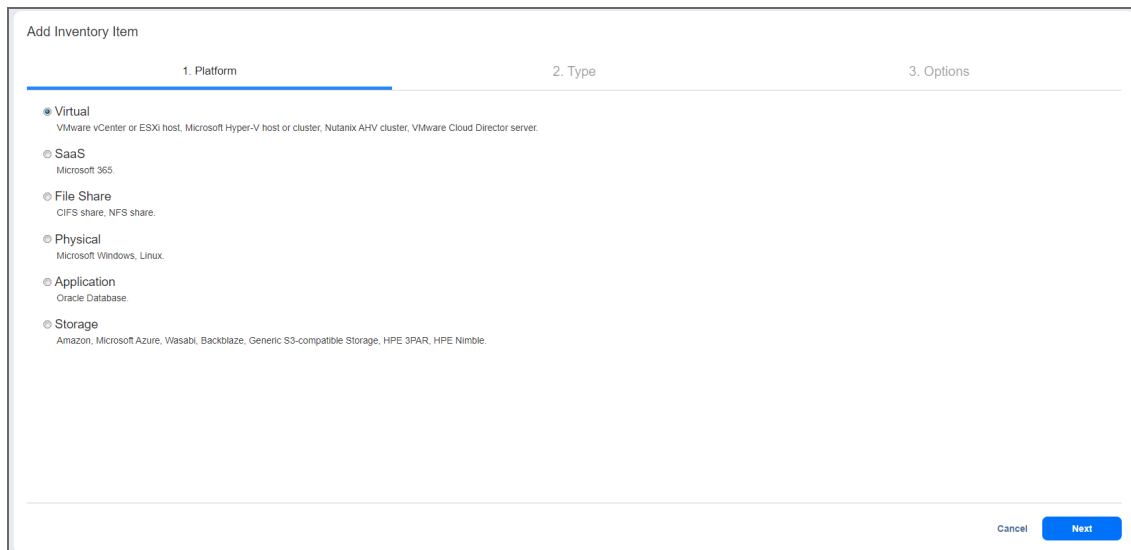
Proceed as follows:

1. On the **Inventory** page of the wizard, click **Add New**.

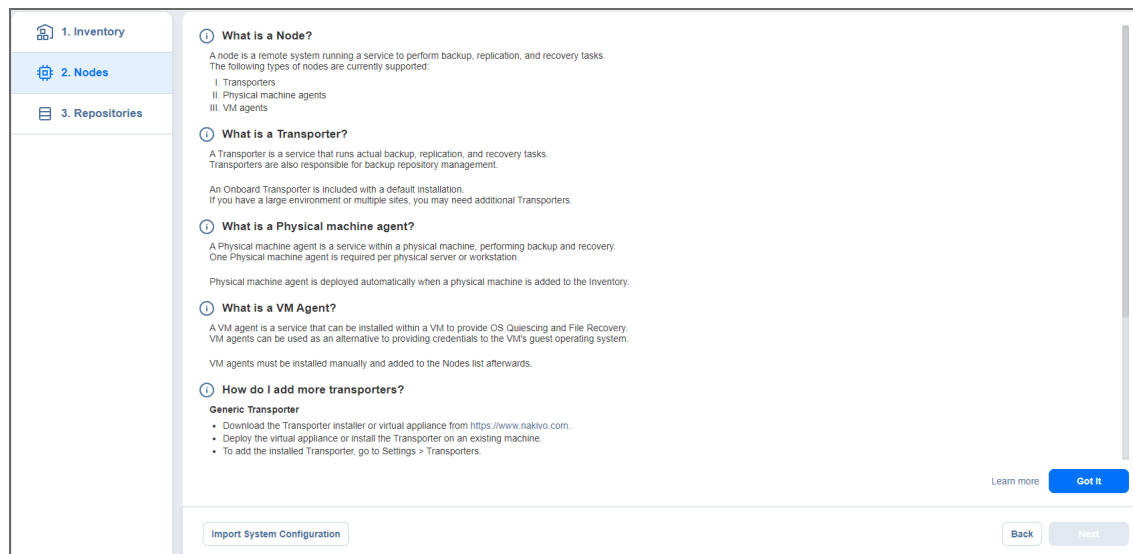


2. Select one of the given options:

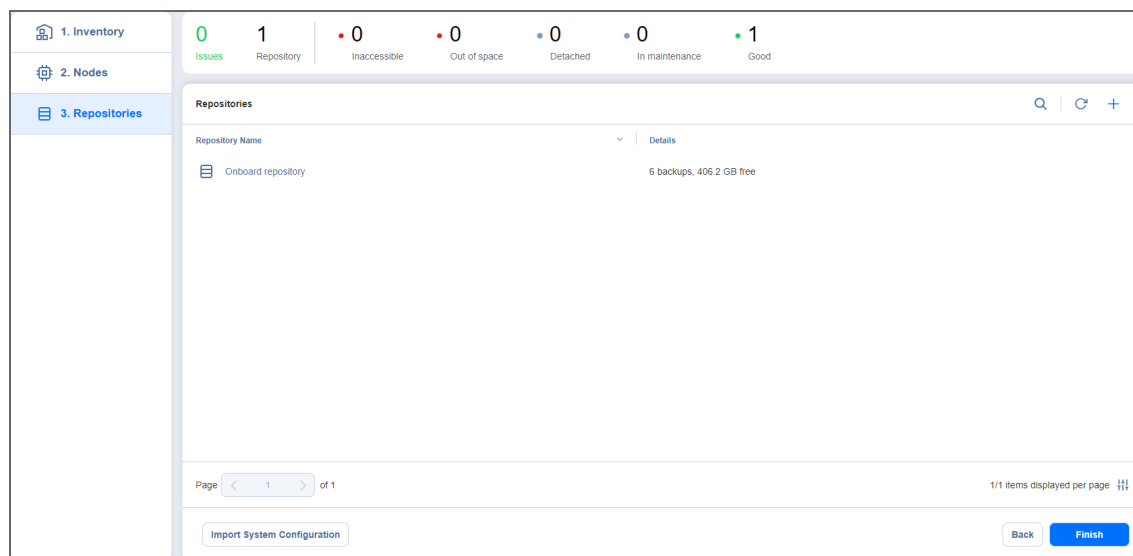
- Virtual
- SaaS
- File Share
- Physical
- Application
- Storage



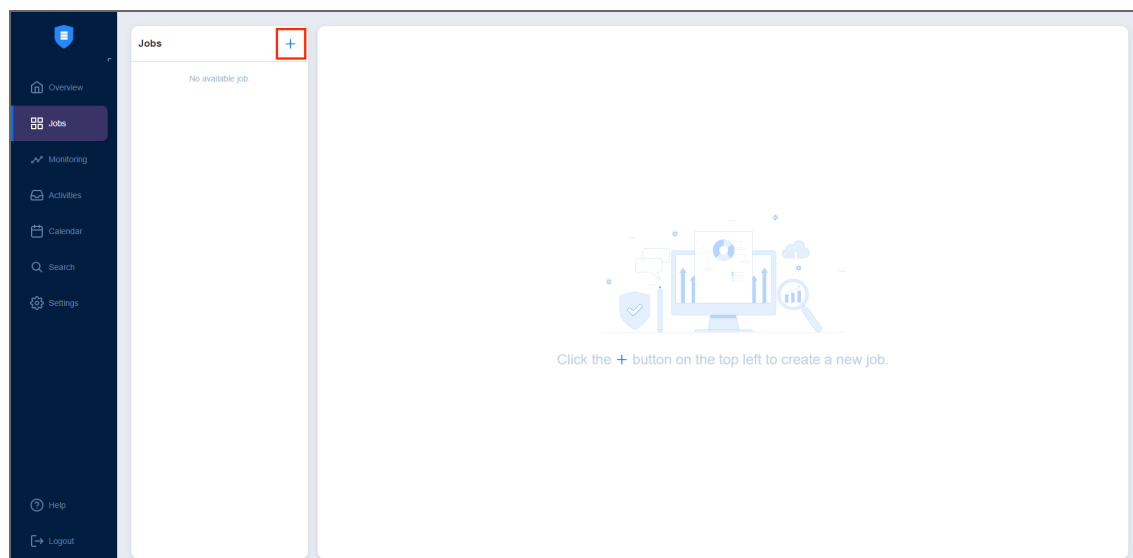
- Proceed with adding items as described in the [Inventory](#) article.
- On the **Transporters** page of the wizard, you will find information about the Transporter component of the NAKIVO Backup & Replication.



- To [deploy](#) a new Transporter or [add](#) an existing one, click **Got it** and proceed as described in the [Transporters](#) article.
- To move to the next page of the wizard, click **Next**.
- On the **Repositories** page of the wizard, you can add a local or a remote Backup Repository to your application by clicking **Add Backup Repository**.



- Click **Finish**.
- The **Jobs** menu of the application opens. Proceed by creating [backup](#) and replication jobs.



If your current license type is **Free** and the **Trial** license has not yet been applied to the current deployment of NAKIVO Backup & Replication, a dialog box appears. Using this dialog box, you can contact the sales team to change your license type or try the full functionality of the solution for 15 days. If you do not want to upgrade your license type right away, you can do it at any time in the [Help menu](#).

Note

If you switch the license type to **Trial**, the product will automatically go back to using your **Free** license after expiration.

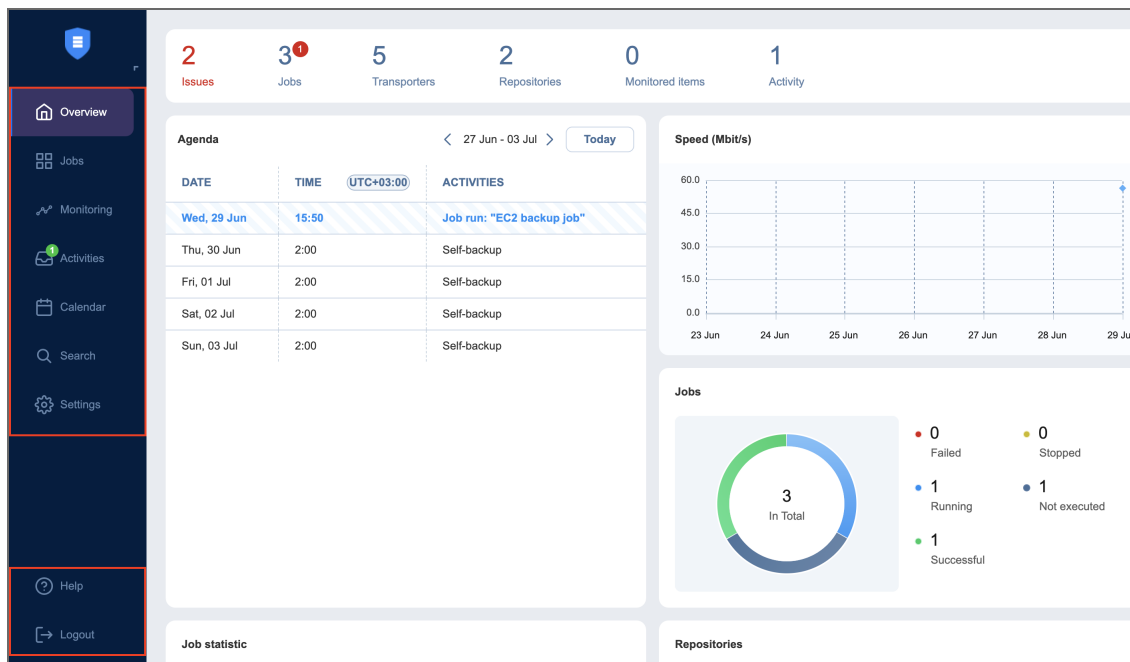
Web Interface Components

The interface of NAKIVO Backup & Replication consists of the following components:

- [Main Menu](#)
- [Overview](#)
- [Jobs](#)
- [Monitoring](#)
- [Activities](#)
- [Calendar](#)
- [Search](#)
- [Settings](#)
- [Help Menu](#)
- [Online Chat Dialog](#)
- [Special Offers Toolbar](#)
- [Tenants Dashboard](#)

Main Menu

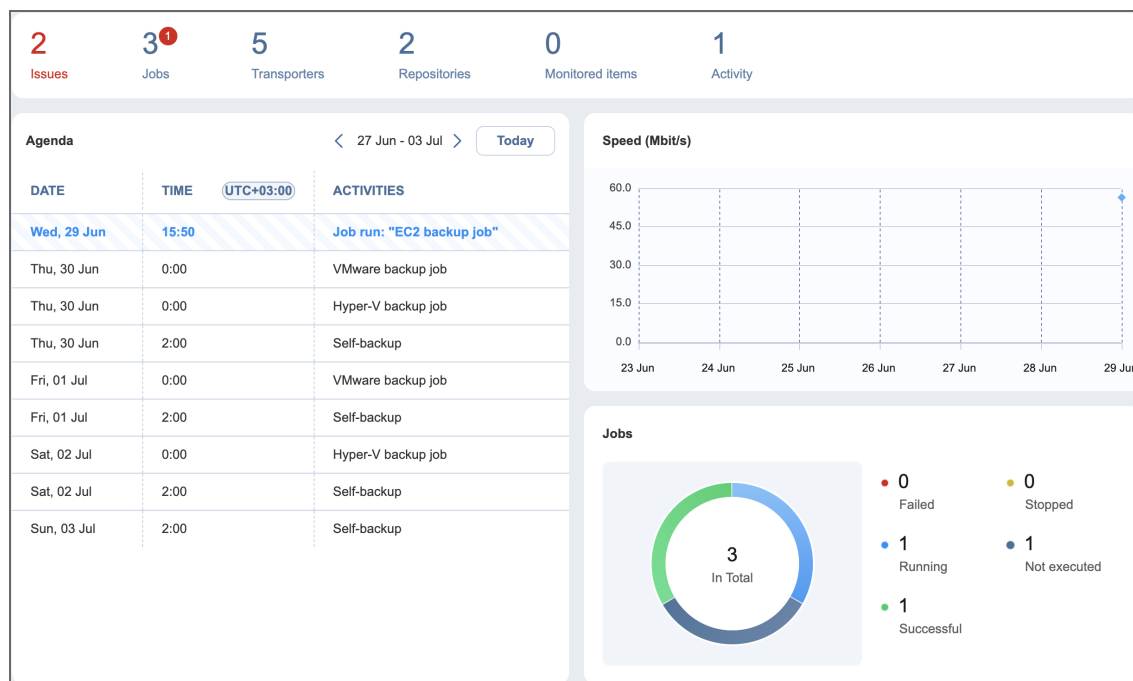
The main menu of NAKIVO Backup & Replication is located on the left side of the product interface. It provides access to the overview dashboard, jobs, activities, calendar, global search, and product settings. It also contains the **Help** menu and **Log Out** button.



Overview

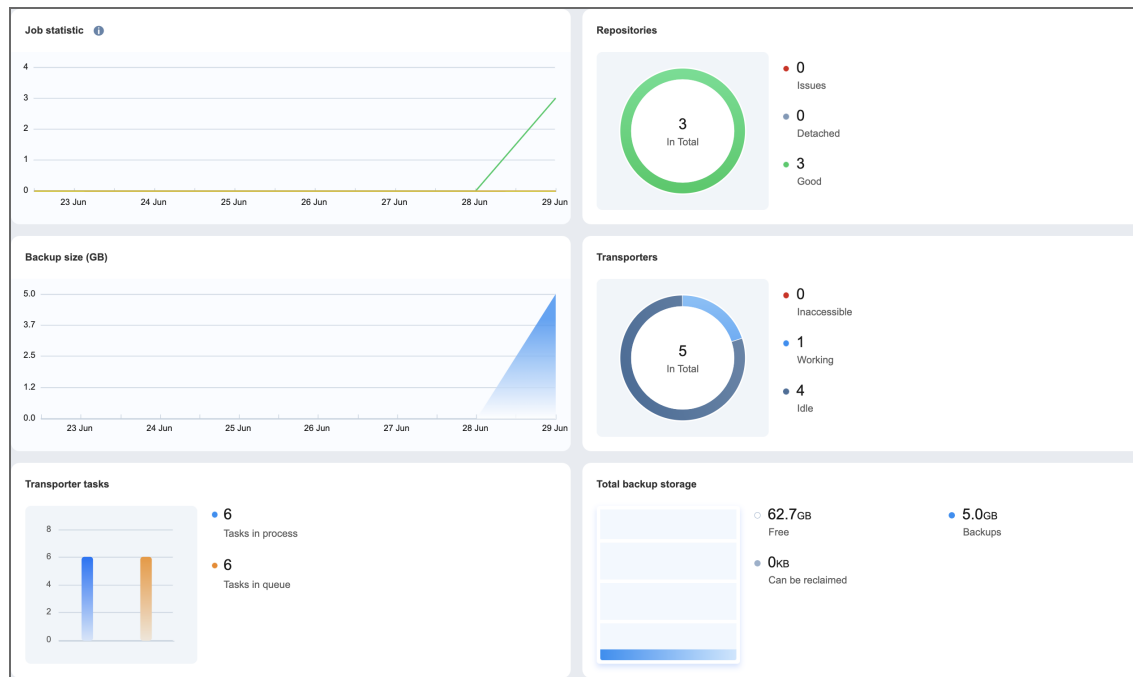
The **Overview** page displays the key statistics for your instance of NAKIVO Backup & Replication. The information is displayed in the following widgets:

- **Summary bar:** Lists the total number of issues (errors and alarms), jobs, transporters, repositories, monitored items, and running activities.
- **Agenda:** Lists running and scheduled activities for a given week. By default, this widget displays the current week.
- **Speed:** Displays the speed at which raw data has been transferred during successful job runs in the previous seven days.
- **Jobs:** Displays the total number of available jobs and their respective last run statuses.



- **Job statistic:** Shows a graph of the number of successful, stopped, and failed jobs for each day in the previous seven days.
- **Repositories:** Displays the total number of available repositories and their statuses.
- **Backup size:** Displays the total size of backups created for each day in the previous seven days. Note that backups in forever incremental (**Store backups in separate files option** is not selected) Backup Repositories are considered OKB, and thus are not reflected in the **Backup size** graph.
- **Transporters:** Displays the total number of available transporters that have been added or deployed successfully and their statuses.
- **Transporter tasks:** Displays the total number of tasks being processed or waiting to be processed by all transporters.

- **Total backup storage:** Displays the total amount of storage of all available repositories.



- **Events:** Lists all events, including errors, warnings, and general status information, sorted by date by default. Includes search and filter functions that simplify finding specific events by name, type, or date range.

Events			🔍	🔼
Event name	Initiated by	Date		
❗ "saas" and its contents were removed from the product. The physical repository and its contents were left intact.	admin	29 Jun 2022 at 16:12		
✅ Refreshing "saas".	admin	29 Jun 2022 at 16:12		
❗ "saas2" and its contents were removed from the product. The physical repository and its contents were left intact.	admin	29 Jun 2022 at 16:12		
✅ Refreshing "saas2".	admin	29 Jun 2022 at 16:12		
❗ The "VMware backup job" VMware vSphere backup job has been edited.	admin	29 Jun 2022 at 16:12		
❗ The "Hyper-V backup job" Microsoft Hyper-V backup job has been edited.	admin	29 Jun 2022 at 16:11		
❗ "SaaS" and its contents were removed from the product. The physical repository and its contents were left intact.	admin	29 Jun 2022 at 16:11		
✅ Refreshing "saas2".	admin	29 Jun 2022 at 16:11		
✅ Refreshing "SaaS".	admin	29 Jun 2022 at 16:02		
✅ Refreshing "SaaS".	admin	29 Jun 2022 at 16:01		

Page 1 of 16 20/304 items displayed per page

Jobs

Using the **Jobs** page, you can:

- View, run, and stop jobs on demand or on schedule
- Recover files, objects, VMs, and sites
- Manage jobs
- Create backup, backup copy, replication, recovery, and flash boot jobs
- Create job reports
- Create and manage job groups

The screenshot shows the 'Jobs overview' page. On the left is a dark sidebar with navigation links: Overview, Jobs (selected), Monitoring, Activities, Calendar, Search, Settings, Help, and Logout. The main content area has a 'Jobs' header with a '+' icon. Below it is a list of job types: Hyper-V backup job, Nutanix AHV backup job, Physical machine backup job, VMware backup job, VMware Cloud Director backup job, and VMware real-time replication job. To the right, under 'Job overview', there are buttons for 'Run/Stop', 'Recover', and 'Manage'. A summary bar shows 0 Issues, 6 Jobs, and 0 Running. Below this is a table of jobs.

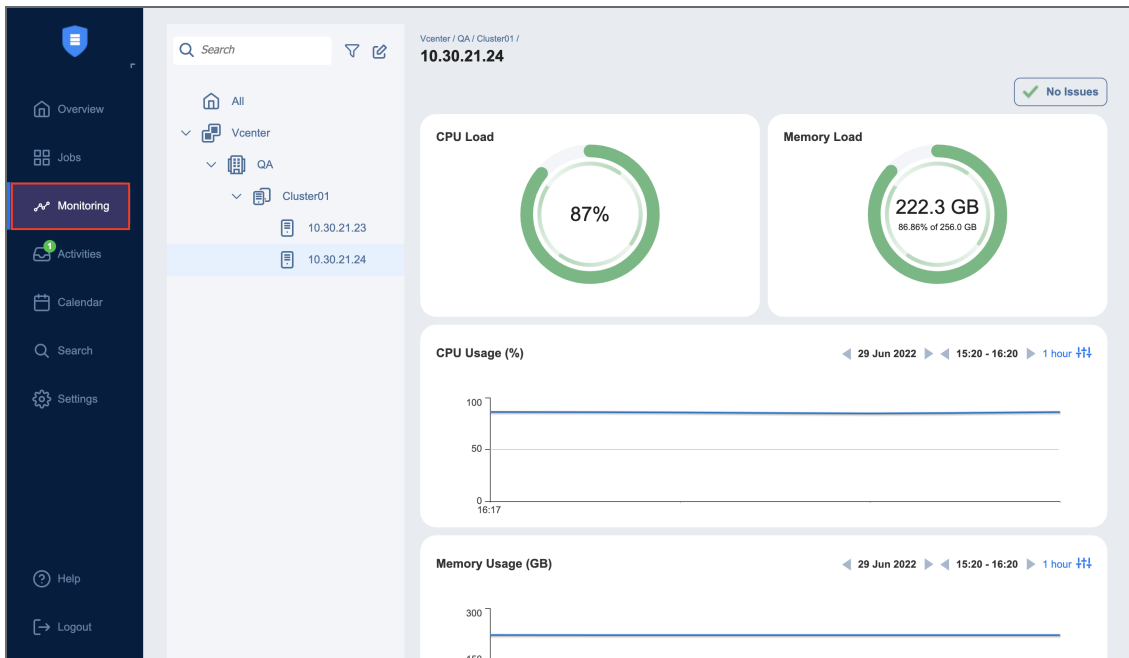
Job name	Priority	Status	Run date	Speed
VMware real-time replicatio...	5	Not executed yet	-	-
VMware backup job	5	Not executed yet	-	-
VMware Cloud Director bac...	5	Not executed yet	-	-
Physical machine backup job	5	Not executed yet	-	-
Nutanix AHV backup job	5	Not executed yet	-	-
Hyper-V backup job	5	Not executed yet	-	-

At the bottom, there is a pagination bar showing 'Page 1 of 1'.

Monitoring

On the **Monitoring** page, you can check the following metrics (current and historical):

- For VMware VMs: CPU usage, memory usage, and disk usage
- For VMware hosts: CPU usage and memory usage
- For VMware datastores: Disk usage



Activities

The **Activities** page displays a list of all running and past activities, such as:

- Job run
- Repository Self-Backup
- File download
- Application object download
- Universal object recovery
- Repository [space reclaim](#)
- Repository [self-healing](#)
- Repository backup verification
- [Backup export](#)
- [Tape-specific activities](#), namely: scanning, erasing, and reading Tape
- Other

For further details and information, refer to [“Managing Activities” on page 318](#).

Activities

Running Activities

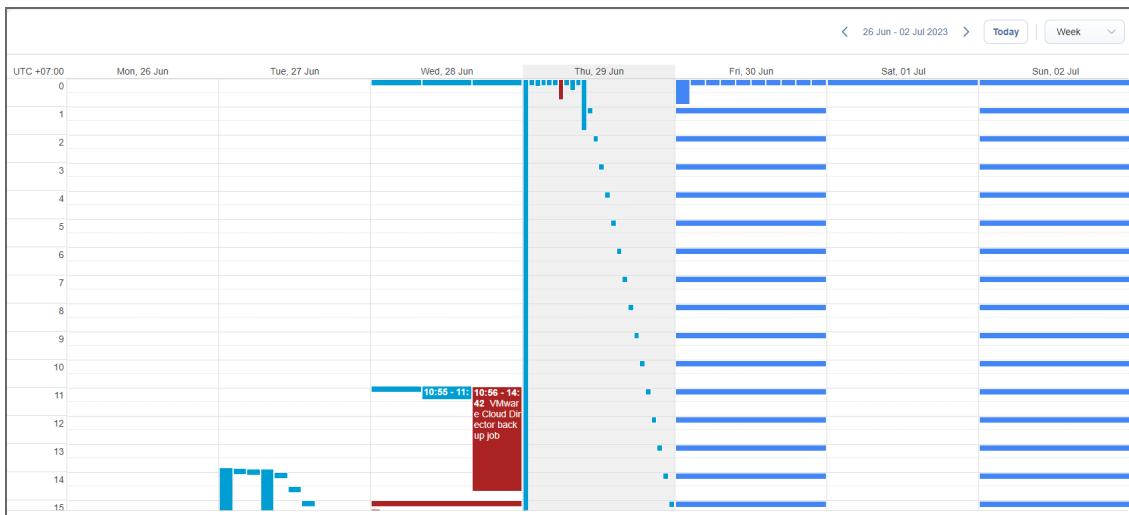
Name	Status	Date
<input type="checkbox"/> <div>Job run: "Physical machine backup job"</div>	3.4%	Fri, 30 Jun at 13:12

Past Activities

Name	Status	Date
<input type="checkbox"/> <div>Backup repository self-healing: "Repo7Tb"</div>	Completed	Fri, 30 Jun at 12:51
<input type="checkbox"/> <div>Job run: "Physical machine backup job"</div>	Stopped	Fri, 30 Jun at 12:39
<input type="checkbox"/> <div>Job run: "Nutanix AHV backup job"</div>	Stopped	Fri, 30 Jun at 12:39
<input type="checkbox"/> <div>Job run: "VMware backup job"</div>	Failed	Fri, 30 Jun at 12:38
<input type="checkbox"/> <div>Job run: "Hyper-V backup job"</div>	Failed	Fri, 30 Jun at 12:38

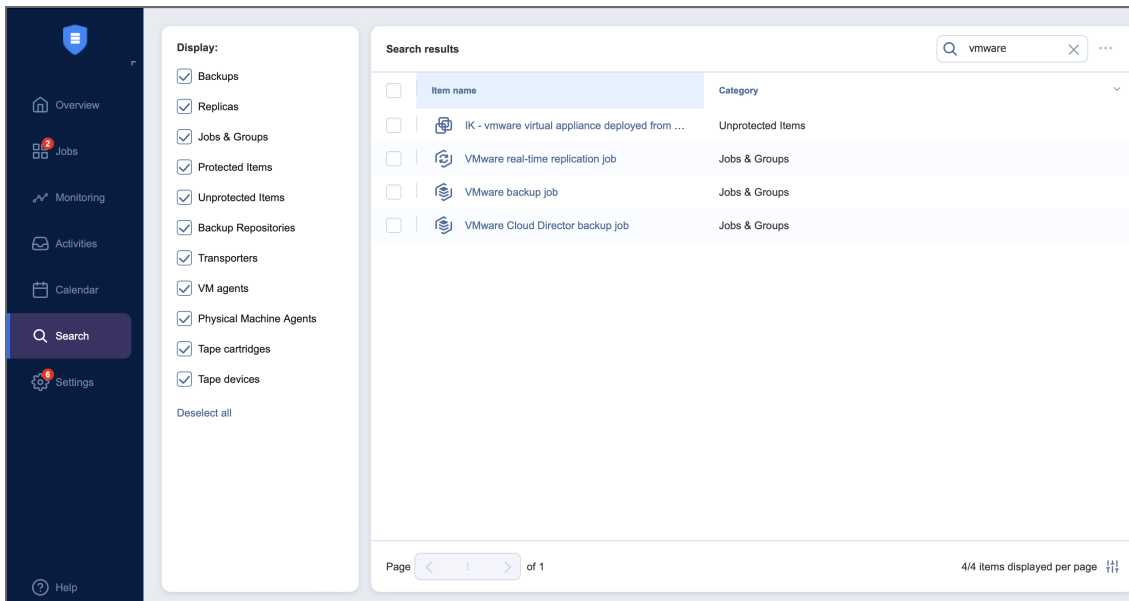
Calendar

The **Calendar** allows you to schedule jobs and view the history of all job runs in one organized space. For more information, refer to [“Using Calendar” on page 322](#).



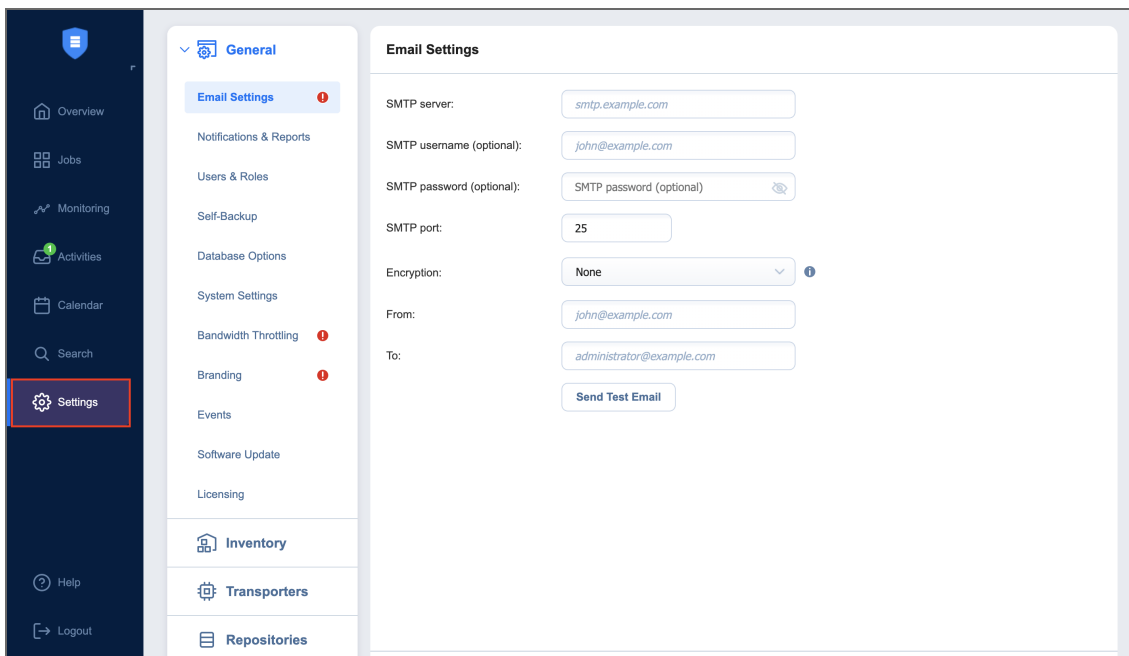
Search

The **Search** page allows you to search for items within the entire NAKIVO Backup & Replication instance—the Inventory, Transporters, Repositories, tape devices, jobs, backups, replicas, and more. For more details, refer to [“Using Global Search” on page 324](#).



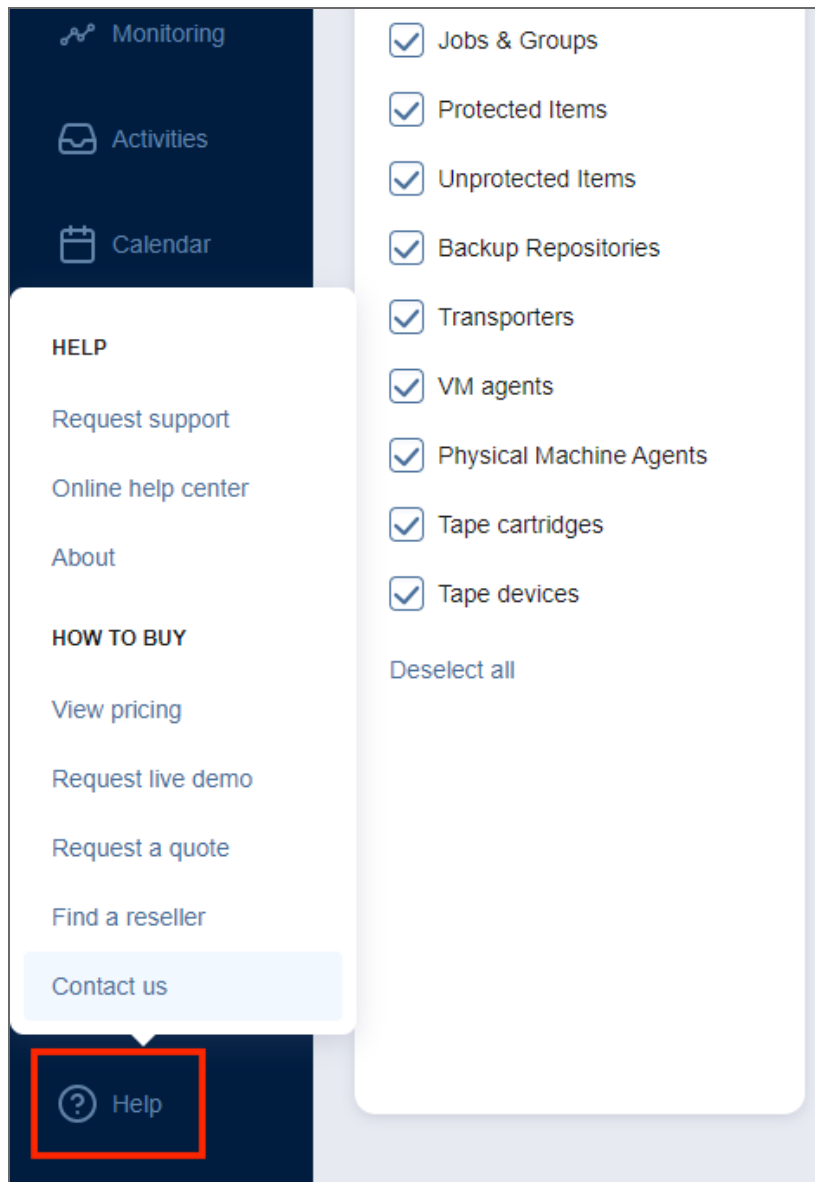
Settings

On the **Settings** page, you can configure NAKIVO Backup & Replication [General](#), [Inventory](#), [Transporters](#), [Repositories](#), and [Tape](#) settings. Refer to [“Settings” on page 329](#) for more detailed information.



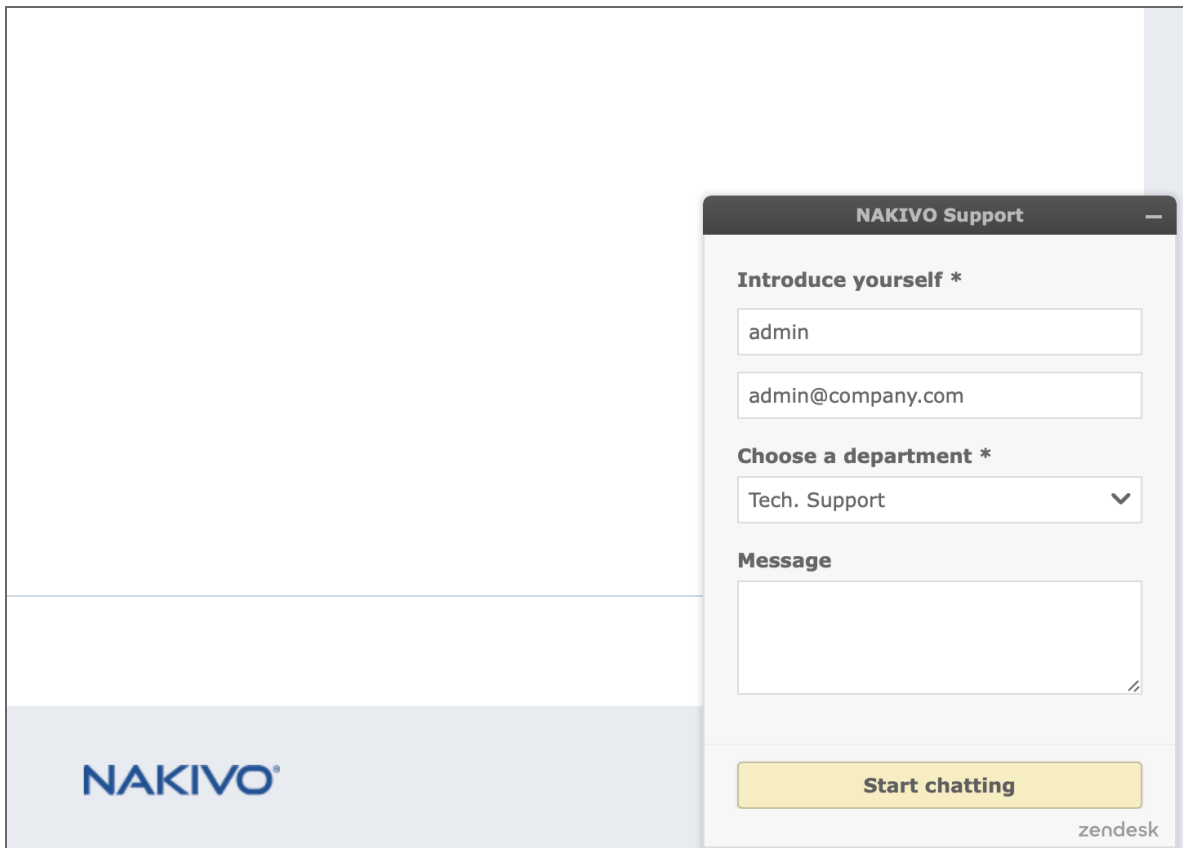
Help Menu

Use the **Help** menu to request technical support and access the NAKIVO online [help center](#). If you are evaluating NAKIVO Backup & Replication, you may also use the **How to Buy** section of the **Help** menu to view pricing, request a live demo or quote, find a reseller, or contact Sales. If you are using a Free license, you may also upgrade to a Trial license for 15 days with the **Try full functionality** option.



Online Chat Dialog

The **NAKIVO Support** online chat is located in the right bottom corner of the application. It enables you to quickly request help from a sales or technical support representative.



Special Offers Toolbar

This element of the interface is located to the left of the NAKIVO Backup & Replication dashboard. The toolbar contains special offers. If you click the button, a dialog opens displaying information about a specific offer. If needed, the **Special Offers** toolbar can be disabled. Refer to [“System Settings” on page 358](#) for details.

Tenants Dashboard

If you use NAKIVO Backup & Replication in a multi-tenant mode, the **Tenants** dashboard allows you to [create](#), [manage](#), and [configure tenants](#).

Managing Jobs and Activities

Using NAKIVO Backup & Replication interface, you can manage jobs and tasks. This section covers the following topics:

- [“Jobs Dashboard” below](#)
- [“Running Jobs on Demand” on page 295](#)
- [“Managing Jobs” on page 302](#)
- [“Managing Job Policies” on page 309](#)
- [“Managing Policy Rules” on page 312](#)
- [“Job Alarms and Notifications” on page 316](#)
- [“Managing Activities” on page 318](#)
- [“Using Calendar” on page 322](#)
- [“Using Global Search” on page 324](#)

Jobs Dashboard

The **Jobs** dashboard is a detailed interface where you can create and manage jobs, as well as get an overview of job details. For a detailed explanation of each component in the Jobs dashboard, see the sections below.

- [Group/Job Overview Dashboard](#)
 - [Action Bar](#)
 - [Summary Bar](#)
 - [Jobs Table](#)
 - [Group Info](#)
 - [Overview Panes](#)
- [Job Dashboard](#)
 - [Action Bar](#)
 - [Summary Bar](#)
 - [Job Info](#)
 - [Job Settings](#)
 - [Job Objects](#)
 - [Overview Panes](#)

Group/Job Overview Dashboard

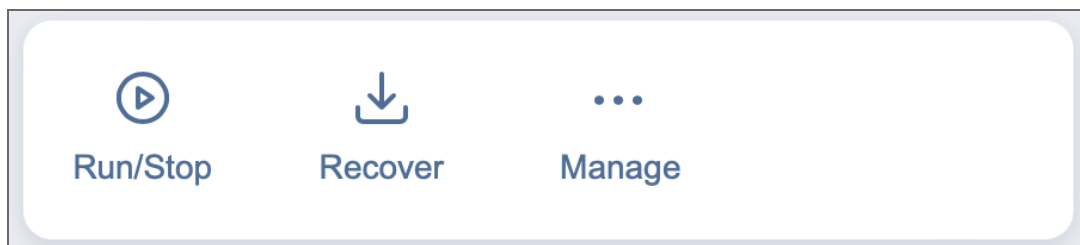
The **Job overview** and job group views offer an overview of multiple jobs. See the sections below for more information.

Action Bar

The group and **Job overview** action bars contain the following three job actions:

- **Run/Stop:** Opens the Run/Stop Jobs dialog box
- **Recover:** Brings up a list of recovery options for the selected group of jobs
- **Manage:** Brings up the options to **Rename**, **Delete**, or **Disable** a job group, as well as change the destination for all backup jobs in the group

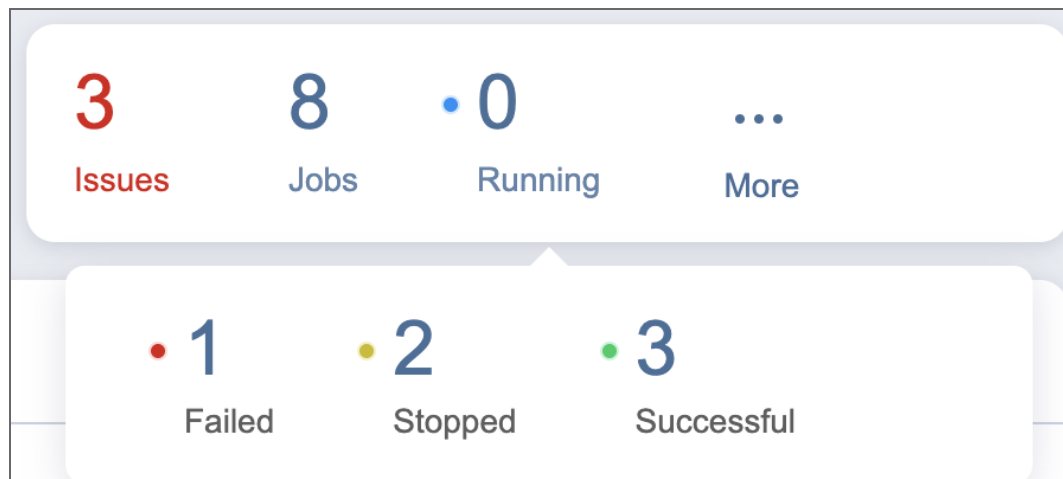
For more information on using the action bar, see [“Running Jobs on Demand” on page 295](#).



Summary Bar

The summary bar displays information about the jobs in a given group. The data displayed is as follows:

- **Issues:** Total number of issues/alarms for the group of jobs. When clicked, this displays the Alarms & Notifications dialog box.
- **Jobs:** Total number of jobs in the group.
- **Running:** The number of running jobs in the group.
- **Failed:** The number of failed jobs in the group.
- **Stopped:** The number of stopped jobs in the group.
- **Successful:** The number of successful jobs in the group.



Jobs Table











The **Jobs** table shows a list of jobs and the information about each job in the following columns:

- **Job name:** The name of a given job in the group.
- **Priority:** The priority level of a given job in the group. Click the arrow button to the right of this parameter to change the priority level of a job.

Note

This column is only available in the Enterprise, Enterprise Essentials, Enterprise Plus, MSP Enterprise, and MSP Enterprise Plus editions.

- **Status:** The status of a given job:
 - **Successful:** The last job run was successfully completed.
 - **Failed:** The last job run failed.
 - **Running:** The job is currently running.
 - **Stopped:** The last job run was stopped.
 - **Not executed yet:** The job has not been executed yet.
- **Run date:** The date of a given job's last run.
- **Speed:** If the job is currently running, displays the current job run speed. If the job is not currently running, displays the speed of the last job run.

Jobs 🔍			
Job name	Priority	Status	Run date ▼
 Backup copy job	5	Failed	11 Nov 2022 at 20:40
 Hyper-V replication job	5	Stopped	04 Nov 2022 at 13:57 ⋮
 VMware Cloud Director bac...	5	Successful	04 Nov 2022 at 13:21
 Hyper-V backup job 2	5	Successful	03 Nov 2022 at 22:26
 Physical machine backup job	5	Successful	03 Nov 2022 at 20:23
 Nutanix AHV backup job	5	Successful	03 Nov 2022 at 20:02
 Microsoft 365 backup job	5	Successful	03 Nov 2022 at 19:20
 EC2 backup job	5	Not executed yet	-
 EC2 fallback job	5	Not executed yet	-
 VMware backup job	5	Not executed yet	-



Page < 1 > of 2 ⌵ ⌴

To customize the sorting of the **Jobs** table, click the head of the column you wish to sort by. To change the order of the columns, drag and drop a column to the needed position. You may also search for a job by clicking the **Search** button at the top of the table. To manage a job in the table, hover over a job and click the ellipsis **Manage** button on the right side.

Group Info

This pane displays current information about the jobs in the selected group. The information includes:

- Currently running jobs, displayed as a ratio to the total number of jobs
- The status of recent jobs; **Completed**, **Failed**, or **Stopped**
- The number of source objects and their respective total size (if applicable)

Group Info
 0 of 8 jobs are running
 1 failed, 2 stopped, 3 completed
 51 source objects, 7.04 TB

Overview Panes

There are several other panes that give an overview for the chosen job group. These panes are as follows:

- **Target Storage:** The target storage(s) of the jobs in the chosen group
- **Raw Data Transfer Speed:** The raw data transfer speed for previous job runs (if no job in the group is currently running) or current job run (if a job is currently running). If a job run includes multiple backup objects, the aggregated data transfer speed of all backup objects is displayed.
- **Transferred Raw Data:** The amount of raw transferred data before compression/deduplication for the current job run or past job run(s)
- **Events:** Table of alarms/notifications for the given group of jobs
- **Transporters:** Table of the Transporters used by the group of jobs

Job Dashboard

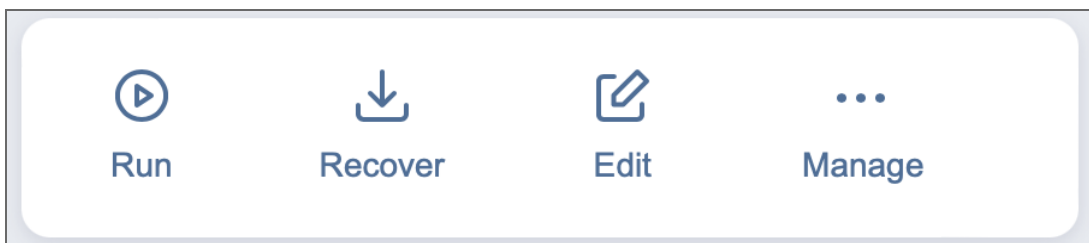
When selecting a specific job in the **Jobs** menu, the following information is displayed.

Action Bar

The job action bar contains the following four actions:

- **Run**: Opens the job run dialog box
- **Recover**: Brings up a list of recovery options for the given job (backup and replication jobs only)
- **Edit**: Opens the job edit wizard
- **Manage**: Brings up the options to **Clone**, **Merge**, **Rename**, **Create report** for, **Enable/Disable**, or **Delete** the job.

For more information on using the action bar, see [“Running Jobs on Demand” on page 295](#).



Summary Bar

The summary bar displays information about a job. The data displayed is as follows:

- **Issues**: Total number of issues/alarms for the job. When clicked, the Alarms & Notifications dialog box is displayed.
- **Objects**: Total number of objects covered by the job
- **Source size**: Total size of the objects covered by the job

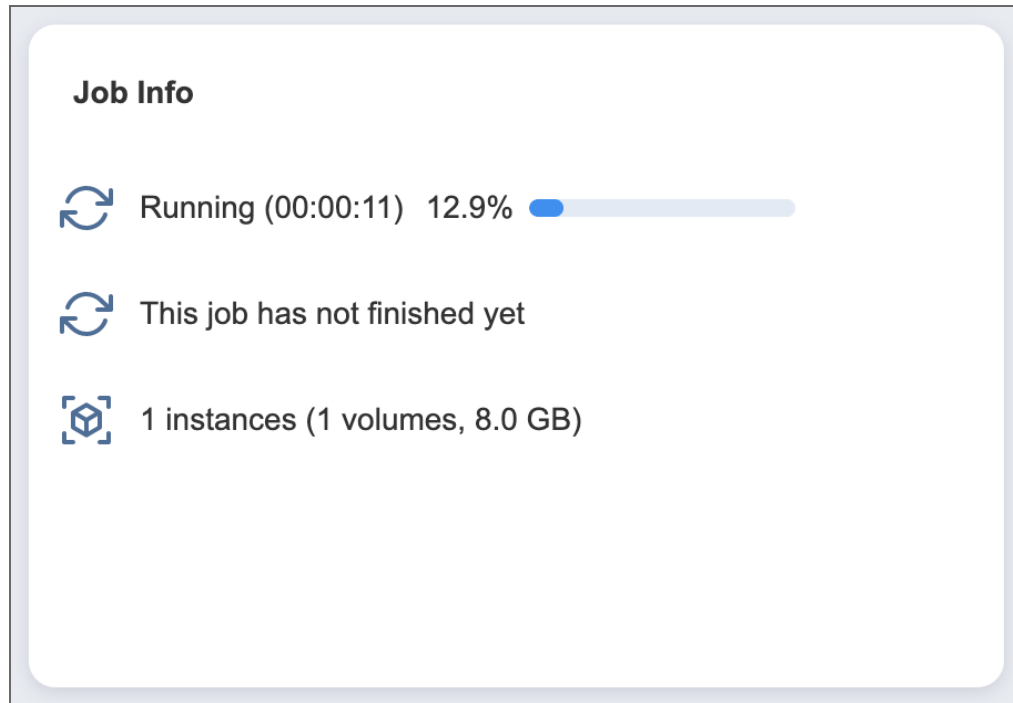


Job Info

This pane displays current information about the job. The information includes:

- The running schedule for this job
- The status of this job; **Successful**, **Failed**, **Running**, **Stopped**, or **Not executed yet**

- The number of source objects and their respective total size (if applicable)



Job Settings

This pane allows you to view and edit certain options for a job. The settings displayed are as follows:

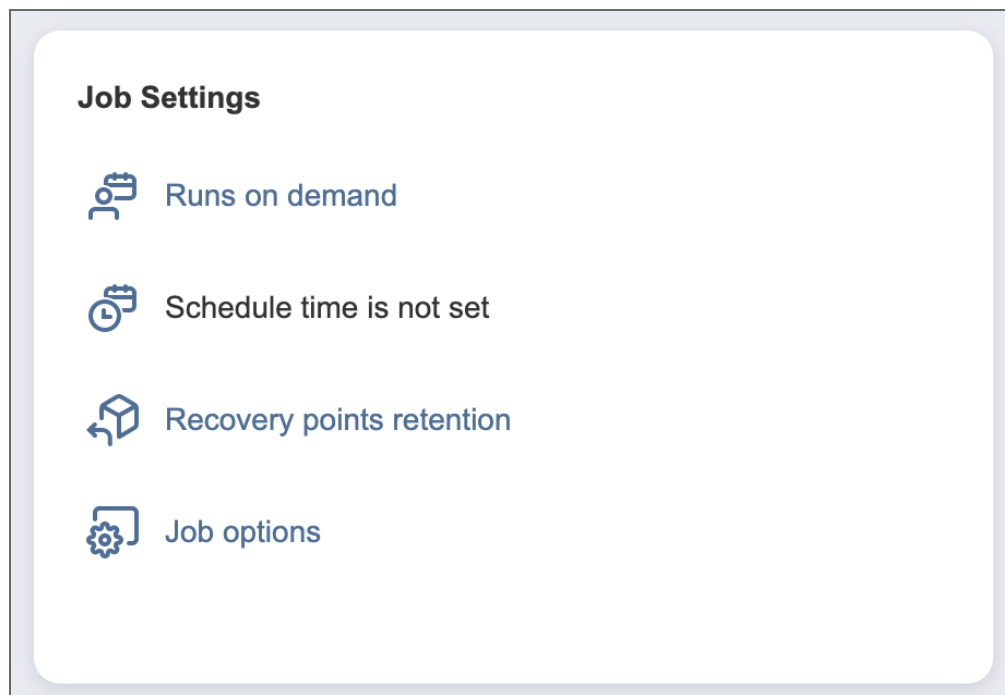
- The running schedule for this job
- Scheduled run time(s) for this job (if applicable)
- **Recovery points retention:** Clicking this opens a dialog box with **Retention Settings** for this job.

Note

This option is only available in the following cases:

- Your version of NAKIVO Backup & Replication is older than v10.8.
- You have updated NAKIVO Backup & Replication from a version older than v10.8 to v10.8 or newer and have not enabled the new scheduler for the respective job.
- You enabled legacy retention in the [Expert](#) tab.

- **Job options:** Clicking this opens a dialog box with **Job Options** for this job.

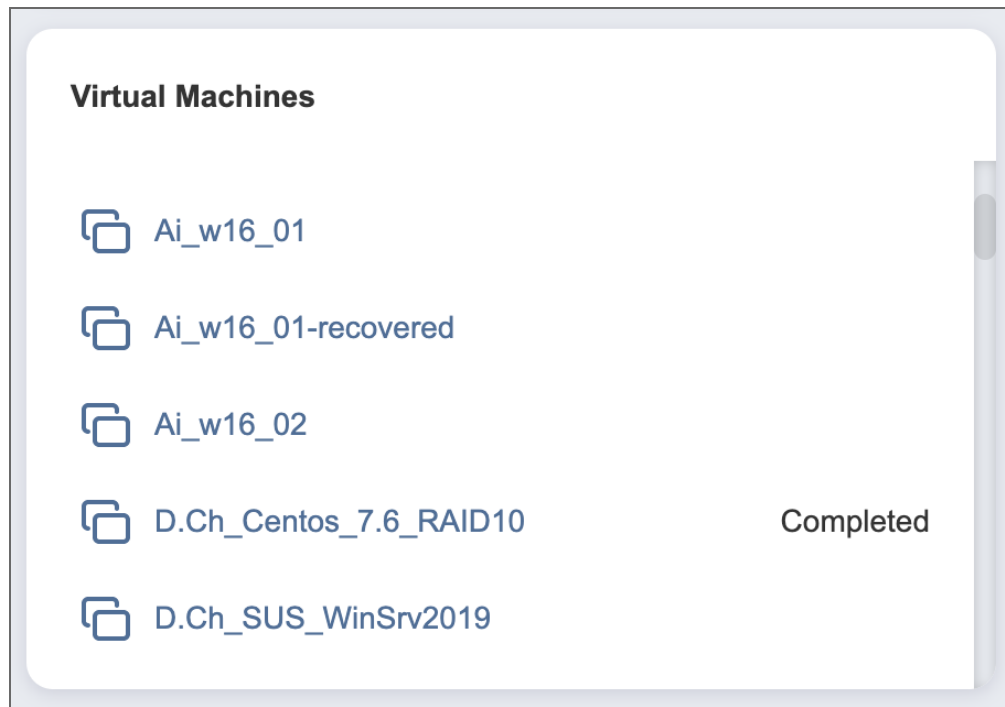


Job Objects

This pane displays a list of backup/replication/recovery objects based on the respective object type. The objects can be one of the following:

- Virtual Machines
- Instances
- Backups
- Physical Machines
- Databases
- Microsoft 365 Items

- File Share Items



Overview Panes

Several other panes give an overview of the chosen job. These panes are as follows:

- **Target Storage:** The target storage of the chosen job
- **Raw Data Transfer Speed:** The raw data transfer speed for the current job run or previous job runs if the job is not currently running. If a job run includes multiple backup objects, the aggregated data transfer speed of all backup objects is displayed.
- **Transferred Raw Data:** The amount of raw transferred data before compression/deduplication for a current job run or past job run(s)
- **Events:** Table of alarms/notifications for the given job
- **Transporters:** Table of the Transporters used by the job

Running Jobs on Demand

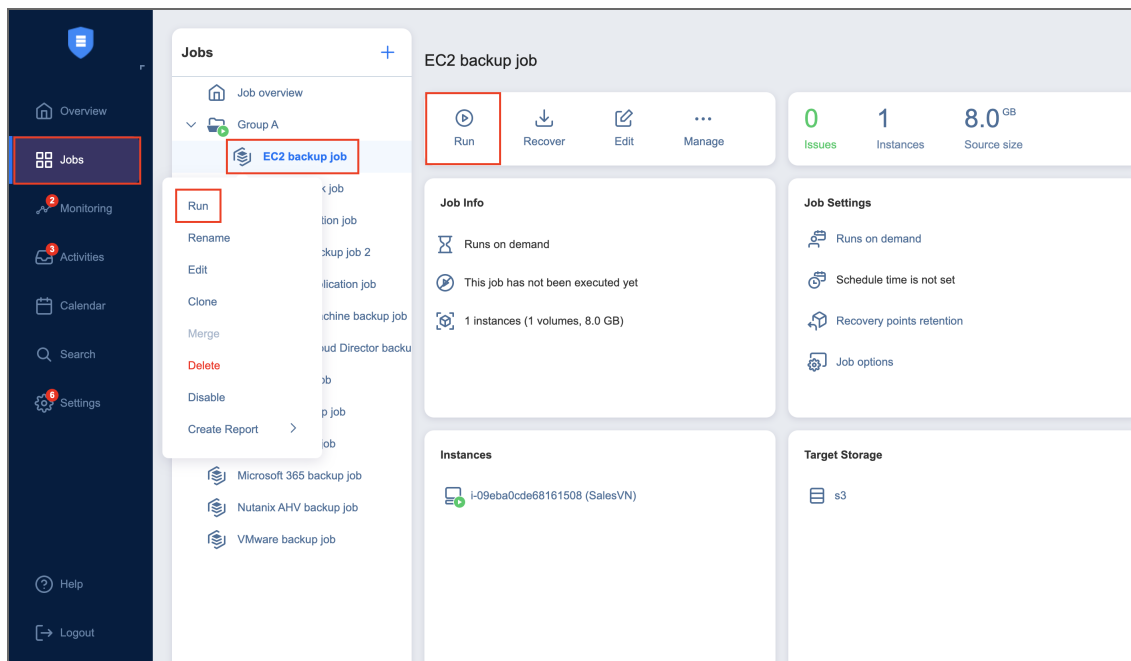
Use the **Jobs** menu to start and stop jobs on demand.

- [Starting Jobs](#)
- [Stopping Jobs](#)
- [Managing Grouped Jobs](#)

Starting Jobs

To start a job, follow the steps below:

1. Go to the **Jobs** menu, select the job from the list of jobs, and click **Run**. Alternatively, right-click a job to bring up the action menu and click **Run**.



2. Choose one of the following options:
 - **Run for all VMs/VM templates/backups/physical machines/instances/databases/sites/accounts/items:** The job runs for all job objects.
 - **Run for selected VMs/VM templates/backups/physical machines/instances/databases/sites/accounts/items:** The job runs for the job objects that you select.
 - **Run for failed VMs/VM templates/backups/physical machines/instances/databases/sites/accounts/items:** If applicable, the job runs for previously failed job objects only.

- **Run for stopped VMs/VM templates/backups/physical machines/instances/databases/sites/accounts/items:** If applicable, the job runs for previously job stopped objects only.
3. If backups in the Backup Repository selected for a job are stored in separate files, you have to choose between the following backup types:
- **Incremental:** The job creates an incremental backup.
 - **Full:** The job creates a full backup. When you choose this option, choose one of the full backup modes:
 - **Synthetic full:** The application first creates an incremental backup—that is, transfers only the data that changed since the last backup—and then creates a new full backup using the last full backup and the chain of subsequent incremental recovery points.
 - **Active full:** The application reads all source machine data and transfers it to the backup repository to create a full backup.
4. For backup and backup copy jobs, you can use preconfigured retention settings by selecting **Use job retention** (legacy retention approach) or **Select schedule** (schedule retention approach), or specify custom retention settings for a manual job run by selecting **Keep recovery points for**.
- **Use job retention:** Select this option to use the preconfigured legacy retention settings for a job run. If a previous run for this job was stopped or failed, the settings used for that run are selected by default.
 - **Select schedule:** Select this option to choose a preconfigured schedule and its retention settings for this job. If a previous run for this job was stopped or failed, the settings used for that run are selected by default. Recovery points created by a manual job run using this option are automatically assigned expiration dates.
 - **Keep recovery points for:** The recovery points created by this job run are kept for the specified period of time and then expire. The expired recovery points are removed during the following job run.

Note

If a job does not support retention or has the **Do not schedule, run on demand** option selected, only the **Keep recovery points for** option will be available.

5. Click the **Run** button to confirm your selection.

Run this job?

Backup type:

Incremental

Full backup mode:

Synthetic full

Job run scope:

☐ Run for all instances

☒ Run for selected instances

Q i-09

X

☒ Instance

☒ i-09eba0cde68161508 (SalesVN)

☐ Use job retention

☒ Keep recovery points for

—

30

+

Days

i

1 of 1 instances will be processed

Cancel

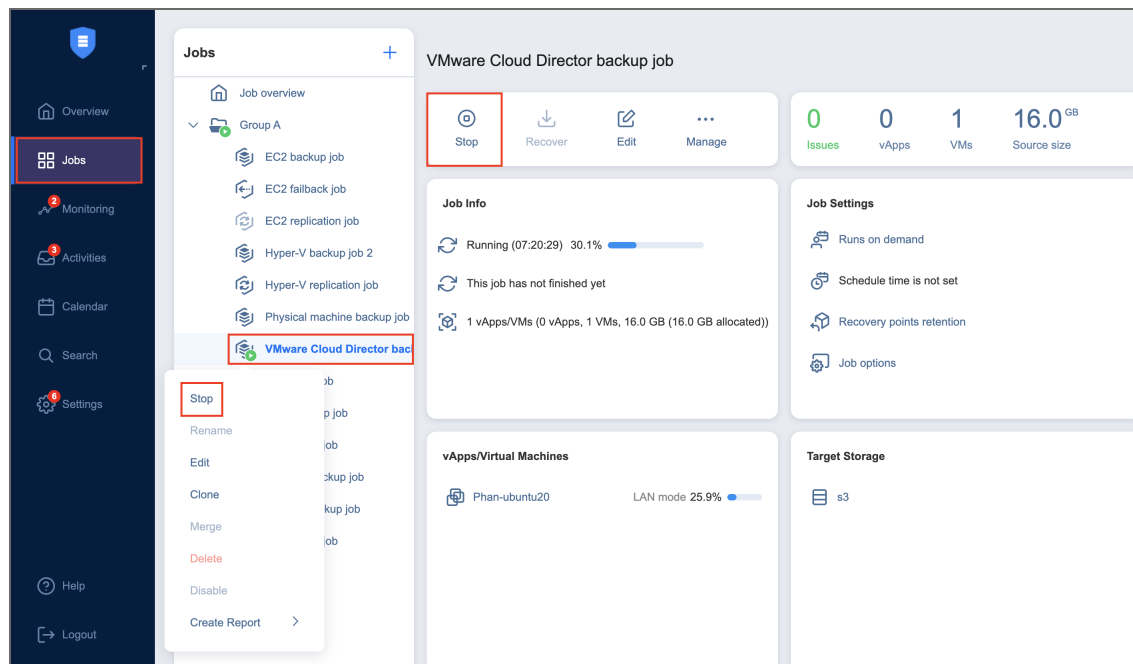
Run

The product will close the dialog box and start running your job.

Stopping Jobs

To stop a job that is running, follow the steps below:

1. Go to the **Jobs** menu, select the job from the list of jobs, and click **Stop** . Alternatively, right-click a job to bring up the action menu and click **Stop**.



2. In the dialog box that opens, choose one of the following:
 - **Stop for all VMs/VM templates/backups/physical machines/instances/databases/sites/accounts/items:** The job stops for all job objects.
 - **Stop for selected VMs/VM templates/backups/physical machines/instances/databases/sites/accounts/items:** The job stops for the job objects that you select.
3. Click the **Stop** button in the dialog box to confirm your selection.

Stop this job?

Job stop scope:

☐

Stop for all vApps/VMs

☒

Stop for selected vApps/VMs

Q Search

☒

Virtual Machine

☒

Phan-ubuntu20

1 of 1 vApps/VMs will be processed

Cancel

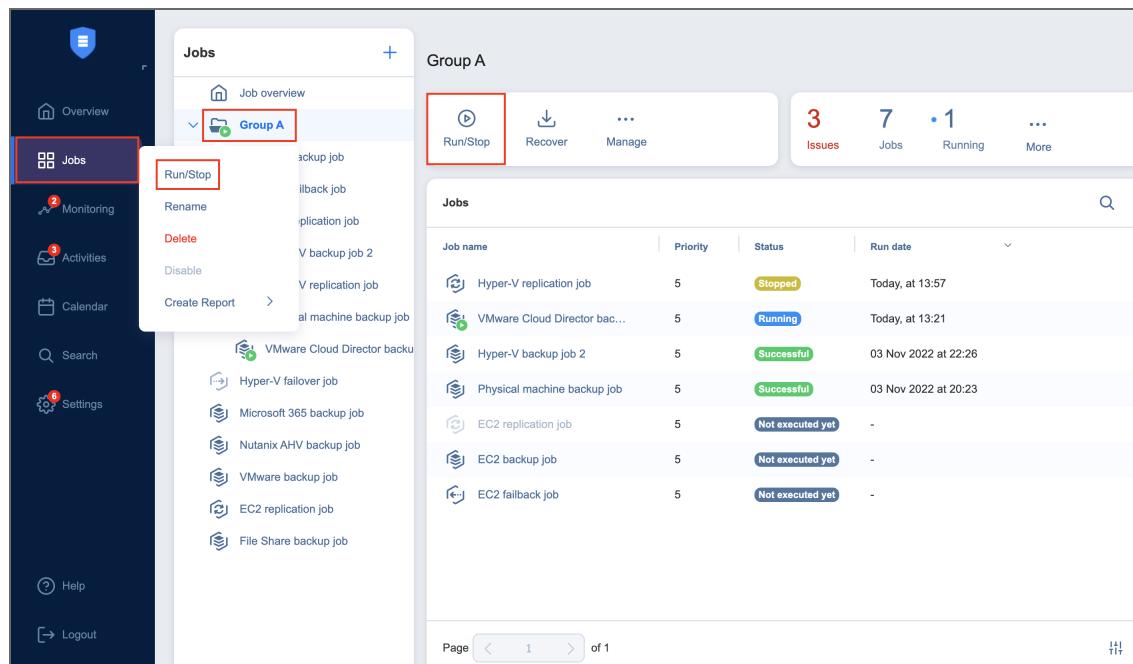
Stop

The application closes the dialog box and stops your job.

Managing Grouped Jobs

To efficiently start or stop jobs in bulk (run all failed jobs, for example), follow these steps:

1. From the **Jobs** menu, select the needed job group and click **Run/Stop**. To manage all jobs and groups at once, select **Overview** and click **Run/Stop**. Alternatively, right-click on the needed job group to bring up the action menu and click **Run/Stop**.



2. In the drop-down **Status** menu, select one of the following:
 - **All jobs:** Displays all jobs in the group
 - **Failed jobs:** Displays all failed jobs in the group
 - **Stopped jobs:** Displays all stopped jobs in the group
3. Select the jobs you want to run/stop.
 - a. When running backup or backup copy jobs, specify the retention settings with one of the following options:
 - **Use the last retention settings:** Select this option to use the retention settings from the last job run for the manual job run.
 - **Keep recovery points for:** The recovery points created by this job run are kept for the specified period of time and then expire. The expired recovery points are removed during the following job run.

Note

If the group of jobs contains at least one job that isn't a backup/backup copy job, does not support retention, or has had its retention settings changed since the previous run, only the **Keep recovery points for** option will be available.
 - b. In the lowest drop-down menu, specify (if applicable) whether you want the operation to run for failed source objects, stopped source objects, or all source objects.
4. Click the **Run** or **Stop** button to confirm your selection.

Run/Stop Jobs


×


Status:

Stopped jobs

▼

Q Search

▼ ☐  Group A

☒  Hyper-V replication job

Run:

Run for stopped source objects

▼

Cancel

Run

Stop

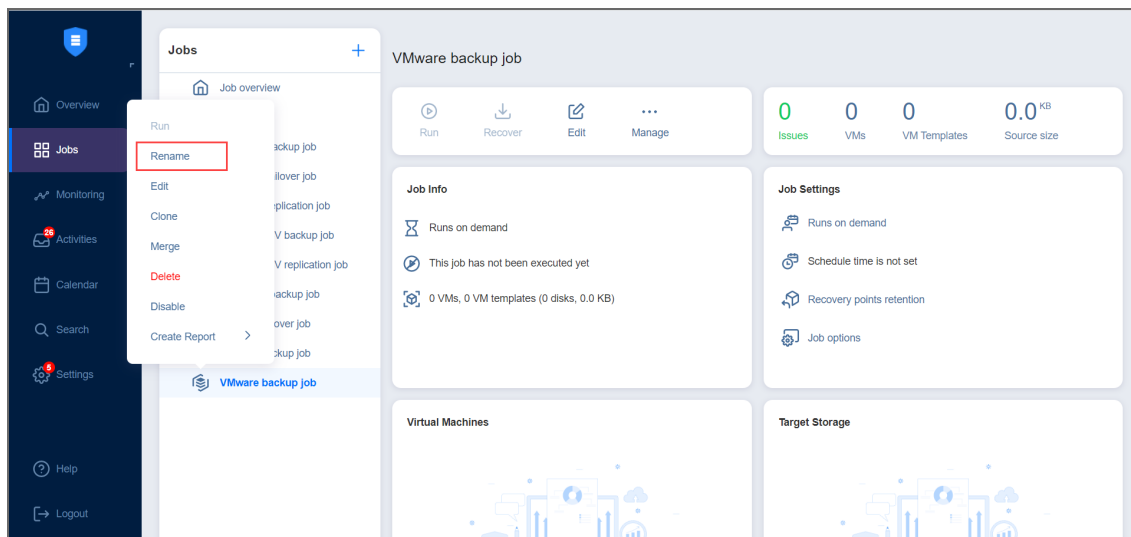
Managing Jobs

Using the **Jobs** menu, you can easily manage jobs. Use the **Manage** menu to rename, edit, merge, delete, and enable/disable jobs.

- [Renaming Jobs](#)
- [Editing Jobs](#)
- [Cloning Jobs](#)
- [Merging Jobs](#)
- [Deleting Jobs](#)
- [Disabling and Enabling Jobs](#)
- [Grouping Jobs](#)
 - [Creating Groups](#)
- [Creating Job Reports](#)

Renaming Jobs

1. From the list of jobs, right-click on the job you want to rename.
2. Click **Rename**.
3. In the dialog box that opens, specify the new name for the job and click **Rename**.



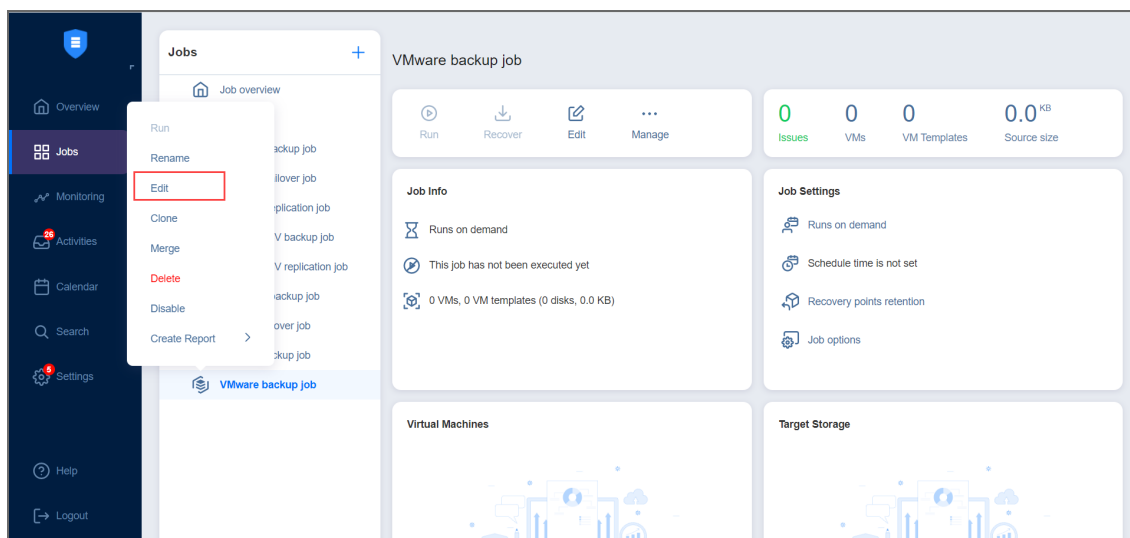
Note

You can also rename jobs by selecting a job and clicking **Manage > Rename**.

Editing Jobs

To edit a job, follow the steps below:

1. Right-click on the job you want to edit from the list of jobs.
2. Click **Edit**.
3. In the **Edit** wizard, click the needed page to open it for editing.
4. Make the required changes and click **Save** or **Save & Run**.



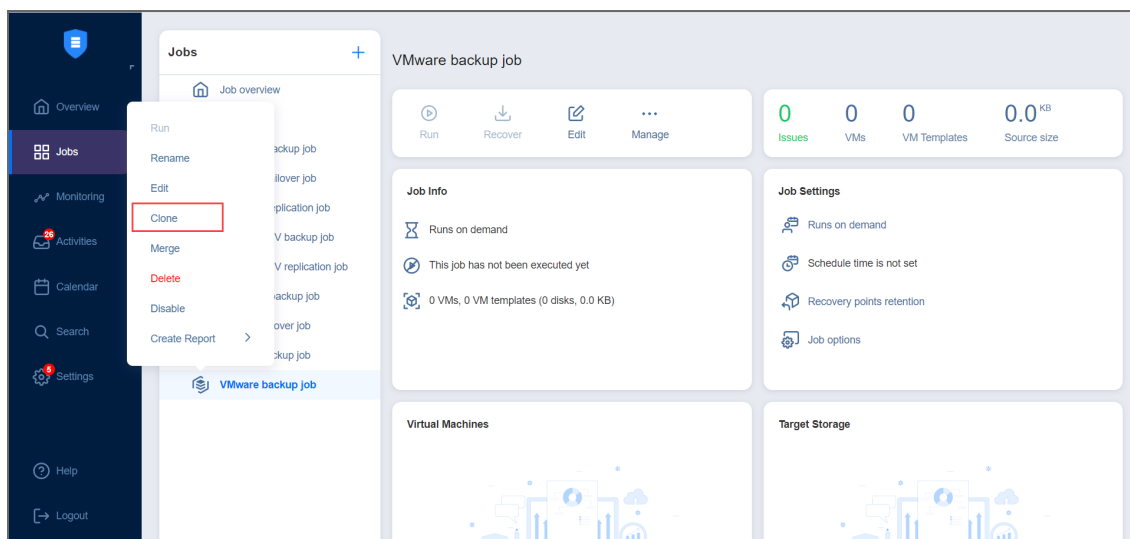
Notes

- You can edit the job while it is running, but the changes will be applied only when the job run has completed.
- You can also edit jobs by selecting a job and clicking **Manage > Edit**.

Cloning Jobs

To clone a job, follow the steps below:

1. Right-click on the job you want to clone from the list of jobs.
2. Click **Clone**.



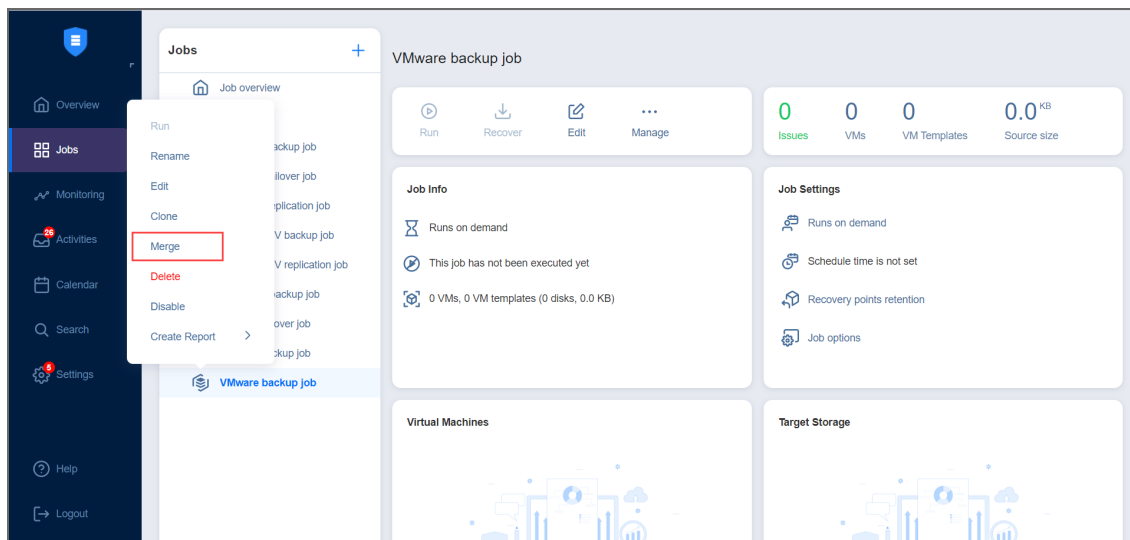
Note

You can also clone jobs by selecting a job and clicking **Manage > Clone**.

Merging Jobs

NAKIVO Backup & Replication allows you to merge jobs of the same type. Before doing this, make sure to check [feature requirements](#) and [how the feature works](#). To merge the jobs, do the following:

1. From the list of jobs, right-click on the source job you want to merge.
2. Click **Merge**.
3. Choose the target job for the merge and click **Apply**.
4. After the merge is finished, click **Close** to close the popup.



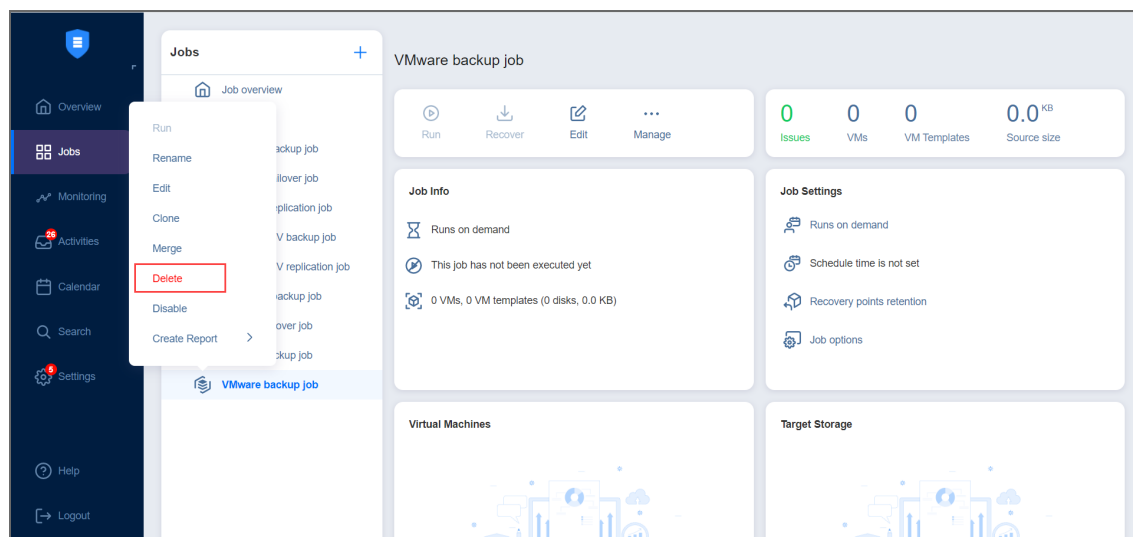
Notes

- The **Merge** button may be unavailable in the following cases:
- The selected job does not meet the feature requirements.
- The selected job is currently running.
- There are no target jobs available to merge the selected job with.

Deleting Jobs

To delete a job follow the steps below:

1. Right-click on the job you want to delete from the list of jobs.
2. Click **Delete**.
3. In the dialog box that opens, select one of the following:
 - **Delete job and keep backups**
 - **Delete job and backups**
4. Click **Delete**



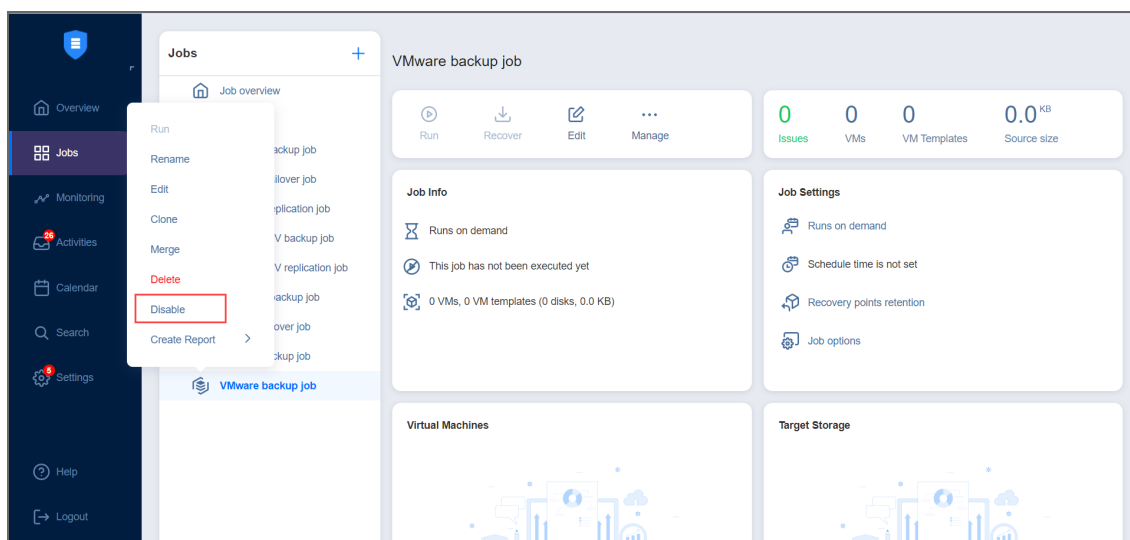
Notes

- You can also delete jobs by selecting a job and clicking **Manage > Delete**.
- Backups can also be [deleted](#) from Backup Repositories.

Disabling and Enabling Jobs

NAKIVO Backup & Replication provides you with the ability to disable jobs. A disabled job does not run based on the schedule and cannot be run on demand.

1. From the list of jobs, right-click on the job you want to disable.
2. Click **Disable**.



To enable a job, select **Enable** from the **Manage** menu.

Note

You can also manage jobs by selecting a job and selecting the desired action from the **Manage** menu.

Grouping Jobs

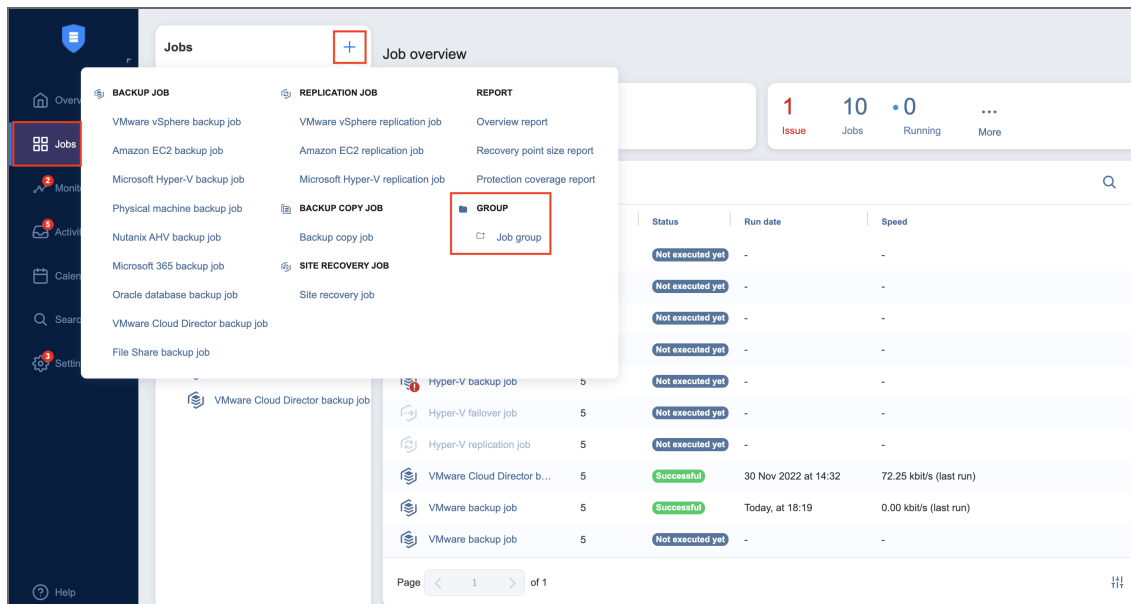
Groups are folders which allow you to:

- Logically arrange jobs (to represent organizations, locations, services, etc.).
- Perform bulk actions with all or selected jobs in a group.

Creating Groups

To create a group, follow the steps below:

1. In the **Jobs** menu, click **Create** and then click **Job group**.
2. Type in the group name in the dialog box that opens and click **Create**.



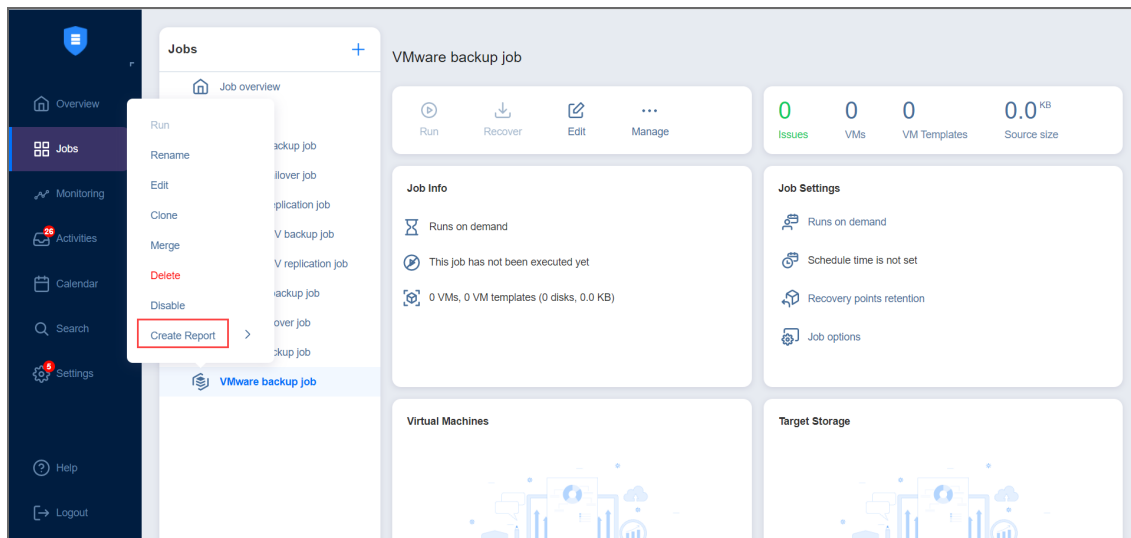
The following actions are available to manage groups:

- To add a job to a group, simply drag the job into the group.
- To remove a job from the group, drag the job outside the group.
- To delete a group, right-click the group and choose **Delete** from the shortcut menu that opens. Confirm the group deletion when prompted to do so. Note that when deleting a group, the jobs in the group are not deleted. The jobs are moved to the parent group (or to *Overview*).
- To rename a group, double-click the group and enter a new name.
- To enable or disable all jobs inside a group, click the **Enable/Disable** switch.
- To run jobs available in a group, click **Run/Stop** and then click **Run Jobs**. In the dialog box that opens, select the jobs you want to run and click **Run Jobs**.
- To stop running the jobs available in a group, click **Run/Stop** and then click **Stop Jobs**. In the dialog box that opens, select the jobs you want to stop and click **Stop Jobs**.

Creating Job Reports

To create a general report for all your jobs:

1. Select **Overview** in the **Jobs** menu.
2. Click **Create Report**.
3. Choose one of the following reports:
 - **Overview report**: Contains information about the status and errors of all jobs.
 - **Recovery point size report**: Contains information regarding the sizes of recovery points of backups/replicas for the chosen job or jobs.
 - **Protection coverage report**: Contains information about all VMs and instances protected by backup/replication jobs, as well as about all unprotected VMs and instances. Choose either the PDF or CSV format for the **Protection coverage report** and click **Create**.
4. Choose a location to save the report and click **Save**.



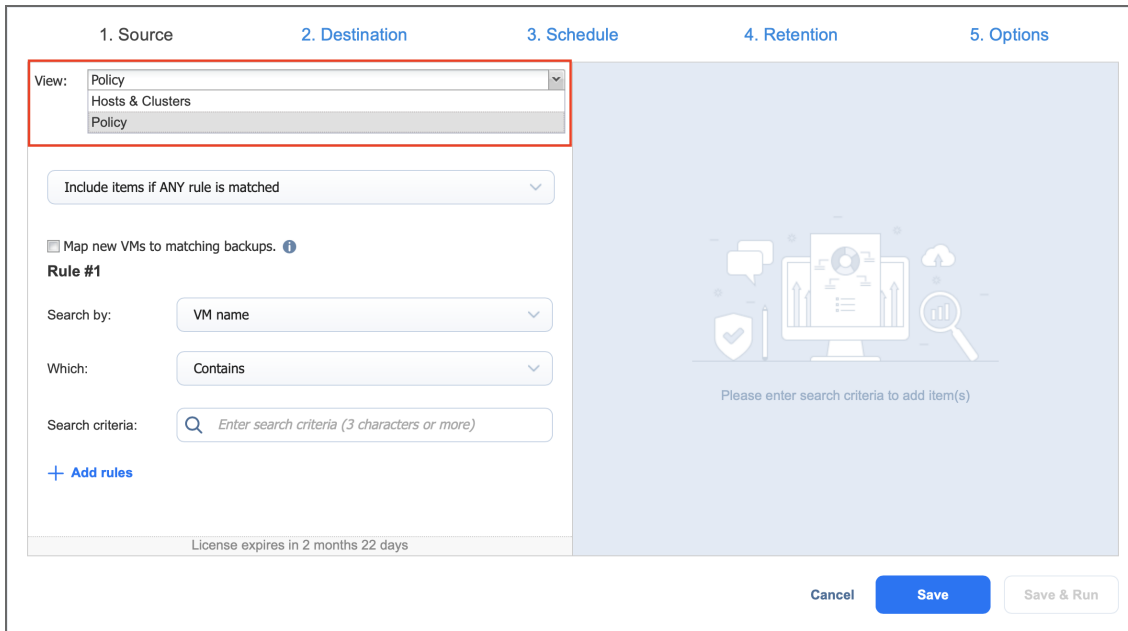
To generate reports from for an individual job, do the following:

1. Go to the list of jobs.
2. Select the job that you need to generate a report for and right-click it or click **Create**.
3. Select one of the following reports from the **Create report** menu:
 - **Last-run report**: Provides data on the last run of the job.
 - **Point-in-time Report**: Provides data on a particular job run. To generate a report, choose a date in the popup and click **Create**.
 - **Job history report**: Provides data on job runs that occurred during a specified time period. To generate a report, pick a start date on the left and finish date on the right side of the popup and click **Create**.
 - **Recovery point size report**: Contains information regarding the sizes of recovery points for backups/replicas for the chosen job or jobs.

- **Protection coverage report:** Contains information about all VMs and instances protected by backup/replication jobs, as well as about all unprotected VMs and instances.
- **Failed item protection report:** Contains information about job objects for which processing failed during the last job run. Only backup and replication jobs are included.
- **Site recovery job report:** Contains a summary of the site recovery job, including the result of passing the **Recovery time objective** value, information about all actions performed, and all registered alarms and notifications.

Managing Job Policies

With policies, you can create rules that easily add matching items to NAKIVO Backup & Replication jobs. For example, you can create a backup job that meets the following criteria: (a) size of VM is more than 4 GB, (b) number of VM CPU sockets is more than 2, and (c) VM name contains "Ubuntu". Any policy is applied to a single job. In the NAKIVO Backup & Replication job wizard, job policy is accessible from the **Policy** view of the Source page.



The screenshot shows the '1. Source' step of the NAKIVO Backup & Replication job wizard. The 'View' dropdown menu is open, showing 'Policy' as the selected option. Below the dropdown, there is a search bar with the text 'Please enter search criteria to add item(s)'. The 'Add rules' button is highlighted in blue. The 'Save' button is also visible at the bottom right.

Every job policy contains at least one rule. Refer to [“Managing Policy Rules” on page 312](#) for details.

Job policies are available for the following job types:

- [Backup jobs](#)
- [Replication jobs](#)
- [Backup copy jobs](#)
- [Failover jobs](#)
- [Failback jobs](#)
- Several actions of the [Site Recovery](#) job

Learn how to save, edit, and remove job policies in these sections:

- [Saving Job Policy](#)
- [Editing Job Policy](#)
- [Removing Job Policy](#)

Saving Job Policy

Follow the steps below to save a policy rule:

1. Make sure your job is opened in the **Policy** view.
2. Choose either of the following **Condition** for your job policy:

- **Include items if ALL rules are matched:** If selected, the logical AND will be applied to the set of policy rules.
 - **Include items if ANY rule is matched:** If selected, the logical OR will be applied to the set of policy rules.
3. **Map new VMs/instances/machines to matching backups:** If the checkbox is selected, NAKIVO Backup & Replication maps new workloads, added to the job as compliant to the configured policy rules, to matching backups within the specified destination. This option is only available for VMware/Hyper-V/Amazon EC2/Physical machine backup jobs.
 4. Provide the necessary policy rules. Refer to [“Managing Policy Rules” on page 312](#) for details. Make sure that at least one item matches the available set of policy rules.
 5. Save your job.

Editing Job Policy

Follow the steps below to edit a job policy:

1. Make sure your job is opened in the **Policy** view.
2. Change the necessary parameters of your job policy:
 1. **Condition.**
 2. Add, edit or delete policy rules. Refer to [“Managing Policy Rules” on page 312](#) for details.
3. Save your job.

Removing Job Policy

Follow the steps below to remove an entire job policy:

1. Make sure your job is opened in the **Policy** view.
2. Switch to any other inventory view available on the list.
3. A dialog opens warning you that switching to a different view will reset your selection for the current job. Click **Switch View** to confirm your operation.
4. Save your job.

The screenshot displays a web-based configuration interface for backup policies, organized into five tabs: 1. Source, 2. Destination, 3. Schedule, 4. Retention, and 5. Options. The '1. Source' tab is active. A red rectangular box highlights a dropdown menu labeled 'View:' which currently shows 'Policy'. A modal dialog box is open over this dropdown, asking 'Do you want to switch the view?' and explaining that switching views will reset the current selection. The dialog has 'Switch View' and 'Cancel' buttons. Below the dialog, the 'Include it' button is visible. The main configuration area under 'Rule #1' includes search filters: 'Search by:' set to 'VM name', 'Which:' set to 'Contains', and 'Search criteria:' with the value '2012'. There is an '+ Add rules' link. At the bottom of the '1. Source' tab, a status bar indicates 'License expires in 2 months 21 days'. The right-hand panel shows a 'Policy Container' with a single item, 'Centos2012'. At the bottom of the entire interface, there are 'Cancel', 'Save', and 'Save & Run' buttons.

Managing Policy Rules

Policy rules are an integral part of [job policies](#). Refer to the following sections for details:

- [About Policy Rules](#)
- [Editing Policy Rules](#)
- [Adding Policy Rule](#)
- [Removing Policy Rule](#)

About Policy Rules

In the **Policy** view of the inventory tree, policy rules are numbered by NAKIVO Backup & Replication for your convenience.

Every policy rule contains the following options:

1. **Search by:** A drop-down list with the following search criteria:
 - **VM / VM Template / Instance / Backup / Replica / Machine name:** The rule is to be applied based on the name of the object.
 - **VM / Instance tag:** The rule is to be applied based on the tag of the object.
 - **VM / VM Template / Instance / Replica / Backup location:** The rule is to be applied based on the location of the object.
 - **Name of VM datastore / VM Template datastore / Replica datastore / VM Path / Replica Path / IP address:** The rule is to be applied based on the name of the datastore, path, or IP address.
 - **Name of VM network / VM Template network / Subnet / replica network:** The rule is to be applied based on the name of the network.
 - **Size of VM / VM Template / instance / replica / physical machine:** The rule is to be applied based on the size of the object.
 - **Amount of VM / instance / physical / replica RAM:** The rule is to be applied based on the amount of RAM for a given object.
 - **Number of VM CPU sockets / replica CPU sockets / VM processors / replica processors / Instance virtual CPUs / physical CPUs:** The rule is to be applied based on the number of CPU sockets, processors, or CPUs, depending on the object.

Note

The objects corresponding to the above criteria are as follows:

- **VM CPU sockets:** VMware VMs
- **Replica CPU sockets:** VMware VM replicas
- **VM processors:** Hyper-V VMs
- **Replica processors:** Hyper-V VM replicas

- **Instance virtual CPUs:** Amazon EC2 instances
- **Physical CPUs:** Physical machines
- **VM power state / Instance power state:** The rule is to be applied based on the power state of the object.
- **IP Address:** The rule is to be applied based on the IP address of the object.

2. **Search parameter:** You can choose either of the following:

- For **VM / VM Template / Instance / Backup / Replica / Machine name, Name of VM network / VM Template network / Replica network / Subnet / VM datastore / VM Template datastore / Replica datastore, VM / VM Template / Replica Path, VM / Instance tag, and IP Address:**
 - **Contains**
 - **Does not Contain**
 - **Equals** (always applied to the VM tag)
 - **Does not equal**
 - **Starts with**
 - **Ends with**
- For **Amount of VM / Instance / Physical / Replica RAM, Number of VM CPU sockets / replica CPU sockets / VM processors / replica processors / instance virtual CPUs / physical CPUs, and Size of VM / VM Template / Instance / Replica / physical machine,** you can choose any of the following search parameters:
 - **Is more than**
 - **Is less than**

- **Equals**
- **Does not equal**
- For **VM / Instance power state** and **VM / VM Template / Instance / Replica / Backup location**:
 - **Is**
 - **Is not**

The screenshot shows the 'Policy Configuration Wizard' with the 'Source' tab selected. The 'View:' dropdown is set to 'Policy'. Below it, there's a section for 'Rule #1' with a 'Search by:' dropdown set to 'VM name'. The 'Which:' dropdown is open, showing a list of search criteria: 'Contains', 'Does not contain', 'Equals', 'Does not equal', 'Starts with', and 'Ends with'. The 'Search criteria:' field is empty. To the right, the 'Policy Container' section shows a list of items, including 'Centos2012'. At the bottom, there are 'Cancel', 'Save', and 'Save & Run' buttons.

3. **Search criteria:** A text string or a numeric value to be used by the policy rule.

When you enter or edit parameters, the changes are immediately reflected in the list of selected items.

Editing Policy Rule

Follow the steps below to edit a policy rule:

1. Make sure your job is opened in the **Policy** view.
2. Locate your policy rule in the left pane of the view. If necessary, use the scroll bar.
3. Change the necessary parameters of your policy rule. Make sure that at least one item matches an available set of policy rules.
4. Click **Next**.

Adding Policy Rule

Follow the steps below to add a policy rule:

1. Make sure your job is opened in the **Policy** view.
2. In the left pane of the wizard, click **Add rules**.
3. The wizard displays a new policy rule, *Rule #N*. Provide the necessary parameters of your new policy rule. Make sure that at least one item matches the available set of policy rules.

- Click **Next** when all parameters are set.

The screenshot shows a configuration window with five tabs: 1. Source, 2. Destination, 3. Schedule, 4. Retention, and 5. Options. The 'View' dropdown is set to 'Policy'. Under 'Include items if ALL rules are matched', there is a dropdown menu. A checkbox 'Map new VMs to matching backups.' is present. 'Rule #1' is configured with 'Search by:' set to 'VM name', 'Which:' set to 'Contains', and 'Search criteria:' set to '2012'. A red box highlights the '+ Add rules' button. At the bottom, there is a 'License expires in 2 months 21 days' message. On the right, a 'Policy Container' section shows 'Centos2012'. At the bottom right, there are 'Cancel', 'Save', and 'Save & Run' buttons.

Removing Policy Rule

Follow the steps below to remove a policy rule:

- Make sure your job is opened in the **Policy** view.
- Locate your policy rule in the left pane of the view. If necessary, use the scroll bar.
- Hover over the rule you would like to remove to reveal the **Remove** icon to its right.
- Click **Next** when all parameters are set.

The screenshot shows the same configuration window as before, but now 'Rule #2' is visible. It has 'Search by:' set to 'VM name', 'Which:' set to 'Contains', and 'Search criteria:' set to 'Enter search criteria (3 characters or more)'. A red box highlights the trash icon (Remove) next to 'Rule #2'. The '+ Add rules' button is also visible. The 'License expires in 2 months 21 days' message and the 'Cancel', 'Save', and 'Save & Run' buttons are also present.

Note

You cannot remove all policy rules. A job policy must have at least one rule.

Job Alarms and Notifications

NAKIVO Backup & Replication displays:

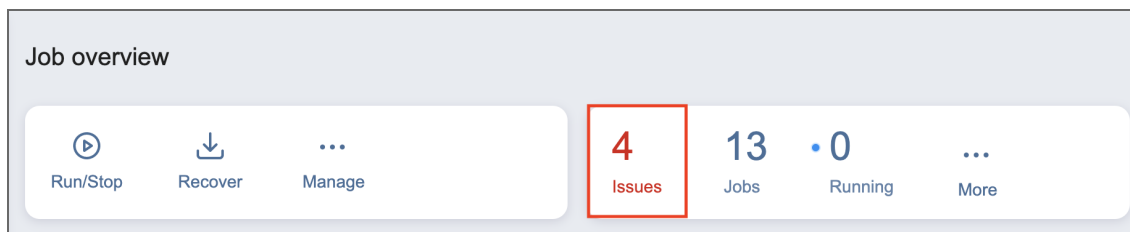
- **Alarms:** Job failures
- **Notifications:** Infrastructure changes and minor errors that do not lead to processing failure

For details, refer to the following sections:

- [Viewing Alarms and Notifications](#)
- [Dismissing Alarms and Notifications](#)

Viewing Alarms and Notifications

To view alarms and notifications, click the red **Issues** number in the **Summary bar**.



Dismissing Alarms and Notifications

To dismiss all alarms and notifications in a job or selected group, click **Dismiss All**. To dismiss an individual alarm or notification, hover the mouse pointer over the alarm or notification and click **Dismiss**.

4 Issues require your attention



Search



Microsoft API throttling has been applied to the "automation01" mailbox.

05 Dec at 20:58

Dismiss

Microsoft is throttling API requests for this job. This can result in lower backup and recovery performance as the product is waiting for the next opportunity to send and receive data. Reduce the number of objects in this job, reduce the number of concurrent jobs or contact Microsoft to increase the throttling limits. [Learn more](#)



Backup of the one note items of the "automation01" mailbox will be skipped.

05 Dec at 20:56

Permissions for one note items are missing. Add required permissions and try again. [Learn more](#)



Replication of the "000-sy-4src" replica has failed

05 Dec at 20:41

Replica with such name ("000-sy-4src-replica") already exists. Change the target Replica name in the job or rename the existing Replica.



CBT cannot be enabled for the "VM1" VM

30 Nov at 14:32

VMware CBT cannot be enabled correctly in powered off VMs. Backup will be performed using proprietary change tracking method. Power on this VM and run the job to start using CBT. [Learn more](#)

Page 1 of 1

[Request Support](#)

Dismiss All

Managing Activities







The **Activities** page displays current and past tasks performed by NAKIVO Backup & Replication. From this dashboard, the following actions can be done:

- [Viewing Activities](#)
- [Searching for Activities](#)
- [Viewing Activity Details](#)
- [Stopping Running Activities](#)
- [Running Activities Again](#)
- [Removing Activities](#)

Past activities are stored for the number of days specified in the **Store job history for the last X days** setting in the [General](#) tab.

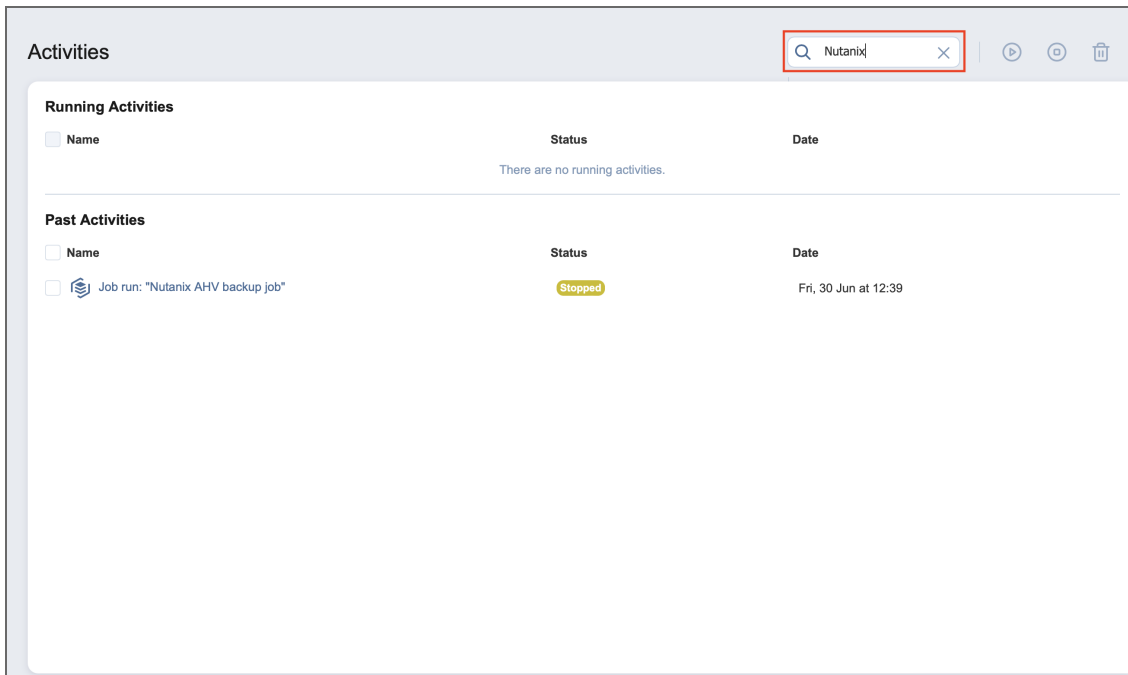
Viewing Activities

The **Activities** dashboard allows viewing all your current and past activities in the application.

Activities			🔍	▶	⌂	🗑
Running Activities						
<input type="checkbox"/> Name	Status	Date				
<input type="checkbox"/>  Job run: "Physical machine backup job"	3.4% <div></div>	Fri, 30 Jun at 13:12				
Past Activities						
<input type="checkbox"/> Name	Status	Date				
<input type="checkbox"/>  Backup repository self-healing: "Repo7Tb"	Completed	Fri, 30 Jun at 12:51				
<input type="checkbox"/>  Job run: "Physical machine backup job"	Stopped	Fri, 30 Jun at 12:39				
<input type="checkbox"/>  Job run: "Nutanix AHV backup job"	Stopped	Fri, 30 Jun at 12:39				
<input type="checkbox"/>  Job run: "VMware backup job"	Failed	Fri, 30 Jun at 12:38				
<input type="checkbox"/>  Job run: "Hyper-V backup job"	Failed	Fri, 30 Jun at 12:38				

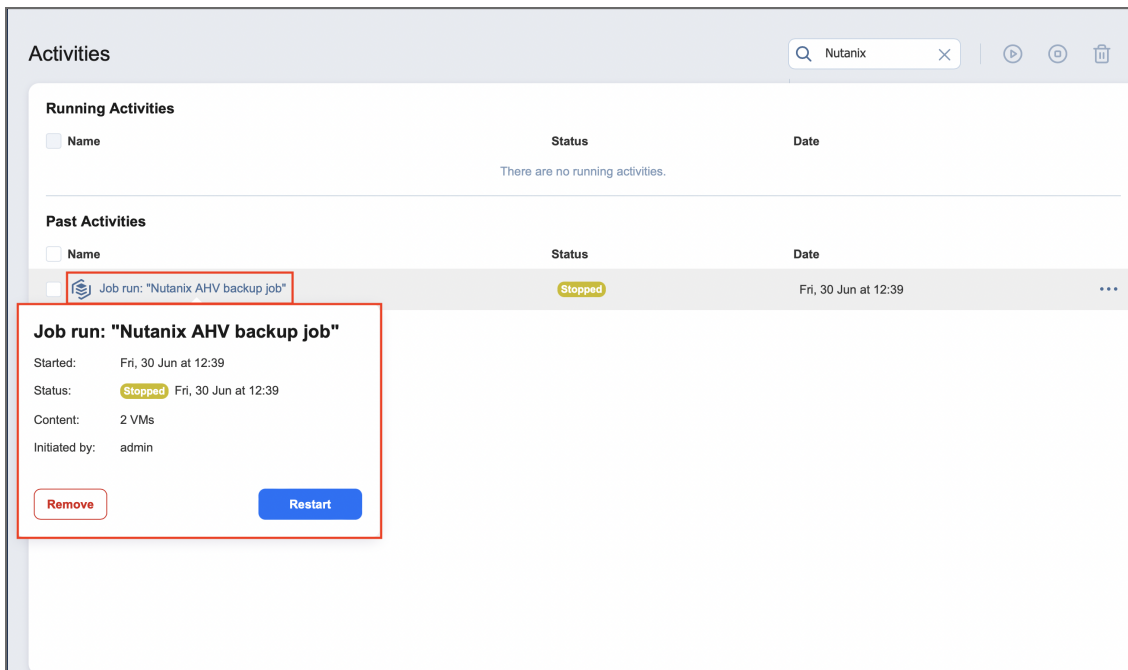
Searching for Activities

Find activity by typing in part of its name in the **Search** field.



Viewing Activity Details

View the details of an activity by selecting an activity name.



Stopping Running Activities

To stop running activities, tick the checkbox next to each desired activity and click **Stop** in the toolbar above. To stop all running activities, tick the **Select/Deselect all** checkbox at the top and click **Stop**. You can also stop a single activity by clicking the **Stop** icon that appears when you hover over a specific running activity.

Removing Activities

To remove activities from the list, tick the checkbox next to each desired activity and click **Remove** in the toolbar above. To remove all activities from the list at once, tick the **Select/Deselect all** checkbox at the top and click **Remove**. You can also remove a single activity by clicking the **Remove** icon that appears when you hover over a specific activity.

The screenshot displays the 'Activities' management interface. At the top, there is a toolbar with a search icon, a refresh icon, a reset icon, and a trash can icon (highlighted with a red box). Below the toolbar, the interface is divided into two sections: 'Running Activities' and 'Past Activities'.

Running Activities: This section contains a table with columns 'Name', 'Status', and 'Date'. A message states 'There are no running activities.'

Past Activities: This section contains a table with columns 'Name', 'Status', and 'Date'. The first three rows are highlighted with a light gray background. The first row has a checkbox checked (highlighted with a red box). The second and third rows also have checkboxes checked. The third row has a three-dot menu icon (highlighted with a red box) to its right, which has opened a context menu with 'Restart' and 'Remove' options. The 'Remove' option is highlighted with a red box.

Name	Status	Date
Job run: "Physical machine backup job"	Stopped	Fri, 30 Jun at 13:18
Job run: "Nutanix AHV backup job"	Stopped	Fri, 30 Jun at 13:18
Job run: "Physical machine backup job"	Stopped	Fri, 30 Jun at 13:18
Job run: "Nutanix AHV backup job"	Stopped	Fri, 30 Jun at 13:18
Job run: "Physical machine backup job"	Stopped	Fri, 30 Jun at 13:15
Job run: "Physical machine backup job"	Stopped	Fri, 30 Jun at 13:12
Backup repository self-healing: "Repo7Tb"	Completed	Fri, 30 Jun at 12:51
Job run: "Physical machine backup job"	Stopped	Fri, 30 Jun at 12:39
Job run: "Nutanix AHV backup job"	Stopped	Fri, 30 Jun at 12:39
Job run: "VMware backup job"	Failed	Fri, 30 Jun at 12:38

Using Calendar

The **Calendar** allows you to schedule and view the history of past job runs.

- [Understanding Calendar Formatting](#)
- [Creating Jobs with Calendar](#)
- [Editing Jobs with Calendar](#)

Understanding Calendar Formatting

Jobs in the Calendar view are formatted by start/end time and color coded by status. The color coding format is as follows:

1. Successful job runs are marked in teal.
2. Future scheduled job runs and currently running jobs are marked in sky blue.
3. Repository maintenance jobs (such as scheduled self-healing) are marked in navy blue.
4. Stopped job runs are marked in yellow.
5. Failed job runs are marked in red.
6. Job runs belonging to disabled jobs are marked in gray.

Note

Job runs that complete later than their start date are marked in the Calendar for the appropriate number of days. In **Month** view, such jobs are also marked with background fill. For example, a job that started on a Monday and finished on a Wednesday will be marked in one continuous solid light blue line across three days.

< Jun 2023 > Today Month						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
28	1	2	3 2:00 Self-backup 5 13:35 EC2 backup job 14:20 EC2 backup job +26 more	4 2:00 Self-backup	5 2:00 Self-backup	6 2:00 Self-backup
7 2:00 Self-backup	8 2:00 Self-backup	9 2:00 Self-backup 14:56 EC2 backup job 15:01 Physical machine... 15:01 EC2 backup job 4	10 2:00 Self-backup	11 2:00 Self-backup 1	12 2:00 Self-backup	13 2:00 Self-backup
14 2:00 Self-backup	15 2:00 Self-backup	16 2:00 Self-backup	17 2:00 Self-backup	18 2:00 Self-backup	19 2:00 Self-backup 11:00 Main Repo self-heal 3	20 2:00 Self-backup
21 2:00 Self-backup 11:22 Microsoft 365 ba... 11:24 Microsoft 365 ba...	22 2:00 Self-backup	23 2:00 Self-backup	24 2:00 Self-backup	25 2:00 Self-backup 17:02 Physical machine...	26 2:00 Self-backup 11:00 Main Repo self-heal	27 2:00 Self-backup
28 2:00 Self-backup	29 2:00 Self-backup 17:44 Self-backup 17:51 Self-backup	30 2:00 Self-backup	31 2:00 Self-backup	1 2:00 Self-backup 18:43 Self-backup 18:44 Self-backup 18:44 Self-backup	2 2:00 Self-backup 2 11:00 Main Repo self-heal	3 2:00 Self-backup 6 16:00 Hyper-V backup job

Creating Jobs with Calendar

To create a job:

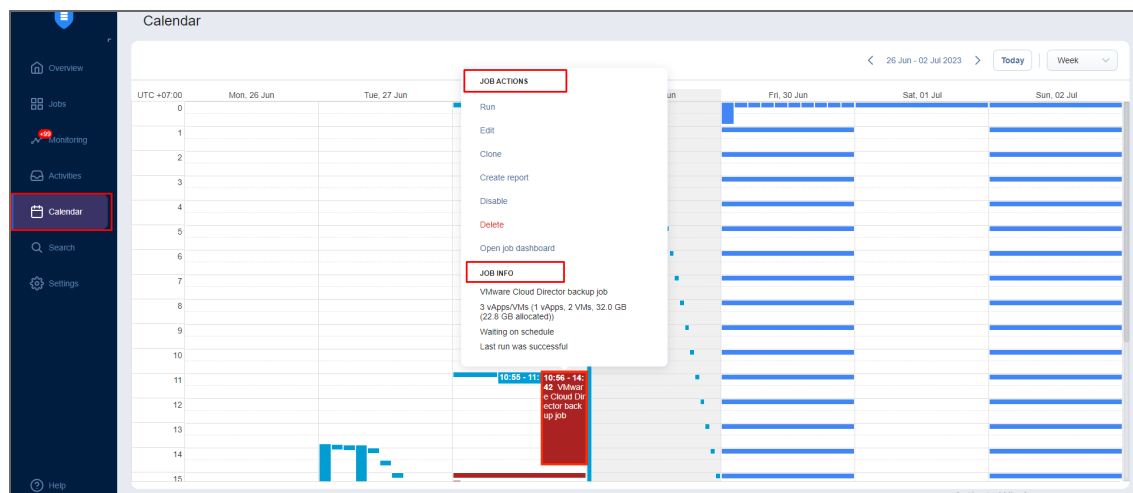
1. Click on the date and time when you'd like to run the job
2. Select the type of job you need.
3. On the **Schedule** page of the wizard, the time you've selected in the **Calendar** will be selected.

Editing Jobs with Calendar

If you click on the job title on the Calendar dashboard, the **Job Actions** menu will appear.

Using this menu, you can:

- Run a job on demand.
- Edit a job.
- Clone a job.
- Delete a job. If the job repeats on schedule, this action will affect all job runs.
- Disable/Enable a job. If the job repeats on schedule, this action will affect all job runs.
- Open the Job Dashboard.
- Create a report.



Using Global Search

Using the **Global Search** dashboard, search for items within the entire inventory of NAKIVO Backup & Replication, Transporters, Backup Repositories, jobs, backups, and replicas.

- [Opening Global Search](#)
- [Running Global Search](#)
- [Filtering Search Results](#)
- [Applying Bulk Action](#)
- [Viewing Object Info](#)

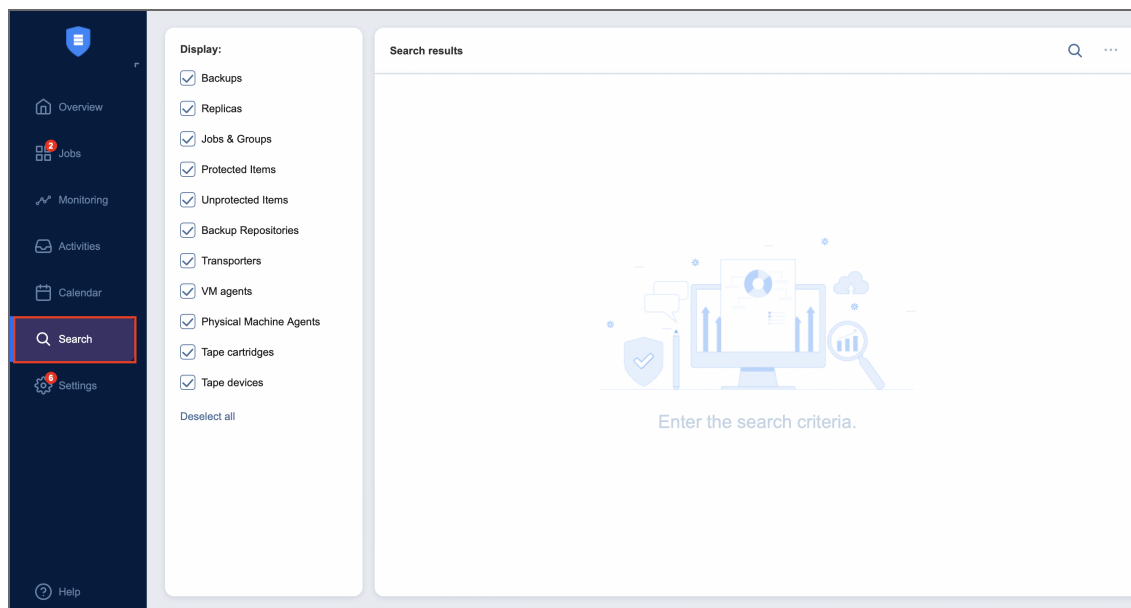
Note

When the multi-tenant mode is enabled, Global Search will operate within a specific tenant. For more information about multi-tenancy in NAKIVO Backup & Replication, please consult with the following resources:

- [“Multi-Tenancy” on page 85](#)
- [“Multi-Tenant Mode” on page 931](#)

Opening Global Search

To open **Global Search**, click the **Search** icon in the main toolbar of the application.

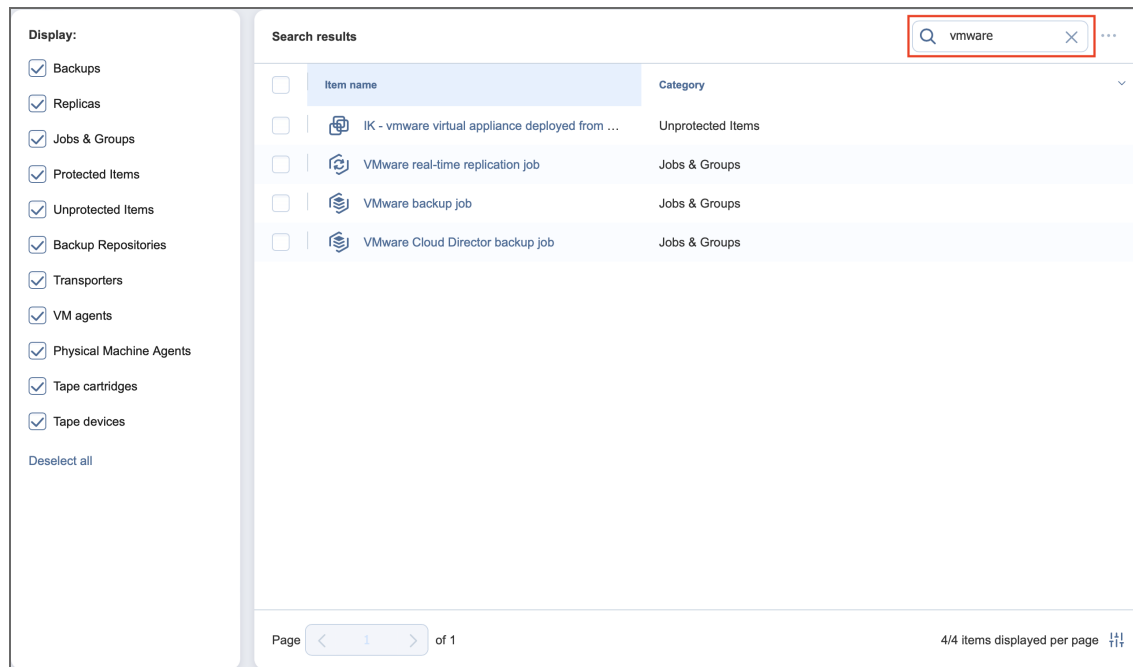


Running Global Search

When the **Global Search** dashboard opens, you can enter your search string into the search box. The string you have entered will be immediately followed by a display of the search results in the form of a list.

To help you fine-tune your search, the following wildcards are applicable:

- "?" representing a single character.
- "*" representing zero or more characters.



Please note the following:

- Search is case insensitive.
- Search results are grouped by categories.

Filtering Search Results

By default, your search results are unfiltered. This means that the search is applied to all categories of NAKIVO Backup & Replication objects.

To narrow your search results, deselect some categories in the categories list:

- Backups
- Replicas
- Jobs & Groups
- Protected Items
- Unprotected Items
- Backup Repositories
- Transporters

- VM agents
- Physical machine agents
- Tape cartridges
- Tape devices

The filtered search results will be displayed immediately in the search results list.

The screenshot displays the NAKIVO Backup & Replication Global Search interface. On the left, a sidebar titled 'Display:' contains a list of categories with checkboxes. The 'Backups' and 'Jobs & Groups' categories are selected. The main panel, titled 'Search results', shows a search bar with the text 'backup'. Below the search bar, a table lists search results. The table has two columns: 'Item name' and 'Category'. The results include several backup jobs under the 'Jobs & Groups' category, such as 'VMware backup job', 'VMware Cloud Director backup job', 'Physical machine backup job', 'Nutanix AHV backup job', and 'Hyper-V backup job'. At the bottom of the main panel, it indicates 'Page 1 of 1' and '7/7 items displayed per page'.

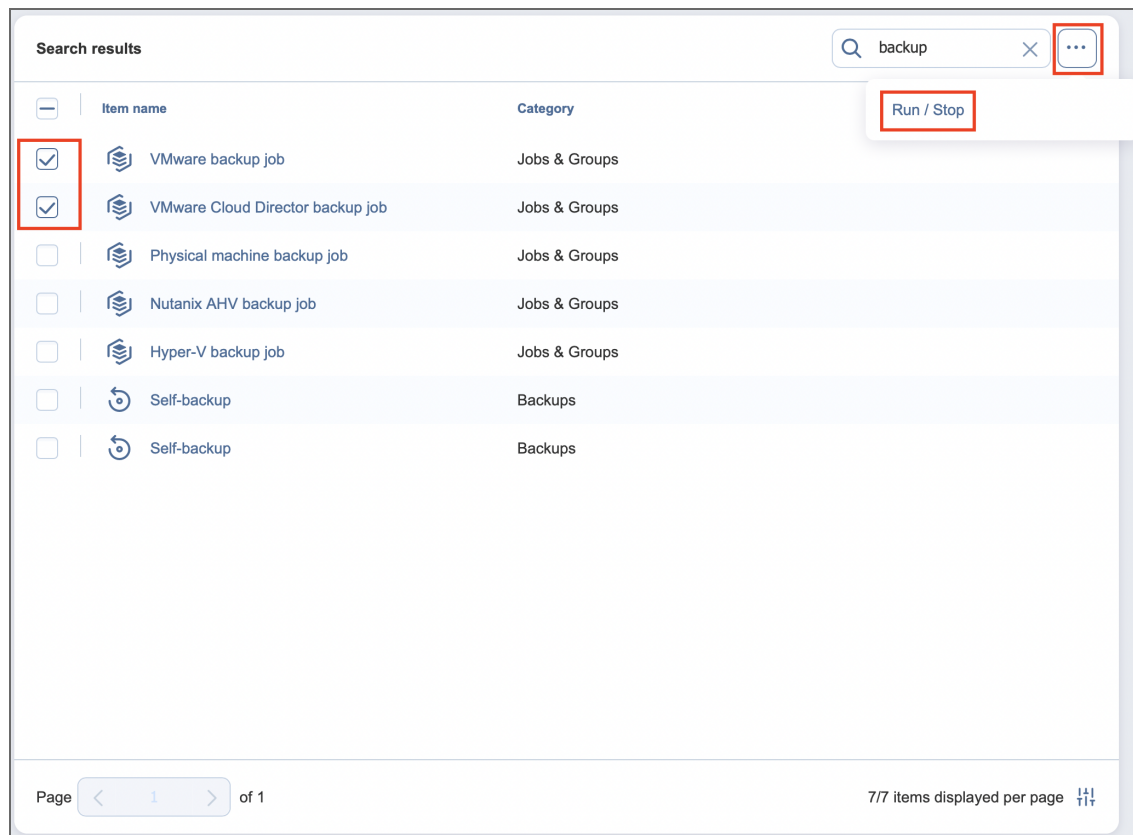
To get back to the default filtering settings, click **Select all** below the categories list.

Applying Bulk Action

With NAKIVO Backup & Replication Global Search, you can apply a bulk action to objects belonging to the same category and of the same type.

Proceed as follows to apply a bulk action:

1. In the search result list, select similar objects.
2. The **Bulk Action** button becomes active in the upper right corner of the dialog. Click **Bulk Action**.



A dialog opens with the list of actions applicable to the selected items. To proceed with the necessary action, click the corresponding item in the list of actions.



Note

Bulk actions are not applicable to NAKIVO Backup & Replication dissimilar objects.

Viewing Object Info

To view info on a specific object available in the search result, click the object.

Search results

	Item name	Category
<input checked="" type="checkbox"/>	 VMware backup job	Jobs & Groups
<input checked="" type="checkbox"/>	 VMware Cloud Director backup job	Jobs & Groups
<input type="checkbox"/>		Jobs & Groups
<input type="checkbox"/>		Jobs & Groups
<input type="checkbox"/>		Jobs & Groups
<input type="checkbox"/>		Backups
<input type="checkbox"/>		Backups

ACTIONS

Run

Open job dashboard

JOB INFO

VMware Cloud Director backup job

1 vApps/VMs (0 vApps, 1 VMs, 32.0 MB (0.0 KB allocated))

Runs on demand

This job has not been executed yet

A dialog opens displaying object info, along with the list of typical actions applicable to the object.

Settings

This section covers the following topics:

- [“General” on page 330](#)
- [“Inventory” on page 402](#)
- [“Nodes” on page 438](#)
- [“Backup Repositories” on page 466](#)
- [“Tape” on page 546](#)
- [“Expert Mode” on page 580](#)
- [“Multi-Tenant Mode Configuration” on page 606](#)
- [“Support Bundles” on page 616](#)
- [“Built-in Support Chat” on page 618](#)

General

This section contains the following topics:

- [“Bandwidth Throttling” on page 331](#)
- [“Branding” on page 334](#)
- [“Configuring Events” on page 336](#)
- [“Email Settings” on page 340](#)
- [“Database Options” on page 337](#)
- [“Licensing” on page 346](#)
- [“MSP” on page 341](#)
- [“Notifications & Reports” on page 349](#)
- [“Self-Backup” on page 352](#)
- [“Software Update” on page 356](#)
- [“System Settings” on page 358](#)
- [“Users and Roles” on page 369](#)

Bandwidth Throttling

With bandwidth throttling settings, you can control the throughput of the data processing by setting specific limits for all or for separate jobs. Bandwidth throttling is managed with bandwidth rules. When a bandwidth rule is applied to your job, the speed of data transfer from source to target will not exceed the specified limit. Refer to [“Advanced Bandwidth Throttling” on page 54](#) for a description of bandwidth rules.

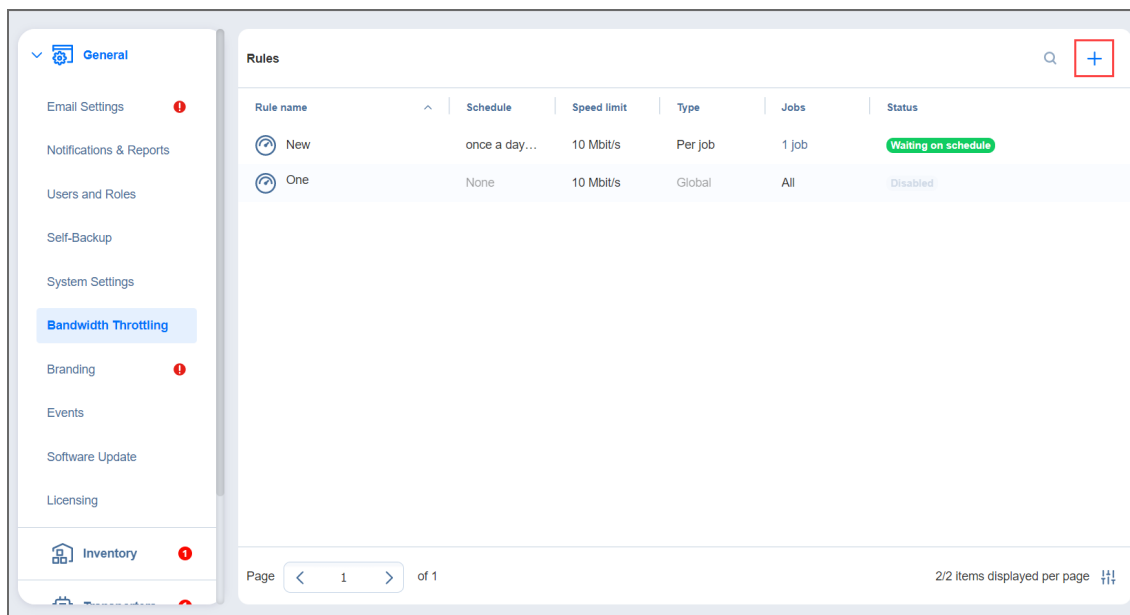
This topic contains the following instructions:

- [Accessing Bandwidth Throttling Settings](#)
- [Creating Bandwidth Rules](#)
- [Managing Bandwidth Rules](#)

Accessing Bandwidth Throttling Settings

To access bandwidth throttling settings, follow the steps below:

1. Click **Settings** in the left pane of the application to open the **Settings** dashboard.
2. In the **General** tab of the **Settings** dashboard, click **Bandwidth throttling**. The *Bandwidth throttling* section opens.



Creating Bandwidth Rules

Please follow the steps below to create a bandwidth rule:

1. In the *Bandwidth throttling* section of the **General** tab of **Settings**, click the “+” icon.
2. The New Bandwidth Rule wizard opens. Proceed as follows:

- a. Choose a type for your bandwidth rule:
 - **Global:** The rule will be applied to all applicable jobs.
 - **Per job:** The rule will be applied to the selected jobs.

Note

When applied to specific jobs, **Per job** bandwidth rules have higher priority over **Global** bandwidth rules.

- b. **Job:** Choose a job to apply the bandwidth rule to.
- c. **Settings:** Configure the following settings:
 - a. **Name:** Enter a name for your bandwidth rule.
 - b. **Throttle bandwidth to:** Enter the value of the bandwidth limit; and choose the measurement unit: Mbit/s or Gbit/s.

Notes

- For your convenience, a description is available below the value you've entered, explaining what the value means.
- In some cases, the actual data transfer speed may exceed the limit you set by up to 0.3 MByte/s or 2.4 Mbit/s.

- c. **Rule schedule:** Choose either of the following:
 - **Always active:** The rule will always be active.
 - **Active on schedule:** The rule will be active on schedule. When chosen, the following options are available:
 - a. **Starting at** and **ending at:** Enter the time, in hours and minutes, when the rule will be active.
 - b. **Days:** Select weekdays for which the rule will be active.
 - c. **Time zone:** Choose a time zone of your rule.
 - **Disabled:** The rule will be disabled.

3. Click **Finish**.

Create Bandwidth Rule

Type

Settings

Name:

Throttle bandwidth to:

Equals 1.25 MB/s or 14 minutes to transfer 1GB of data

Rule schedule:

Starting at: :

☒ Ending at: :

Days:

Every: weeks

Time Zone:

Managing Bandwidth Rules

You can search for the specific rule by clicking the **magnifying glass** icon in the upper-right part of the screen and entering the name in the search box.

Click on the **ellipsis** to the right of the rule's name to manage bandwidth rules with the following commands:

- **Edit:** The Edit Bandwidth Rule dialog opens where you can modify your rule.
- **Disable/Enable:** When applied, the command will disable/enable the rule.
- **Remove:** When applied, a dialog will open asking you to confirm the operation. Click **Delete** to confirm that you wish to delete your rule.

Note

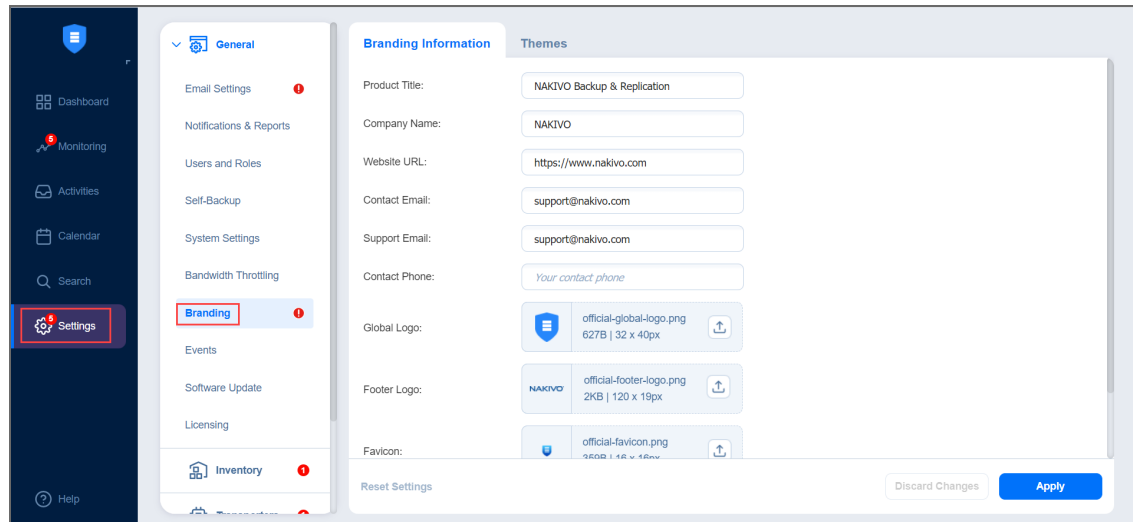
Per job bandwidth rules can also be created/managed on the **Options** page of the wizard during creating/editing the corresponding jobs. Please refer to the topics:

- [“Creating Hyper-V Backup Jobs” on page 626](#)
- [“Creating Backup Copy Jobs” on page 658](#)
- [“Creating Hyper-V Replication Jobs” on page 719](#)
- [“Hyper-V VM Recovery” on page 809](#)

Branding

You can change the product branding settings such as product name, logo, background, and so on. To configure these product settings, follow the steps below:

1. Click **Settings** in the left pane of the product.
2. Go to the **General** tab and click **Branding**.



3. Change the following, as appropriate:
 - **Product title**
 - **Company name**
 - **Website URL**
 - **Contact email**
 - **Support email**
 - **Contact phone**
 - **Page background**
 - **Global logo**
 - **Footer logo**
 - **Favicon**
4. On the **Themes** tab, you can configure the colors of your NAKIVO Backup & Replication instance.
5. After making the necessary changes, click **Apply**. Alternatively, click **Discard Changes** to discard any changes you have made.
6. Optionally, click **Reset Settings** to return all the settings to their default values.

During upload, the logo and bookmark icon images are internally resized while preserving the aspect ratio. The background image is used as it is. To get the best image quality, follow the recommendations below.

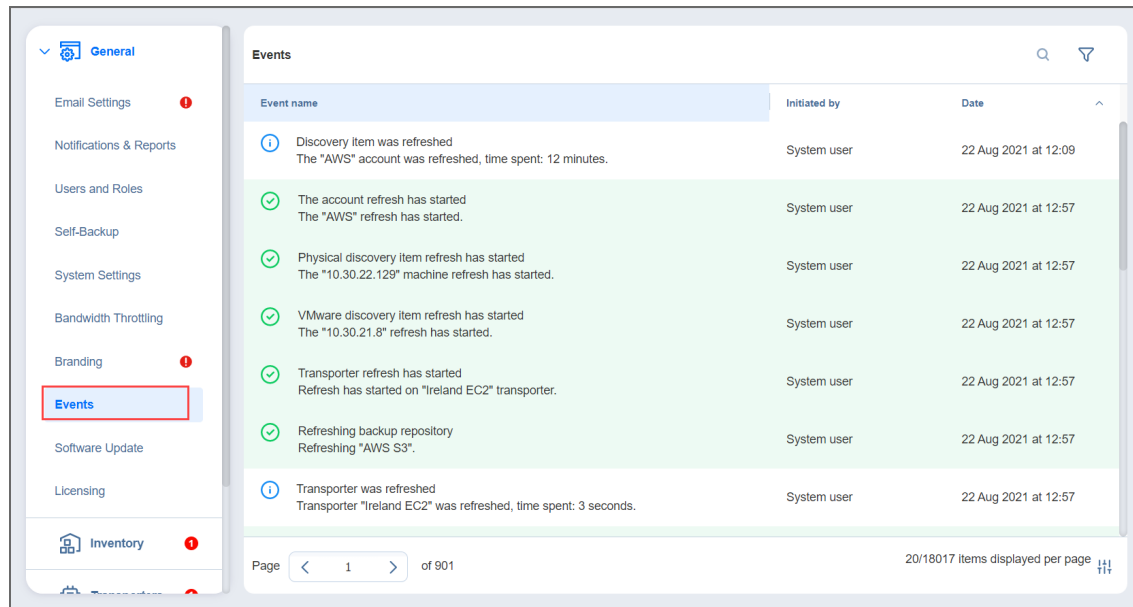
Image	Best format	Best resolution
Global logo	.png	32x40
Footer logo	.png	32x40
Favicon	.png	16x16

Configuring Events

NAKIVO Backup & Replication can store and display system events. By default, events are stored for 60 days; you can [change the time period](#) in **Settings**.

To view events, follow the steps below:

1. Click **Settings** in the left pane of the product.
2. Open the **General** tab and click **Events**. The **Events** page opens, displaying the NAKIVO Backup & Replication system events.



3. Optionally, you can enter a search string to the **Search** box. This allows you to see events related only to NAKIVO Backup & Replication items – Transporters, repositories, jobs, backups, and replicas, – contained in your search string.
4. Optionally, you can select filter the events by the following parameters:
 - **Initiated by:** Select one of the users of the product in the dropdown
 - **Event type:** Choose among the following event types:
 - Info
 - Warning
 - Error
 - Debug
 - **Date:** After selecting this parameter, choose the start and end dates. This allows you to limit the events list within a specific time period.

Database Options

NAKIVO Backup & Replication allows you to migrate the internal H2 database used by the NAKIVO Backup & Replication Director to an external database. To do that, take the following steps:

Important

- If you migrate the internal H2 database to an external database, you will not be able to switch back to the internal database or an external database of the same type later.
- For multi-tenant mode, only the Master Admin can perform database migration. The functionality is not available for the local tenant. The remote tenant can still perform database migration as described below if they log in as single tenant into NAKIVO Backup & Replication.
- The migration occurs for all local tenants at the same time. If the migration fails for one of the tenants, the product reverts to the previous database type automatically.

1. Go to **Settings > General > Database Options**.
2. Select the external database from the list of supported platforms in the **Type** drop-down list. Note that the internal database is selected by default.
3. In the **Host** field, enter the hostname or IP of the server housing the database.
4. In the **Port** field, enter the relevant port number.
5. Enter the name for your database in the **Database name** field.
6. Enter **Username** and **Password** in the corresponding fields.
7. Click **Test Connection**.
8. If the test is successful, click **Apply Settings**:
 - If the database does not exist, a dialog box appears asking if you would like to create one and proceed with the migration. Click **Migrate**.
 - If the database belongs to the current NAKIVO Backup & Replication installation, a dialog box appears asking if you would like to update the settings of the existing database. Click **Update** to proceed.
 - If the database already exists and is compatible with the current NAKIVO Backup & Replication installation, a dialog box appears asking if you would like to use it, cleanup all its records and replace the contents of the database with the new data. Click **Proceed**.

The screenshot shows the 'Database Options' configuration window. On the left, a sidebar lists various settings: General, Email Settings, Notifications & Reports, Users & Roles, Self-Backup (with a red indicator), Database Options (selected), System Settings, Bandwidth Throttling, Branding, Events, Software Update, and Licensing. At the bottom of the sidebar is the 'Inventory' section. The main configuration area is titled 'Database Options' and includes the following fields: 'Type' (a dropdown menu set to 'PostgreSQL'), 'Host' (a text box with 'localhost'), 'Port' (a spinner box set to '23'), 'Database name' (a text box with 'New Database'), 'Username' (a text box with 'admin'), and 'Password' (a masked text box with a toggle icon). A blue 'Test Connection' button is positioned below the password field.

Notes

- If you have the [Self-Backup](#) feature enabled, the self-backup process starts before the database switch and runs again after the switch is completed.
- Self-backup of an external database is possible only with a single-tenant instance of the solution.
- If the external database is installed on another VM or is using an IP address instead of *localhost*, take the following steps before migration:
 1. Open the *pg_hba.conf* file located in the external database installation folder.
 2. Change **IPv4 local connections** settings *from 127.0.0.1/32 to 0.0.0.0/0*.
 3. Save changes.
 4. Restart external database service.
- If the connection between PostgreSQL and NAKIVO Backup & Replication cannot be established, add the following string to the *pg_hba.conf* file:


```
host DATABASE USER ADDRESS METHOD [OPTIONS]
host all all 0.0.0.0/0 md5
```

Note that method (md5) may be different for some versions of PostgreSQL. Check the respective method for your version of PostgreSQL before applying the changes.
- If Master Tenant connects to existing database that already houses the data from previous migrations, such database is automatically mapped to the tenants during the new migration using the database UUID.
- It is not possible to recover from a self-backup and system migration in the following cases:
 - The NAKIVO Backup & Replication installation uses the H2 database while the self-backup contains data from an external database.

- The NAKIVO Backup & Replication installation uses an external database while the self-backup contains data from the H2 database.
- It is not possible to edit the external database **Host**, **Port**, and **Database name** after a successful migration.
- If the internal database is used, the product checks the performance capability adequacy of this database to the current product workload:
 - This check is performed every 10 days by default.
 - If the total number of protected workloads for single tenant or per tenant for Multi-Tenant mode exceeds the limit of 100 VMs/instances/physical machines/oracle databases, the product displays the notification with recommendation to switch to the external database.

Email Settings

On this page, you can configure your email settings. Do this by following the steps below:

- Log in to NAKIVO Backup & Replication.
- Click **Settings** in the left pane of the product.
- Go to the **General** tab.
- Click **Email Settings** to configure email settings on the page that opens.

The screenshot shows the 'Email Settings' page. On the left, a sidebar lists various settings categories: General (selected), Notifications & Reports, Users and Roles, Self-Backup, System Settings, Bandwidth Throttling, Branding, Events, Software Update, and Licensing. The 'Email Settings' option under 'General' is highlighted with a red box. The main content area is titled 'Email Settings' and contains the following fields:

- SMTP server:
- SMTP username (optional):
- SMTP password (optional):
- SMTP port:
- Encryption:
- From:
- To:

At the bottom right of the form is a 'Send Test Email' button. At the bottom left of the page are 'Reset Settings', 'Discard Changes', and 'Apply' buttons.

Important

If you use an email with two-factor authentication, grant access permissions to NAKIVO Backup & Replication via your account security settings and generate a unique password. As an example, use instructions for Google accounts provided in the [Create & use App Passwords](#) article. When configuring email setting of the product, enter this password in the **SMTP password** box.

1. To set email settings, fill out the fields in the Email settings section:
 - **SMTP server:** The address of the server responsible for sending emails.
 - **SMTP username:** The username on the server (usually the same as the email username).
 - **SMTP password:** Usually the same as the password to your email.
 - **SMTP port:** Depends on encryption type.
 - **Encryption:** Select the type of encryption:
 - **None:** Always use a plaintext connection. Not recommended.
 - **TLS, if possible:** Start with plaintext, then use STARTTLS to switch to secure connection if supported by the server.
 - **TLS, required:** Start with plaintext, then use STARTTLS to switch to secure connection;

drop the connection if not supported by the server.

- **SSL, required:** Use the SSL-encrypted connection.
- **From:** Specify the sender email address
- **To:** Specify the receiver email address

Click **Send Test Email** to verify that the settings are correct.

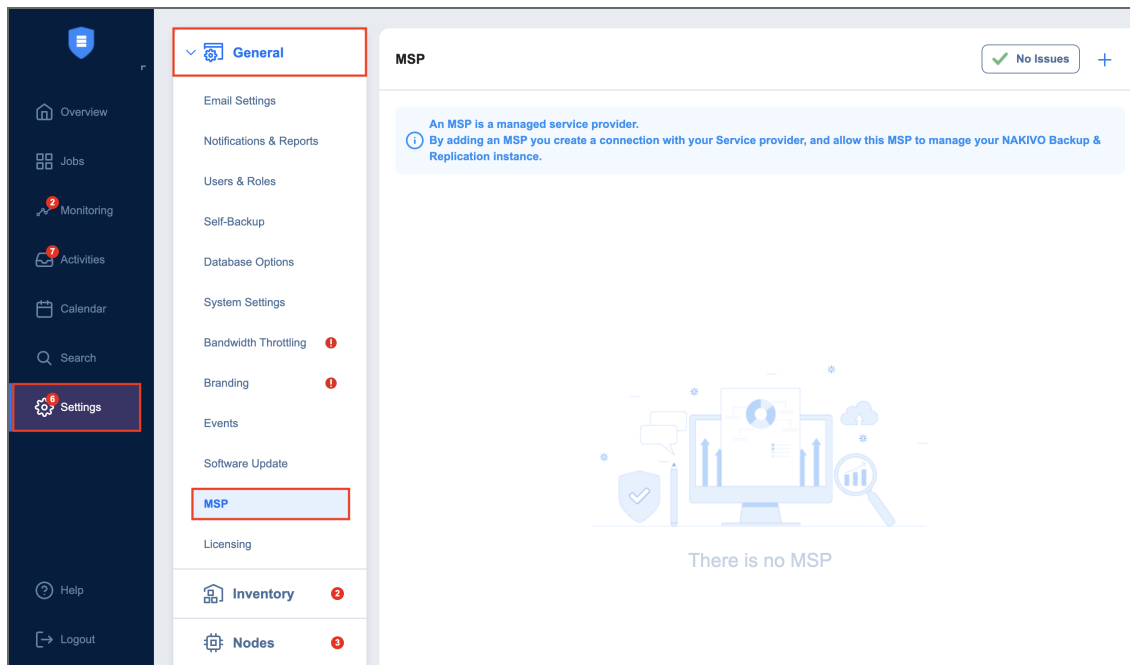
Note

If you want to use a Gmail account to receive email notifications, turn on the **Less secure apps access** setting by navigating to **Manage your Google Account > Security** in your Google account.

2. Click **Apply** to save the settings.
3. Alternatively, click **Discard Changes** to discard any changes you have made to the email configuration.
4. Optionally, click **Reset Settings** to return all the settings to their default values.

MSP

To use the **MSP Console** feature as a tenant, you will first need to link your instance of NAKIVO Backup & Replication to a managed service provide (MSP), allowing the MSP to manage your instance. To do so, you should first add and configure the MSP details on the **MSP** page in **Settings**. These details can be provided by the MSP after [Remote Tenant Configuration](#).



On the **MSP** page, you can add and remove connections to an MSP. Establishing a connection to an MSP as a remote tenant allows them to monitor and manage your instance of NAKIVO Backup & Replication. See the topics below for more information:

- [“Adding an MSP” below](#)
- [“Managing an MSP Connection” on the next page](#)

Adding an MSP

To add an MSP to which you would like to link your instance of NAKIVO Backup & Replication, you need the Master Tenant’s hostname or IP address, port number, and the remote tenant credentials they have generated for you. Once you have the above information, follow the steps below:

1. From the **MSP** menu, click the **Add** button in the top right corner.
2. Fill in the **Hostname or IP**, **Port**, **Username**, and **Password** fields based on the information provided by your Master Tenant.

The screenshot displays the NAKIVO Backup & Replication interface for managing Managed Service Providers (MSPs). The main header shows 'MSP' with a 'No Issues' status indicator and a red-bordered '+' button for adding a new MSP. A modal window titled 'Add MSP' is open, containing the following fields:

- Hostname or IP:** 10.10.10.10
- Port:** 4443
- Username:** tenant1
- Password:** (masked with dots)

A red box highlights these input fields. Below the fields, a warning message states: 'Full access to the instance will be granted to the MSP, including deletion of jobs and backups'. At the bottom of the modal are 'Cancel' and 'Apply' buttons. The background of the main interface shows a faint 'There is no MSP' message.

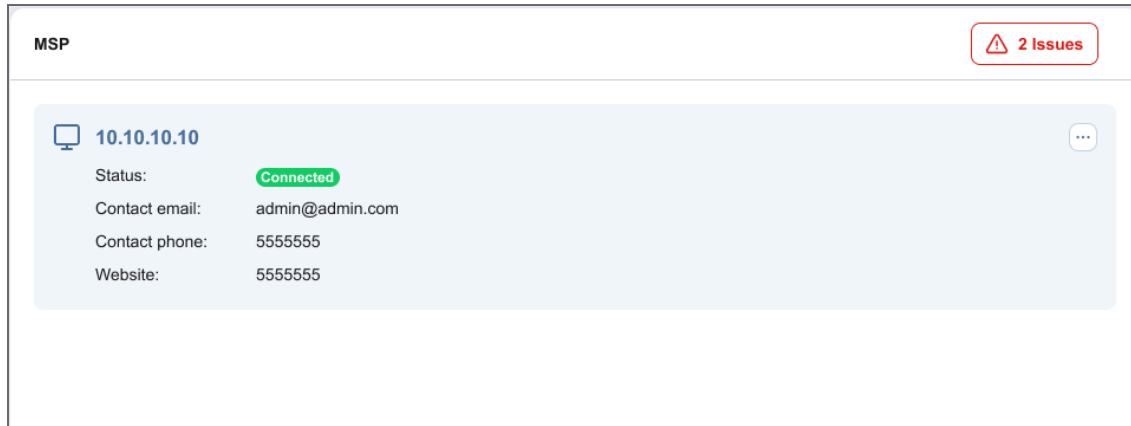
3. Click **Apply**. The following screen will display the MSP’s certificate details.

Note

- Your version of NAKIVO Backup & Replication must be the same as the MSP’s version. Otherwise, you will not be able to use the **MSP Console** feature with the given MSP.

- The MSP uses a separate listening port for communication with a remote tenant's instance (port 6702 is used by default). If the MSP changes the listening port used, the connection may be interrupted. For more information on required TCP ports, see the **MSP Console** section in [“Feature Requirements” on page 151](#).

4. Read through the MSP’s certificate details and click **Accept**.
5. The added MSP should now appear in your **MSP** menu.



Once the MSP is added, you will have successfully established a connection with the Master Tenant as a remote tenant. This allows the Master Tenant to access your instance of NAKIVO Backup & Replication as long as the connection is active.

Managing an MSP Connection

There are several options available for managing an established connection to an MSP. See the sections below for more information on managing your **MSP Console** connection.

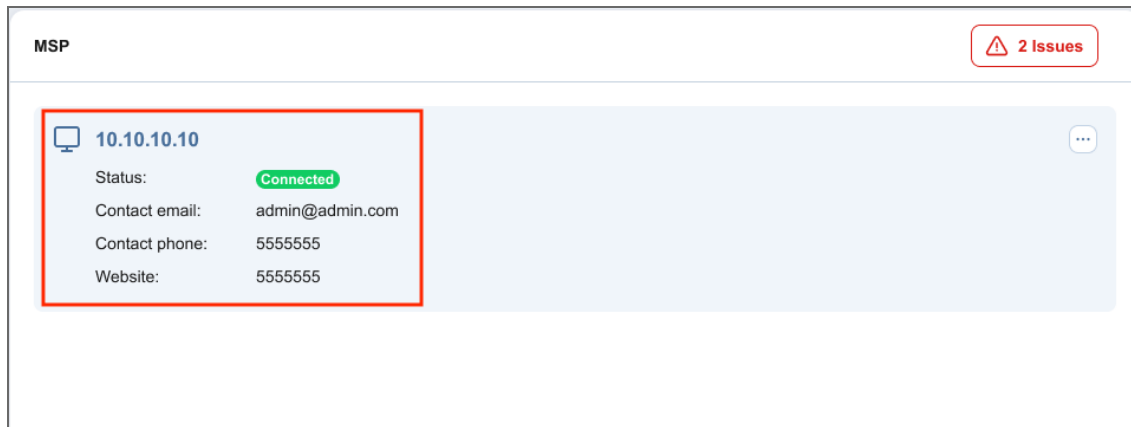
- [Viewing MSP Details](#)
- [Disconnecting/Reconnecting an MSP](#)
- [Deleting an MSP](#)

Viewing MSP Details

The MSP block in the **MSP** menu contains the following information:

- **Hostname or IP:** The hostname or IP address of the Master Tenant.
- **Connection status:** Current status of your connection to the MSP.
 - **Connected:** Your NAKIVO Backup & Replication is connected to the MSP
 - **Disconnected:** Your NAKIVO Backup & Replication is disconnected from the MSP
 - **Connecting:** Your NAKIVO Backup & Replication is actively trying to establish a connection to the MSP

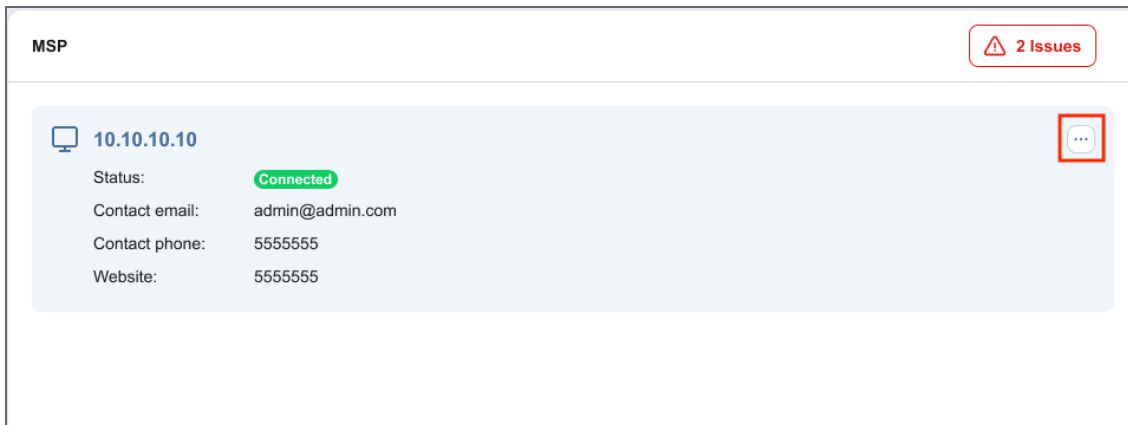
- **Contact information:** The Master Tenant's email address, phone number, and website, updated automatically.



Disconnecting/Reconnecting an MSP

To disconnect your instance of NAKIVO Backup & Replication from an MSP, click the ellipsis **Manage** button in the top right corner of the MSP block. In the popup, click **Disconnect**. This will suspend the connection to the MSP until resumed.

To reconnect to the MSP, simply click the ellipsis **Manage** button in the top right corner of the MSP block and click **Connect** in the popup. You will not be asked to provide the same details you did when first connecting to the MSP unless the MSP has changed their certificate or your remote tenant credentials.



Deleting an MSP

To delete an MSP connection, click the ellipsis **Manage** button in the top right corner of the MSP block. In the popup, click **Delete** and confirm the action. This action will erase all tenant data from the MSP's side and vice versa.

MSP

 2 Issues



10.10.10.10

Status:

Connected

Contact email:

admin@admin.com

Contact phone:

5555555

Website:

5555555

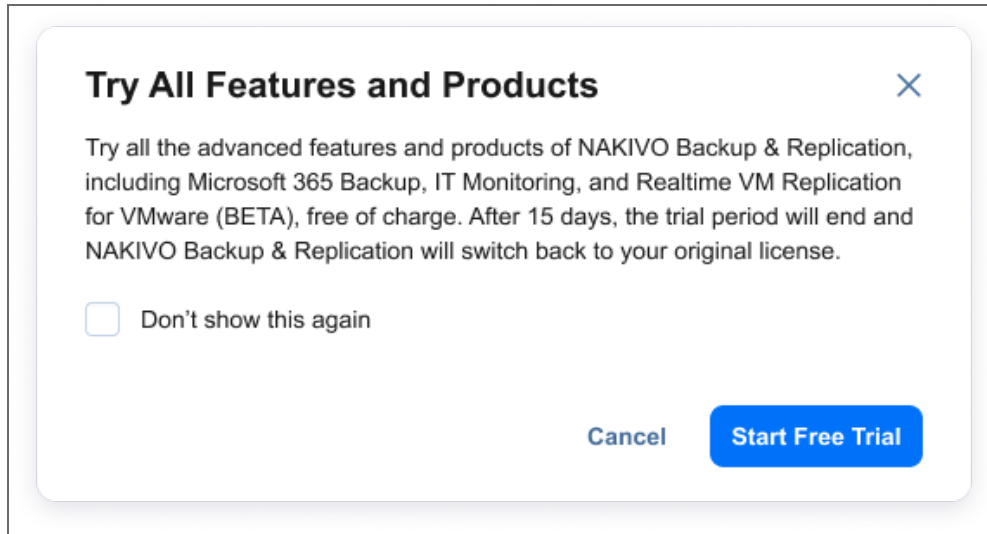


Licensing

To check your license details, follow these steps:

1. Go to the main menu of NAKIVO Backup & Replication and click **Settings > General**.
2. Go to the **Licensing** tab to see license details.

Optionally, you can click the **Try All Features and Products** button to enable all Enterprise Plus license features for 15 days. After this time period ends, NAKIVO Backup & Replication automatically switches back to your original license.



Notes

The button is not displayed in the following cases:

- You are using NAKIVO Backup & Replication as a tenant in Multi-Tenant mode.
- You are using one of the following license editions:
 - Free
 - Trial
 - Beta
 - Promo
 - Enterprise Plus
 - MSP Enterprise Plus

In the **License Information** section, you can find detailed license information, including:

- **Type:** Type of the license
- **Edition:** Edition of the license
- **Serial number:** Serial number of the license
- **License expiration date:** Date when the the license expires

In the **Perpetual licensing section**, you can see the following information:

- Number of licensed and used CPU sockets
- Number of licensed and used VMs
- Number of licensed and used physical servers
- Number of licensed and used physical workstations
- Number of licensed and used EC2 instances
- Number of licensed and used Oracle databases

In the **Per-workload subscription licensing section**, you can see the following information:

- Number of licensed and used workloads
- Subscription end date

In the **Microsoft 365 subscription licensing section**, you can see the following information:

- Number of licensed and used Microsoft 365 users
- Subscription end date

If you are logged in as a tenant in multi-tenant mode, the following information is displayed in the **Obtain more licenses** section:

- **Email address** of the master tenant
- **Contact phone** of the master tenant
- **Company website** of the master tenant

To change your license, follow the steps below:

1. Go to the main menu of NAKIVO Backup & Replication and click **Settings**.
2. Go to the **Licensing** tab and click **Change License**.
3. Locate and open the license file in the window that appears.

License information

Type:	Trial
Edition:	Enterprise Plus
Serial number:	4E2C6173-83A3-4E15-8352
License expiration date:	2016-12-26 (in 9 days)

i Below you can see the number of items used under different licensing models.

Perpetual licensing

Sockets:	X out of <i>unlimited</i> used	<i>i</i>
Physical servers:	X out of <i>unlimited</i> used	<i>i</i>
Physical workstations:	X out of <i>unlimited</i> used	<i>i</i>
Oracle databases:	X out of <i>unlimited</i> used	<i>i</i>

Per-workload subscription licensing

Workloads:	X out of <i>unlimited</i> used	<i>i</i>
------------	--------------------------------	----------

Microsoft 365 subscription licensing

Microsoft 365 users	X out of <i>unlimited</i> used
---------------------	--------------------------------

Upgrading from Free License

If your license type is **Free** and the **Trial** license has not yet been applied to your deployment of NAKIVO Backup & Replication, you can try the full functionality of the solution for 15 days. To do that:

1. Open the **Help Menu**.
2. Select the **Try full functionality** option. A new popup window appears.
3. Click **Start Free Trial**.

Note

Once the **Trial** license expires, the product automatically switches back to the **Free** license.

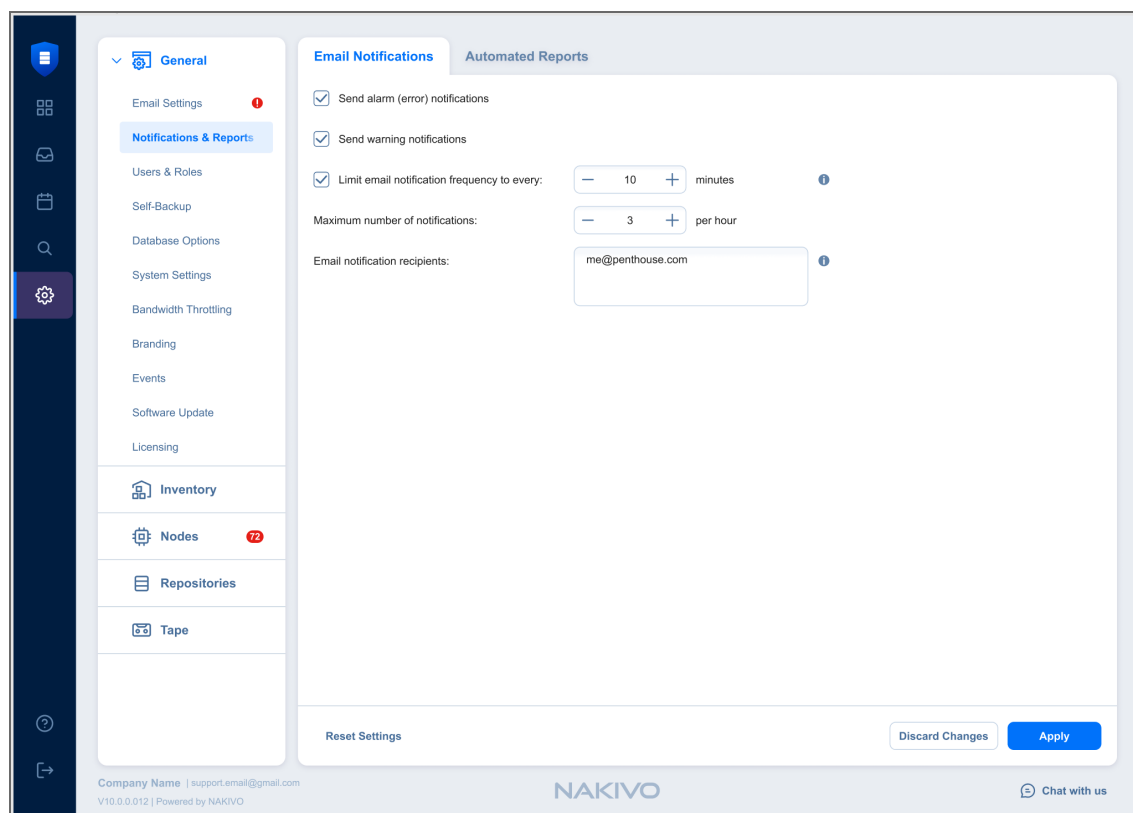
Notifications & Reports

NAKIVO Backup & Replication can send notifications and reports over email.

- [Email Notifications](#)
- [Automatic Reports](#)

To receive automatic notifications, configure email settings by following the steps below:

1. Log in to NAKIVO Backup & Replication.
2. Click **Settings** in the left pane of the product.
3. Go to the **General** tab.
4. Click **Notifications & Reports** to configure notifications and automatic reports section on the page that opens.
5. Click **Apply** to save the settings after you're done.
6. Alternatively, click **Discard Changes** to discard any changes you have made to the email configuration.
7. Optionally, click **Reset Settings** to return all the settings to their default values.



Note

To configure email notifications and automatic reports, you must first configure email settings.

Email Notifications

To set Email notifications, fill out the fields in the *Email notifications* section:

- **Send alarm (error) notifications:** If this option is selected, NAKIVO Backup & Replication will send email notifications to the specified recipients in case an error (for example, a job failure) occurs in the product. For users in Multi-Tenant Mode, these notifications also identify the relevant tenant and the instance where the error occurred.
- **Send warning notifications:** If this option is selected, NAKIVO Backup & Replication will send email notifications to the specified recipients in case the product generates a warning message (for example, lost connection to a host or Backup Repository). For users in Multi-Tenant Mode, these notifications also identify the relevant tenant and the instance that generated the warning.
- **Limit email notification frequency:** This option allows you to set up an email notification frequency in minutes. If deselected, notification emails will be sent every 5 minutes with no hourly limit.
- **Maximum number of notifications:** Use this option to change the limit of email notifications receivable per hour. If this limit is reached, any additional notifications will be delivered the following hour.
- **Email notification recipients:** Specify the recipients who will be receiving alarm and warning notifications (if enabled).

Automatic Reports

To set automatic reports, fill out the fields in the Automatic Reports section:

- **Job reports:** If this option is selected, NAKIVO Backup & Replication will send an HTML report after the completion of every job (regardless of the job success or failure) to email addresses specified in the text field. Use a semi-colon to separate multiple email addresses.
- **Failed Item Protection report:** Contains information about all items which had failed to be protected by backup and/or replication jobs, and the error message. Additionally, configure **Report info in the last** option by entering the number of days you want to get the report for.
- **Overview report:** If this option is selected, NAKIVO Backup & Replication will generate the Overview report (which includes information about all jobs and groups in the product) on the date and time specified in the scheduler and will send the report to the recipients specified in the text field. Use a semi-colon to separate multiple email addresses.
- **Protection Coverage:** If this option is selected, NAKIVO Backup & Replication will generate the Protection Coverage report. This includes information about all VMs & instances protected by backup and/or replication jobs as well as the information about all unprotected VMs & instances. The report will be sent to the recipients specified in the text field on the date and time specified in the scheduler. Use a semi-colon to separate multiple email addresses.
- **Schedule:** Configure the schedule at which you want to get the reports.

- **Attach PDF copy to all automated reports:** Select this option to get the additional attached copy of the report in the PDF format.
- **Attach CSV copy to all automated reports:** Select this option to get the additional attached copy of the report in the CSV format.

Note

NAKIVO Backup & Replication supports the following special characters in reports:

- US special characters
- Characters in the following languages:
 - Vietnamese
 - Japanese
 - Korean
 - Chinese
 - Arabic

The screenshot displays the 'Automated Reports' configuration page in the NAKIVO Backup & Replication web interface. The left sidebar contains navigation links for General, Inventory, Nodes, Repositories, and Tape. The main content area is divided into two tabs: 'Email Notifications' and 'Automated Reports'. The 'Automated Reports' tab is active, showing settings for non-scheduled and scheduled reports, a schedule, and attachments.

General

- Email Settings
- Notifications & Reports**
- Users & Roles
- Self-Backup
- Database Options
- System Settings
- Bandwidth Throttling
- Branding
- Events
- Software Update
- Licensing

Inventory

- Nodes
- Repositories
- Tape

Automated Reports

Non-scheduled reports

- ☒ Job reports: administrator@gmail.com

Scheduled reports

- ☐ Failed Item Protection report: Send Now
- ☐ Overview report: Send Now
- ☐ Protection Coverage report: Send Now

Schedule

Time: 00 : 00 AM PM

Days: MO TU WE TH FR SA SU

Every: 1 weeks

Time Zone: (UTC+02:00, EET) Eastern European

Attachments

- ☐ Attach PDF copy to all automated reports
- ☐ Attach CSV copy to all automated reports

Reset Settings Discard Changes Apply

Company Name | support.email@gmail.com
V10.0.0.012 | Powered by NAKIVO

[Chat with us](#)

Self-Backup

The self-backup feature allows you to automatically protect configuration settings of your NAKIVO Backup & Replication instance. For more information, refer to [“Self-Backup Feature” on page 50](#).

Note

Self-backup is not supported for the multi-tenant configuration.

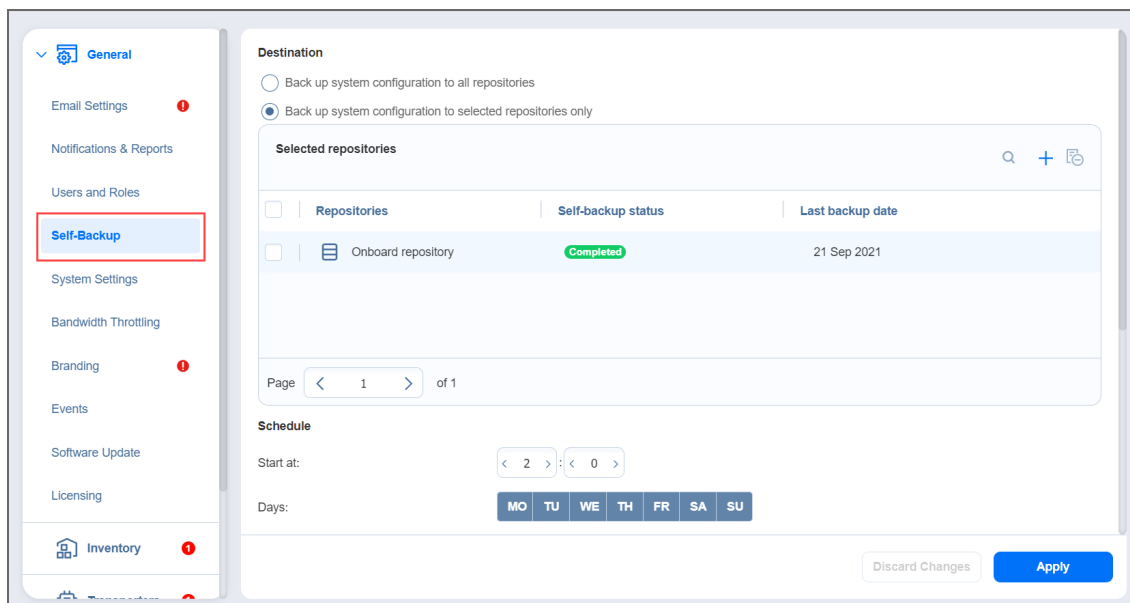
To configure self-backup options, proceed as described in the following sections:

- [Accessing Self-Backup Options](#)
- [Setting Up Self-Backup Destination](#)
- [Self-Backup Schedule](#)
- [Self-Backup Options](#)
- [Self-Backup Encryption](#)
- [Recovering from Self-Backup](#)

Accessing Self-Backup Options

To access self-backup options, follow the steps below:

1. Click **Settings** in the left pane of NAKIVO Backup & Replication.
2. Go to the **General** tab and click **Self-backup**.
3. After making the necessary changes, click **Apply**. Alternatively, click **Discard Changes** to discard any changes you have made.



Setting Up Self-Backup Destination

To configure a self-backup destination, follow the steps below:

1. Select **Back up system configuration to all repositories** to enable all repositories in the list of repositories where system configuration will be backed up. If deselected, you can remove specific repositories from the list.

Important

- Backing up your NAKIVO Backup & Replication system configuration to a [DD Boost storage unit Backup Repository](#) causes the DD Boost storage unit to be unmounted. Therefore, to avoid re-adding the DD Boost storage as an existing Backup Repository manually, exclude DD Boost storage unit repositories from the list of repositories for self-backup.
 - Self-backup cannot be performed to **SaaS** type of Backup Repository.
2. Alternatively, select **Back up system configuration to selected repositories only** and select specific repositories you wish to use for self-backup.
 3. If necessary, add a Backup Repository to the list:
 - Click the “+” icon to add repositories to the list of repositories for system backing up.
 - In the **Add Backup Repositories** dialog that opens, select the necessary repositories and close the dialog.

Self-Backup Schedule

To configure the self-backup schedule, follow the steps below:

1. In the **Schedule section**, enter time to trigger starting the self-backup. You can choose a specific time zone from the list, enter the hours and minutes of the day, and select the necessary days of the week.
2. If you need to start the self-backup immediately, click **Run Self-backup Now**.
3. When ready with configuring the self-backup schedule, click **Apply**.

General

Email Settings !

Notifications & Reports

Users and Roles

Self-Backup

System Settings

Bandwidth Throttling

Branding !

Events

Software Update

Licensing

Inventory !

Destination

☒ Back up system configuration to all repositories

☐ Back up system configuration to selected repositories only

Schedule

Start at: :

Days: MO TU WE TH FR SA SU

Every: weeks

Time Zone: (UTC+02:00, EET) Eastern European ...

Options

Keep recovery points

☐ Encrypt self-backup !

Password:

Self-Backup Options

In the **Options** section of the self-backup settings, you can enter a number of recovery points to be kept for the self-backup. To apply your settings, click the **Apply** button.

General

Email Settings !

Notifications & Reports

Users and Roles

Self-Backup

System Settings

Bandwidth Throttling

Branding !

Events

Software Update

Licensing

Inventory !

Destination

☒ Back up system configuration to all repositories

☐ Back up system configuration to selected repositories only

Schedule

Start at: :

Days: MO TU WE TH FR SA SU

Every: weeks

Time Zone: (UTC+02:00, EET) Eastern European ...

Options

Keep recovery points

☐ Encrypt self-backup !

Password:

Self-Backup Encryption

Select **Encrypt self-backup** to encrypt your backup for additional security. Afterwards, enter the password in the **Password** and **Confirm Password** fields which are required to recover from the self-backup.

Recovering from Self-Backup

To recover the configuration of NAKIVO Backup & Replication from a self-backup stored in a Backup Repository, do the following:

1. Go to **Settings > Repositories**.
2. Select one of the repositories that contain a self-backup.
3. Select the self-backup from the **Backups** list and click **Recover**.
4. Select a recovery point and click **Restore**.
5. Wait while the system configuration is restored. When the self-backup recovery process is completed, a message announcing success appears.

Note

If a selected recovery point was created from an encrypted self-backup, you will have to enter the password to it.

Software Update

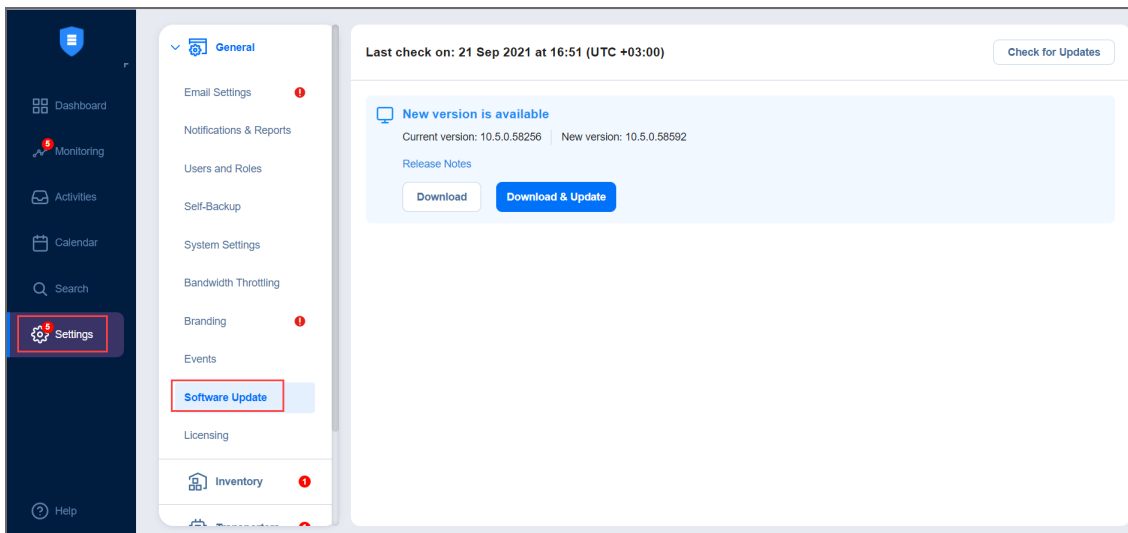
- [Download & Update Option](#)
- [Download Option](#)

When the full solution of NAKIVO Backup & Replication (that is, the Director and the Transporter) is installed on a Windows or Linux machine, you can download product updates from the **Software Update** tab in the web interface. This feature automatically updates your NAKIVO Backup & Replication instance, the Onboard Transporter, and any other nodes that support auto-update.

For a list of supported nodes and requirements for the auto-update feature, see the **Auto-Update** section in [“Feature Requirements” on page 151](#).

To check if an update is available, do the following:

1. Click **Settings** in the left pane of the product.
2. Go to the **General** tab.
3. Go to the **Software Update** page.
4. Click **Check for Updates** if needed.



Note

If you are using a multi-tenant solution, only master-tenant users with the appropriate permissions are able to see and manage software updates.

Download & Update Option

To download and install the update, do the following:

1. Optionally, click **Release Notes** to see features and improvements implemented in the new product version.
2. Select the **I have read the Release Notes** checkbox.

3. Click **Download & update**.
4. Click **Update Now**.

Before downloading the update, the product performs a self-backup and stops all current activities including running jobs, recovery jobs, repository maintenance, etc. When the download is complete, the product updating process begins. The product downloads the update to the Director first. When the Director is updated, the update is automatically uploaded to the Transporters that are then updated simultaneously. If some Transporters are not updated, you can update them manually. Refer to the corresponding [articles](#) for details.

Notes

- For a list of supported Transporters, see the **Auto-Update** section in “[Feature Requirements](#)” on [page 151](#).
- Only 20 Transporters can be updated simultaneously. All other Transporters will be sent to a queue and updated once the previous update is completed.

Download Option

If you wish to postpone an update or schedule it, take the following steps to download the update without installing it:

1. Optionally, click **Release Notes** to see features and improvements implemented in the new product version.
2. Select the **I have read the Release Notes** checkbox.
3. Click **Download**.
4. After the download is completed, do one of the following:
 - Click **Update Now** if you want to start the updating process. Updating the product will stop all current activities, including running jobs, recovery jobs, repository maintenance, etc.
 - Click **Schedule Update** to update the solution at a specific time:
 1. In the dialog box that opens, pick a day and time for updating. Click **Apply**.
 2. On a working day before the scheduled update, you will see a notification in the product menu with the **Update Reminder** dialog box. By hovering over this notification, you can:
 - a. Click **Reschedule** if you want to reschedule the update and pick a different time.
 - b. Click **Cancel update** to cancel updating the full solution.

Note

A notification about the update will also be sent to your email if [email settings](#) are configured.

System Settings

To configure the system settings, follow the steps below:

1. Click **Settings** in the main menu on the left.
2. Go to the **General** tab and click **System settings**.
3. Set the following options:
 - In the **Configuration** tab:
 - **Store system events for the last x days**: Events older than the specified number of days (can be from 5 to 365) will be deleted.
 - **Store job history for the last x days**: The history of the jobs older than the specified number of days (can be from 5 to 90) will be deleted.

Note

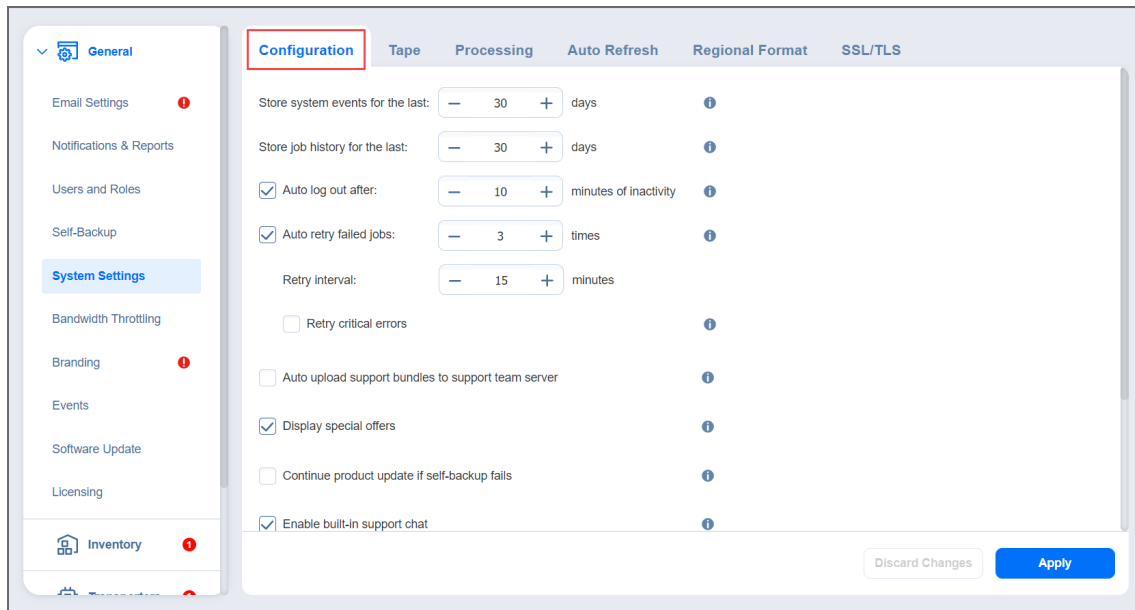
This option is not displayed for the Master tenant in Multi-tenancy mode.

- **Auto log out after x minutes of inactivity**: When this option is selected, the current user will be automatically logged out of NAKIVO Backup & Replication after the specified period of inactivity.
- **Auto retry failed jobs x times with y minutes interval**: When this option is selected, failed jobs are automatically retried the specified number of times (from 2 to 10) and with the specified time interval (from 1 to 60). Jobs with failed backup, replication, and recovery remain in the “running” state until all retries have either succeeded or failed.
 - **Retry critical errors**: When this option is selected, NAKIVO Backup & Replication tries to automatically rerun jobs with critical and non-critical errors a specified number of times.

Notes

- The term **critical error** refers to persistent errors that are unlikely to change without any additional intervention, that is, hardware failure.
- The term **non-critical error** refers to non-persistent errors that are likely to change without any additional intervention, that is, unstable network connection.

- **Auto upload support bundles to support team server:** When this option is selected, NAKIVO Backup & Replication automatically creates, encrypts, and uploads support bundles once a day to a NAKIVO support server. The NAKIVO Support Team may use this information to improve the product experience and to identify and resolve product issues faster.
- **Display special offers:** When this option is enabled, the NAKIVO special offers toolbar appears in the NAKIVO Backup & Replication interface.
- **Continue product update if self-backup fails:** When this option is selected, updates proceed even if self-backup cannot be performed.
- **Enable built-in support chat:** When this option is selected, you can contact a NAKIVO representative via chat in the NAKIVO Backup & Replication interface. When selected in the multi-tenant mode, the built-in support chat is available to all tenants of the NAKIVO Backup & Replication instance.
- **Enable Aptare Integration:** Select this option to integrate the APTARE storage resource management platform with NAKIVO Backup & Replication. For integration details, refer to [Aptare IT Analytics Integration](#).
- **Send anonymous product usage data:** Enable this option to send anonymous product usage data to NAKIVO for efficient product development and enhancement. Note that no personal data is collected.
- Click the **Use New Scheduler** link to enable the use of a new scheduler that merges the retention and schedule steps. The scheduler allows you to set backup retention settings per schedule and get expiration dates for recovery points.
- You can click **Restart Director service** to stop all current activities and restart the Director. After clicking the link, a confirmation window appears. Click **Reboot** to confirm the restart.
- **Import System Configuration:** Find more information on the topic [here](#).
- **Export System Configuration:** Find more information on the topic [here](#).



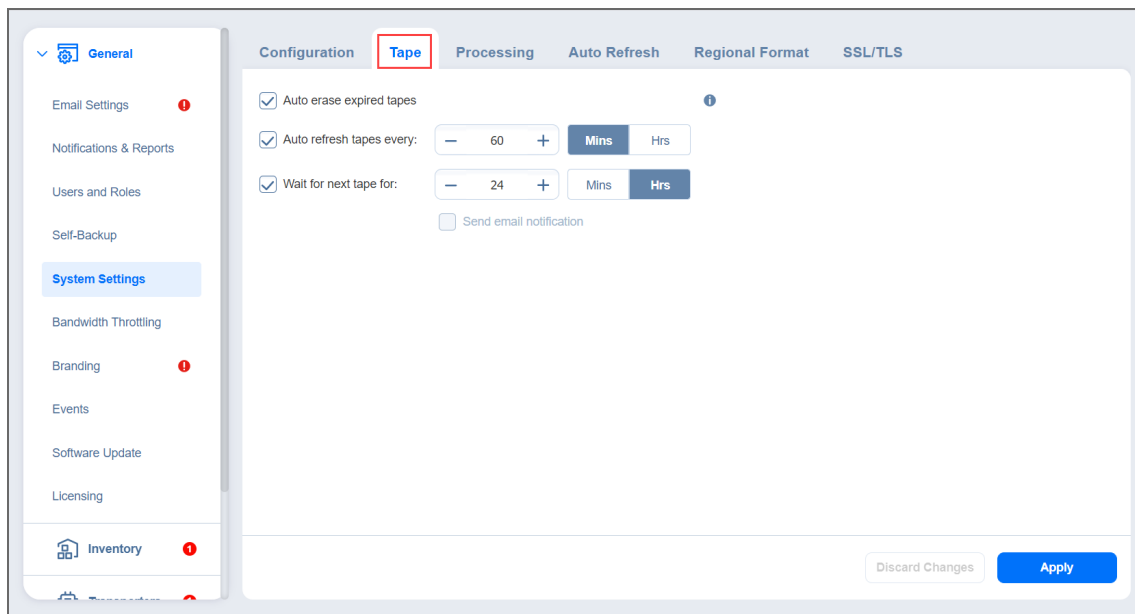
- In the **Tape** tab:

- **Auto erase expired tapes:** When this option is selected, expired tapes are erased automatically.

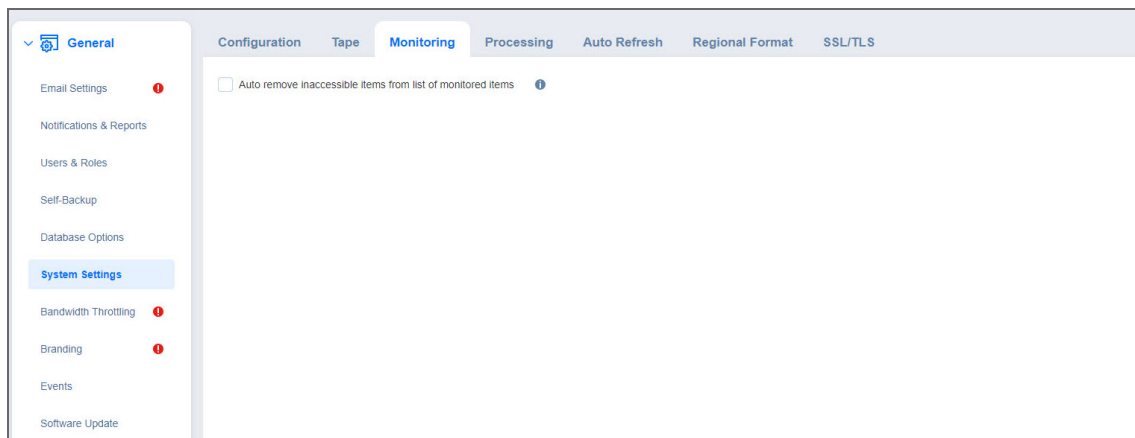
Important

If this option is selected, the following prerequisites must be met for a cartridge to be erased:

- All recovery points within the tape cartridge are expired.
 - There are no dependent recovery points on other tape cartridges.
 - The product keeps at least one full chain of recovery points.
- **Auto refresh tapes every:** Select how often the contents of the tapes are refreshed in minutes or hours. Deselect if refreshing is not required.
- **Wait for next tape for:** Specify how long the system should wait for the next tape if there is no appropriate amount. Select the **Send email notification** checkbox to receive email notifications.

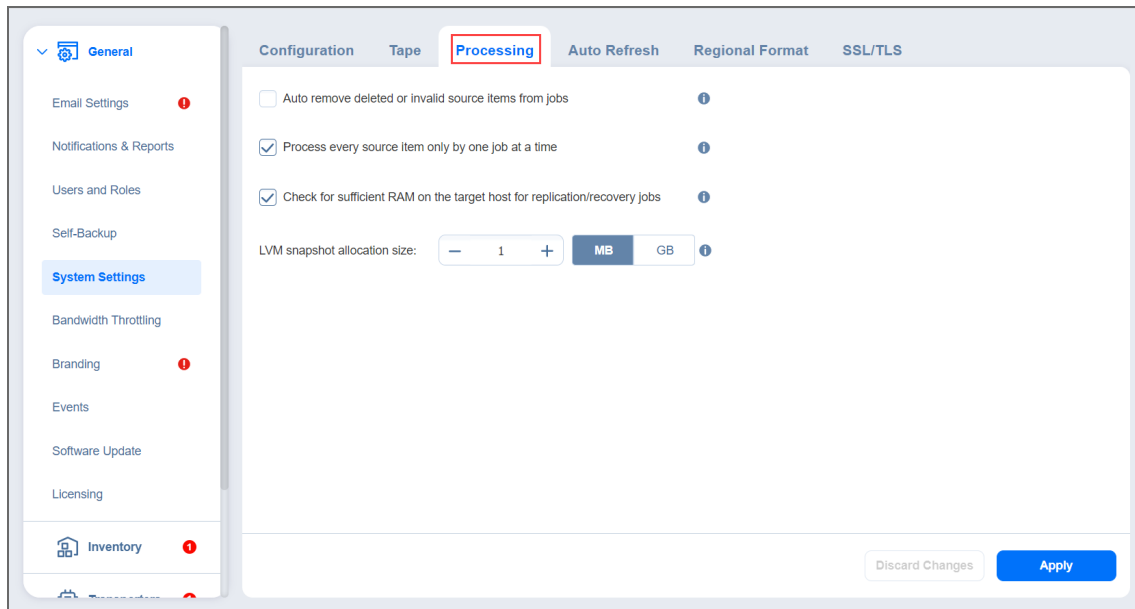


- In the **Monitoring** tab:
 - **Auto remove inaccessible items from list of monitored items:** When this option is selected, all inaccessible items are removed automatically from the list of monitored items.



- In the **Processing** tab:
 - **Auto remove deleted or invalid source items from jobs:** This option applies to a protected container (such as a VMware cluster or EC2 region). When this option is selected, if NAKIVO Backup & Replication discovers (during the [inventory refresh](#)) that a VM(s) and/or EC2 instance(s) is no longer available in the protected container, NAKIVO Backup & Replication automatically removes these VMs and EC2 instances from all jobs.
 - **Process every source item only by one job at a time:** When this option is selected, all machines in backup and replication jobs are processed by one job at a time only. Running jobs and respective source objects will not be affected after changing this setting. For physical servers, this option is always enabled.

- **Check for sufficient RAM on the target host for replication/recovery jobs:** When this option is deselected, NAKIVO Backup & Replication does not check whether the amount of RAM on the target host is sufficient for replication and recovery jobs.
- **LVM snapshot allocation size:** This option allows you to set an LVM allocation snapshot size for a Linux physical server backup. The default size is 1 GB. The maximum size is 1000 GB.

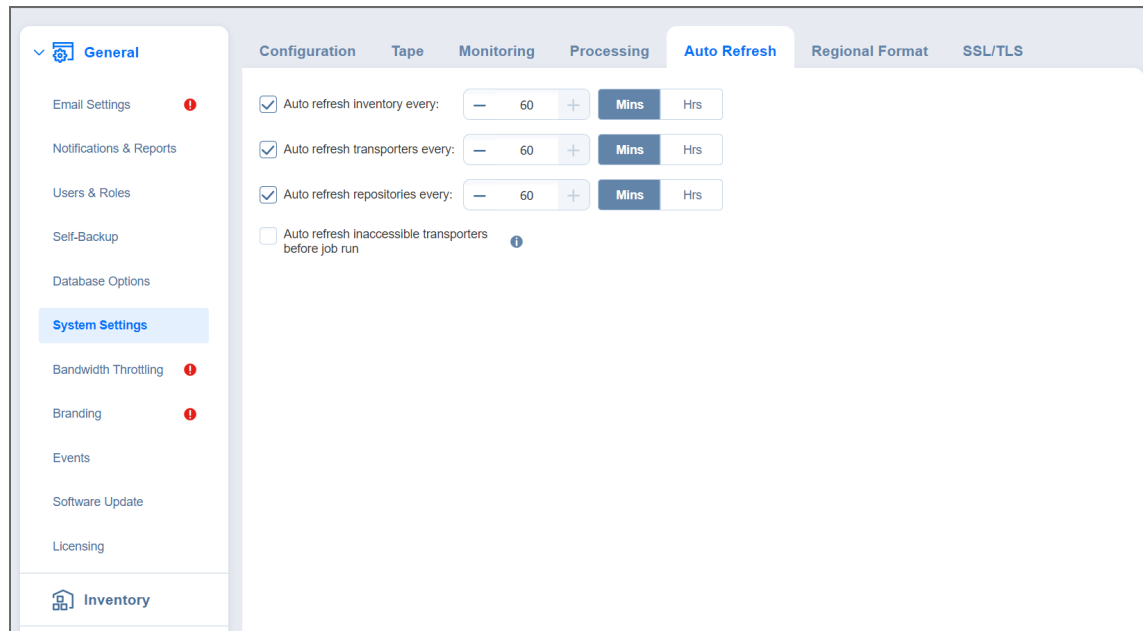


- In the **Auto Refresh** tab:
 - **Auto refresh inventory every X minutes:** Specify how often you want your inventories to be refreshed.
 - **Auto refresh transporters every X minutes:** Specify how often you want your transporters to be refreshed.
 - **Auto refresh repositories every X minutes:** Specify how often you want your repositories to be refreshed.
 - **Auto refresh inaccessible transporters before job run:** If this option is enabled, the product refreshes all inaccessible transporters before a job is processed.

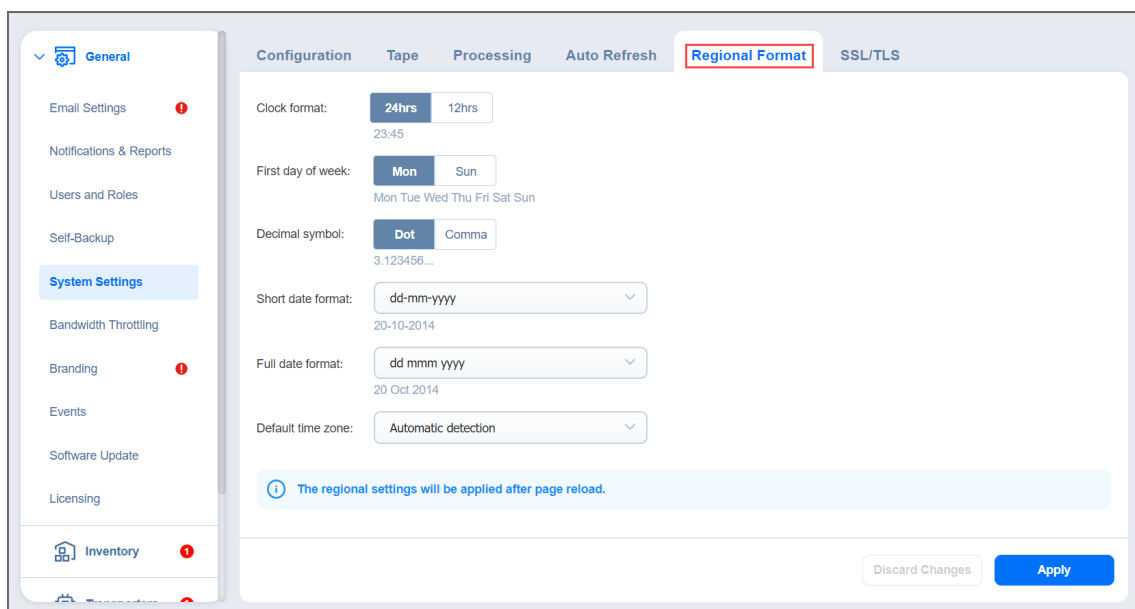
Notes

- Repositories assigned to the inaccessible transporters are refreshed as well during the auto refresh.
- The **Auto refresh inaccessible transporters before job run** option is supported only for the following platforms:
 - VMware vSphere
 - AWS

- Cloud Director
- Nutanix AHV



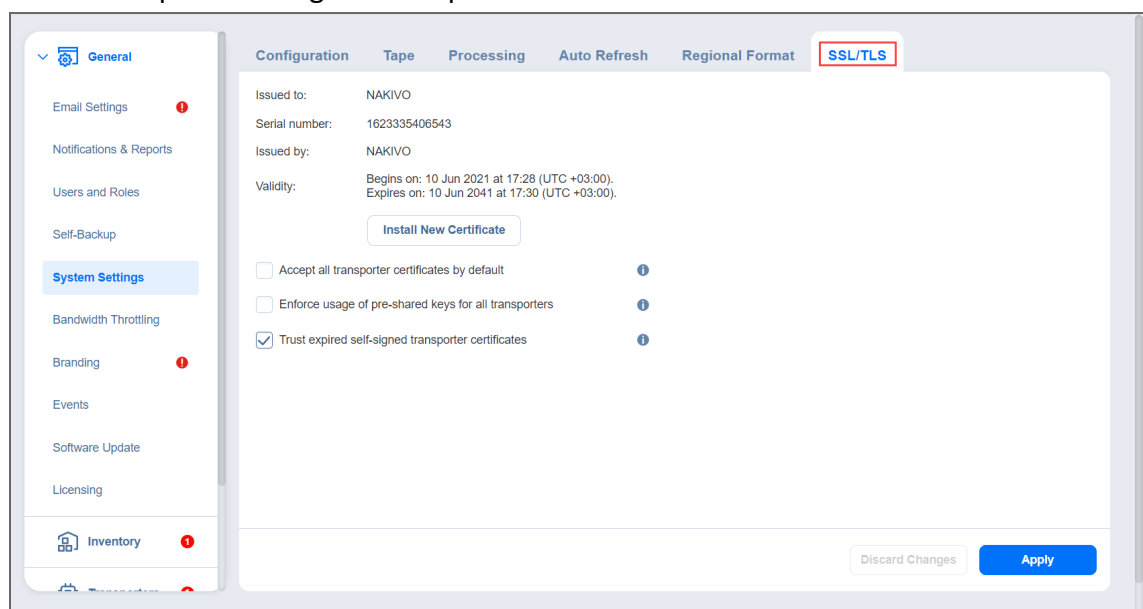
- In the **Regional Format** tab, set:
 - **Clock format**
 - **First day of week**
 - **Decimal symbol**
 - **Short date format**
 - **Full date format**
 - **Default time zone**



Note

If any time zone other than **(UTC+00:00, UTC) Coordinated Universal Time** is chosen, daylight savings times are honored.

- In the **SSL/TLS** tab, you can either:
 - **Install new certificate:** A dialog opens allowing you to install a new TLS/SSL certificate for the NAKIVO Backup & Replication web interface. Certificates are generated either internally or through certification authorities. Proceed as follows to install a new certificate:
 - Click **Browse** and navigate to the location of either of the following certificate file types:
 - **Private key:** A file in the *.key format.
 - **Private key password (optional):** A password for your private key.
 - **Certificate file:** A file in the *.pem, *.crt, *.cer, *.p7b, or *.p7s format.
 - **Intermediate certificate (optional):** A file in one of the following formats: *.pem, *.crt, *.cer, *.p7b, *.p7s.
 - **Accept all transporter certificates by default:** Select this option to automatically accept all transporter certificates. After selecting the option, click **Continue** in the warning popup window that appears to confirm the selection.
 - **Enforce usage of pre-shared keys for all transporters:** Selecting this option makes sure that transport function only when pre-shared key is installed.
 - **Trust expired self-signed transporter certificates:** Selecting this option makes the solution trust the expired self-signed transporter certificates.



4. After making the necessary changes, click **Apply**. Alternatively, click **Discard Changes** to discard any changes you have made.

Notes

- NAKIVO Backup & Replication supports Certificates with the RSA algorithm only.
- In the *Web Interface TLS/SSL Certificate* section, you can see a notification about imminent TLS/SSL Certificate expiration in 30 days and onwards. If your certificate has expired, you will be asked to install a valid certificate.

System Migration

NAKIVO Backup & Replication provides you with the ability to migrate all your settings (including inventory, jobs, credentials, transporter settings, and so on) to a new instance (copy) of the product.

Important

System configuration export and import are designed for migration purposes only, and not to serve as a system configuration backup. After you have exported system configuration from an old instance of the product, do not run jobs in that old instance. Doing so will result in failed jobs in the new instance after the migration. All jobs will have to be recreated, and full initial job run will be required.

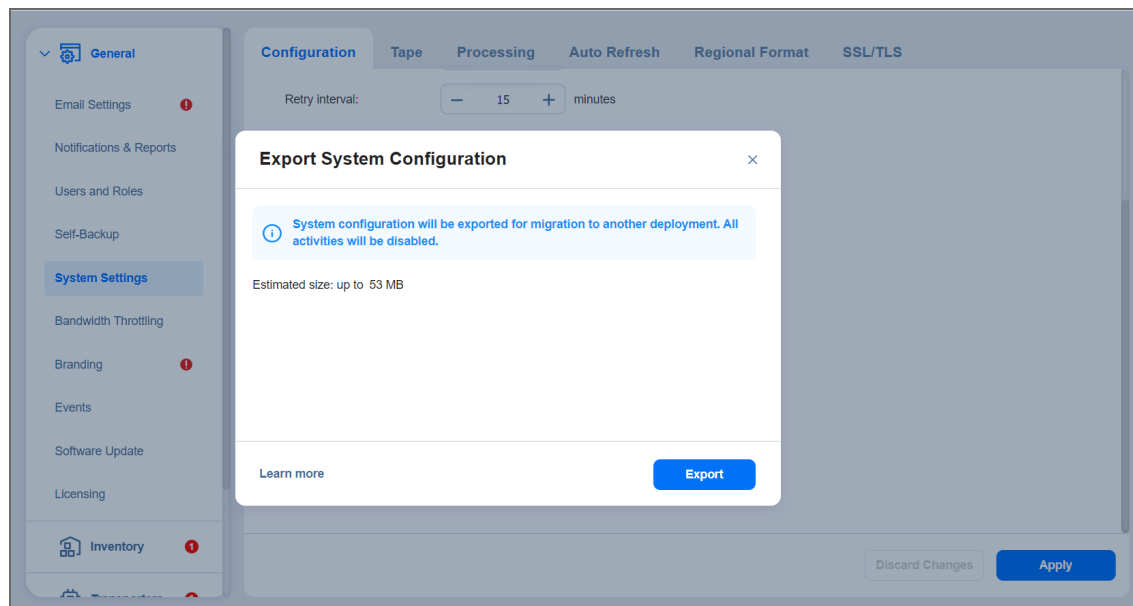
See the topics below for more information:

- [Exporting System Configuration](#)
- [Importing System Configuration](#)

Exporting System Configuration

To export system configuration from the old deployment, follow the steps below:

1. Click **Settings** in the left pane of the product.
2. Select **System Settings** tab in the **General** section.
3. On the **Configuration** tab, click **Export System Configuration**.
4. In the dialog window that appears, click **Export**.



5. Click **Proceed** to confirm the operation.

Note

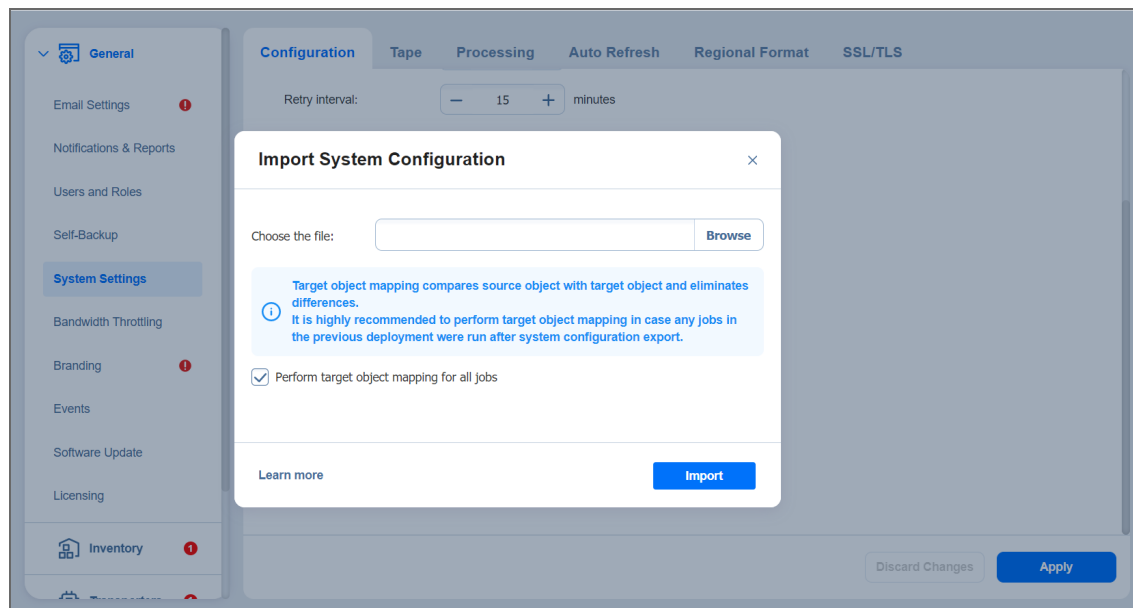
All activities in the old instance (such as jobs and recovery sessions) will be automatically stopped and all jobs will be disabled.

6. Wait until the export is completed and download the export bundle.
7. Do not run jobs in the old instance.

Importing System Configuration

To import system configuration into a new instance of the product, follow the steps below:

1. Click **Settings** in the left pane of the product.
2. Select **System Settings** tab in the **General** section.
3. On the **Configuration** tab, click **Import System Configuration**.
4. In the dialog window that appears, locate the system configuration bundle using the **Browse** button.



5. Click **Import**.
6. Click **Proceed** to confirm the operation.

Important

- If there is any existing data in the new instance, it will be overwritten with the import operation.
- If a physical configuration of your source deployment differs from a target deployment, a Backup Repository may become inaccessible after the bundle import is completed.

7. Wait until the import is completed, and close the dialog window.

Notes

- Backup Repositories are not migrated by the system configuration export and import. If you have a local Backup Repository on the old instance of the product, you may want to [move](#) it to the new location. After moving the Backup Repository, you may need to [edit](#) Backup Repository settings in the new instance so that the new settings refer to the actual Backup Repository location.

- In case a custom TLS/SSL certificate of the Web server was used in the old instance, a manual service restart will be required in the new deployment.

Users and Roles

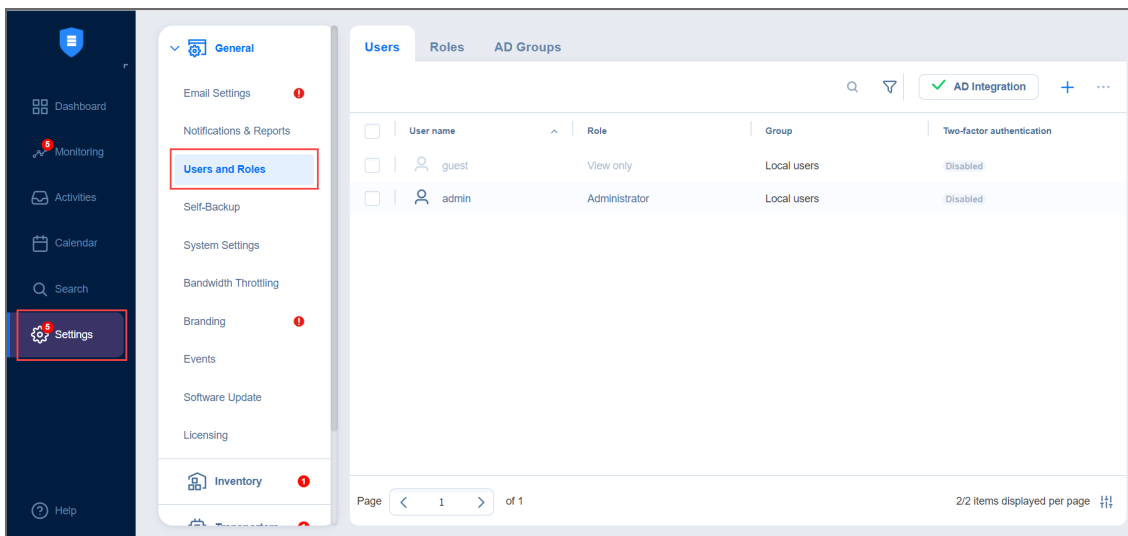
Accessing NAKIVO Backup & Replication is possible either with a user account created in the product or with an account added to the product from Active Directory. Each user in the product is assigned a role, which is a set of specific permissions.

- [Managing Users and Roles](#)
- [Navigating Users View](#)
- [Navigating Roles View](#)
- [Navigating AD Groups View](#)

Managing Users and Roles

Managing users and roles can be done by following these steps:

1. Log in to NAKIVO Backup & Replication.
2. Click **Settings** (cog icon) in the left pane of the product.
3. Go to the **General** tab and click **Users and Roles**.



Navigating Users View

To see the list of all local users, select the **Users** view in the upper pane. On this page of the solution you can do the following:

- See the list of all local users added to NAKIVO Backup & Replication.
- Sort the list by **Name**, **Role**, **2FA**, **Access level**, or **Group** by clicking on the respective name of the column.

Note

The **Access level** column is displayed only for the **Master tenant** in Multi-tenant mode. It displays the access level assigned to the user.

- Filter the list of users by entering the name of the user fully or partially into the Search bar or by selecting the Filter option.
 - Clicking **Filter** opens a new window that allows you to filter the list of local users according to **User name, Role, State, and Group**.
- Add a new local user by clicking “+” icon.
- Integrate Active Directory account by clicking **AD Integration**.
- Edit, delete, disable, enable Two-factor authentication, and assign a new role to the local user individually. These actions, except **Edit**, can also be done in bulk by checking the box in the upper left pane to select all users and clicking "ellipsis" icon.

Note

When selecting all local users to apply a bulk action, NAKIVO Backup & Replication selects only those users that are displayed on the screen.

- Edit the role assigned to the local use by clicking on the name of the role in the respective column.

Navigating Roles View

To see the list of all local users, select the **Roles** view in the upper pane. On this page of the solution you can do the following:

- See the list of all user roles added to NAKIVO Backup & Replication.
- Sort the list by **Role name**, **Access level**, or **Number of users** by clicking on the respective name of the column.

Note

The **Access level** column is displayed only for the **Master tenant** in Multi-tenant mode. It displays the access level that the role has.

- Filter the list of users by entering the name of the user fully or partially into the **Search** bar or by selecting the **Filter** option.
 - Clicking Filter opens a new window that allows you to filter the list of local users according to **Role name** or **Number of users**.

- Add a new local user by clicking the “+” icon.
- Edit, delete, or clone the user roles individually. These actions, except **Edit**, can also be done in bulk by checking the box in the upper left pane to select all users and clicking "ellipsis" icon. When selecting all local users to apply a bulk action, NAKIVO Backup & Replication selects only those users that are displayed on the screen.
- **Edit, Delete, Clone** the role by clicking the ellipses to the right of the role's name.

Navigating AD Groups View

To see the list of all Active Directory groups, select the **AD Groups** view in the upper pane. On this page of the solution you can do the following:

- See the list of all AD groups added to NAKIVO Backup & Replication.
- Sort the list by **Group name**, **Logged in users**, **Access level**, or **Role** by clicking on the respective name of the column.

Note

The **Access level** column is displayed only for the **Master tenant** in Multi-tenant mode. It displays the access level assigned to the AD group.

- Filter the list of users by entering the name of the user fully or partially into the **Search** bar or by selecting the Filter option.
 - Clicking **Filter** opens a new window that allows you to filter the list of local users according to **Group name**, **Role**, **Number of users**, and **Status**.
- Add a new AD group by clicking “+” icon.
- Integrate Active Directory account by clicking **AD Integration**.
- Edit, delete, disable, enable Two-factor authentication, and assign a new role to the local user individually. These actions, except **Edit**, can also be done in bulk by checking the box in the upper left pane to select all users and clicking "ellipsis" icon.

Note

When selecting all AD groups to apply a bulk action, NAKIVO Backup & Replication selects only those groups that are displayed on the screen.

- Edit the role assigned to the user by clicking on the name of the role in the respective column.

For details, refer to the following sections:

- [“Managing Active Directory Users” on page 377](#)
- [“Managing Local Users” on page 384](#)

- [“Managing User Roles” on page 392](#)
- [“Configuring Two-Factor Authentication” on page 373](#)

Configuring Two-Factor Authentication

NAKIVO Backup & Replication allows you to add an additional layer of security with two-factor authentication (2FA). For details, refer to the topics below:

- [Enabling Two-Factor Authentication](#)
- [Managing Two-Factor Authentication](#)
- [Setting Up Google Authenticator](#)

Enabling Two-Factor Authentication

Two-factor authentication can be enabled in either of the following pages:

- On the [Editing local user](#) page, select the **Two-factor authentication** checkbox.

Notes

- Users without **User management** permission cannot enable Two-factor authentication.
- Users without **Administrator** role or **Configuration** permission can only configure Two-factor authentication on the login screen of NAKIVO Backup & Replication.
- It is possible to enable Two-factor authentication only after configuring [Email Notifications](#).

- On the Users view, hover over user's name and select **Manage > Enable two-factor authentication**.

Proceed with configuring two-factor authentication:

1. Click **Continue** in the dialogue window that appears.
2. Click **Continue** in the **Verify your Email Address** popup that appears.
 - Optionally, click on the **change your email** link to enter the new email address for the user
 - Select **Continue** to proceed with 2FA configuration.
3. Enter the verification code that was sent to the specified email address, and click **Continue**.
4. Optionally, enter the alternative email address that can be used in case the primary one becomes unavailable, and select **Continue**. Alternatively, select **skip** to skip this step.
5. If you have entered the alternative email address during the previous step, enter the verification code that was sent to the specified email, and click **Continue** to proceed with [Google Authenticator configuration](#). Alternatively when configuring 2FA on the [Editing local user](#) page, select **Cancel** on the **Get Google Authenticator** popup to set up Google Authenticator later.

Note

When configuring 2FA on the login screen, clicking **Cancel** returns you to the main login screen.

Managing Two-Factor Authentication

You can manage two-factor authentication in the following way:

1. Click the **manage** link to the right of **Two-factor authentication** checkbox.
2. Choose one of the following verification methods:
 - **Google Authenticator**: Choose this option to use the Google Authenticator app to generate verification codes. Optionally, click on the **Google Authenticator pairing key** link to see your pairing key or on the **Backup codes** link to view your backup codes.
 - **Email**: Choose this option to receive verification codes via email. Optionally, you can view and change your primary email by clicking **change email** link and add an alternative email by clicking **add** link. Here you can also view your backup codes by clicking the **Backup codes** link.
3. Click **OK** when you're done.

Setting Up Google Authenticator

NAKIVO Backup & Replication uses Google Authenticator for two-factor authentication. To set up Google Authenticator, do the following:

1. Optionally, if you selected **Cancel** on the **Get Google Authenticator** popup, click the **configure** link to the right of the **Two-factor authentication** checkbox if you are configuring.
2. Follow the instructions in the popup window to download and install Google Authenticator.
3. Add your NAKIVO Backup & Replication user account to Google Authenticator. Use one of the following methods:
 - Select **Scan QR Code** option, and scan the QR code in the popup window.
 - Select **Enter a Code** option, and follow the instructions in the popup window to enter the shown code into the Google Authenticator app.
4. A popup window appears containing the pairing key, which can be used for adding multiple devices to your account.

Important

It is highly recommended that you save the pairing key or write it down.

You have the following options:

- Optionally, click on the **copy the Key** link to copy your key and save it for future use.
 - Optionally, click on the **download pairing information** link to download and save instructions on how to use the pairing key.
 - Click **Continue** when you're done.
5. The **Backup codes** popup window with four backup codes appears. These one-time codes can be used to log in when you are unable to provide a verification code. Click on the **download as PDF** link to download and save these codes in PDF format or write them down. Additionally, you can click the **generate backup codes** link to generate new codes. Click **Continue**.
 6. Enter one of the backup codes in the next popup window to confirm that you have saved them, and click **Finish**.

Notes

- The backup code used in this step remains valid for one more use.
- The **manage** link replaces the **configure** link after this step has been completed.

Managing Active Directory Users

With NAKIVO Backup & Replication, you can configure Active Directory integration at any time. You can also freely add, edit, disable, delete AD users, or assign a role to them. For details, refer to the topics below:

- [“Adding Active Directory User” on page 378](#)
- [“Assigning Role to Active Directory User” on page 379](#)
- [“Configuring Active Directory Integration” on page 380](#)
- [“Deleting Active Directory User” on page 382](#)
- [“Disabling Active Directory User” on page 383](#)
- [“Editing Active Directory User” on page 384](#)

Adding Active Directory User

After [configuring AD integration](#) in the **Active Directory Configuration** wizard, you can proceed with adding AD user(s). Alternatively, switch to **AD Groups** tab and then click on the "+" symbol. Proceed as follows:

1. Optionally, you can filter the tree of Active Directory users by entering a string to the **Search** box. You can enter a section or the whole name of the item.
2. Select Active Directory users and groups by placing a checkmark to their left.
3. The selected items appear in the right pane of the page. If necessary, reorder the selected items by dragging them to a new position. By doing so, you can specify to add the most important users and groups first.

Note

Only logged in users that belong to the group can be added.

4. Review the list of selected items. If necessary, remove a selected user or group from the list in either of the following ways:
 - Deselect the item in the left pane. This will remove the item from the right pane.
 - In the right pane, hover the pointer over the item you wish to remove and click the **Remove** button. This will deselect the item in the left pane
5. Click **Next** to proceed to the **Role** Tab.
6. On the **Role** tab, choose a user role to be assigned to the users.
7. In the lower right corner of the page, click **Finish**. Active Directory users appear in the NAKIVO Backup & Replication list of users.

Assigning Role to Active Directory User

Follow the steps below to assign a role to an Active Directory user:

1. Go to **Settings > General > Users and Roles**.
2. The **Users and Roles** page opens in the **Users** view. Hover over the Active Directory user, and then click **ellipsis** symbol in the rightmost column of the row.
3. In the menu that opens, click **Assign role**.
4. In the dialog box that opens, select a new user role from the **Role** list and then click **Save**.

The Active Directory user appears in the list of users with the assigned role.

Configuring Active Directory Integration

To configure Active Directory integration, follow these steps:

1. Go to **Settings > General > Users and Roles**.
2. The **Users & Roles** page opens. Click the **Configure AD Integration** button.
3. The **Active Directory Configuration Wizard** opens on the **Settings** page. Proceed as follows:
 - a. In the **Domain name** box, enter the domain name.
 - b. In the **Preferred DC hostname/IP** box, enter the name of the preferred domain controller or its IP address.
 - c. Optionally, you can enter the name of the preferred Active Directory groups in the **Prioritized integrated groups** box.

Note

If a user is a member of two or more Active Directory groups, enter the prioritized group's name in this field.

- d. In the **Domain user login** box, enter the username that will be applied when integrating Active Directory.
- e. In the **Domain user password** box, enter the user password that will be applied when integrating Active Directory.
- f. Optionally, enable **Use LDAPS** option. If checked, port 636 is used for LDAP (Lightweight Directory Access Protocol) over SSL.
- g. **Refresh AD information every:** Specify a periodicity of refreshing Active Directory information.
- h. In case Active Directory integration was successfully completed before, you can optionally click **Remove AD Integration** to cancel the AD integration.

Note

The **Remove AD Integration** option is disabled if AD integration is not configured.

- i. Click **Apply** after you're done.

j. On the **Users** page of the wizard, proceed with [adding an Active Directory user](#).

When the wizard closes, the **Users & Roles** page opens, displaying the newly-added Active Directory users in the list of users.

Deleting Active Directory User

Follow the steps below to delete an Active Directory user:

1. Go to **Settings > General > Users and Roles**.
2. The **Users and Roles** page opens in the **Users** view. Hover over the Active Directory user you want to delete, and then click **ellipsis** icon in the rightmost cell of the row.
3. In the menu that opens, click **Delete**.
4. In the dialog box that opens, click **Delete** to confirm that you wish to delete the AD user.

The Active Directory user disappears from the list of users.

Disabling Active Directory User

Follow the steps below to disable an Active Directory user:

1. Go to **Settings > General > Users and Roles**.
2. The **Users and Roles** page opens in the **Users** view. Hover over the Active Directory user you want to disable, and then click **ellipsis** icon in the rightmost column of the row.
3. In the menu that opens, click **Disable**.
4. In the dialog box that opens, click **Disable** to confirm that you want to disable the Active Directory user.

The Active Directory user appears dimmed in the list of users.

Editing Active Directory User

Follow the steps below to edit an Active Directory user:

1. Go to **Settings > General > Users and Roles**.
2. The **Users and Roles** page opens in the **Users** view. In the list of users, do either of the following:
 - a. Locate the Active Directory user and click its name.
 - b. Hover over the Active Directory user, click **ellipsis** icon in the rightmost column of the row.
 - c. Click **Edit**.
3. The **Edit Active Directory User** page opens. Edit the Active Directory user properties if necessary:
 - a. In the **General** tab, edit the user.
 - b. In the **Role** tab, edit the user role.
 - c. Click **Save** to save your modifications to the Active Directory user.

Managing Local Users

With NAKIVO Backup & Replication, you can freely add, edit, disable, delete local users, or assign a role to them. For details, refer to the topics below:

- [“Adding Local Users” on page 385](#)
- [“Assigning Role to Local User” on page 387](#)
- [“Deleting Local User” on page 388](#)
- [“Disabling Local User” on page 389](#)
- [“Editing Local User” on page 390](#)

The application has the following built-in local users:

- **admin**: This user has the **Administrator** role assigned. You cannot delete it, disable it, or assign another role.
- **guest**: This user has the **View only** role assigned, with configurable file and object recovery permissions. By default, the account is disabled.

Adding Local Users

Follow the steps below to add a local user:

1. Go to **Settings > General > Users and Roles**
2. The **Users and Roles** page opens on the **Users** tab.
3. Click the **+** symbol.

4. The **Add Local User** page opens. Proceed as follows:
 - a. In the **Username** box, enter the user name.
 - b. In the **Name** box, enter the user's real name.
 - c. In the **Password** box, enter the user password. To generate a password automatically and send it to the user, select **Generate password and send by email**.
 - d. In the **Repeat password** box, re-enter the user password.
 - e. In the **Email** box, enter the user's email address.
 - f. In the **Description** box, optionally enter a user description.

- g. Click **Next** to proceed to the **Role** Tab.
- h. In the **Access level** dropdown list, select an access level for the new user (for multi-tenant solutions only).
- i. In the **Role** dropdown list, select a user role. Refer to [“Managing User Roles” on page 392](#) for more details about user roles.
- j. In the lower right corner of the page, click **Finish**. The local user will appear in the list of users.

Assigning Role to Local User

Follow the steps below to assign a role to a local user:

1. Go to **Settings > General > Users and Roles**.
2. The **Users and Roles** page opens in the **Users** view. Hover over the local user, and then click the **Ellipsis** icon in the rightmost cell of the row.
3. In the resulting menu, click **Assign role**.
4. In the dialog box that opens, select a new user role from the **Role** drop-down list and then click **Save**.
The local user will appear in the list of users with the assigned role.

Deleting Local User

Follow the steps below to delete a local user:

1. Go to **Settings > General > Users and Roles**.
2. The **Users and Roles** page opens in the **Users** view. Hover over the local user you wish to be deleted, and then click the **Ellipsis** icon in the rightmost cell of the row.
3. In the resulting menu, click **Delete**.
4. In the dialog box that opens, click **Delete** again to delete the local user. The user will disappear from the list of users.

Disabling Local User

Follow the steps below to disable a local user:

1. Go to **Settings > General > Users and Roles**.
2. The **Users and Roles** page opens in the **Users** view. Hover over the local user you wish to be disabled, and then click the **Ellipsis** icon in the rightmost cell of the row.
3. In the resulting menu, click **Disable**.
4. In the dialog box that opens, click **Disable** again to disable the local user. The user will appear dimmed in the list of local users.

Editing Local User

Please follow the steps below to edit a local user:

1. Go to **Settings > General > Users and Roles**.
2. The **Users and Roles** page opens in the **Users** view. In the list of users, do either of the following:
 - a. Locate the local user that you want to edit and click on the user name.
 - b. Hover over the local user and click the **Ellipsis** icon in the rightmost cell of the row. In the resulting menu, click **Edit**.
3. The **Edit User** page opens. Edit the local user properties if needed:
 - a. In the **Username** box, edit the user name.
 - b. In the **Name** box, edit the user's real name.
 - c. In the **Password** box, edit the user password.
 - d. If you edited the user password, re-enter the user password in the **Repeat password** box.
 - e. In the **Email** box, edit the user's email address.
 - f. Optionally, enable **Two-factor authentication**.

Note

This feature is disabled when no email address has been provided for the user.

- g. In the **Description** box, edit the user description.
- h. In the **Role** tab, edit the user's role.
- i. Click **Save** to save your modifications to the local user.

Managing User Roles

A user role with full access to the **User management** permission is assigned to your user profile to manage user roles. You cannot edit or delete the user role that is assigned to your user profile. The following topics describe how to manage roles of NAKIVO Backup & Replication users in detail:

- [“Overview of User Roles” on page 399](#)
- [“Adding User Role” on page 393](#)
- [“Editing User Role” on page 397](#)
- [“Cloning User Role” on page 395](#)
- [“Deleting User Role” on page 396](#)

Adding User Role

Follow the steps below to add a user role:

1. Go to **Settings > General > Users and Roles**.
2. On the **Users and Roles** page, switch to the **Roles** tab.
3. Click **+** symbol and then select **Add Role**.
4. The **Add Role** page opens. Proceed as follows:
 - a. In the **Role name** box, enter the role name.
 - b. If you are working with a multi-tenant environment, choose either a tenant, master tenant, or all tenants, from the **Access level** list.
 - c. In the **Description** box, optionally enter a user description.
- d. Click **Next** to proceed to **Permission** tab.
- e. A list of permissions opens. Specify necessary permissions for the user role.

f. Click **Finish** in the lower right corner of the page.

The user role appears in the list of roles.

Cloning User Role

Follow the steps below to clone a user role:

1. Go to **Settings > General > Users and Roles**.
2. On the **Users and Roles** page, switch to the **Roles** tab.
3. Hover over the user role, click the **Ellipsis** icon in the rightmost column of the row and then click **Clone**.
4. A dialog opens asking you to enter the name of the new user role. Enter the name of the new user role and click **Save**.

The new user role appears in the list of roles.

Deleting User Role

Follow the steps below to delete a user role:

1. Go to **Settings > General > Users and Roles**.
2. On the **Users and Roles** page, switch to the **Roles** tab.
3. Hover over the user role, click the **Ellipsis** icon in the rightmost column of the row and then click **Delete**.
4. In the dialog box that opens, click **Delete** to confirm deletion of the local user.

The user role disappears from the list of roles.

Editing User Role

Follow the steps below to edit a user role:

1. Go to **Settings > General > Users and Roles**.
2. On the **Users and Roles** page, switch to the **Roles** tab.
3. In the list of roles, do either of the following:
 - a. Locate the user role and click on it.
 - b. Hover over the user role, click the **Ellipsis** icon in the rightmost column of the row, and click **Edit**.
4. The **Edit Role** page opens. Edit the user role properties if needed:
 - a. In the **Role name** box, edit the user role name.
 - b. If you are working with a multi-tenant environment, you can change the access level for this role by choosing another tenant, master tenant, or all tenants in the **Access level** list.
 - c. In the **Description** box, edit the user description.
 - d. You can view the **Number of users** with this role, as well as view a full list by clicking the **x users** button.
 - e. In the **Permissions** tab, you can edit all necessary permissions for the user role.

- f. When finished, click **Save** in the lower right corner of the page.

Overview of User Roles

NAKIVO Backup & Replication allows you to assign roles and grant specific permissions to users of the product.

- [User Roles](#)
- [Access Levels](#)
- [Built-in User Roles](#)

User Roles

A user role consists of a set of permissions that can be granted to a NAKIVO Backup & Replication user.

Available permissions are grouped by the following product objects:

- **Calendar:** Contains permissions for accessing the Calendar dashboard.
- **Activities:** Contains permissions for accessing the Activities dashboard.
- **Global Search:** Contains permissions for accessing Global Search.
- **Configuration:** Contains a series of permissions for accessing configuration of NAKIVO Backup & Replication.
- **Jobs:** Contains a series of permissions for managing jobs.
- **User profile:** Contains a series of permissions for managing user profile.
- **Help and Support:** Contains a series of permissions for accessing email support, online help center, chat support, and system information.
- **Aptare Report Generation:** Contains permissions for managing Aptare report generation.
- **Monitoring:** Contains permissions for managing Monitoring feature.

Access Levels

There are the following access levels that can be set up for particular permission:

- **No access:** The user cannot view, edit, and run the commands, neither from the graphical interface nor from the command line.
- **View only:** The user can view the commands in the graphical interface but cannot edit or run them; using the command line, the user can only run the commands that do not change NAKIVO Backup & Replication objects.
- **Run only:** The user can only view and run commands, both from the graphical interface and the command line.
- **Full access:** The user can view, edit, and run the commands, both from the graphical interface and the command line.
- **Custom:** A custom set of permissions is configured for a product object.

Built-In User Roles

The product offers you a number of built-in user roles:

- Backup operator
- Recovery operator
- Self-service administrator
- Self-service user
- View only

Built-in user roles can be used for performing typical user management tasks. If you need an extra level of security, you can [add a new user role](#) or take a built-in user role as a starting point by [cloning](#) it. The user profile can only have a single role assigned.

Inventory

Prior to creating backup, replication, or recovery jobs, you need to add your virtual/cloud/physical infrastructure, Microsoft 365 account, Oracle database, or supported storage device to the product's Inventory. The discovered item is added to the internal product database, which is refreshed every 1 hour by default. The **Inventory** tab contains a **Summary** bar, which offers an overview of all Inventory items. The data displayed is as follows:

- **Issues:** Total number of issues/alarms related to Inventory items
- **Items:** Total number of items in Inventory

Refer to the following sections to learn more about adding and managing Inventory items:

- [“Adding Microsoft Hyper-V Servers” on page 403](#)
- [“Adding Amazon EC2 Accounts” on page 404](#)
- [“Adding Generic S3-Compatible Object Storage ” on page 405](#)
- [“Adding Wasabi Accounts” on page 407](#)
- [“Adding Backblaze Accounts” on page 409](#)
- [“Adding Microsoft Azure Storage Accounts” on page 413](#)
- [“Managing Credentials” on page 433](#)
- [“Managing Inventory” on page 428](#)

Adding Microsoft Hyper-V Servers

To add Microsoft Hyper-V servers to the product, follow the steps below:

1. In the main menu, click **Settings**.
2. Go to the **Inventory** page and click **+**.
3. On the **Platform** page, select **Virtual** and then click **Next** to proceed.
4. On the **Type** page, select **Microsoft Hyper-V host or cluster** and then click **Next** to proceed.
5. The **Options** page opens. Fill out the fields as follows:
 - **Display name:** Enter a name for the host. This name will be displayed in the inventory.
 - **Type:** Select whether you want to add a standalone Microsoft Hyper-V server or a cluster.
For Hyper-V Failover Clusters, it's enough to add any cluster member by an IP address or domain name. The list of cluster members will be retrieved automatically.
 - **Hostname or IP:** Specify the hostname or IP address of the Microsoft Hyper-V server.
 - **Username and Password:** Specify the credentials of the Microsoft Hyper-V server that you want to add to the inventory.
The credentials you specify should have full administrative privileges to the Hyper-V server
 - **WS MAN port:** Specify the port number for WS MAN.
6. Click **Finish**.

After the process has completed successfully, you can exit **Settings** and create jobs with the newly discovered VMs.

Notes

- When adding a new Microsoft Hyper-V server to the inventory, NAKIVO Backup & Replication automatically installs the [Transporter](#) service onto the server. This service is used to read data from source VMs during backup and replication.
- Multiple Directors are not supported. If you add the same Microsoft Hyper-V host to the inventory of an additional NAKIVO Backup & Replication instance, Transporter installation fails.

Adding Amazon EC2 Accounts

Add an Amazon EC2 account to NAKIVO Backup & Replication as described in the sections below.

- [“Creating AWS Access Key ID and Secret Access Key”](#) below
- [“Adding an Amazon EC2 Account to Inventory”](#) below

Creating AWS Access Key ID and Secret Access Key

Prior to adding your AWS account to the inventory, you need to create and retrieve an AWS Access Key ID and Secret Access Key. The Access Key ID and Secret Access Key are used by NAKIVO Backup & Replication to sign the programmatic requests sent to AWS, such as retrieving the list of instances, creating snapshots, and so on.

To create an AWS Access Key ID and a Secret Access Key, follow the steps below:

1. If you don't have an AWS account, create a new one at <https://aws.amazon.com>.
2. Open the [IAM console](#).
3. In the left pane, click **Users**.
4. Click your IAM username (not the checkbox).
5. Go to the **Security Credentials** tab and then click **Create Access Key**.
6. Click **Download Credentials** and store the keys in a secure location.

Important

Your Secret Access Key will no longer be available in the AWS Management Console; you will have one copy only. Store it in a secure location and do not share it in order to protect your account from unauthorized access.

Adding an Amazon EC2 Account to Inventory

To add an Amazon EC2 account to NAKIVO Backup & Replication, follow the steps below:

1. Click **Settings**.
2. Go to the **Inventory** page and click **+**.
3. On the **Platform** page of the wizard, select **Storage** and click **Next** to proceed.
4. On the **Type** page of the wizard, select **AWS Account** and click **Next** to proceed.
5. On the **Options** page of the wizard, fill in the following fields:

- a. Enter the name in the **Display name** box.
 - b. Select the AWS account from the **Type** drop-down list.
 - c. Select the AWS region from the **Region(s)** drop-down list.
 - d. Enter the **Access Key ID** and **Secret Access Key** of a root user or a sub-user in the corresponding fields.
6. Click **Finish** when you're done.

The screenshot shows a web-based wizard titled "Add Inventory Item". It has three steps: "1. Platform", "2. Type", and "3. Options". Step 2, "Type", is currently active and highlighted with a blue underline. The form contains the following fields:

- Display name:** A text input field containing "AWS 1".
- Type:** A dropdown menu with "AWS account" selected. A blue information icon is to its right.
- Region(s):** A dropdown menu with "All regions" selected. A blue information icon is to its right.
- Access key ID:** A text input field containing "key". A blue information icon is to its right.
- Secret access key:** A text input field filled with dots. A blue information icon is to its right.

At the bottom right of the form, there are two buttons: "Cancel" and "Finish". The "Finish" button is highlighted in blue.

Adding Generic S3-Compatible Object Storage

Note

Only specific S3-compatible vendors are supported. Please see [Feature Requirements](#) for more information.

To add S3-compatible object storage to Inventory in NAKIVO Backup & Replication, follow the steps below:

1. Verify that the S3-compatible object storage meets [Feature Requirements](#).
2. Click **Settings** in the main menu of NAKIVO Backup & Replication.
3. Go to the **Inventory** page and click "+".
4. On the **Platform** page of the wizard, select **Storage** and click **Next** to proceed.

Add Inventory Item

1. Platform 2. Type 3. Options

- ☐ Virtual
VMware vCenter or ESXi host, Microsoft Hyper-V host or cluster, Nutanix AHV cluster, VMware Cloud Director server
- ☐ SaaS
Microsoft 365
- ☐ File Share
CIFS share, NFS share
- ☐ Physical
Microsoft Windows, Linux
- ☐ Application
Oracle Database
- ☒ Storage
Amazon, Microsoft Azure, Wasabi, Backblaze, Generic S3-compatible Storage ^{BETA}, HPE 3PAR, HPE Nimble.

Cancel Next

5. On the Type page of the wizard, select **Generic S3-compatible storage** and click **Next** to proceed.

Add Inventory Item

1. Platform 2. Type 3. Options

- ☐ Amazon
- ☐ Microsoft Azure
- ☐ Wasabi
- ☐ Backblaze
- ☒ Generic S3-compatible Storage ^{BETA}
- ☐ HPE 3PAR
- ☐ HPE Nimble

Cancel Finish

6. On the **Options** page of the wizard, provide the following information:
- **Display name:** Specify a name for the S3-compatible object storage device. This name will be displayed in the Inventory.
 - **Service endpoint:** Enter a full HTTP/HTTPS URL that is used to access the storage.
 - **Region code:** Optionally, enter the technical region code where the data is stored. To enter several region codes, separate them using the semicolon “;” symbol. It is highly recommended to leave this field blank.
 - **Access key ID or Username:** Enter the storage access key ID or username that was created during account setup or on the App Keys page in your storage account.
 - **Secret access key or Password:** Enter the storage secret access key or password that was created during account setup or on the App Keys page in your storage account.
 - Click **Connect** to bring up the Certificate Details popup.

Note

The Connect button may be disabled if no HTTP/HTTPS certificates are detected or required for the storage to be added to the Inventory.

7. Optionally, you can select **Auto accept new certificate if this certificate is expired or changed**.
8. Click **Accept** to confirm the certificate.

Add Inventory Item

1. Platform 2. Type 3. Options

Display name: New Storage

Service endpoint: https://s3.endpointexample.com ⓘ

Region code (Optional): region code ⓘ

Access key ID or Username: key ⓘ

Secret access key or Password: ⓘ

Connect

Cancel Finish

9. Finally, click **Finish** when you are done.

Adding Wasabi Accounts

Add a Wasabi account to NAKIVO Backup & Replication as described in the sections below.

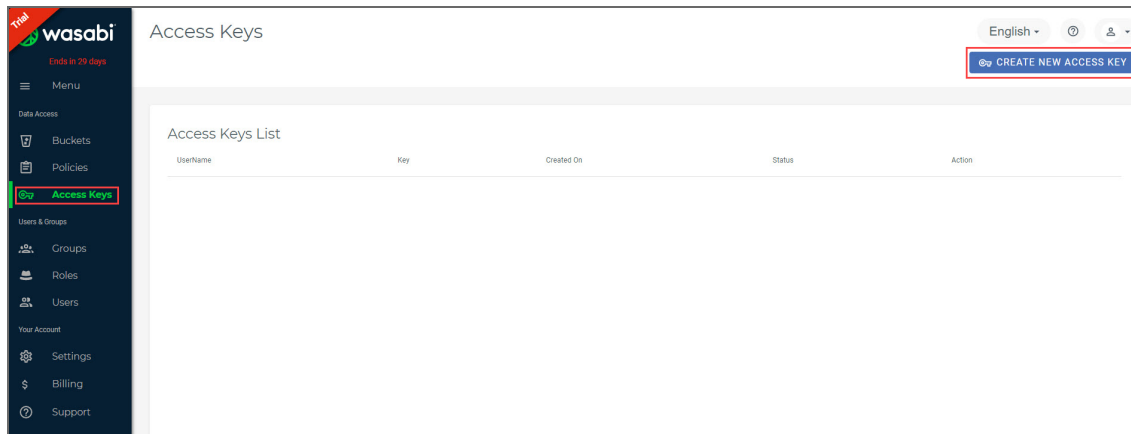
- [Creating Wasabi Access Key ID and Secret Access Key](#)
- [Adding a Wasabi Account to Inventory](#)

Creating Wasabi Access Key ID and Secret Access Key

Prior to adding your Wasabi account to the inventory, you need to create and retrieve a Wasabi Access Key ID and Secret Access Key. They are used by NAKIVO Backup & Replication to sign the programmatic requests sent to Wasabi, such as retrieving the list of instances, creating snapshots, and etc.

To create a Wasabi Access Key ID and a Secret Access Key, follow the steps below:

1. If you don't have a Wasabi account, create a new one at wasabi.com/sign-up/
2. Log in to your Wasabi account.
3. Navigate to the main menu and click **Access Keys**.
4. Click **Create New Access Key**.



5. In the dialog box that opens, select one of the following:

- **Root user:** Select this option and click **Create**.

- **Sub-User:** Select a sub-user from the **Assign to a user** drop-down list and click **Create**. Note that the original user access key of the selected user will be changed.

Note

To use the Sub-User option, you need to have at least one user created in your Wasabi account. For details, refer to [Creating a User](#) and [How do I set up Wasabi for user access separation?](#)

6. Click **Download CSV** and save the file with generated keys in a secure location. Keep the Access key confidential in order to protect your account.

Adding a Wasabi Account to Inventory

To add an Wasabi account to NAKIVO Backup & Replication, follow the steps below:

1. Click **Settings**.
2. Go to the **Inventory** page and click **+**.
3. On the **Platform** page of the wizard, select **Storage** and click **Next** to proceed.
4. On the **Type** page of the wizard, select **Wasabi account** and click **Next** to proceed.
5. On the **Options** page of the wizard, fill in the following fields:
 - a. Enter the name in the **Display name** box.
 - b. Select the Wasabi region from the **Region(s)** drop-down list.
 - c. Enter the **Access Key ID** and **Secret Access Key** of a root user or a sub-user in the corresponding fields.
6. Click **Finish**.

Add Inventory Item

1. Platform 2. Type 3. Options

Display name:

Region(s):

Access key ID:

Secret access key:

Cancel Finish

Adding Backblaze Accounts

Add a Backblaze account to NAKIVO Backup & Replication as described in the sections below.

- [Obtaining Backblaze Credentials](#)
- [Adding a Backblaze Account to Inventory](#)

Obtaining Backblaze Credentials

If you have not already generated and saved application key information in your Backblaze account, you will need to do so. To obtain the credentials required to add a Backblaze account to the NAKIVO Backup & Replication inventory, follow the steps below:

1. Log in to your Backblaze account.
2. Locate the **Account** tab on the left side and click **App Keys**.

B2 Cloud Storage

Buckets

Browse Files

Snapshots

Reports

Caps & Alerts

Fireball

Cloud Replication


Account

App Keys

My Settings

Billing

Application Keys



Application keys are used as a pair: Key ID and Application Key. This allows B2 to communicate securely with different devices or apps. Once you generate your Master Application Key, this key has full capabilities. Create your own Application Keys to limit features like read/write. [Learn more.](#)

Master Application Key

keyID:

keyName: Master Application Key

bucketName: -

capabilities: bypassGovernance,
listKeys, writeKeys, deleteKeys,
listBucketNames, listBuckets, readBuckets, writeBuckets,
deleteBuckets, readBucketEncryption, readBucketReplications,
readBucketRetentions, writeBucketEncryption,
writeBucketReplications, writeBucketRetentions,
listFiles, readFiles, shareFiles, writeFiles, deleteFiles,
readFileRetentions, readFileLegalHolds, writeFileRetentions,
writeFileLegalHolds

expiration: Never

namePrefix: (none)

3. Find the **Add a New Application Key** button and click it.

- 410 -

Master Application Key

keyID:

keyName: Master Application Key

bucketName: -

capabilities: bypassGovernance,
listKeys, writeKeys, deleteKeys,
listBucketNames, listBuckets, readBuckets, writeBuckets,
deleteBuckets, readBucketEncryption, readBucketReplications,
readBucketRetentions, writeBucketEncryption,
writeBucketReplications, writeBucketRetentions,
listFiles, readFiles, shareFiles, writeFiles, deleteFiles,
readFileRetentions, readFileLegalHolds, writeFileRetentions,
writeFileLegalHolds


expiration: Never

namePrefix: (none)

Generate New Master Application Key

Warning: Generating a new key will cancel the old key.

Your Application Keys

 [Add a New Application Key](#)

4. Fill in the following information:

- **Name of Key:** Enter a key name of your choice.
- **Allow access to Bucket(s):** Select a specific bucket or all buckets.
- **Type of access:** Choose the level of access given to external applications.
- **Allow List All Bucket Names:** Check to allow listing of all bucket names for S3 API purposes (required).
- **File name prefix:** Limits access to files that begin with the specified text.
- **Duration (seconds):** Validity duration of the key in seconds (leave blank to keep it indefinite).

5. Click **Create New Key**.

×

Add Application Key

Name of Key:
(keyName)

Technical

Allow access to Bucket(s):
(optional)
(bucketName)

Technical-writer

Type of Access:
(optional)
(capabilities)

☒ Read and Write
☐ Read Only
☐ Write Only

Allow List All Bucket Names:
(optional)

☒ Allow listing all bucket names including bucket creation dates (required for S3 List Buckets API)

File name prefix:
(optional)
(namePrefix)

Allow access to file names that start with this.

Duration (seconds):
(optional)
(validDurationSeconds)

Positive integer less than 1000 days (in seconds).

Create New Key

Cancel

6. Locate the generated key and note the following information:

- **keyID**
- **Application Key**

Success! Your new application key has been created. **It will only appear here once.**

keyID: 004560642dc

keyName: Technical

applicationKey: K00417qzPYh

Copy to Clipboard

Adding a Backblaze Account to Inventory

To add a Backblaze storage account to Inventory, do the following:

1. Click **Settings** in the left pane.
2. Go to the **Inventory** tab and click **+**.
3. On the **Platform** page of the wizard, select **Storage**. Click **Next** to proceed.
4. On the **Type** page, choose **Backblaze**. Click **Next** to proceed.
5. On the **Options** page, configure the following:
 - **Display name:** Enter a display name for the Backblaze storage account.
 - **Key ID:** Enter the **keyID** generated on the **App Keys** page in your Backblaze account.
 - **Application Key:** Enter the **Application Key** generated on the **App Keys** page in your Backblaze account.
6. Click **Connect**. This should bring up the **Certificate Details** pop-up window.

The screenshot shows the 'Add Inventory Item' wizard with three tabs: '1. Platform', '2. Type', and '3. Options'. The 'Options' tab is active. The form contains the following fields:

- Display name:** Backblaze
- Key ID:** 004560642dc
- Application Key:** (masked with dots)

A blue **Connect** button is located next to the Application Key field. A 'Certificate Details' pop-up window is open, displaying the following information:

- Certificate fingerprint:** 13:F5:63:40:11:F3:81:3F:41:E7:05
- Valid:** 28 Apr 2022 - 27 Jul 2022
- Issued by:** CN=R3, O=Let's Encrypt, C=US
- Issued for:** CN=backblazeb2.com

There is a **More** link below the 'Issued for' field. A checkbox labeled 'Auto accept new certificate if this certificate is expired or changed' is checked. At the bottom of the pop-up are **Cancel** and **Accept** buttons. At the bottom right of the main wizard window are **Cancel** and **Finish** buttons.

7. Optionally, you can select **Auto accept new certificate if this certificate is expired or changed**. Click **Accept** to confirm the certificate.
8. Click **Finish** to add the account to Inventory.

Adding Microsoft Azure Storage Accounts

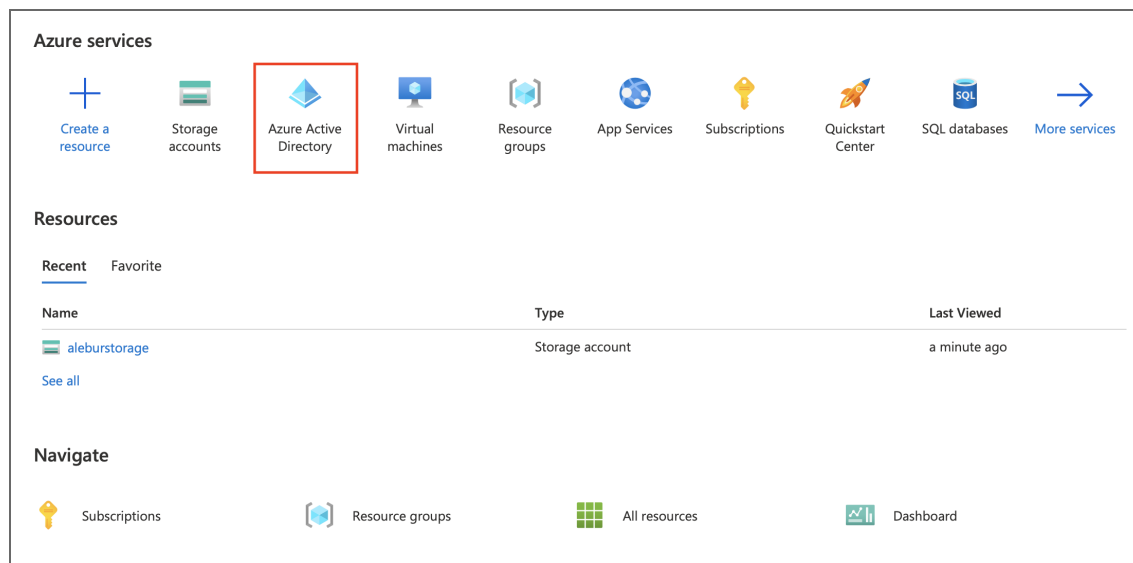
Configure and add a Microsoft Azure Storage account to NAKIVO Backup & Replication as described in the sections below.

- [Configuring a Microsoft Azure Storage Account](#)
- [Obtaining Microsoft Azure Credentials](#)
- [Adding Microsoft Azure Storage Account to Inventory](#)

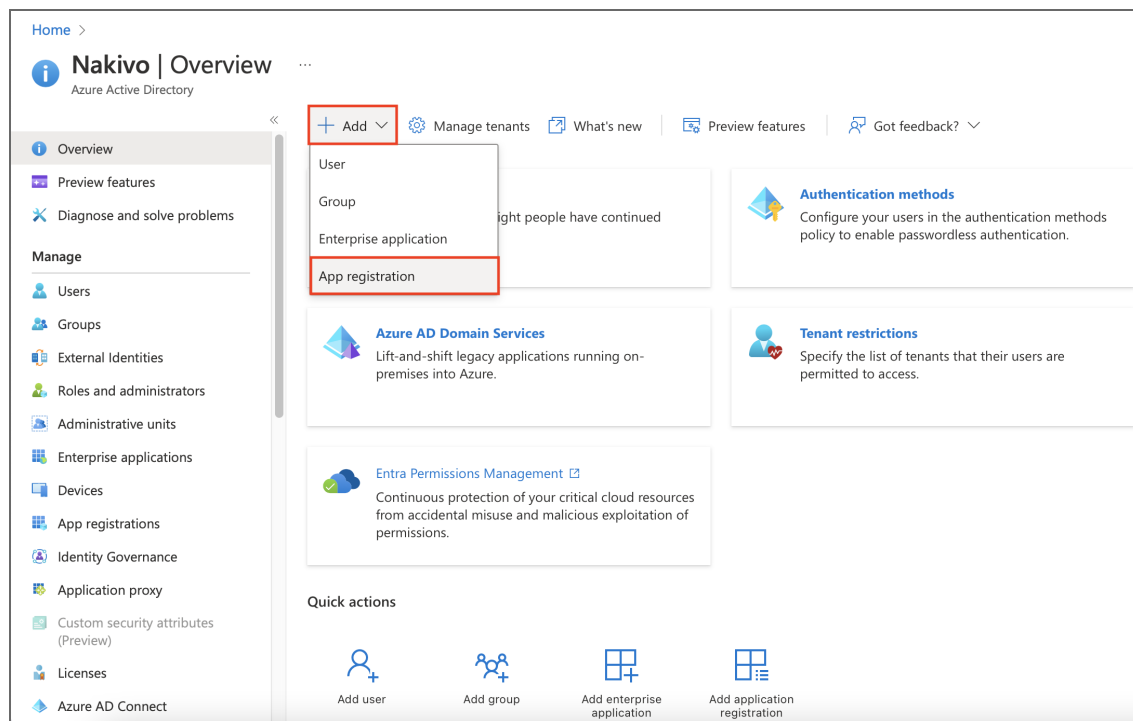
Configuring a Microsoft Azure Storage Account

To configure a Microsoft Azure Storage account to work with NAKIVO Backup & Replication, follow the steps below.

1. Open the Azure Portal by going to portal.azure.com.
2. Sign in to Microsoft Azure with your Microsoft account credentials.
3. Open **Azure Active Directory** from the services dashboard.



4. Register a new application by clicking **Add > App registration** from the **Overview** or **App registrations** menu. If you already have an application for use with NAKIVO Backup & Replication, skip to step 6.



5. Enter a name for your application and set the access level per your requirements. When you're done, click **Register**.

Home > Nakivo | App registrations >

Register an application

The user-facing display name for this application (this can be changed later).

Nakivo Blob ✓

Supported account types

Who can use this application or access this API?

☒ Accounts in this organizational directory only (Nakivo only - Single tenant)

☐ Accounts in any organizational directory (Any Azure AD directory - Multitenant)

☐ Accounts in any organizational directory (Any Azure AD directory - Multitenant) and personal Microsoft accounts (e.g. Skype, Xbox)

☐ Personal Microsoft accounts only

[Help me choose...](#)

Redirect URI (optional)

We'll return the authentication response to this URI after successfully authenticating the user. Providing this now is optional and it can be changed later, but a value is required for most authentication scenarios.

Select a platform ▼ e.g. https://example.com/auth

Register an app you're working on here. Integrate gallery apps and other apps from outside your organization by adding from [Enterprise applications](#).

6. Next, return to the Azure homepage and open **Storage accounts** from the services dashboard.

Azure services

Create a resource

Storage accounts

Azure Active Directory Virtual machines Resource groups App Services Subscriptions Quickstart Center SQL databases More services

Resources

Recent Favorite

Name	Type	Last Viewed
aleburstorage	Storage account	a minute ago

[See all](#)

Navigate








Subscriptions Resource groups All resources Dashboard



7. Click **Create** to create an Azure storage account. If you already have a storage account, skip to step 9.




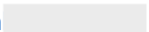

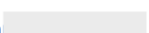


[Home](#) >

Storage accounts ...

Nakivo (nakivo04.onmicrosoft.com)

 Create  Restore  Manage view   Refresh  Export to CSV  Open query

Subscription equals **all** Resource group equals **all**  Location equals **all** 

<input type="checkbox"/> Name 	Type 
<input type="checkbox"/>  a 	Storage account
<input type="checkbox"/>  a 	Storage account
<input type="checkbox"/>  a 	Storage account

8. Select the appropriate **Subscription** and **Resource group** from the respective drop-down menus. You may also create a new resource group by clicking the **Create new** button under the **Resource group** drop-down menu. Name your storage account and configure the **Region**, **Performance**, and **Redundancy** settings based on your preference.

[Home](#) > [Storage accounts](#) >

Create a storage account ...

Basics Advanced Networking Data protection Encryption Tags Review

Project details

Select the subscription in which to create the new storage account. Choose a new or existing resource group to organize and manage your storage account together with other resources.

Subscription * Azure subscription 1 ▼

Resource group * Storage ▼
[Create new](#)

Instance details

If you need to create a legacy storage account type, please click [here](#).

Storage account name ⓘ * techwblob

Region ⓘ * (US) East US ▼

Performance ⓘ *

☒ **Standard:** Recommended for most scenarios (general-purpose v2 account)

☐ **Premium:** Recommended for scenarios that require low latency.

Redundancy ⓘ *

Geo-redundant storage (GRS) ▼

☒ Make read access to data available in the event of regional unavailability.

[Review](#) [< Previous](#) [Next : Advanced >](#)

- If you wish to enable Backup Immutability for this storage account, go to the **Data protection** tab. Under **Tracking**, find and enable the **Enable versioning for blobs** setting. Under **Access control**, find and enable the **Enable version-level immutability support** setting.

Home > Storage accounts >

Create a storage account ...

Basics Advanced Networking **Data protection** Encryption Tags Review

Tracking

Manage versions and keep track of changes made to your blob data.

☒ **Enable versioning for blobs**
Use versioning to automatically maintain previous versions of your blobs. [Learn more](#)

Consider your workloads, their impact on the number of versions created, and the resulting costs. Optimize costs by automatically managing the data lifecycle. [Learn more](#)

☐ **Enable blob change feed**
Keep track of create, modification, and delete changes to blobs in your account. [Learn more](#)

Access control

☒ **Enable version-level immutability support**
Allows you to set time-based retention policy on the account-level that will apply to all blob versions. Enable this feature to set a default policy at the account level. Without enabling this, you can still set a default policy at the container level or set policies for specific blob versions. Versioning is required for this property to be enabled. [Learn more](#)

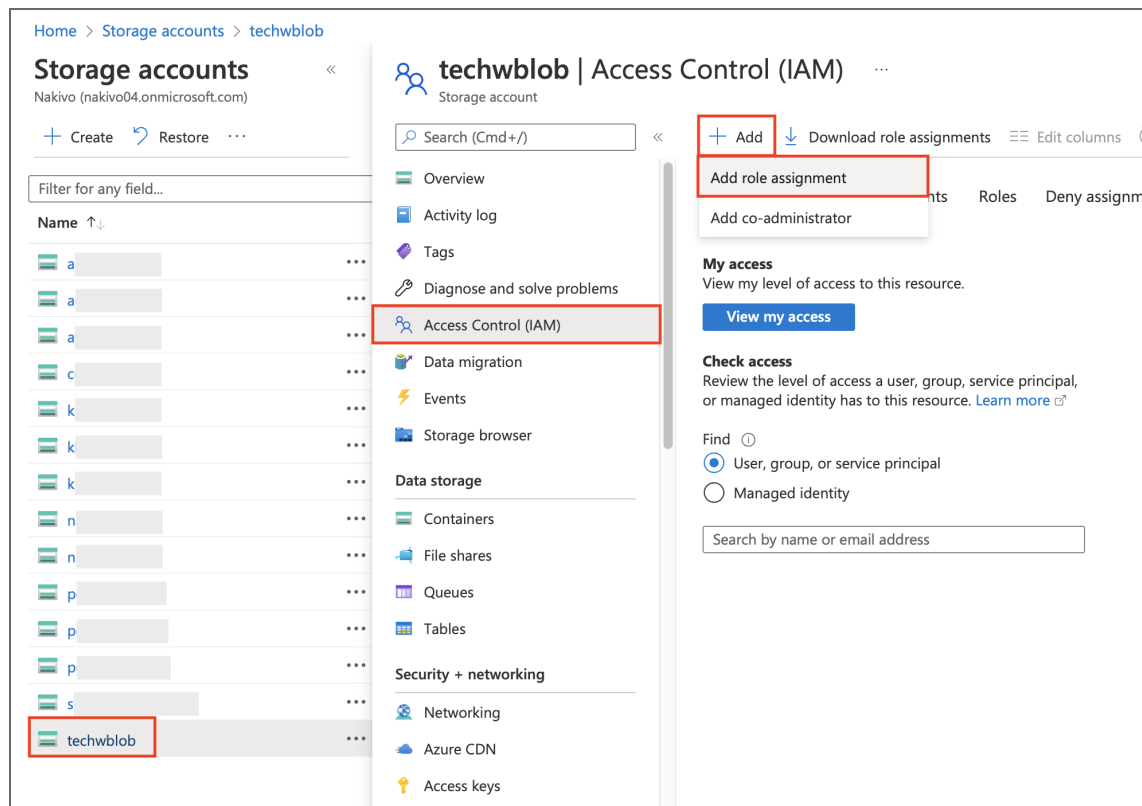
[Review](#) [< Previous](#) [Next : Encryption >](#)

- Optionally, configure advanced settings within the other tabs. When you're done, click **Review**. Review the account configuration and click **Create** if everything is in order.

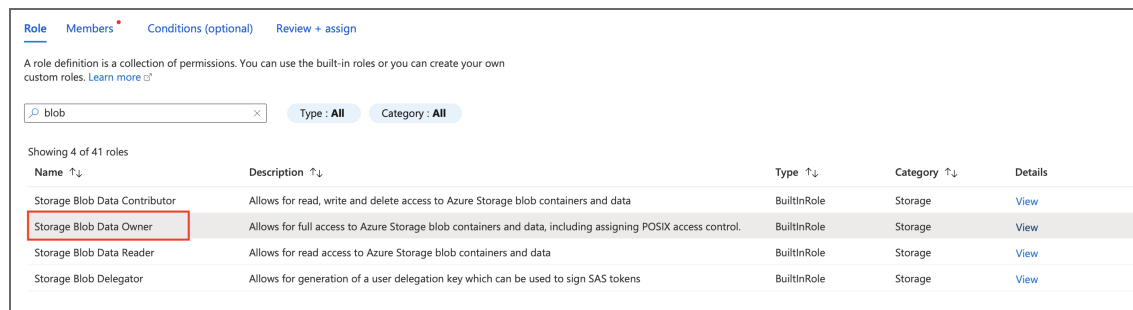
Note

After clicking **Create**, the storage account will undergo a short deployment stage before it appears in the **Storage accounts** menu.

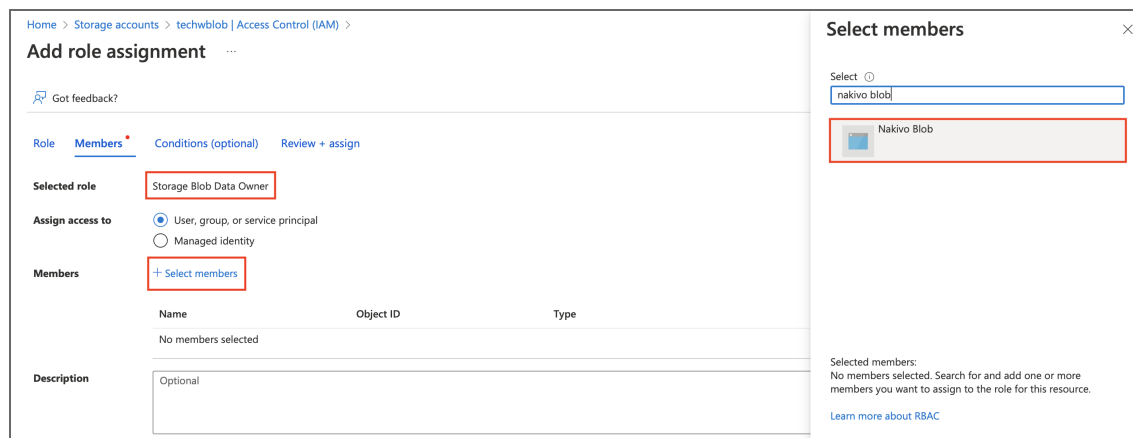
- Locate your storage account in the **Storage accounts** menu and click on it to open the account settings. Go to the Access Control (IAM) tab and click **Add > Add role assignment**.



12. Find the **Storage Blob Data Owner** role and select it. Click **Next**.



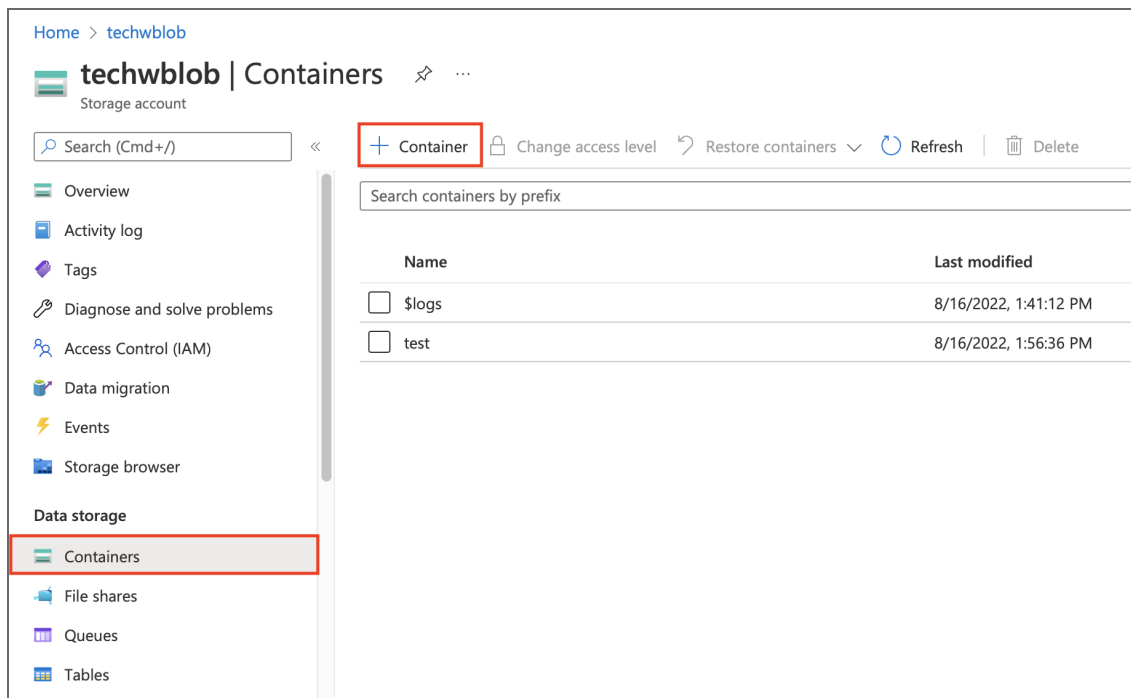
13. Click **Select members** and find the application registered in the previous steps using the search bar. Click on the application name and click **Select** below to confirm. Click **Review + assign** to add the role.



14. To add storage containers to the storage account and configure immutability, go to the **Containers** tab and click **+ Container**.

Note

NAKIVO Backup & Replication automatically detects containers created after adding a Microsoft Azure Storage account to inventory.



15. Name the container and configure its access level as needed. Select **Enable version-level immutability support** under **Advanced** settings if you wish to enable Backup Immutability for this container.

Note

If your storage account does not have version-level immutability support enabled (as described in step 9), you will need to enable this option per container. Existing containers without the **Enable version-level immutability support** option enabled will not be able to make use of Backup Immutability.

New container

×

Name *

nbrblob

✓

Public access level ⓘ

Blob (anonymous read access for blobs only)

✓

⚠

Blobs within the container can be read by anonymous request, but container data is not available. Anonymous clients cannot enumerate the blobs within the container.

^

Advanced

Encryption scope

Select from existing account scopes

✓

☐

Use this encryption scope for all blobs in the container

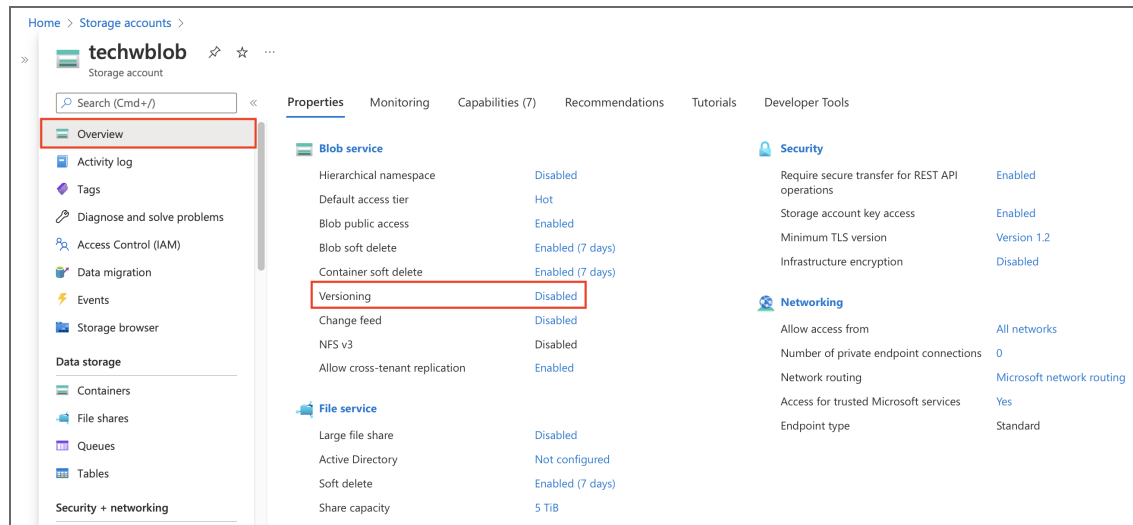
☐

Enable version-level immutability support ⓘ

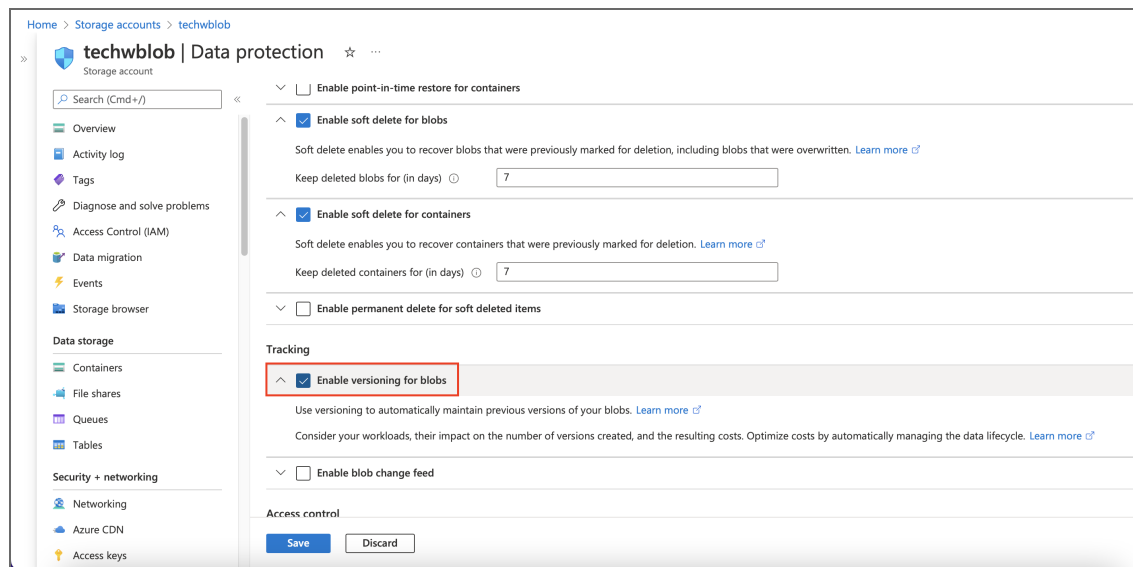
ⓘ

In order to enable version-level immutability support, your storage account must have versioning turned on.

16. If you enabled version-level immutability support in any of the previous steps, also make sure that versioning for blobs is enabled. Return to the storage account's Overview menu and scroll down to find **Versioning** in the **Properties** tab. If your versioning is **Disabled**, click **Disabled**.



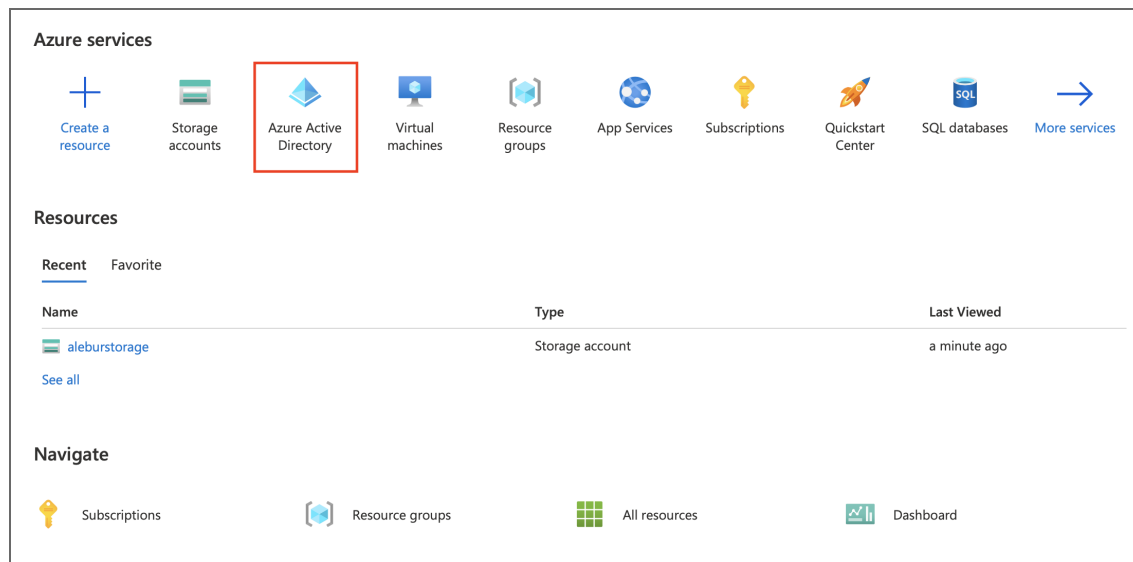
17. Scroll down to find **Enable versioning for blobs** under **Tracking**. Enable this feature and click **Save** below.



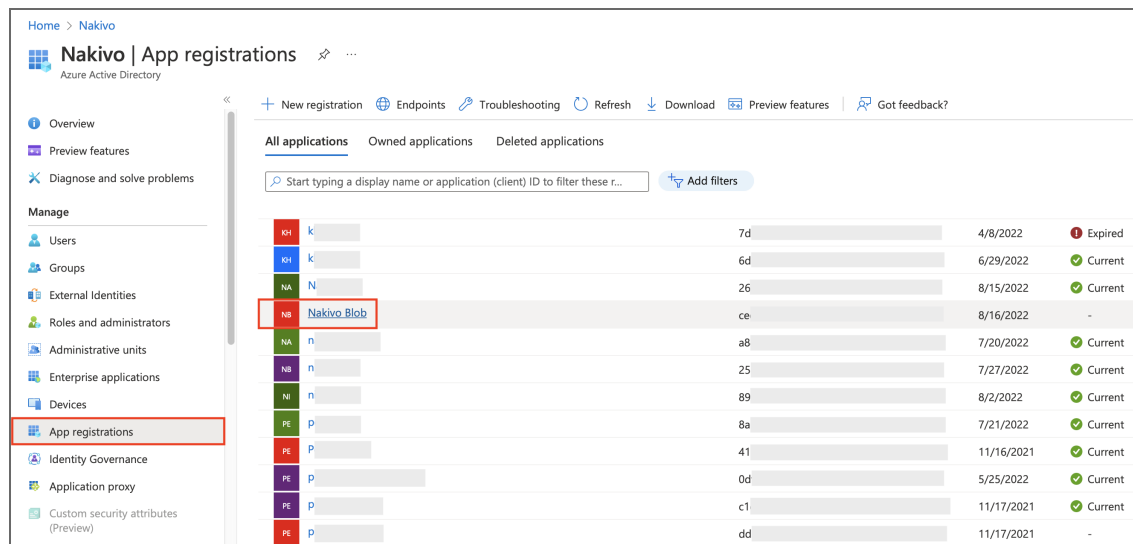
Obtaining Microsoft Azure Credentials

To obtain the credentials required to add a Microsoft Azure Storage account to the NAKIVO Backup & Replication inventory, follow the steps below.

1. Open the Azure Portal by going to portal.azure.com
2. Sign in to Microsoft Azure with your Microsoft account credentials.
3. Select **Azure Active Directory** from the Dashboard or from the Portal Menu.



4. In the left menu, click **App registrations** and locate the application registered for use with NAKIVO Backup & Replication. Click on its name to open the application's settings.



5. Locate and make a note of the Client ID and Tenant ID near the top of the **Overview** menu.

Home > Nakivo | App registrations >

Nakivo Blob

Search (Cmd+/) << Delete Endpoints Preview features

Overview

Quickstart

Integration assistant

Manage

- Branding & properties
- Authentication
- Certificates & secrets
- Token configuration
- API permissions
- Expose an API
- App roles
- Owners

Essentials

Display name : [Nakivo Blob](#)

Application (client) ID : ce [redacted]

Object ID : a2 [redacted]

Directory (tenant) ID : fb [redacted]

Supported account types : [My organization only](#)

Starting June 30th, 2020 we will no longer add any new features to Azure Active Directory Authentication and security updates but we will no longer provide feature updates. Applications will need to be updated.

[Get Started](#) Documentation

6. Go to the **Certificates & secrets** tab. If you already have a client secret for this application, skip this portion. Otherwise, generate a new client secret for the application by clicking **New client secret** in the **Client secrets** tab. Set a description and expiration period for your client secret and click **Add** below.

Home > Nakivo | App registrations > Nakivo Blob

Nakivo Blob | Certificates & secrets

Search (Cmd+/) << Got feedback?

Credentials enable confidential applications to identify themselves to the authentication service when they request a token. For a higher level of assurance, we recommend using a certificate (instead of a client secret scheme).

Application registration certificates, secrets and federated credentials can be found in the tabs below

Certificates (0) **Client secrets (0)** Federated credentials (0)

A secret string that the application uses to prove its identity when requesting a token. Also can be referred to as application password.

[+ New client secret](#)

Description	Expires	Value
No client secrets have been created for this application.		

Add a client secret

Description:

Expires:

7. Find your newly generated client secret in the **Client secrets** tab in the **Value** column. Store the client secret in a reliable location, as you will have to generate a new one if you lose it.

Certificates (0) **Client secrets (1)** Federated credentials (0)

A secret string that the application uses to prove its identity when requesting a token. Also can be referred to as application password.

[+ New client secret](#)

Description	Expires	Value	Secret ID
NBR v10.7	11/16/2022	Ql~ [redacted] 6S...	d [redacted]

Adding Microsoft Azure Storage Account to Inventory

To add a Microsoft Azure Storage account to the NAKIVO Backup & Replication Inventory, follow the steps below.

1. Click **Settings** in the left pane.
2. Go to the **Inventory** tab and click +.
3. On the **Platform** page of the wizard, select **Storage**. Click **Next** to proceed.
4. On the **Type** page, choose **Microsoft Azure Storage**. Click **Next** to proceed.
5. On the **Options** page, configure the following:
 - **Display name:** Enter a desired Inventory display name for the Microsoft Azure Storage account.
 - **Storage account:** Enter the name of the storage account created in the Azure portal.
 - **Tenant ID:** Enter the Azure Tenant ID created when registering your Microsoft Azure account in the Azure Portal.
 - **Azure Client ID:** Enter the Azure Client ID created when registering your Microsoft Azure account in the Azure Portal.
 - **Azure Client Secret:** Enter the Azure Client Secret obtained in the Azure Portal. For more information on obtaining Azure credentials, refer to the [Obtaining Microsoft Azure Credentials](#) section above.

Note

In order to add a Microsoft Azure Storage account to NAKIVO Backup & Replication, the account must be registered in Azure Active Directory. In addition, NAKIVO Backup & Replication must be assigned an appropriate role within Azure's access control. See the [Configuring a Microsoft Azure](#)

[Storage Account](#) section above for more details.

The screenshot shows a dialog box titled "Add Inventory Item" with three steps: 1. Platform, 2. Type, and 3. Options. Step 3 is currently active. It contains the following fields:

- Display name: Azure Blob
- Storage account: techwblob
- Tenant ID: fb
- Azure Client ID: ce
- Azure Client secret: [masked]

At the bottom right, there are "Cancel" and "Finish" buttons.

6. Click **Finish** to add the account to Inventory.

Adding Scan Servers

To add Scan Servers to the Inventory, do the following:

1. Go to **Settings > Inventory**.
2. Click the "... " button and select **Scan servers**.
3. The **Scan Servers** popup displays a list of added scan servers. Optionally, you can click the "... " button to the right of an added scan server and select **Edit** or **Delete** to either edit a scan server's settings or delete it from the list.
4. Click the "+" button.
5. In the **New Scan Server** popup, provide the following information:
 - **Display name:** Specify a name for the scan server.
 - **Platform:** Select either **Microsoft Windows** or **Linux**.
 - **Hostname or IP:** Specify the hostname or IP address of the scan server that you want to add to the inventory.
 - **Credentials type:** Choose your preferred option and enter your respective credentials:
 - **Password:** Enter a **Username** with administrative privileges for the scan server entered above and your **Password**.
 - **Private key:** Select your private key from the drop-down list.

6. Optionally, you can add, manage, or delete your credentials using the **Manage credentials** functionality. Refer to [Managing Credentials](#) for more information.
7. Click **Test Connection** to make sure that NAKIVO Backup & Replication can successfully connect to your scan server.
8. Configure the **Maximum load** for the scan server, which is the maximum number of concurrent scan tasks the scan server can process.
9. After you're done, click **Add**.

The screenshot displays the NAKIVO Backup & Replication software interface. A 'New Scan Server' dialog box is open in the foreground, allowing for the configuration of a new scan server. The dialog box includes the following fields and options:

- Display name:** A text input field containing 'Server1_AVscan'.
- Platform:** A dropdown menu set to 'Microsoft Windows'.
- Hostname or IP:** A text input field containing '10.10.12.10'.
- Credentials type:** A dropdown menu set to 'Password'.
- Username:** A dropdown menu with the placeholder text 'Type or select username'.
- Password:** A text input field with masked characters (dots).
- Test Connection:** A blue button located to the right of the Password field.
- Manage Credentials:** A blue link located below the Password field.
- Maximum load:** A numeric input field set to '2', with a '+' button to its right and the text 'concurrent scan tasks'.
- Buttons:** 'Cancel' and 'Add' buttons at the bottom right of the dialog box.

The background interface shows the 'Inventory' tab with a table of hosts:

Inventory Name	Details
10.10.10.20	1 host, 95 VMs
10.10.10.23	2 hosts, 95 VMs
10.10.10.25	2 hosts, 95 VMs

The footer of the interface includes the text 'Company Name | support.email@gmail.com', 'V10.0.0.012 | Powered by NAKIVO', the 'NAKIVO' logo, and a 'Chat with us' button.

Managing Inventory

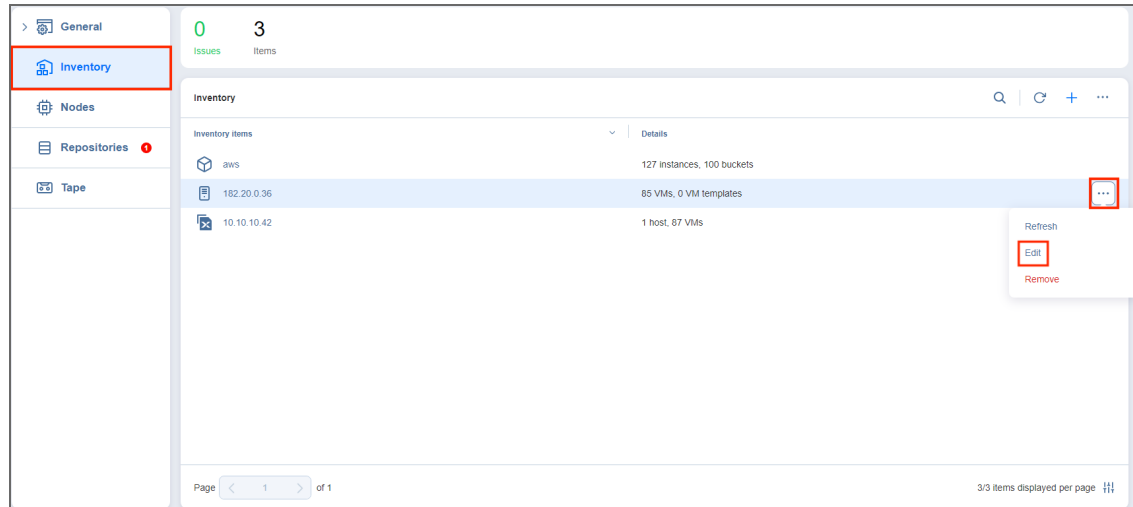
Refer to the following topics:

- [“Editing Inventory Items” on page 429](#)
- [“Refreshing Inventory” on page 430](#)
- [“Removing Items from Inventory” on page 432](#)

Editing Inventory Items

If the credentials of an inventory item are no longer correct, the connection to the inventory item will be lost. To re-establish a connection, update the required fields in the product by following the steps below:

1. Click **Settings** in the left pane of the product.
2. Go to the **Inventory** tab.
3. Hover over the item you would like to edit.
4. Click **Manage** on the right side and then click **Edit**.



5. Update the appropriate fields and click **Save**.

Refreshing Inventory

NAKIVO Backup & Replication keeps the information about the discovered infrastructure in its internal database, which is refreshed every 1 hour by default. During the inventory refresh, the product collects all required information about your virtual infrastructure, such as a list of hosts and VMs, their power state, and so on.

Only one item can be refreshed at a time. If you have added multiple items to the inventory, they will remain in the queue until they are able to be refreshed. Refer to the sections below to learn how to refresh the discovered infrastructure.

- [Changing Inventory Refresh Frequency](#)
- [Manually Refreshing All Inventory](#)
- [Manually Refreshing a Discovered Item](#)

Changing Inventory Refresh Frequency

1. Click **Settings** in the left pane of the product.
2. Go to the **System setting > Auto refresh** tab.
3. Do either of the following:
 - To prevent the product from automatically refreshing the inventory, deselect the **Refresh inventory every X [time period]** checkbox.
 - To change the inventory refresh frequency, enter a new value in the **Refresh inventory every X [time period]** field (from 1 to 60 minutes or from 1 to 24 hours).

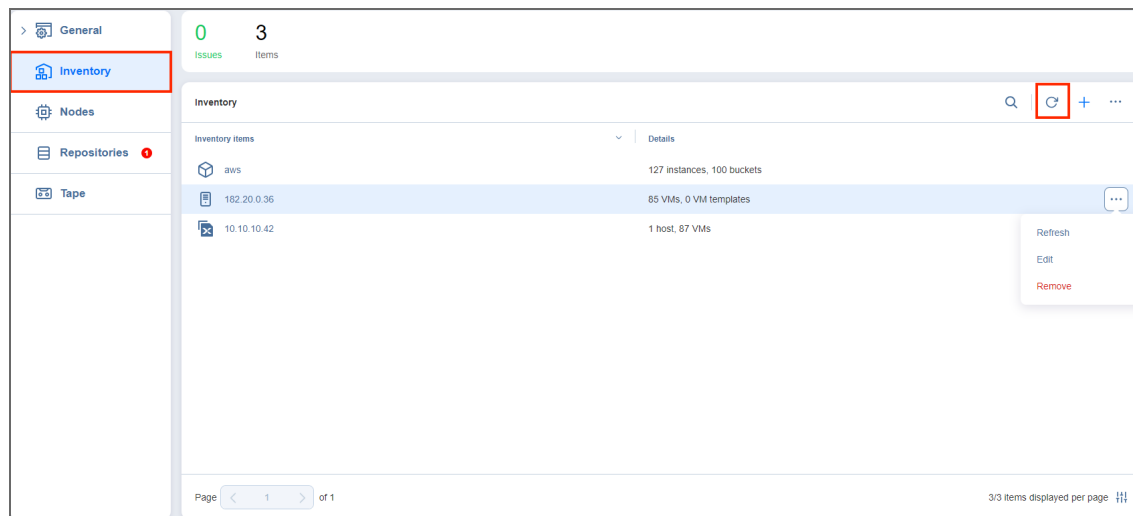
Note

New settings are applied instantly and do not need to be saved.

Manually Refreshing the Entire Inventory

To refresh all inventory items, follow the steps below:

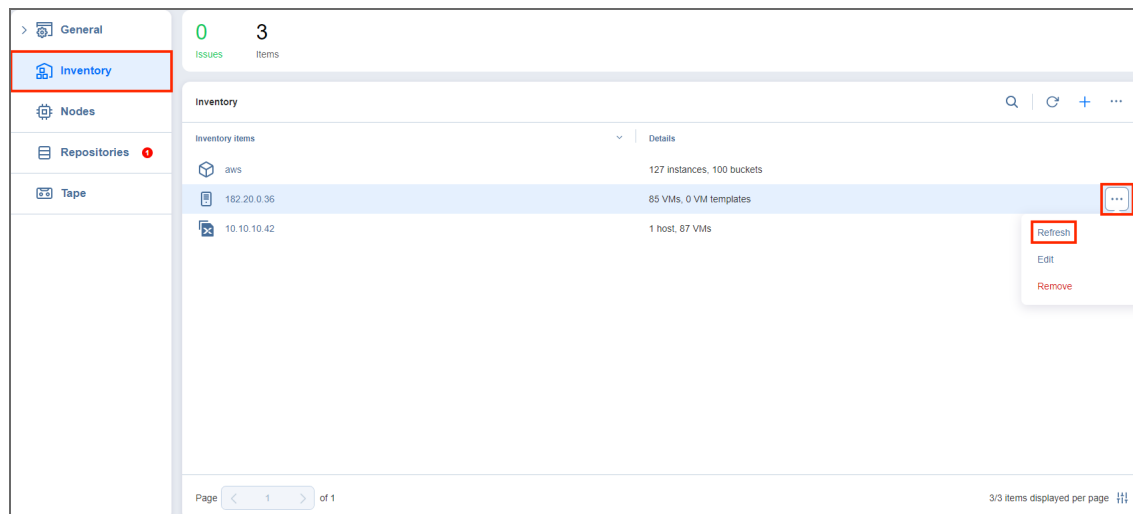
1. Click **Settings** in the left pane of the product and go to the **Inventory** tab.
2. Click the **Refresh All** button.



Manually Refreshing an Inventory Item

To refresh a single inventory item, follow the steps below:

1. Click **Settings** in the left pane of the product and go to the **Inventory** tab.
2. Click the **...** button next to the item that you would like to refresh.
3. Click **Refresh**.

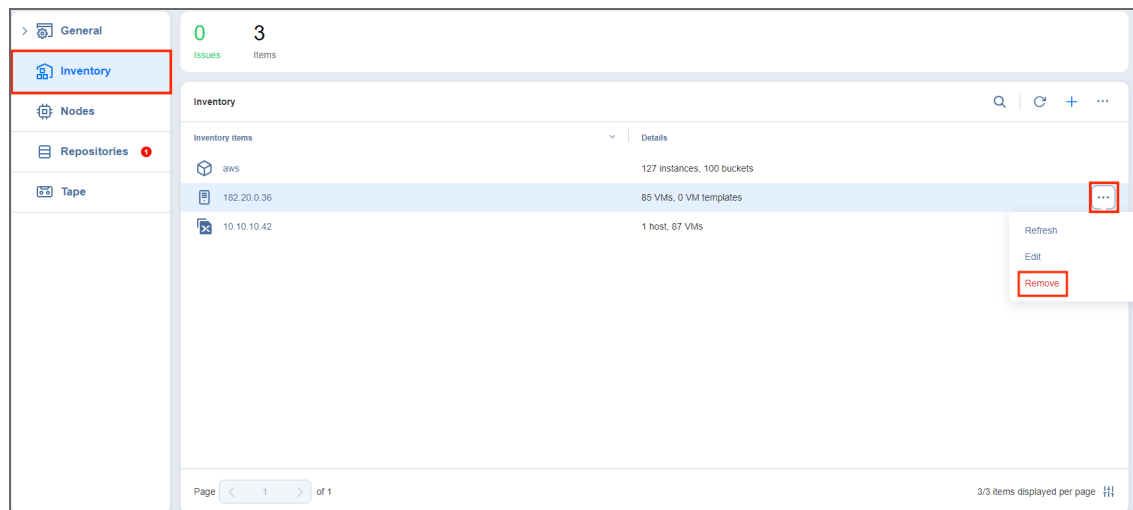


Removing Items from Inventory

You cannot remove an inventory item if there is at least one backup or replication job that uses the item or its children. In order to remove such items from the inventory, you first need to delete (or edit) the corresponding jobs so no VMs/Instances are backed up or replicated on the host/server/account being removed.

To remove an item from the inventory, follow the steps below:

1. Click **Settings** in the left pane of the product and go to the **Inventory** tab.
2. Hover over the item that you would like to remove from the inventory.
3. Click **Manage** on the right side and click **Remove**.



Managing Credentials

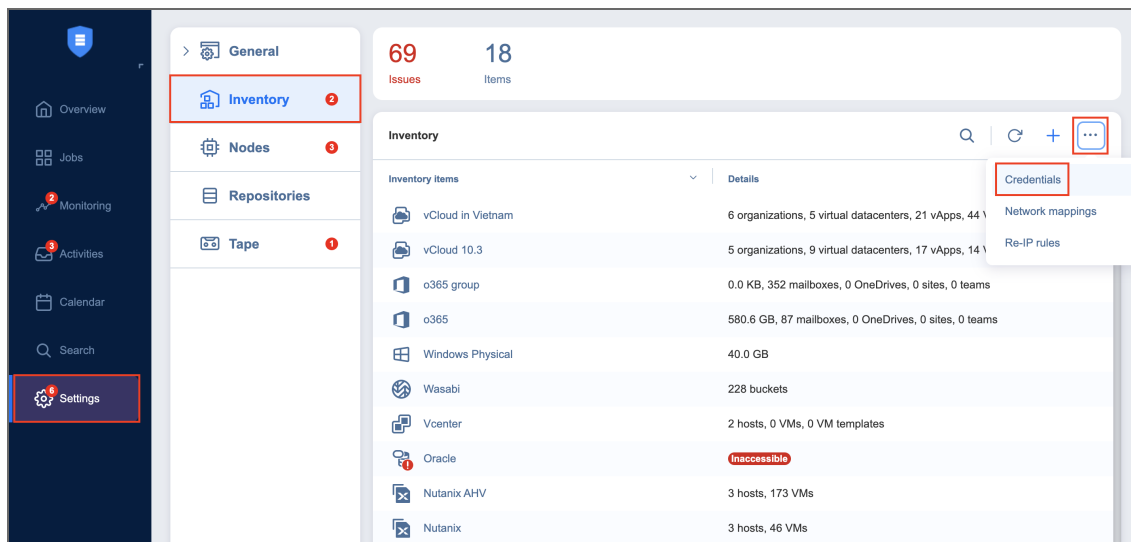
NAKIVO Backup & Replication provides you with the ability to store your OS login and password, Amazon EC2 instance private keys, and SSH keys to your Linux machines. Refer to the following topics:

- [Adding Credentials](#)
- [Editing Credentials](#)
- [Deleting Credentials](#)

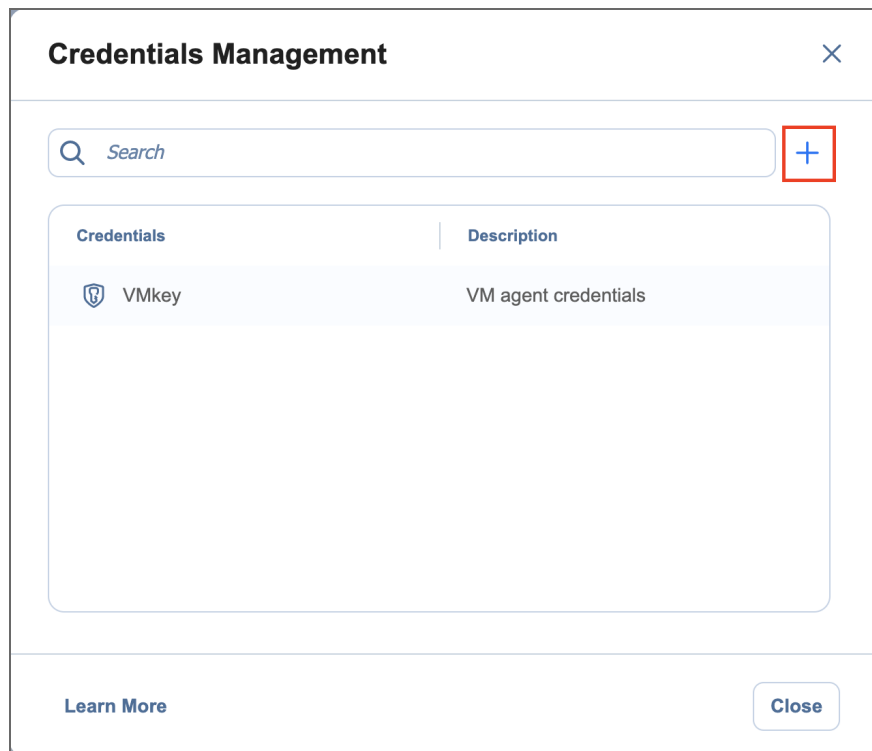
Adding Credentials

To add new credentials, do the following:

1. Click **Settings** in the left pane of the product.
2. Go to the **Inventory** tab.
3. Click **Manage**.
4. In the dialog box that opens, click **Credentials**.



5. In the **Manage Credentials** dialog box that opens, click **Add Credentials**.



6. Then, do the following:

- **Type:** Select the type of credentials:
 - To set up a basic username and password, fill out the **Username**, **Password**, and (optionally) **Description** fields and click **Save**.
 - To set up a master password, select **Master password** from the drop-down list and fill out the **Name**, **Password**, and (optionally) **Description** fields and click **Save**.
 - To add a private key to an Amazon EC2 instance or a Linux physical machine, do the following:
 - a. **Private key:** Select **Private Key** from the Type menu.
 - b. **Username:** Enter a username for the private key.
 - c. **Password:** Create a password for the private key.
 - d. **Repeat password:** Repeat password.

Note

If you generated your key with a passphrase, you have to enter this passphrase into the **Password** and **Repeat password** boxes.

- e. Locate and select the private key.

Note

- Supported key formats: RSA, DSA
- By default, newer versions of *ssh-keygen* generate keys with the unsupported -----BEGIN OPENSSH PRIVATE KEY----- format. To generate a key with the -----BEGIN RSA PRIVATE KEY----- format, include *-m PEM* in your *ssh-keygen* command.
- Supported file extensions: no extension, .pem, .key, .cer, .der, .txt

f. Fill out the **Description** box.

g. Click **Save**.

Add Credentials [X]

Type: Private Key [v]

Username: user

Password: [dots] [eye icon]

Repeat password: [dots] [eye icon]

Private Key: key.pem [Browse...]

Description: OS key

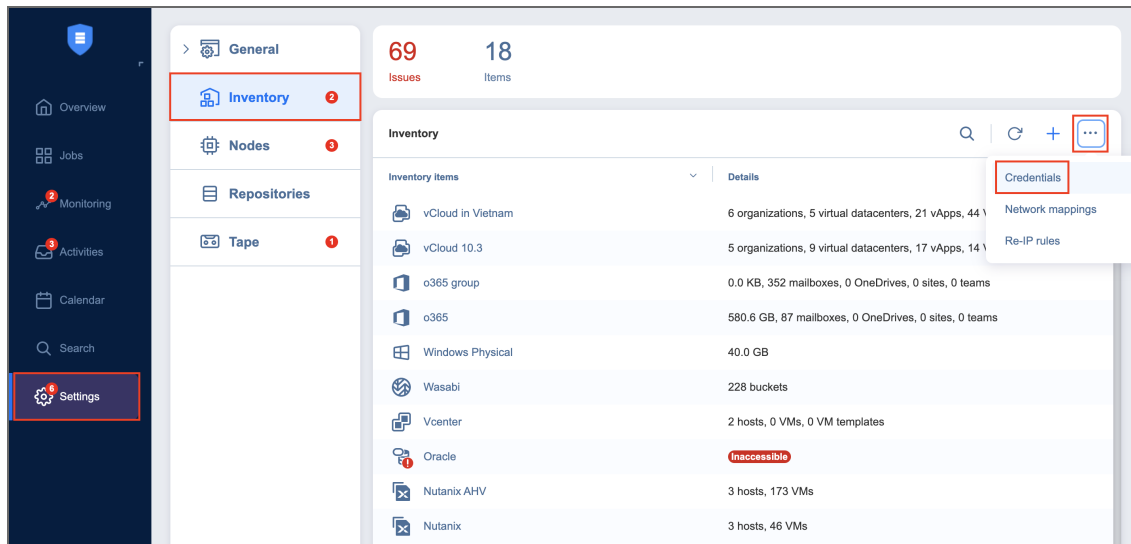
[Learn More] [Cancel] [Add]

You can now assign the credentials while creating jobs or setting up VM agents.

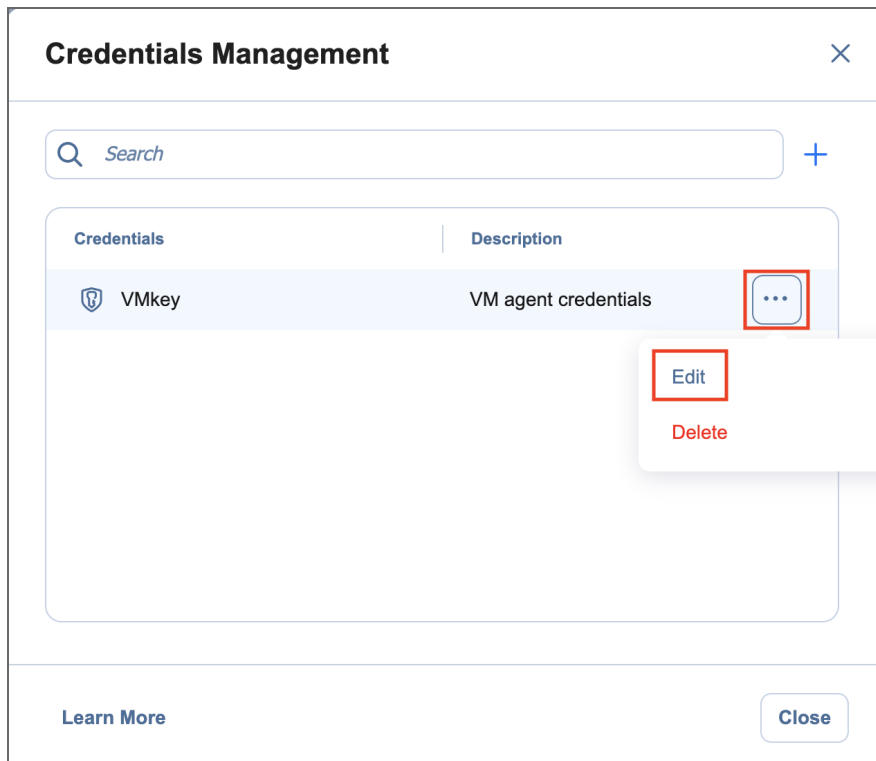
Editing Credentials

To edit credentials, do the following:

1. Click **Settings** in the left pane of the product.
2. Go to the **Inventory** tab.
3. Click **Manage**.
4. In the dialog that opens, click **Credentials**.



5. Hover over the record that you would like to edit and click **Manage > Edit**.

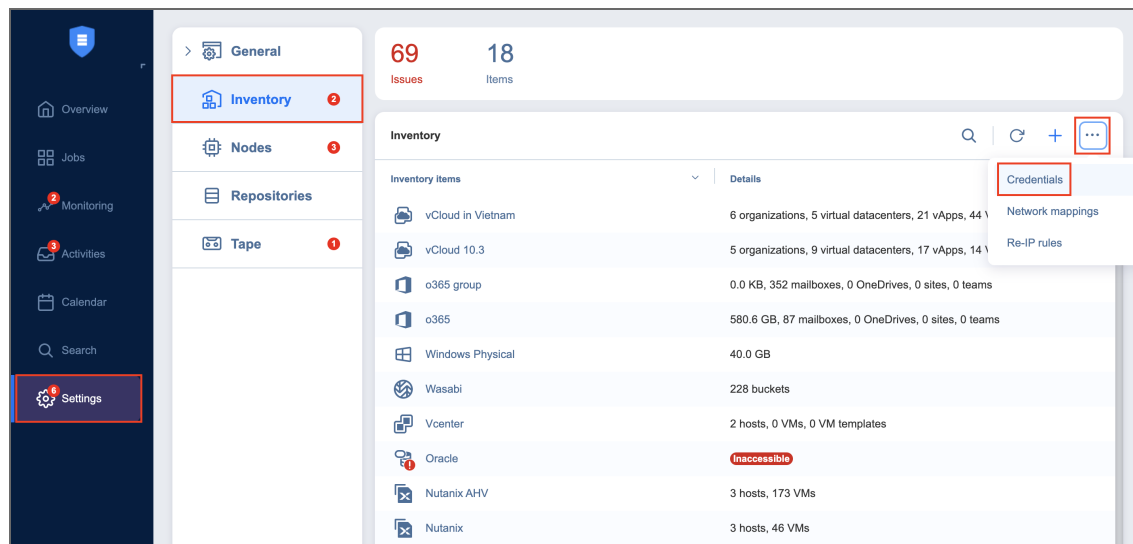


6. Make any required changes, and then click **Save**.

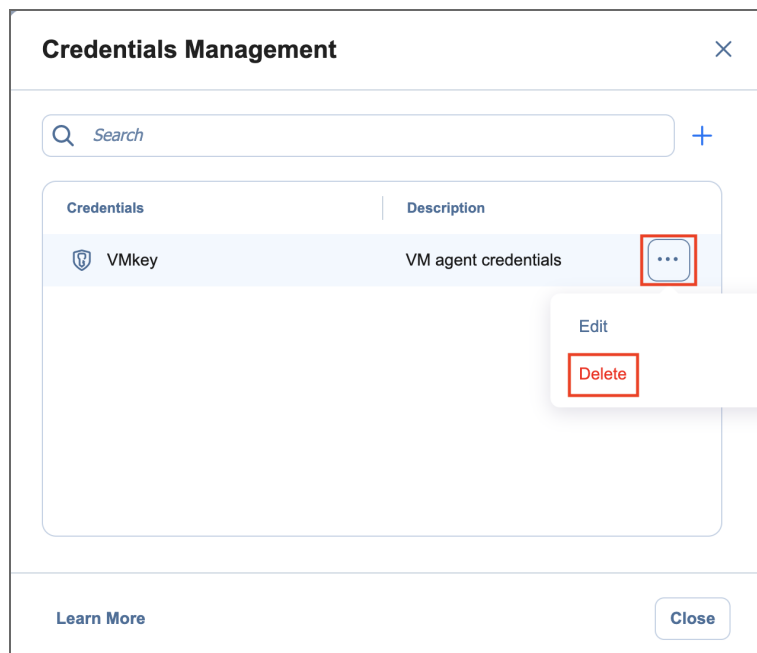
Deleting Credentials

To delete credentials, do the following:

1. Click **Settings** in the left pane of the product.
2. Go to the **Inventory** tab.
3. Click **Manage**.
4. In the dialog that opens, click **Credentials**.



5. Hover over the record that you would like to delete and click **Manage > Delete**.



6. Click **Delete** in the confirmation dialog box that opens.

Nodes

Nodes are an essential component of NAKIVO Backup & Replication. They include Transporters, VM Agents, and Physical Machine Agents. The [Transporter](#), for example, performs backup, replication, and recovery, as well as data compression, deduplication, and encryption. The **Nodes** tab contains a **Summary** bar, which offers an overview of all nodes. The data displayed is as follows:

- **Issues:** Total number of issues/alarms related to nodes
- **Nodes:** Total number of nodes
- **Inaccessible:** Total number of inaccessible nodes
- **Working:** Total number of working nodes
- **Idle:** Total number of idle nodes

The screenshot displays the NAKIVO Backup & Replication interface. On the left is a dark sidebar with navigation icons and labels: Overview, Jobs, Monitoring (with a red badge '2'), Activities, Calendar, Search, Settings (with a red badge '8'), Help, and Logout. The main content area has a top navigation bar with 'General', 'Inventory' (with a red badge '1'), 'Nodes' (with a red badge '3'), 'Repositories', and 'Tape' (with a red badge '1'). Below this is a summary bar for the 'Nodes' tab, enclosed in a red box, showing: 204 Issues, 11 Nodes, 4 Inaccessible, 0 Working, and 7 Idle. The main area contains a table titled 'Nodes' with columns: Name, Type, Hostname or IP, Port, Max I/O, Current load, Version, and Status. The table lists several nodes, including Transporters (Onboard, 10.30.23..., Asia Pac..., HV, Asia Pac..., aws, 34.254.1..., Nutanix, HyperV) and Physical machine agents (Windows...). Some nodes are marked as 'Good', 'Inaccessible', or 'Failed'. At the bottom, there is a pagination bar showing 'Page 1 of 1' and '11/11 items displayed per page'.

Name	Type	Hostname or IP	Port	Max I/O	Current load	Version	Status
Onboard...	Transporter (Installed)	10.30.23.14	9446	6	0	10.8.0.r695	Good
10.30.23...	Transporter (Nutanix /	10.30.24.29	9446	6	0	10.8.0.r695	Good
Asia Pac...	Transporter (Amazon	10.0.177.50	9446	6	0	10.8.0.e695	Good
HV	Transporter (Installed)	10.30.21.18	9446	6	0	10.8.0.r695	Good
Windows...	Physical machine age	10.30.23.52	9446	6	0	10.8.0.p695	Good
Asia Pac...	Transporter (Amazon	18.143.100.	9446	6	0	10.8.0.e695	Good
aws	Transporter (Amazon	35.159.46.1	9446	6	0	10.7.0.e682	Inaccessible
34.254.1...	Transporter (Installed)	34.254.189.	9446	6	0		Failed
Nutanix	Transporter (Nutanix /		9446	6	0		Failed
HyperV	Transporter (Installed)	10.30.40.65	9446	6	0	10.7.0.r663i	Inaccessible
34.254.1...	Transporter (Installed)	34.254.189.	9446	6	0	10.8.0.r695	Refreshing... 40%

To learn how to add nodes and manage them, refer to the topics below:

- [“Configuring Nodes” below](#)
- [“Managing Nodes” on page 457](#)

Configuring Nodes

Refer to the following topics:

- [“Adding Existing Nodes” on the next page](#)
- [“Deploying Transporter as Nutanix AHV Appliance” on page 448](#)
- [“Deploying Transporter as VMware Appliance” on page 449](#)

- [“Deploying Transporters in Amazon EC2” on page 452](#)
- [“Installing a VM Agent” on page 455](#)

Adding Existing Nodes

After you have installed a Transporter or Agent, you need to add it to NAKIVO Backup & Replication so that the Transporter or Agent can be used for backup, replication, and recovery tasks.

Important

Before adding the existing Transporter to your NAKIVO Backup & Replication, make sure that this Transporter is not used by any other Director as it may lead to unforeseen errors.

Refer to the following topics:

- [Installed Service](#)
- [VMware Appliance](#)
- [Amazon EC2 Instance](#)
- [Nutanix AHV Appliance](#)

Installed Service

Follow the steps below to add a node that is installed as a service:

1. Click **Settings** in the left pane of the product and go to the **Nodes** tab.
2. Click **Add Existing Node** and then click **Installed service**.

The screenshot displays the NAKIVO Backup & Replication interface. On the left, the 'Nodes' tab is selected in the sidebar. The main panel shows a summary of node status: 391 Issues, 6 Nodes, 2 Inaccessible, 0 Working, and 4 Idle. Below this is a table of nodes:

Name	Type	Hostname or IP	Port	Max load	Status
aws	Transporter (Amazon)	35.159.46.1	9446	6	Good
Windows...	Physical machine agent	10.30.23.52	9446	6	Good
Onboard ...	Transporter (Installed)	10.30.23.14	9446	6	Good
HyperV	Transporter (Installed)	10.30.40.65	9446	6	Inaccessible
Asia Paci...	Transporter (Amazon)	10.0.37.138	9446	6	Good
10.30.23....	Transporter (Nutanix)	10.30.24.29	9446	6	Good

A dropdown menu is open, showing the following options: 'Installed service' (selected), 'VMware vSphere appliance', 'Amazon EC2 Instance', and 'Nutanix AHV appliance'. The 'Add Existing Node' button is highlighted in the bottom right corner of the dropdown menu.

3. The **Add Existing Node - Installed Service** menu opens. In the **Hostname or IP** box, enter the IP address or hostname of the machine on which the node is installed.

Note

If you are adding the node by a DNS name, make sure this DNS name can be resolved on the machines on which the Director and any other nodes (which you plan to use in conjunction with the current one) are installed.

4. Click **More options...** to reveal and edit the following fields:
 - In the *Networking* section:
 - **Node port:** Specify the port number that will be used to connect to the node.
 - **Data transfer ports:** Specify a range of port numbers (from 1 to 65535) that will be used to transfer data. The range you specify should contain at least 100 ports. Make sure that the ports you specify are open in your firewall.
 - In the *Settings* section:
 - **Node name:** Specify a display name for the node.
 - **Maximum load:** Specify the maximum number of tasks that the node should process simultaneously. A task, for example, is a backup or replication of a single VM disk, or one granular recovery session.
 - **Additional load for recovery jobs:** If selected, the specified amount of tasks will be added to set maximum node load to be used for recovery jobs exclusively. This allows running the specified amount of concurrent recovery jobs along with other types of jobs without the need to wait for their completion.
 - **Enable Direct Connect for this node:** When this option is enabled, you can access remote resources via a single port connection without establishing a VPN connection. The following conditions must be met at the remote infrastructure to enable this feature:
 - A NAKIVO Transporter or Agent must be installed.
 - A master password must be set for security reasons. A pre-shared key is generated based on the entered master password.
 - The node port on the local machine must be exposed to external availability via the Internet.
 - **Enable debug logging for this node:** If needed, enable debug level logging for the current node. It is not recommended to use this option on a permanent basis.
 - In the *Security* section:

- **Master Password:** Optionally, you can set a password to secure the connection. The set password must match the one configured on the Transporter or Agent. Note that setting a master password is required when the **Enable Direct Connect for this node** option is enabled. Proceed as follows:
 - a. After entering the password, click **Connect**.
 - b. The **Certificate Details** dialog box appears. Verify the certificate details, and click **Accept**.

Notes

- The master password must adhere to the following requirements:
 - Minimal length - 5 characters.
 - Maximum length - 50 characters.
 - The master password can be set and re-set manually by running the command on the machine housing the Transporter or Agent. Follow these steps:
 - Enter the following command `bhsvc -b password`, replacing "password" with your master password.
 - **Restart** the Transporter or Agent.
5. Click **Add**. The node is added to the product and can be used for backup, replication, and recovery jobs.

Add Existing Node - Installed Service

Hostname or IP: i

Networking

Node port: i

Data transfer ports: i

Settings

Node name:

Maximum load: concurrent tasks i

☒ Additional load for recovery jobs: concurrent tasks i

☐ Enable Direct Connect for this node (requires master password) i

☐ Enable debug logging for this node i

Security

Master password: i

Connect

VMware Appliance

Follow the steps below to add a Transporter that is [deployed as a VMware appliance](#):

1. Click **Settings** in the left pane of the product dashboard and go to the **Nodes** tab.
2. Click **Add Existing Node** and then click **VMware vSphere appliance** in the dialog that opens.

The screenshot shows the product dashboard with the **Nodes** tab selected in the left sidebar. The main area displays a table of nodes with columns: Name, Type, Hostname or IP, Port, Max load, and Status. A dialog box titled "Add Existing Node" is open, showing a list of installed services: VMware vSphere appliance, Amazon EC2 instance, and Nutanix AHV appliance. The "Add Existing Node" button is highlighted in the dialog.

Name	Type	Hostname or IP	Port	Max load	Status
aws	Transporter (Amazon	35.159.46.1	9446	6	Good
Windows...	Physical machine age	10.30.23.52	9446	6	Good
Onboard ...	Transporter (Installed	10.30.23.14	9446	6	Good
HyperV	Transporter (Installed	10.30.40.65	9446	6	Inaccessible
Asia Paci...	Transporter (Amazon	10.0.37.138	9446	6	Good
10.30.23...	Transporter (Nutanix #	10.30.24.29	9446	6	Good

3. The **Add Existing Transporter - VMware vSphere Appliance** dialog opens. Fill out the fields as described below:
- In the **Host or cluster** box, specify the location of the host or cluster where the corresponding virtual machine is deployed.
 - In the **Virtual machine** box, specify the virtual machine on which the Transporter is installed.
 - In the **OS Username** and **OS Password** fields, specify credentials for accessing the virtual machine.
 - In the **SSH port** box, enter the SSH port if needed.
 - Click **More options** to reveal and edit the following fields:
 - In the *Networking* section:
 - **Transporter port**: Specify the port number that will be used to connect to the Transporter.
 - **Data transfer ports**: Specify a range of port numbers (from 1 to 65535) that will be used to transfer data. The range you specify should contain at least 100 ports. Make sure that the ports you specify are open in your firewall.
 - In the *Settings* section:
 - **Transporter name**: Specify a display name for the Transporter.
 - **Maximum load**: Specify the maximum number of tasks that the Transporter should process simultaneously. A task, for example, is a backup or replication of a single VM disk, or one granular recovery session.
 - **Additional load for recovery jobs**: Selecting this option reserves the Transporter's resources exclusively for recovery jobs. This allows you to run recovery jobs concurrently with other types of jobs without the need to wait for their completion. The Transporter resources will be reserved according to the specified number.
 - **Enable debug logging for this transporter**: If needed, enable debug level logging for the current transporter. It is not recommended to use this option on a permanent basis.
 - **Enable Direct Connect for this transporter**: When this option is enabled, you can access remote resources via a single port connection without establishing a VPN connection. The following conditions must be met at the remote infrastructure to enable this feature:
 - A NAKIVO Transporter must be installed.
 - A master password must be set for security reasons. A pre-shared key is generated based on the entered master password.
 - The Transporter port on the local machine must be exposed to external availability via the Internet.

- Click **Add**. The Transporter is added to the product and can be used for backup, replication, and recovery jobs.

Add Existing Transporter - VMware vSphere Appliance

Host or cluster: vSan

Virtual machine: AD Server-replica

OS username: user

OS password: *****

SSH port: 2221

Networking

Transporter port: 9446

Data transfer ports: 9448-10000

Settings

Transporter name: VMware

Maximum load: 6 concurrent tasks

☒ Additional load for recovery jobs: 2 concurrent tasks

☐ Enable debug logging for this transporter

☐ Enable Direct Connect for this transporter

Cancel Add

Amazon EC2 Instance

If you have already deployed a Transporter in Amazon EC2 and now wish to re-import the Transporter in a new instance of NAKIVO Backup & Replication, do the following:

- Click **Settings** in the left pane of the product and go to the **Nodes** tab.
- Click **Add Existing Node** and then click **Amazon EC2 instance** in the pop-up that opens.

General Inventory **Nodes** Repositories Tape

391 Issues 6 Nodes 2 Inaccessible 0 Working 4 Idle

Nodes Node Pools

Name	Type	Hostname or	Port	Max loa
aws	Transporter (Amazon	35.159.46.1	9446	6
Windows...	Physical machine age	10.30.23.52	9446	6
Onboard ...	Transporter (Installed	10.30.23.14	9446	6
HyperV	Transporter (Installed	10.30.40.65	9446	6
Asia Paci...	Transporter (Amazon	10.0.37.138	9446	6
10.30.23....	Transporter (Nutanix	10.30.24.29	9446	6

Installed service

VMware vSphere appliance

Amazon EC2 instance

Nutanix AHV appliance

Add Existing Node

Deploy New Node

Page 1 of 1

6/6 items displayed per page

3. The **Add Existing Transporter - Amazon EC2 Instance** dialog opens. Fill out the fields as described below:
- **AWS account:** Choose an appropriate Amazon AWS Account from the list of Amazon AWS Accounts added to the [Inventory](#).
 - **Region:** Choose a region in which an AWS EC2 instance with the Transporter is deployed.
 - **EC2 Instance:** Select the Amazon EC2 Instance with the Transporter that you wish to add to the product.
 - **Private key:** Click the **Browse** button to locate and upload the Private key for the Transporter Instance that was created when you deployed the Transporter in the cloud.
 - Click **More options** to reveal and edit the following fields:
 - In the *Networking* section:
 - **Transporter port:** Specify the port number that will be used to connect to the Transporter.
 - **Data transfer ports:** Specify a range of port numbers (from 1 to 65535) that will be used to transfer data. The range you specify should contain at least 100 ports. Make sure that the ports you specify are open in your firewall.
 - In the *Settings* section:
 - **Operation mode:** Choose one of the following Transporter operation modes:
 - **Always running**
 - **Running while required**
 - **Transporter name:** Specify a display name for the Transporter.
 - **Maximum load:** Specify the maximum number of tasks that the Transporter should process simultaneously. A task, for example, is a backup or replication of a single VM disk, or one granular recovery session.
 - **Additional load for recovery jobs:** If selected, the specified amount of tasks will be added to set maximum transporter load to be used for recovery jobs exclusively.
 - **Enable debug logging for this Transporter:** If needed, enable debug level logging for the current transporter. It is not recommended that you use this option on a permanent basis.
4. Click **Add**. The Transporter is added to the product and can be used for backup, replication, and recovery jobs.

Add Existing Transporter - Amazon EC2 Instance

AWS account:
 Region:
 EC2 instance:
 Private key: Please upload the key

Networking
 Transporter port:
 Data transfer ports:

Settings
 Operation mode:
 Transporter name:
 Maximum load: concurrent tasks
☒ Additional load for recovery jobs: concurrent tasks
☐ Enable debug logging for this transporter

Nutanix AHV Appliance

Follow the steps below to add a Transporter that is [deployed as a Nutanix AHV appliance](#):

1. Click **Settings** in the left pane of the product and go to the **Nodes** tab.
2. Click **Add Existing Node** and then select **Nutanix AHV appliance**.

The screenshot shows the Nutanix AHV Appliance interface. On the left, the 'Nodes' tab is selected in the sidebar. The main panel displays a table of nodes with columns: Name, Type, Hostname or Port, Max load, and Status. A dialog box is open, showing the 'Add Existing Node' option selected from a dropdown menu. The dialog also shows the 'Nutanix AHV appliance' option selected from a list of installed services.

Name	Type	Hostname or Port	Max load	Status
aws	Transporter (Amazon)	35.159.46.1	9446	6
Windows...	Physical machine age	10.30.23.52	9446	6
Onboard ...	Transporter (Installed)	10.30.23.14	9446	6
HyperV	Transporter (Installed)	10.30.40.65	9446	6
Asia Paci...	Transporter (Amazon)	10.0.37.138	9446	6
10.30.23...	Transporter (Nutanix)	10.30.24.29	9446	6

3. In the **Add Existing Transporter - Nutanix AHV Appliance** dialog, enter the following options:
 - In the **Cluster** box, select the cluster where the corresponding virtual machine is deployed.
 - In the **Virtual machine** box, specify the virtual machine on which the Transporter is installed.

- In the **OS Username** and **OS Password** fields, specify credentials for accessing the virtual machine.
- In the **SSH port** box, enter the SSH port if needed.
- Click **More options** to reveal and edit the following fields:
 - In the *Networking* section:
 - **Transporter port:** Specify the port number that will be used to connect to the Transporter.
 - **Data transfer ports:** Specify a range of port numbers (from 1 to 65535) that will be used to transfer data. The range you specify should contain at least 100 ports. Make sure that the ports you specify are open in your firewall.
 - In the *Settings* section:
 - **Transporter name:** Specify a display name for the Transporter.
 - **Maximum load:** Specify the maximum number of tasks that the Transporter should process simultaneously. A task, for example, is a backup or replication of a single VM disk, or one granular recovery session.
 - **Additional load for recovery jobs:** If selected, the specified amount of tasks will be added to set maximum transporter load to be used for recovery jobs exclusively.
 - **Enable debug logging for this Transporter:** If needed, enable debug level logging for the current transporter. It is not recommended that you use this option on a permanent basis.

Add Existing Transporter - Nutanix AHV Appliance

Cluster:
Nutanix AHV

Virtual machine:
24

OS username:
user

OS password:

SSH port:
2221

Transporter port:
9446

Data transfer ports:
9448-10000

Settings

Transporter name:
Nutanix

Maximum load:
6
concurrent tasks

☒ Additional load for recovery jobs:
2
concurrent tasks

☐ Enable debug logging for this transporter

Cancel
Add

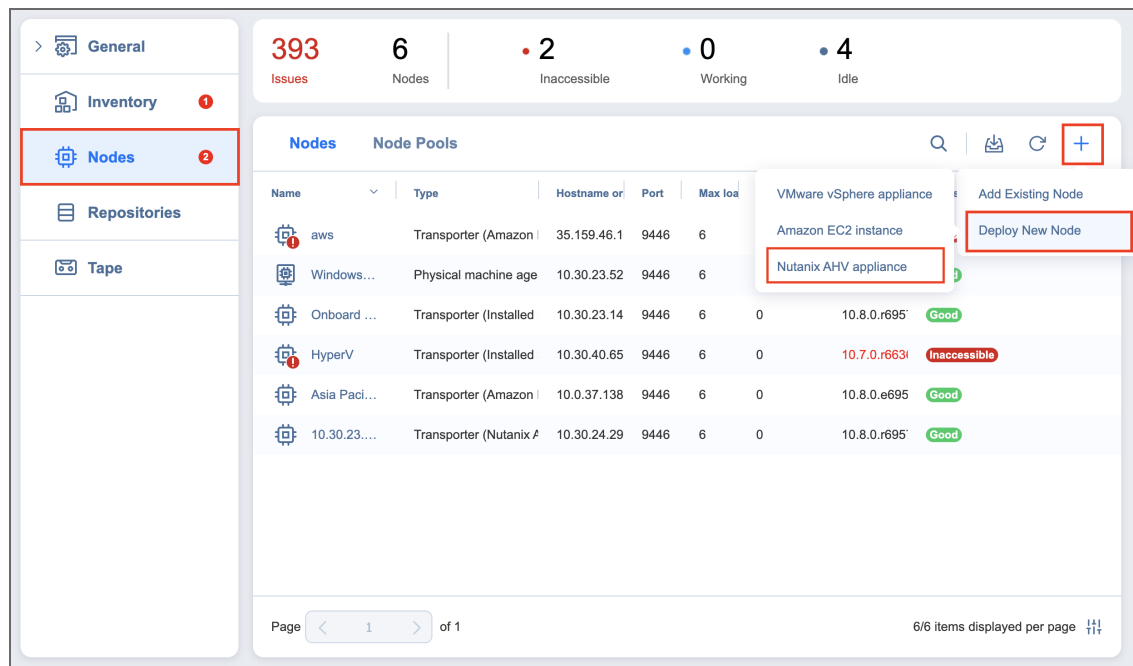
4. Click **Add**. The Transporter is added to the product and can be used for backup, replication, and recovery jobs.

Deploying Transporter as Nutanix AHV Appliance

To enable NAKIVO Backup & Replication to create and run jobs within a Nutanix AHV cluster, a dedicated Transporter must be deployed as a Nutanix appliance in that cluster.

Please follow the steps below to add a transporter as a Nutanix appliance:

1. Go to the **Settings > Nodes** tab and click **Deploy New Node**.
2. In the dialog that opens, click **Nutanix AHV appliance**.



3. In the **Deploy New Transporter - Nutanix AHV Appliance** dialog, specify the following options:
 - **Transporter name:** Enter a name for the new Transporter.
 - **Cluster:** Select a cluster where the transporter VM will run.
 - **Storage container:** Select a storage container where the transporter VM will be located.
 - **Virtual network:** Select a virtual network where the transporter VM will be connected.
4. Click **Deploy** to proceed with the automatically selected networking options and default Transporter load configuration.
5. Alternatively, click **More options** if you wish to manually set the following options:
 - **IP configuration:** Can be either **Automatic setup (DHCP)** or **Manual setup**. With manual setup selected, specify an **IP address**, **Subnet mask** and **Default gateway**.
 - **DNS configuration:** Can be either **Automatic setup (DHCP)** or **Manual setup**. With manual setup selected, specify **Primary** and **Secondary DNS**.
 - **Transporter port:** Enter a communication port for your Transporter.

- **Data transfer ports:** Enter a port range that will be used by your Transporter for actual data transfer.
- **Maximum load:** Specify the maximum number of tasks that the Transporter should process simultaneously. A task, for example, is a backup or replication of a single VM disk, or one granular recovery session.
- **Additional load for recovery jobs:** If selected, the specified quantity of tasks will be added to set the maximum Transporter load to be used for recovery jobs exclusively. This allows for running the specified amount of concurrent recovery jobs along with other types of jobs without the need to wait for their completion.
- **Enable debug logging for this transporter:** If needed, enable debug level logging for the current transporter. Using this option on a permanent basis is not recommended.

Deploy New Transporter - Nutanix AHV Appliance

Transporter name:

Cluster: ⓘ

Storage container: ⓘ

Virtual network: ⓘ

Networking

IP configuration: ⓘ

IP address:

Subnet mask:

Default gateway:

DNS configuration: ⓘ

Primary DNS:

Secondary DNS:

Transporter port: ⓘ

Data transfer ports: ⓘ

Settings

Maximum load: concurrent tasks ⓘ

☒ Additional load for recovery jobs: concurrent tasks ⓘ

☐ Enable debug logging for this transporter ⓘ

6. Click **Deploy** to begin the deployment process. Successfully deployed Transporters are displayed in the **Transporters** tab.

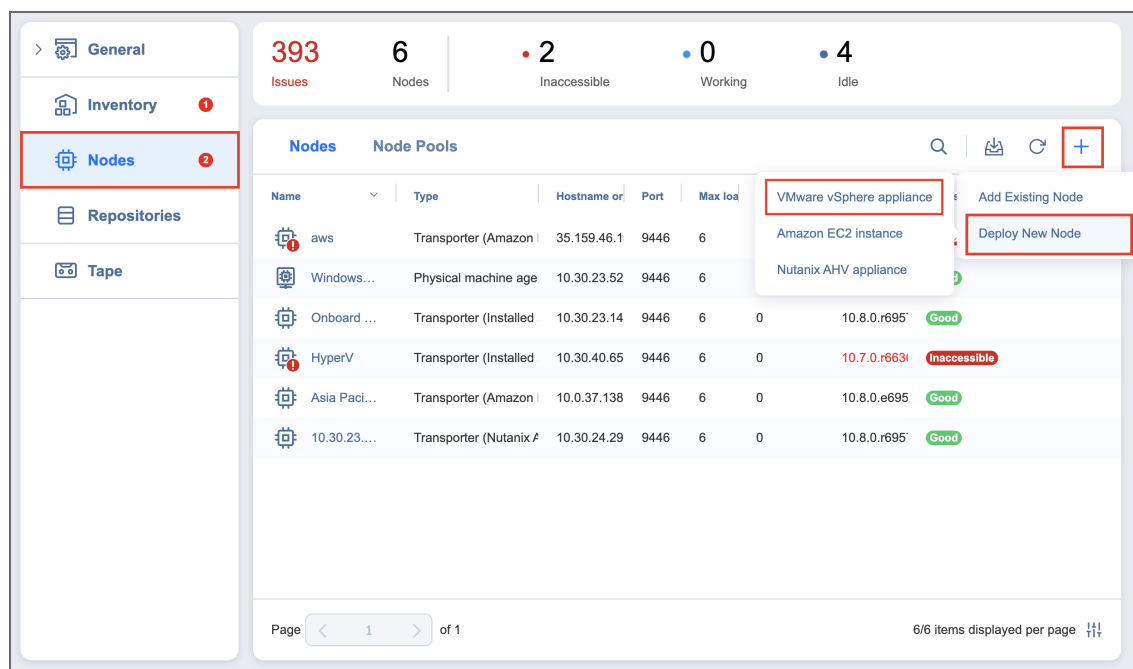
Deploying Transporter as VMware Appliance

Note

If your instance of NAKIVO Backup & Replication is installed on ARM-based NAS, an external Transporter needs to be deployed to work with VMware vCenters and ESXi hosts. This is because certain features are not supported by ARM-based NASes.

Please follow the steps below to deploy a Transporter that supports VMware vCenter:

1. Go to the **Settings > Nodes** tab and click **Deploy New Node**.
2. In the dialog that opens, click **VMware vSphere appliance**.



3. In the **Deploy New Transporter - VMware vSphere Appliance** dialog that opens, proceed as follows:

- **Transporter name:** Enter a name for your Transporter.
- **Host or cluster:** Select a target host or cluster.
- **Datastore:** Select a target datastore.
- **Virtual network:** Select a target virtual network.

Note

An internet connection is required to deploy a new Transporter as a VMware appliance on the target host or cluster.

- If necessary, access the advanced options for your Transporter by clicking **More options** and then entering data for the following parameters:
 - In the *Networking* section:
 - **IP configuration:** It can be either **Automatic setup (DHCP)**, or **Manual setup**.
 - **IP address:** If you have chosen **Manual setup** for the IP configuration, enter a Transporter IP address.
 - **Subnet mask:** If you have chosen **Manual setup** for the IP configuration, enter a subnet mask.
 - **Default gateway:** If you have chosen **Manual setup** for the IP configuration, enter a default gateway.
 - **DNS configuration:** It can be either **Automatic setup (DHCP)**, or **Manual setup**.

- **Primary DNS:** If you have chosen **Manual setup** for the **DNS configuration**, enter a primary DNS server IP address.
- **Secondary DNS:** If you have chosen **Manual setup** for the **DNS configuration**, enter a secondary DNS server IP address.
- **Transporter port:** Enter a communication port for your transporter.
- **Data transfer ports:** Enter a port range that will be used by your transporter for actual data transfer.
- In the *Settings* section:
 - **Maximum load:** A number of tasks concurrently processed by the Transporter.
 - **Additional load for recovery jobs:** If selected, the specified amount of tasks will be added to set maximum transporter load to be used for recovery jobs exclusively. This allows for running the specified amount of concurrent recovery jobs along with other types of jobs without the need to wait for their completion.
 - **Enable debug logging for this transporter:** When selected, it enables debug level logging for the Transporter. It is not recommended to have this option selected on a permanent basis.
 - **Enable Direct Connect for this transporter:** When this option is enabled, you can access remote resources via a single port connection without establishing a VPN connection. The following conditions must be met at the remote infrastructure to enable this feature:
 - A NAKIVO Transporter must be installed.
 - A master password must be set for security reasons. A pre-shared key is generated based on the entered master password.
 - The Transporter port on the local machine must be exposed to external availability via the Internet.

4. Click **Deploy** to confirm deploying the Transporter.

Deploy New Transporter - VMware vSphere Appliance

Transporter name:

VMware

Host or cluster:

vSan

Datstore:

vsanDatastore

Virtual network:

VM Network

Networking

IP configuration:

Automatic setup (DHCP)

IP address:

Subnet mask:

Default gateway:

DNS configuration:

Automatic setup (DHCP)

Primary DNS:

Secondary DNS:

Transporter port:

9446

Data transfer ports:

9448-10000

Settings

Maximum load:

6

concurrent tasks

☒ Additional load for recovery jobs:

2

concurrent tasks

☐ Enable debug logging for this transporter

☐ Enable Direct Connect for this transporter

Cancel

Deploy

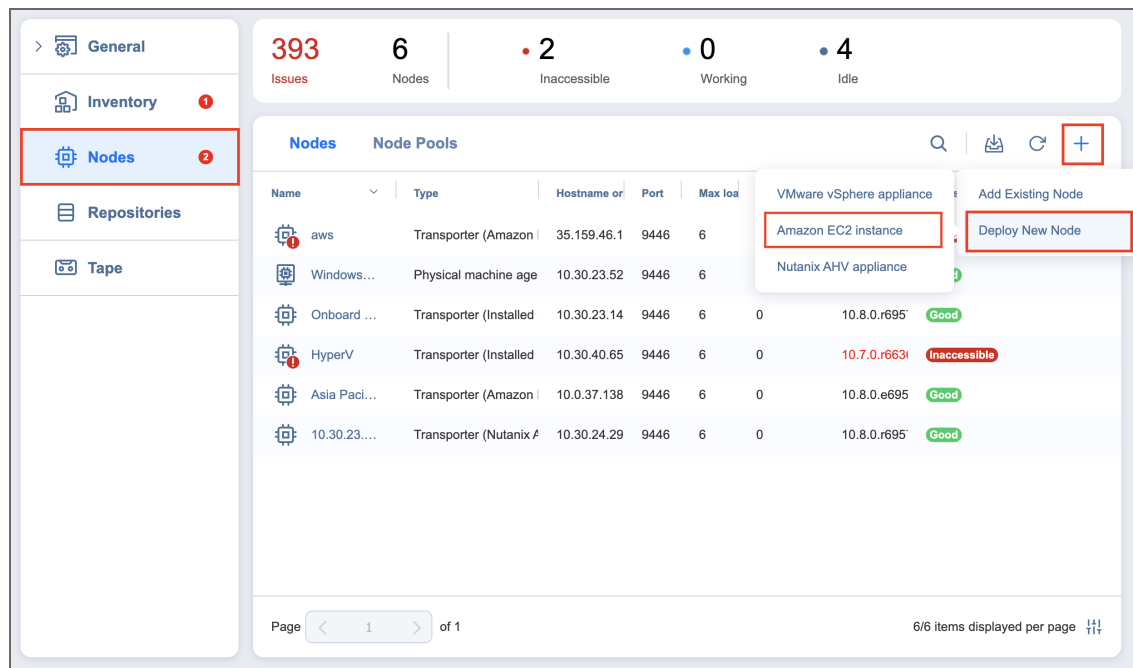
Deploying Transporters in Amazon EC2

You need to deploy a Transporter in Amazon EC2 to enable the following features:

- Backing up VMware VMs and/or Amazon EC2 Instances to a backup repository located in Amazon EC2.
- Backing up Amazon EC2 Instances in a particular Amazon EC2 Region.

NAKIVO Backup & Replication automates deploying a Transporter in Amazon EC2. To deploy a Transporter in Amazon EC2 within the product interface, follow the steps below:

1. Click **Settings** in the left pane of the product and go to the **Nodes** tab.
2. Click **Deploy New Node** and click **Amazon EC2 instance** in the resulting drop-down list.



3. The **Deploy New Transporter - Amazon EC2 Instance** dialog opens. Fill out the fields as described below:

- **Transporter name:** Enter a name for the Transporter.
- **Region:** Select an Amazon EC2 region where you wish to deploy the Transporter. This will enable you to create a backup repository in the region as well as back up Amazon EC2 Instances available in the region.
- **Instance type:** Choose a type of Amazon EC2 Instance (for example, "t2.medium") that will be used to deploy the Transporter. Note that more powerful Instances may be able to process data faster, but will cost more to run on Amazon EC2.

Note

ARM-based instances cannot be selected if you have chosen **Windows** for the **Platform** option.

- Click **More options** to reveal and edit the following options:
 - In the *Networking* section:
 - **Automatically configure VPC for this transporter:** If selected, a new VPC with a single public subnet will be created and used to deploy this transporter. If you want to deploy the Transporter into a different VPC and subnet, deselect this option.
 - **Network:** Select a network to which the Amazon EC2 instance with the Transporter will be connected.
 - **Subnet:** Select a subnet for the Amazon EC2 Instance with the Transporter.

- **Allowed traffic from:** Enter the IP addresses of the machines that can connect to the Amazon EC2 instance with the Transporter. Access from other IP addresses will be restricted.

Important

By default, the Amazon EC2 security group is not restricted; that is, the Transporter can be accessed by and receive tasks from any machine. For security purposes, restrict traffic to trusted IP addresses.

- **Transporter Port:** Specify the port number that will be used to connect to the Transporter.
- **Data transfer ports:** Specify a range of port numbers (from 1 to 65535) that will be used to transfer data. The range you specify should contain at least 100 ports. Make sure that the ports you specify are open in your firewall.
- In the *Settings* section:
 - **Operation mode:** If you select the **Running while required** option, the Amazon EC2 Instance with the Transporter will be powered on only when the Transporter is required to run a backup, replication, and recovery tasks.
 - **Platform:** Choose an OS for the instance where the Transporter will be deployed.

Note

Windows OS is not supported for ARM-based instances.

- **Maximum load:** Specify the maximum number of tasks that the Transporter should process simultaneously. An example of a task is processing a single VM disk or a single file recovery session.
- **Additional load for recovery jobs:** If selected, the specified amount of tasks will be added to set the maximum Transporter load to be used for recovery jobs exclusively. This allows for running the specified quantity of concurrent recovery jobs along with other types of jobs without the need to wait for their completion.
- **Enable debug logging for this Transporter:** Enables debug level logging for the current Transporter. Since this feature slows down Transporter performance, it is recommended that you enable debug logging only for the investigation of support issues.

Note

Refer to [“Amazon EC2 Concepts” on page 19](#) for the definitions of Amazon EC2-related terms.

4. Click **Deploy**.

Deploy New Transporter - Amazon EC2 Instance

Transporter name:

EC2

Region:

EU (London)

Instance type:

a1.large

Networking

☒ Automatically configure VPC for this transporter

Network:

Select target network

Subnet:

Select target subnet

Allowed traffic from:

0.0.0.0/0

Transporter port:

9446

Data transfer ports:

9448-10000

Settings

Operation mode:

Always running

Platform:

Linux

Maximum load:

6

concurrent tasks

☒ Additional load for recovery jobs:

2

concurrent tasks

☐ Enable debug logging for this transporter

Cancel

Deploy

Note

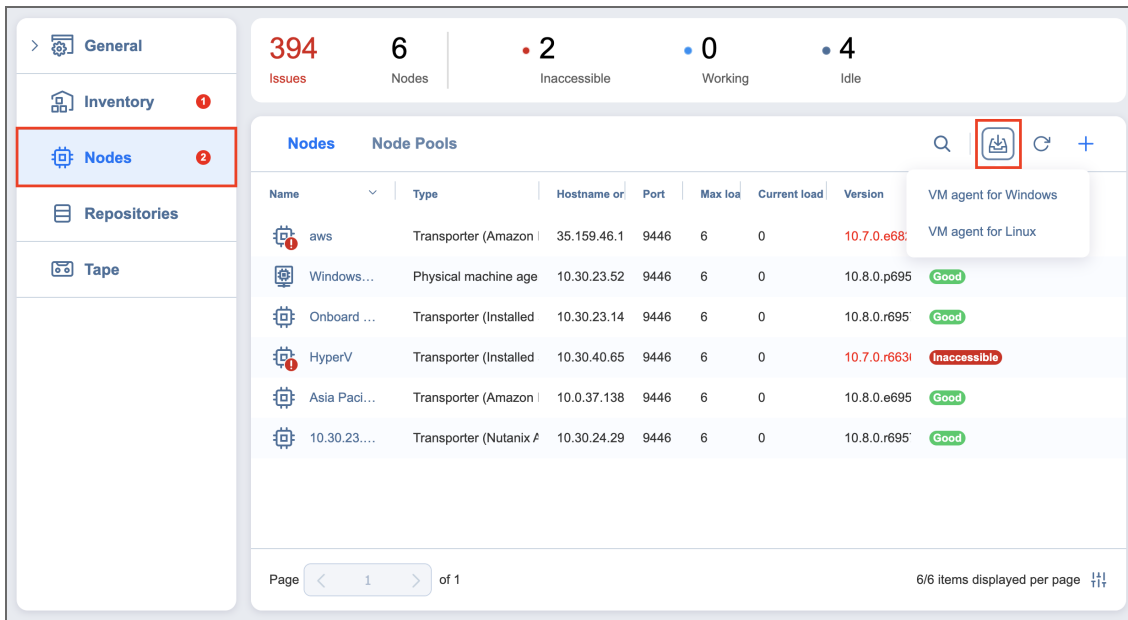
- After deploying a Transporter in Amazon EC2, you need to download the Transporter Key. A Transporter Key is used by NAKIVO Backup & Replication to access and manage the Transporter in Amazon EC2. If you lose the current instance of NAKIVO Backup & Replication and install a new copy of the product, you will need to provide the Transporter Key to access the Transporter.
- You may be additionally charged for using a 3rd-party resource. Please refer to the 3rd-party resource provider documentation for details.

Installing a VM Agent

Each VM agent (VMA) has its own ID, certificate, and pre-shared key. The VMA ID must be unique, meaning that duplicate agents (that is, agents with the same ID) are not permitted. It is recommended that you use unique certificates and master passwords with each VMA. See below for installation details.

Installation

You can download the VM Agent (VMA) installer files from the application UI. To do this, go to **Settings > Nodes**, click the **Download** button, and select the needed OS.



Installation is done via the command line and requires you to set up a master password with a minimum length of 5 characters. Note that you cannot install a VMA on a machine on which a Transporter is installed, and vice versa. See command examples below:

- Windows: `installer.exe --cert C:\certificate.pem -p ExamplePassword --eula-accept`
 - To confirm installation success, check **Control Panel > Programs & Features**
 - Installation result is logged in `C:\install.log`
- Linux: `installer.sh -s 9445 --cert /tmp/certificate.pem -p ExamplePassword --eula-accept`
 - To confirm installation success, run the `systemctl status nkvm-bhsvc` command.
 - Installation result is logged in `/tmp/nkv-install.log`

After installing the VM Agent, proceed as described in [“Adding Existing Nodes” on page 439](#).

Removal

Removing a VM agent in the product UI does not remove it from the VM. Removing VM agents is only possible by uninstalling them from the VM. See uninstallation details below:

- Windows: Run *Uninstall NAKIVO Backup & Replication Agent*, located in the *NAKIVO* folder within *Programs*.
- Linux: Run the `/opt/nakivo/agent/uninstall` command.

Certificate

Installed VM agents (VMAs) may use a CA-signed certificate or a self-signed certificate. After successful installation of the VMA, local copies of the provided certificate for VMA installation are automatically removed.

Multiple CA certificate chains are not supported. CA certificates must be placed in the Director installation folder. These certificates are trusted automatically by the Director.

If a CA-signed certificate is not provided, the VMA automatically generates a self-signed certificate.

Managing Nodes

Refer to the following topics:

- “Editing Nodes” below
- “Downloading Transporter Credentials” on page 459
- “Managing Node Pools” on page 460
- “Refreshing Node Details” on page 460
- “Removing (Deleting) Nodes” on page 462
- “Using a VM Agent” on page 462

Editing Nodes

To modify the settings of an existing node, follow the steps below:

1. Click **Settings** in the left pane of the product.
2. Go to the **Nodes** tab and hover over the node you would like to edit.
3. On the right side, click the ellipsis **Manage** button and then click **Edit**.

The screenshot displays the VMA interface. On the left, the 'Nodes' tab is selected in the sidebar. The main panel shows a summary of node statistics: 394 Issues, 6 Nodes, 2 Inaccessible, 0 Working, and 4 Idle. Below this is a table of nodes. The table has columns: Name, Type, Hostname or IP, Port, Max load, Current load, Version, and Status. A node with status 'Inaccessible' is highlighted, and a context menu is open showing 'Edit' and 'Remove' options.

Name	Type	Hostname or IP	Port	Max load	Current load	Version	Status
aws	Transporter (Amazon	35.159.46.1	9446	6	0	10.7.0.e682	Inaccessible
Windows...	Physical machine age	10.30.23.52	9446	6	0	10.8.0.p695	Good
Onboard ...	Transporter (Installed	10.30.23.14	9446	6	0	10.8.0.r695	Good
HyperV	Transporter (Installed	10.30.40.65	9446	6	0	10.7.0.r663	Inaccessible
Asia Paci...	Transporter (Amazon	10.0.37.138	9446	6	0	10.8.0.e695	Good
10.30.23....	Transporter (Nutanix	10.30.24.29	9446	6	0	10.8.0.r695	Good

4. A dialog opens for editing the node's settings. Edit the settings as required:
 - **Hostname or IP:** Here you can edit the IP address or hostname of the machine on which the node is installed. Not applicable to Nutanix AHV Appliances, VMware vSphere appliances, or Amazon EC2 instances.

- In the *Networking* section:
 - If editing a Nutanix AHV Appliance, VMware vSphere appliance, or Amazon EC2 instance, you can edit the following options:
 - **OS username:** Enter the username used to access the virtual machine.
 - **OS password:** Enter the password for the username entered previously (not applicable to EC2 instances).
 - **SSH port:** Enter the SSH port if needed.
 - If editing other node types:
 - **Node port:** Enter a communication port for your node.
 - **Data transfer ports:** Enter a port range that will be used by your node for actual data transfer.
- In the *Settings* section:
 - **Node name:** Edit the name of your node.
 - **Maximum load:** Edit the number of tasks concurrently processed by the node.
 - **Additional load for recovery jobs:** If selected, the specified amount of tasks will be added to the set maximum node load to be used for recovery jobs exclusively. This allows for running the specified amount of concurrent recovery jobs along with other types of jobs without the need to wait for their completion.
 - **Enable Direct Connect for this node:** When this option is enabled, you can access remote resources via a single port connection without establishing a VPN connection. The following conditions must be met at the remote infrastructure to enable this feature:
 - A NAKIVO Transporter or Agent must be installed.
 - A master password must be set for security reasons. A pre-shared key is generated based on the entered master password.
 - The node port on the local machine must be exposed to external availability via the Internet.
 - **Enable debug logging for this node:** Enable/disable debug level logging for the node. Having this option enabled on a permanent basis is not recommended.

5. Click **Apply** to save your changes.

Edit: Onboard transporter

Hostname or IP: ⓘ

Networking

Node port: ⓘ

Data transfer ports: ⓘ

Settings

Node name:

Maximum load: ⓘ concurrent tasks ⓘ

☐ Additional load for recovery jobs: ⓘ concurrent tasks ⓘ

☐ Enable Direct Connect for this node ⓘ

☐ Enable debug logging for this node ⓘ

Security

Master password: ⓘ

Downloading Transporter Credentials

If you would like to import an Amazon EC2, Nutanix AHV, or VMware Transporter into another installation of NAKIVO Backup & Replication, you need to download the Transporter's credentials. To obtain the credentials, hover over the desired Transporter and click the ellipsis **Manage** button on the right side. In the dialog box, click **Download Key**. This begins the download of a ZIP file containing the Transporter's credentials.

Managing Node Pools

NAKIVO Backup & Replication allows you to group nodes into pools to optimize backup, replication, and recovery jobs. To create a node pool, do the following :

1. Navigate to **Settings**.
2. Click the **Nodes** tab.
3. Open the **Node Pools** tab, then click the plus **Add** button.
4. Complete the **Create Node Pool** wizard and click **Finish**.


Create Node Pool

1. Nodes

2. Options

Search

Name	Pool
<input type="checkbox"/> 10.30.23.142-Tr	
<input type="checkbox"/> 34.254.189.248	
<input type="checkbox"/> Asia Pacific (Mumbai) Linux transporter	
<input type="checkbox"/> Asia Pacific (Singapore) Linux transp...	
<input type="checkbox"/> HV	
<input type="checkbox"/> HyperV	
<input type="checkbox"/> Onboard transporter	
<input type="checkbox"/> Windows Physical	
<input type="checkbox"/> aws	



Select at least one item on the left

Cancel

Next

A node pool can be selected in the *Data Transfer* section on the **Options** page of backup, replication, and recovery jobs. A node can be included in only one pool. To move a node from one pool to another, you need to remove it from the original pool first.

Refreshing Node Details

By default, NAKIVO Backup & Replication refreshes the information about Transporters every hour. During the refreshing process, the product collects all the required information about all Transporters. Only one Transporter can be refreshed at a time. If you have more than one Transporter, all others will remain in the queue until they are able to be refreshed.

- [Manually Refreshing All Nodes](#)
- [Manually Refreshing a Single Node](#)

Manually Refreshing All Nodes

To refresh all nodes, follow the steps below:

1. Click **Settings** in the left pane of the product and go to the **Nodes** tab.
2. Click the **Refresh** button above the **Nodes** table.

Nodes

Name	Type	Hostname or Port	Max loa	Current load	Version	Status
aws	Transporter (Amazon	35.159.46.1	9446	6	0	10.7.0.e682 Inaccessible
Windows...	Physical machine age	10.30.23.52	9446	6	0	10.8.0.p695 Good
Onboard ...	Transporter (Installed	10.30.23.14	9446	6	0	10.8.0.r695 Good
HyperV	Transporter (Installed	10.30.40.65	9446	6	0	10.7.0.r663 Inaccessible
Asia Paci...	Transporter (Amazon	10.0.37.138	9446	6	0	10.8.0.e695 Good
10.30.23....	Transporter (Nutanix	10.30.24.29	9446	6	0	10.8.0.r695 Good

Manually Refreshing a Single Node

To refresh a single node, follow the steps below:

1. Click **Settings** in the left pane of the product.
2. Go to the **Nodes** tab.
3. Hover over the node you would like to refresh and click the ellipsis **Manage** button.
4. Click **Refresh**.

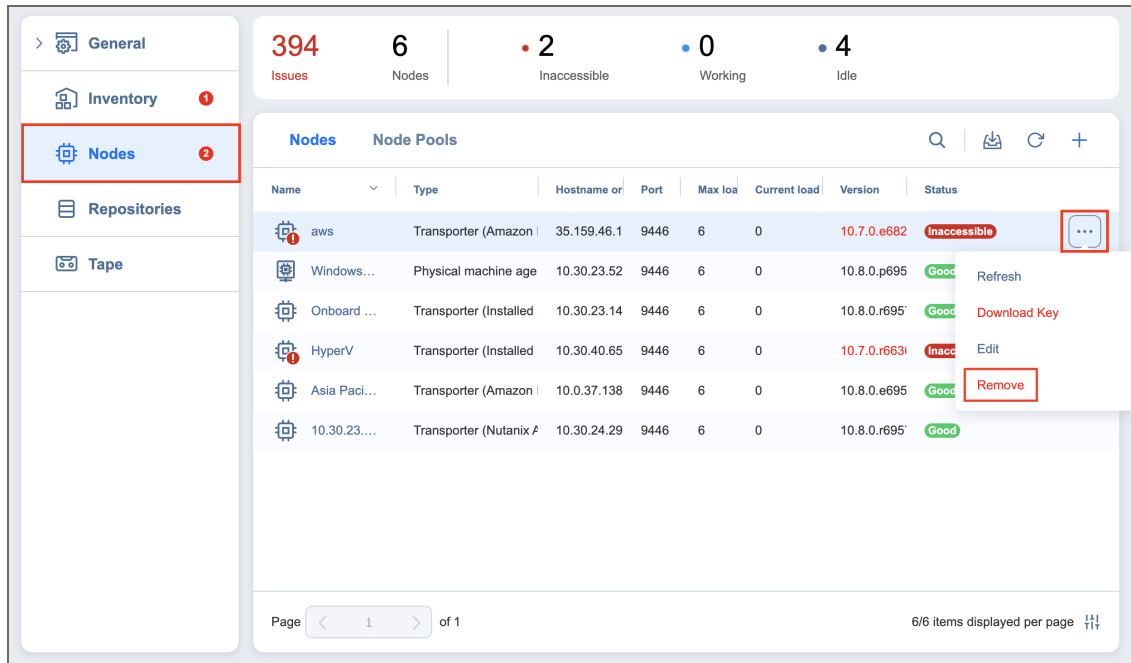
Nodes

Name	Type	Hostname or Port	Max loa	Current load	Version	Status
aws	Transporter (Amazon	35.159.46.1	9446	6	0	10.7.0.e682 Inaccessible
Windows...	Physical machine age	10.30.23.52	9446	6	0	10.8.0.p695 Good
Onboard ...	Transporter (Installed	10.30.23.14	9446	6	0	10.8.0.r695 Good
HyperV	Transporter (Installed	10.30.40.65	9446	6	0	10.7.0.r663 Inaccessible
Asia Paci...	Transporter (Amazon	10.0.37.138	9446	6	0	10.8.0.e695 Good
10.30.23....	Transporter (Nutanix	10.30.24.29	9446	6	0	10.8.0.r695 Good

Removing (Deleting) Nodes

To remove a Transporter from NAKIVO Backup & Replication, follow the steps below:

1. Click **Settings** in the left pane of the product.
2. Go to the **Nodes** tab.
3. Hover over the node you would like to remove.
4. On the right side, click the ellipsis **Manage** button and then click **Remove**.



Note

The following nodes cannot be removed:

- The Onboard Transporter (which is installed with the “[Director](#)” on [page 99](#) by default)
- Nodes manually assigned to a job
- Transporters assigned to backup repositories

Using a VM Agent

With NAKIVO Backup & Replication, you can install a permanent virtual machine agent (VMA) rather than injecting a temporary agent for every job run. This agent simplifies OS quiescing and file-level recovery to the source virtual machine by eliminating the need to provide credentials for the VM’s guest OS.

For information on VMA system requirements, see “[Feature Requirements](#)” on [page 151](#). For information on installing a VMA, see “[Installing a VM Agent](#)” on [page 455](#).

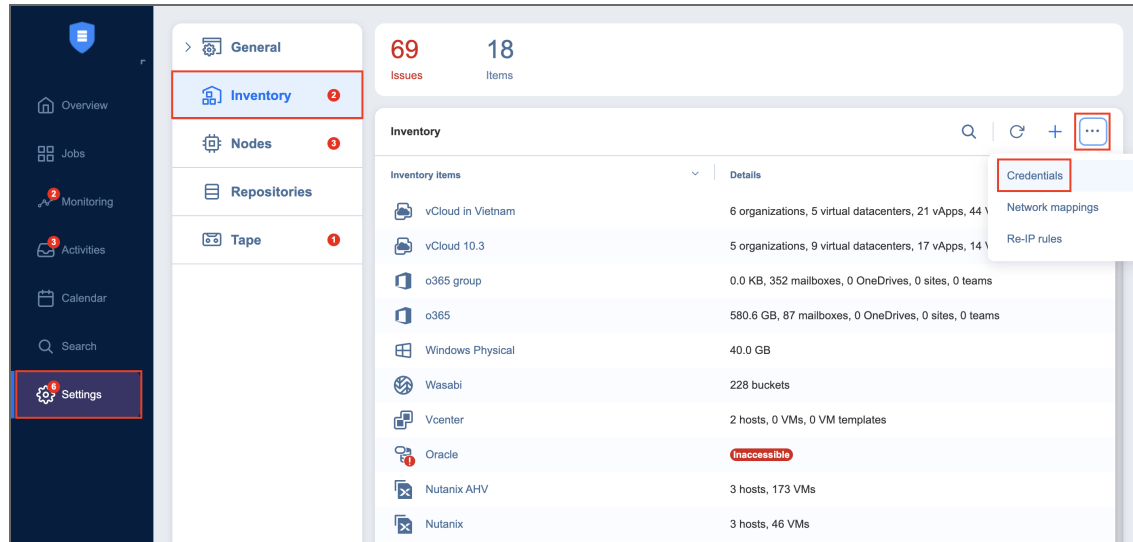
After installing a VM agent inside a VM and adding it to the **Nodes** tab, you may proceed with configuring it for use in jobs. See the sections below:

- [Setting Default Credentials](#)
- [Enabling VM Agents](#)
- [How a VM Agent Works](#)

Setting Default Credentials

To configure a default master password for VM agents, do the following:

1. Go to **Settings > Inventory > Manage > Credentials**.



2. Click **Add Credentials**.
3. In the **Type** drop-down list, select **Master password**.
4. Enter a **Name** and **Password**.

5. Optionally, add a **Description**.

Add Credentials

Type:

Master password

Name:

VMkey

Password:

.....

Repeat password:

.....

Description:

VM Agent credentials

Learn More

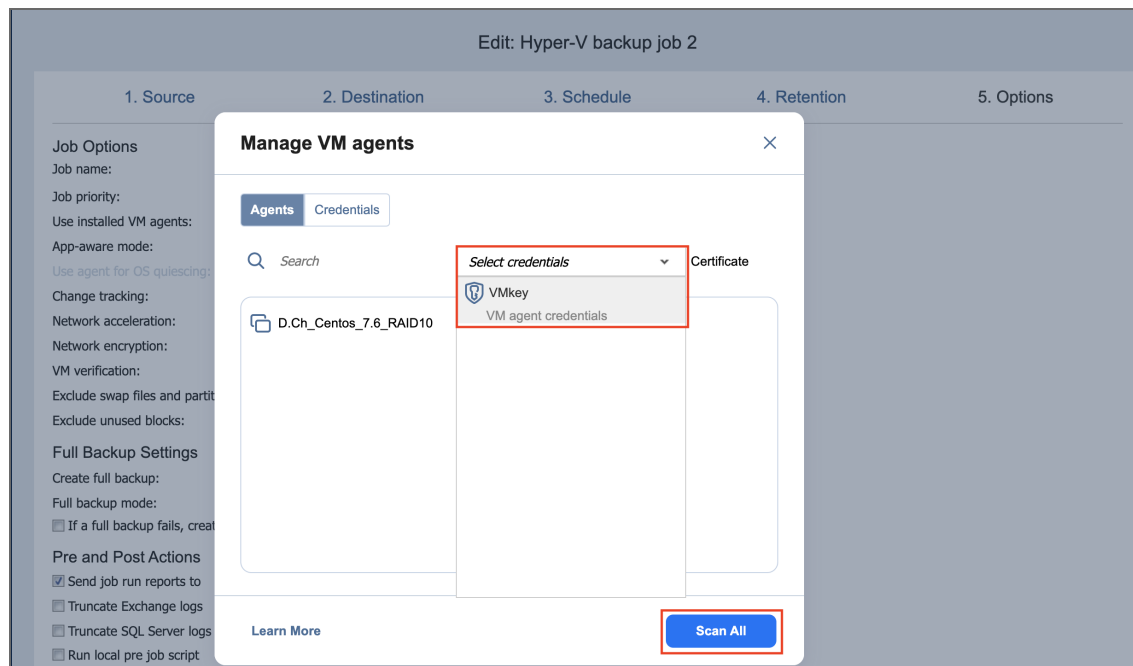
Cancel

Add

Enabling VM Agents

To enable your installed VM agents (VMAs) to be used in jobs, proceed as follows:

1. Click on a job containing the VM in which you have installed a permanent agent.
2. Go to **Manage > Edit > Options**.
3. Make sure that **Use installed VM** agents is enabled. Click **settings**.
4. Click **Scan All** to scan every VM in the job for a VM agent.
5. Once the scan is complete, select the master password you wish to use for the discovered VM agents from the **Select credentials** drop-down list.



6. In the **Certificate** column, click **Verify** to verify the validity of a VMA's certificate.
7. **Save** the updated job options.

Repeat this process for all jobs for which you want to enable the use of VMAs.

Note

- If a VM agent is installed on the recovery server when creating or editing a [File Recovery job](#), the installed agent will automatically be chosen to perform recovery operations.
- If NAKIVO Backup & Replication cannot find installed VM agents or is prevented from doing so (such as by a firewall), the application will scan the VMs until a 2-minutes timeout. VMs are scanned in parallel.
- If there is no VM agent at the target VM, you may proceed by providing OS credentials to the target machine.

How a VM Agent Works

When supported VM actions are prompted, the Director checks for VM agent availability on the respective VM as follows:

1. If an installed VMA is found in the VM, the Director uses this VMA to perform the specified action(s).
2. If an installed VMA is not found in the VM, the Director injects a temporary agent or uses native tools (for example, VMware Tools) to perform the specified action(s). You must then enter VM credentials to proceed.
3. If the usage of an installed VMA is disabled in job options, the Director uses the injection approach or native tools to proceed.

Backup Repositories

A Backup Repository is one of the key components of NAKIVO Backup & Replication and is a regular folder where the product stores backups and backup metadata. For more detailed information, refer to [“Backup Repository” on page 105](#).

This section covers repository-related topics such as creation, management, etc. of Backup Repositories and contains the following articles:

- [“Creating Backup Repositories” on page 470](#)
- [“Adding Existing Backup Repositories” on page 467](#)
- [“Viewing Backup Repository Details” on page 541](#)
- [“Managing Backup Repositories” on page 521](#)

Adding Existing Backup Repositories

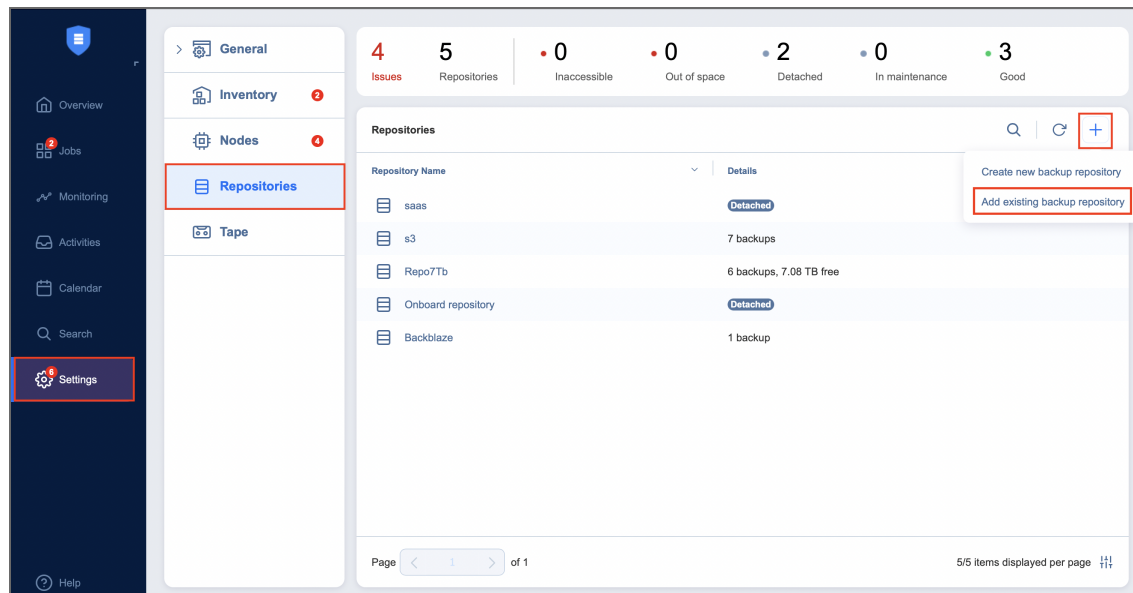
NAKIVO Backup & Replication allows you to add an existing Backup Repository to a new copy of the product.

Note

During the import process, NAKIVO Backup & Replication searches for the *NakivoBackup* folder in the specified location. If your Backup Repository is located in *E:\backup\NakivoBackup*, you should specify the following path: *E:\backup*

To import an existing Backup Repository, do the following:

1. In the main menu, click **Settings**.
2. Go to the **Repositories** tab and click **+**.
3. Click **Add existing backup repository** in the dialog box that opens.



4. The **Add Existing Backup Repository** wizard opens. On the **Type** page of the wizard, select one of the following Backup Repository types:
 - **Local Folder**
 - **CIFS Share**
 - **NFS Share**
 - **Cloud & S3-Compatible Storage**
 - **Deduplication Appliance**
5. When you select **Cloud**, the **Vendor** page opens. Select the cloud storage vendor from the following options:

- Amazon S3
 - Microsoft Azure
 - Wasabi
 - Backblaze
 - Amazon EC2
 - Generic S3-compatible storage
6. When you select **Deduplication Appliance**, the **Device** page opens. Select the device from the following options:
- Dell EMC Data Domain Boost
 - HPE StoreOnce Catalyst
 - NEC HYDRastor
7. On the **Name & Location** page of the wizard, fill out all the necessary fields as described in the article for the corresponding Backup Repository type.
8. On the **Options** page of the wizard, depending on the repository type, the following options can be available for configuration:
- **Encryption password:** If the Backup Repository is encrypted, type in the encryption password.
 - **Enable automatic repository self-healing:** Leave this option selected to automatically trigger repository self-healing in case the product detects symptoms of problems in the backup infrastructure (such as incorrect timestamps on metadata and data files). You can deselect this option and [run self-healing manually](#).
 - **Run repository self-healing on schedule:** You can select this checkbox to additionally run repository self-healing based on a schedule. You can configure the schedule by clicking the **schedule** link when the option is selected. The default schedule is set to run every day at 11 AM.
 - **Run full data verification on schedule:** When this option is selected, the product runs full verification of all data available in the Backup Repository based on the specified schedule. The product reads each block of data to ensure that it is identical to the data block that was read on the source VM during the backup process. This way the product verifies each recovery point in the Backup Repository.
Backup verification is a time-consuming process and consumes CPU of the Transporter assigned to the Backup Repository. It is recommended to schedule backup verification during non-working hours.
 - **Reclaim unused space on schedule:** You can select this option to run the Backup Repository [space reclaim](#) process based on a schedule. You can configure the schedule by clicking the **schedule** link when the option is selected. The default schedule is set to run every Saturday at 12 PM.

- **Enforce explicit file system sync:** When this option is selected, explicit sync with the file system is enforced during all backup operations to this repository. This setting is considered more reliable but may lead to lower performance on some storage devices.
- **Detach this repository on schedule:** Select this option if you want to [detach](#) and then [reattach](#) the Backup Repository based on a schedule. Detaching a Backup Repository saves the Backup Repository data and metadata in a consistent state and stops the product interaction with the Backup Repository (so the Backup Repository can be copied or moved). You can use this feature, for example, for the disk-to-disk-to-tape (D2D2T) data protection approach: backups are stored on a disk for fast operational recovery and copied to a tape (while the repository is detached) for archiving and long-term storage.
 - **Delete and re-create the repository on attach:** When this option is selected, all data in the Backup Repository is erased prior to attaching it to the product. As a result, jobs that write to this Backup Repository create full VM backups. You can use this option, for example, to create full daily, weekly, or monthly VM backups and write them to tape or removable media.

9. Click **Finish**. The Backup Repository is imported to the list.

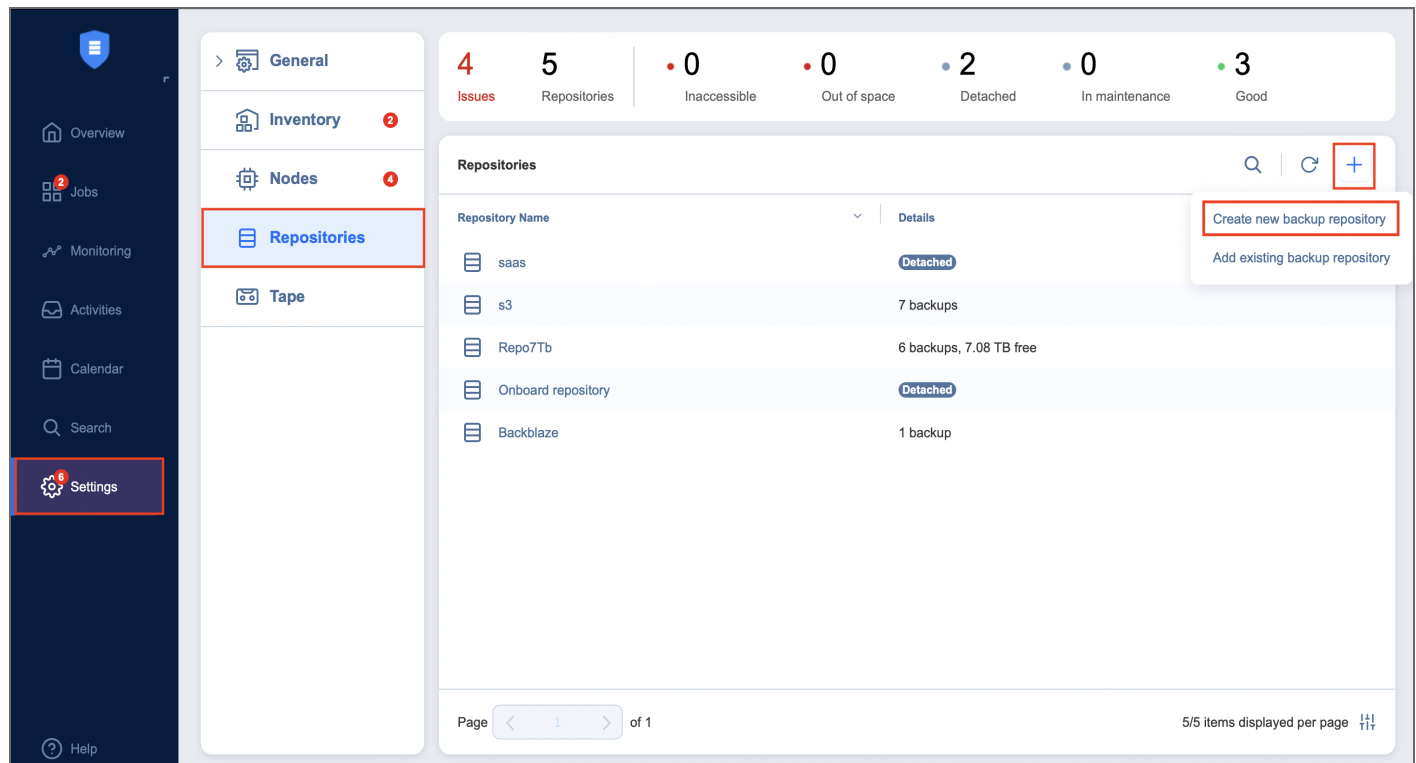
Creating Backup Repositories

NAKIVO Backup & Replication allows you to create additional Backup Repositories for storing backups. You can use a local folder, NFS share, CIFS share, public cloud, or deduplication appliance as a Backup Repository location. To create a new Backup Repository, follow the steps below.

Important

Do not create Backup Repositories inside NAKIVO Backup & Replication installation folders. The data inside **Director** and **Transporter** folders may be lost after a solution update.

1. In NAKIVO Backup & Replication, navigate to **Settings**.
2. Go to the **Repositories** tab and click **+**.
3. Click **Create new backup repository**.



Choose one of the locations for storing your backups by completing the **Create Backup Repository** wizard as described in the sections below:

- [“Local Backup Repository” on page 472](#)
- [“Backup Repository on CIFS Share” on page 477](#)
- [“Backup Repository on NFS Share” on page 482](#)
- [“Backup Repository in Amazon EC2” on page 487](#)
- [“Backup Repository in Amazon S3” on page 493](#)

- “Backup Repository in Microsoft Azure Blob Storage” on page 501
- “Backup Repository in Backblaze B2 Cloud Storage” on page 504
- “Backup Repository in Wasabi Hot Cloud Storage” on page 509
- “Backup Repository on Deduplication Appliance” on page 513

Local Backup Repository

To create a Backup Repository locally on the machine on which the assigned Transporter is installed, choose a local folder. Proceed as described in the following sections:

- [Create Backup Repository: Type](#)
- [Create Backup Repository: Name and Location](#)
- [Create Backup Repository: Options](#)

Create Backup Repository: Type

On the **Type** page of the **Create Backup Repository** wizard, select **Local Folder** and click **Next** to move to the next page of the wizard.

Create Backup Repository

1. Type 2. Name & Location 3. Options

☒ **Local Folder**
Directly attached storage or locally mounted share on an assigned transporter.

☐ CIFS Share
Network share used by transporter through CIFS Interface.

☐ NFS Share
Network share used by transporter through NFS Interface.

☐ Cloud & S3-Compatible Storage
Amazon S3, Wasabi, Backblaze B2 Cloud Storage, Microsoft Azure Blob Storage, Amazon EC2, Generic S3-compatible Storage.

☐ SaaS
Directly attached storage or locally mounted share on an assigned transporter used for storing Microsoft 365 objects.

☐ Deduplication Appliance
Integration with Dell EMC Data Domain Boost, HPE StoreOnce Catalyst and NEC HYDRASstor.

Cancel **Next**

Create Backup Repository: Name and Location

On the **Name & Location** page of the wizard, do the following:

1. Enter the name of the Backup Repository in the **Name** box.
2. Select the Transporter from the **Assigned transporter** drop-down list.
3. Enter the path to the local Backup Repository folder on the machine on which the assigned Transporter is installed.

Example

/opt/nakivo/repository

4. Click **Next** to go to the next page of the wizard.

Important

Before choosing this location, make sure that you have read and write permissions for the folder that

will be used as a repository.

The screenshot shows a wizard titled "Create Backup Repository" with three steps: 1. Type, 2. Name & Location (current), and 3. Options. In Step 2, there are three input fields: "Name:" with the value "Repo", "Assigned transporter:" with a dropdown menu showing "Onboard transporter", and "Path to the local folder:" with the value "/opt/nakivo/repo". Each field has an information icon (i) to its right. At the bottom right, there are "Cancel" and "Next" buttons.

Create Backup Repository: Options

On the **Options** page, do the following:

1. Set up *Storage Savings & Encryption* options:
 - **Data size reduction:** If this option is enabled, NAKIVO Backup & Replication enables the use of data size reduction for this repository to save disk space. Note that this may put additional load on the CPU. Disabling data size reduction is required if the target is a deduplication storage appliance. Click settings to configure the settings. A popup window appears. Set the following:
 - **Compression:** Select a compression level that will be used to reduce the data size in the Backup Repository. Note that higher compression levels consume considerably more CPU and may slow down VM backup speed. The following options are available:
 - **Disabled:** The data in the Backup Repository will not be compressed.
 - **Fast:** Lowest compression level.
 - **Medium:** Medium compression level.
 - **Best:** Maximum compression level.

Note

This option cannot be configured after creating the Backup Repository.

- **Store backups in separate files:** Select this option to enable this backup repository to store data of every machine in separate backup files. Enabling this option is highly recommended to ensure higher reliability and performance. Leave this option unchecked if you wish to enable deduplication on a given backup repository.
- **Deduplication:** Select this option to enable the backup deduplication method to reduce the backup size by excluding duplicate data blocks from the backup.

Note

This option is not available if the Store backups in separate files checkbox has been selected.

- **Encryption:** This option is available only if the Backup Repository is created locally on the machine on which the Assigned Transporter is installed, and the machine is running a Linux OS. Select **Enabled** from the drop-down list and specify an encryption password. (The password will be required for importing the Backup Repository into a new instance of the product.) The product will encrypt the repository destination (using `ecryptfs` for folders and `cryptsetup` (`crypt-md`) in LUKS mode for devices/partitions) prior to creating the Backup Repository.

Notes

- To avoid `ecryptfs` errors, make sure that there are no other folders and files except the NakivoBackup folder in the repository location.
- Backup Repository encryption can significantly influence backup speed.

2. Set up *Reliability & Maintenance* options:

- **Enable automatic repository self-healing:** Leave this option selected to automatically trigger repository self-healing in case the product detects symptoms of problems in the backup infrastructure such as incorrect timestamps on metadata and data files. You can deselect this option and [run self-healing manually](#).
- **Run repository self-healing on schedule:** If required, select this checkbox to run repository self-healing on schedule. You can configure the schedule by clicking the **schedule** link when the option is selected. The default schedule is set to run every day at 11 AM.
If **Stop backup and recovery to run self-healing** is selected, any jobs or recoveries which use this repository will be stopped to run scheduled self-healing. Otherwise, scheduled self-healing will be skipped in case there are running jobs or recoveries on this repository.

- **Run full data verification on schedule:** If selected, NAKIVO Backup & Replication will run full verification of all data available in the Backup Repository on the specified schedule. The product will read each block of data and ensure that it is identical to the data block that was read on the source VM during the backup. This way, the product will verify each recovery points in the Backup Repository.

If **Stop backup and recovery to run backup verification** is selected, any running jobs which use this Backup Repository will be stopped to run scheduled data verification. Otherwise, scheduled data verification will be skipped in case there are running jobs on this Backup Repository.

Note

Backup verification is a time-consuming process and consumes CPU of the Transporter assigned to the Backup Repository. It is recommended that you schedule backup verification during non-working hours.

- **Reclaim unused space on schedule:** If required, select this option to run the Backup Repository [space reclaim](#) process on schedule. Space reclaim will compact the data. Unused space will be reclaimed. Keep in mind that this process can be time-consuming.

Note

This option is available only if **Store backups in separate files** is not enabled.

If **Stop backup and recovery to run space reclaim** is selected, any running jobs which use this Backup Repository will be stopped to run scheduled space reclaiming. Otherwise, scheduled space reclaiming will be skipped in case there are running jobs on this Backup Repository.

Important

Do not reboot/disconnect the "null" Transporter and storage device while space reclaim is in progress to avoid Backup Repository corruption.

- **Enforce explicit file system sync:** When selected, explicit sync with the file system is enforced during all backup operations to this repository. This setting is considered more reliable but may lead to lower performance on certain storage devices. By default, the option is disabled.

4. Schedule detaching of the Backup Repository:

- **Detach this repository on schedule:** Select this option if you want to [detach](#) and then [attach](#) the Backup Repository on a schedule. Detaching a Backup Repository saves the Backup Repository data and metadata in a consistent state and then stops the product's interaction with the Backup Repository (so that the Backup Repository can be copied or moved). You can use this feature, for example, for the disk-to-disk-to-tape (D2D2T) data protection approach, in which backups are stored on a disk for fast operational recovery, and copied to a tape (while the repository is detached) for archiving and long-term storage.
- **Delete and re-create the repository on attach:** If this option is selected, all data in the Backup Repository will be erased prior to attaching it to the product. As a result, jobs that write to this Backup Repository will create full VM backups. You can use this option, for example, to create full daily, weekly, or monthly VM backups and write them to tape or removable media.

5. Click **Finish** to finish creating the Backup Repository.

Create Backup Repository

1. Type 2. Name & Location 3. Options

Storage Savings & Encryption

Data size reduction: [settings](#)

Encryption:

Reliability & Maintenance

- ☒ Enable automatic repository self-healing
- ☐ Run repository self-healing on schedule
- ☐ Run full data verification on schedule
- ☐ Enforce explicit file system sync

Scheduled Detach

- ☐ Detach this repository on schedule

Data Size Reduction Settings

Compression level:

- ☒ Store backups in separate files (recommended)

[Apply](#) [Cancel](#)

[Cancel](#) [Finish](#)

Backup Repository on CIFS Share

Choose this option if you want to create a Backup Repository on a Windows CIFS share. Before creating a Backup Repository on a CIFS share, make sure that all the necessary prerequisites are met:

- The folder where you would like to create the Backup Repository exists on the share.
- The share can be accessed from the machine on which the Assigned Transporter is installed.
- You are using credentials with read and write permissions to the share.
- The share is compatible with Version 2 or later of the SMB protocol.

To create a Backup Repository on a Windows CIFS share, proceed as described in the following sections:

- [Create Backup Repository: Type](#)
- [Create Backup Repository: Name and Location](#)
- [Create Backup Repository: Options](#)

Create Backup Repository: Type

On the **Type** page of the **Create Backup Repository** wizard, select **CIFS Share** and click **Next** to move to the next page of the wizard.

Create Backup Repository

1. Type 2. Name & Location 3. Options

☐ Local Folder
Directly attached storage or locally mounted share on an assigned transporter.

☒ CIFS Share
Network share used by transporter through CIFS interface.

☐ NFS Share
Network share used by transporter through NFS interface.

☐ Cloud & S3-Compatible Storage
Amazon S3, Wasabi, Backblaze B2 Cloud Storage, Microsoft Azure Blob Storage, Amazon EC2, Generic S3-compatible Storage.

☐ SaaS
Directly attached storage or locally mounted share on an assigned transporter used for storing Microsoft 365 objects.

☐ Deduplication Appliance
Integration with Dell EMC Data Domain Boost, HPE StoreOnce Catalyst and NEC HYDRAsstor.

Cancel Next

Create Backup Repository: Name and Location

On the **Name & Location** page of the wizard, do the following:

1. Enter the name of the Backup Repository in the **Name** box.
2. Select the Transporter from the Assigned transporter drop-down list.
3. Enter the path to the CIFS share.

Example

Synology share path: `\\10.30.30.61\ayunt_cifs1`

4. Provide username and password in the appropriate boxes.

Note

If you're using domain credentials to access the share, enter your domain username via the following format: domain\username.

5. Select **Advanced mount options** if needed. Refer to the mount `man` pages for a detailed description of CIFS share mount options.
6. Click **Next** to go to the next page of the wizard.

Create Backup Repository

1. Type 2. Name & Location 3. Options

Name: CIFS share

Assigned transporter: Onboard transporter

Path to the share: \\Server\Path

Username: admin

Password: *****

☐ Advanced mount options:

Cancel Next

Create Backup Repository: Options

On the **Options** page, do the following:

1. Set up *Storage Savings & Encryption* options:
 - **Data size reduction:** If this option is enabled, NAKIVO Backup & Replication enables the use of data size reduction for this repository to save disk space. Note that this may put additional load on the CPU. Disabling data size reduction is required if the target is a deduplication storage appliance. Click settings to configure the settings. A popup window appears. Set the following:
 - **Compression:** Select a compression level that will be used to reduce the data size in the Backup Repository. Note that higher compression levels consume considerably more CPU and may slow down VM backup speed. The following options are available:
 - **Disabled:** The data in the Backup Repository will not be compressed.
 - **Fast:** Lowest compression level.
 - **Medium:** Medium compression level.
 - **Best:** Maximum compression level.

Note

This option cannot be configured after creating the Backup Repository.

- **Store backups in separate files:** Select this option to enable this backup repository to store data of every machine in separate backup files. Enabling this option is highly recommended to ensure higher reliability and performance. Leave this option unchecked if you wish to enable deduplication on a given backup repository.
- **Deduplication:** Select this option to enable the backup deduplication method to reduce the backup size by excluding duplicate data blocks from the backup.

Note

This option is not available if the Store backups in separate files checkbox has been selected.

- **Encryption:** This option is available only if the Backup Repository is created locally on the machine on which the Assigned Transporter is installed, and the machine is running a Linux OS. Select **Enabled** from the drop-down list and specify an encryption password. (The password will be required for importing the Backup Repository into a new instance of the product.) The product will encrypt the repository destination (using `ecryptfs` for folders and `cryptsetup` (`crypt-md`) in LUKS mode for devices/partitions) prior to creating the Backup Repository.

Notes

- To avoid `ecryptfs` errors, make sure that there are no other folders and files except the `NakivoBackup` folder in the repository location.
- Backup Repository encryption can significantly influence backup speed.

2. Set up *Reliability & Maintenance* options:

- **Enable automatic repository self-healing:** Leave this option selected to automatically trigger repository self-healing in case the product detects symptoms of problems in the backup infrastructure such as incorrect timestamps on metadata and data files. You can deselect this option and [run self-healing manually](#).

- **Run repository self-healing on schedule:** If required, select this checkbox to run repository self-healing on schedule. You can configure the schedule by clicking the **schedule** link when the option is selected. The default schedule is set to run every day at 11 AM.
If **Stop backup and recovery to run self-healing** is selected, any jobs or recoveries which use this repository will be stopped to run scheduled self-healing. Otherwise, scheduled self-healing will be skipped in case there are running jobs or recoveries on this repository.
- **Run full data verification on schedule:** If selected, NAKIVO Backup & Replication will run full verification of all data available in the Backup Repository on the specified schedule. The product will read each block of data and ensure that it is identical to the data block that was read on the source VM during the backup. This way, the product will verify each recovery points in the Backup Repository.
If **Stop backup and recovery to run backup verification** is selected, any running jobs which use this Backup Repository will be stopped to run scheduled data verification. Otherwise, scheduled data verification will be skipped in case there are running jobs on this Backup Repository.

Note

Backup verification is a time-consuming process and consumes CPU of the Transporter assigned to the Backup Repository. It is recommended that you schedule backup verification during non-working hours.

- **Reclaim unused space on schedule:** If required, select this option to run the Backup Repository [space reclaim](#) process on schedule. Space reclaim will compact the data. Unused space will be reclaimed. Keep in mind that this process can be time-consuming.

Note

This option is available only if **Store backups in separate files** is not enabled.

If **Stop backup and recovery to run space reclaim** is selected, any running jobs which use this Backup Repository will be stopped to run scheduled space reclaiming. Otherwise, scheduled space reclaiming will be skipped in case there are running jobs on this Backup Repository.

Important

Do not reboot/disconnect the "null" Transporter and storage device while space reclaim is in progress to avoid Backup Repository corruption.

- **Enforce explicit file system sync:** When selected, explicit sync with the file system is enforced during all backup operations to this repository. This setting is considered more reliable but may lead to lower performance on certain storage devices. By default, the option is disabled.

4. Schedule detaching of the Backup Repository:

- **Detach this repository on schedule:** Select this option if you want to [detach](#) and then [attach](#) the Backup Repository on a schedule. Detaching a Backup Repository saves the Backup Repository data and metadata in a consistent state and then stops the product's interaction with the Backup Repository (so that the Backup Repository can be copied or moved). You can use this feature, for example, for the disk-to-disk-to-tape (D2D2T) data protection approach, in which backups are stored on a disk for fast operational recovery, and copied to a tape (while the repository is detached) for archiving and long-term storage.
- **Delete and re-create the repository on attach:** If this option is selected, all data in the Backup Repository will be erased prior to attaching it to the product. As a result, jobs that write to this Backup Repository will create full VM backups. You can use this option, for example, to create full daily, weekly, or monthly VM backups and write them to tape or removable media.

5. Click **Finish** to finish creating the Backup Repository.

Create Backup Repository

1. Type 2. Name & Location 3. Options

Storage Savings & Encryption

Data size reduction: [settings](#)

Encryption:

Reliability & Maintenance

☒ Enable automatic repository self-healing

☐ Run repository self-healing on schedule

☐ Run full data verification on schedule

☐ Enforce explicit file system sync

Scheduled Detach

☐ Detach this repository on schedule

Data Size Reduction Settings

Compression level:

☒ Store backups in separate files (recommended)

[Apply](#) [Cancel](#)

[Cancel](#) [Finish](#)

Backup Repository on NFS Share

Choose this option if you wish to create a Backup Repository on an NFS share. Before creating a Backup Repository on an NFS share, make sure that all the necessary prerequisites are met:

- The folder where you would like to create the Backup Repository exists on the share.
- The share can be accessed from the machine on which the Assigned Transporter is installed.
- You are using credentials with read and write permissions to the share.

To create a repository on an NFS share, proceed as described in the following sections:

- [Create Backup Repository: Type](#)
- [Create Backup Repository: Name and Location](#)
- [Create Backup Repository: Options](#)

Create Backup Repository: Type

On the **Type** page of the **Create Backup Repository** wizard, select **NFS Share** and click **Next** to move to the next page of the wizard.

Create Backup Repository

1. Type 2. Name & Location 3. Options

☐ Local Folder
Directly attached storage or locally mounted share on an assigned transporter.

☐ CIFS Share
Network share used by transporter through CIFS Interface.

☒ NFS Share
Network share used by transporter through NFS Interface.

☐ Cloud & S3-Compatible Storage
Amazon S3, Wasabi, Backblaze B2 Cloud Storage, Microsoft Azure Blob Storage, Amazon EC2, Generic S3-compatible Storage.

☐ SaaS
Directly attached storage or locally mounted share on an assigned transporter used for storing Microsoft 365 objects.

☐ Deduplication Appliance
Integration with Dell EMC Data Domain Boost, HPE StoreOnce Catalyst and NEC HYDRAsstor.

Cancel Next

Create Backup Repository: Name and Location

On the **Name & Location** page of the wizard, do the following:

1. Enter the name of the Backup Repository in the **Name** box.
2. Select the Transporter from the **Assigned transporter** drop-down list.
3. Enter the path to the NFS share.

Examples

QNAP share path: 10.30.30.109:/ayunt_nfs

Note

If the Assigned Transporter is installed on a Windows OS, you need to enable the "Client for NFS" feature on the machine on which the Transporter is installed.

4. Select **Advanced mount options** if needed. Refer to the `mount` man pages for a detailed description of mount options.

Note

To create a Backup Repository on a NEC HydraStor deduplication appliance, refer to [Integrating with NEC HydraStor](#).

5. Click **Next** to go to the next page of the wizard.

The screenshot shows a wizard window titled "Create Backup Repository". It has three tabs: "1. Type", "2. Name & Location" (which is active and highlighted with a blue bar), and "3. Options". Under the "2. Name & Location" tab, there are four input fields: "Name:" with the value "NFS share", "Assigned transporter:" with a dropdown menu showing "Onboard transporter", "Path to the share:" with the value "server:/NFS/share", and "Advanced mount options:" which is preceded by a checked checkbox. Each input field has a small blue information icon to its right. At the bottom right of the wizard, there are two buttons: "Cancel" and "Next".

Create Backup Repository: Options

On the **Options** page, do the following:

1. Set up *Storage Savings & Encryption* options:
 - **Data size reduction:** If this option is enabled, NAKIVO Backup & Replication enables the use of data size reduction for this repository to save disk space. Note that this may put additional load on the CPU. Disabling data size reduction is required if the target is a deduplication storage appliance. Click settings to configure the settings. A popup window appears. Set the following:

- **Compression:** Select a compression level that will be used to reduce the data size in the Backup Repository. Note that higher compression levels consume considerably more CPU and may slow down VM backup speed. The following options are available:
 - **Disabled:** The data in the Backup Repository will not be compressed.
 - **Fast:** Lowest compression level.
 - **Medium:** Medium compression level.
 - **Best:** Maximum compression level.

Note

This option cannot be configured after creating the Backup Repository.

- **Store backups in separate files:** Select this option to enable this backup repository to store data of every machine in separate backup files. Enabling this option is highly recommended to ensure higher reliability and performance. Leave this option unchecked if you wish to enable deduplication on a given backup repository.
- **Deduplication:** Select this option to enable the backup deduplication method to reduce the backup size by excluding duplicate data blocks from the backup.

Note

This option is not available if the Store backups in separate files checkbox has been selected.

- **Encryption:** This option is available only if the Backup Repository is created locally on the machine on which the Assigned Transporter is installed, and the machine is running a Linux OS. Select **Enabled** from the drop-down list and specify an encryption password. (The password will be required for importing the Backup Repository into a new instance of the product.) The product will encrypt the repository destination (using `ecryptfs` for folders and `cryptsetup` (`crypt-md`) in LUKS mode for devices/partitions) prior to creating the Backup Repository.

Notes

- To avoid `ecryptfs` errors, make sure that there are no other folders and files except the `NakivoBackup` folder in the repository location.
- Backup Repository encryption can significantly influence backup speed.

2. Set up *Reliability & Maintenance* options:

- **Enable automatic repository self-healing:** Leave this option selected to automatically trigger repository self-healing in case the product detects symptoms of problems in the backup infrastructure such as incorrect timestamps on metadata and data files. You can deselect this option and [run self-healing manually](#).
- **Run repository self-healing on schedule:** If required, select this checkbox to run repository self-healing on schedule. You can configure the schedule by clicking the **schedule** link when the option is selected. The default schedule is set to run every day at 11 AM.
If **Stop backup and recovery to run self-healing** is selected, any jobs or recoveries which use this repository will be stopped to run scheduled self-healing. Otherwise, scheduled self-healing will be skipped in case there are running jobs or recoveries on this repository.
- **Run full data verification on schedule:** If selected, NAKIVO Backup & Replication will run full verification of all data available in the Backup Repository on the specified schedule. The product will read each block of data and ensure that it is identical to the data block that was read on the source VM during the backup. This way, the product will verify each recovery points in the Backup Repository.
If **Stop backup and recovery to run backup verification** is selected, any running jobs which use this Backup Repository will be stopped to run scheduled data verification. Otherwise, scheduled data verification will be skipped in case there are running jobs on this Backup Repository.

Note

Backup verification is a time-consuming process and consumes CPU of the Transporter assigned to the Backup Repository. It is recommended that you schedule backup verification during non-working hours

- **Reclaim unused space on schedule:** If required, select this option to run the Backup Repository [space reclaim](#) process on schedule. Space reclaim will compact the data. Unused space will be reclaimed. Keep in mind that this process can be time-consuming.

Note

This option is available only if **Store backups in separate files** is not enabled.

If **Stop backup and recovery to run space reclaim** is selected, any running jobs which use this Backup Repository will be stopped to run scheduled space reclaiming. Otherwise, scheduled space reclaiming will be skipped in case there are running jobs on this Backup Repository.

Important

Do not reboot/disconnect the "null" Transporter and storage device while space reclaim is in progress to avoid Backup Repository corruption.

- **Enforce explicit file system sync:** When selected, explicit sync with the file system is enforced during all backup operations to this repository. This setting is considered more reliable but may lead to lower performance on certain storage devices. By default, the option is disabled.

4. Schedule detaching of the Backup Repository:

- **Detach this repository on schedule:** Select this option if you want to [detach](#) and then [attach](#) the Backup Repository on a schedule. Detaching a Backup Repository saves the Backup Repository data and metadata in a consistent state and then stops the product's interaction with the Backup Repository (so that the Backup Repository can be copied or moved). You can use this feature, for example, for the disk-to-disk-to-tape (D2D2T) data protection approach, in which backups are stored on a disk for fast operational recovery, and copied to a tape (while the repository is detached) for archiving and long-term storage.
- **Delete and re-create the repository on attach:** If this option is selected, all data in the Backup Repository will be erased prior to attaching it to the product. As a result, jobs that write to this Backup Repository will create full VM backups. You can use this option, for example, to create full daily, weekly, or monthly VM backups and write them to tape or removable media.

5. Click **Finish** to finish creating the Backup Repository.

Create Backup Repository

1. Type 2. Name & Location 3. Options

Storage Savings & Encryption

Data size reduction: Enabled [settings](#)

Encryption: Disabled

Reliability & Maintenance

- ☒ Enable automatic repository self-healing
- ☐ Run repository self-healing on schedule
- ☐ Run full data verification on schedule
- ☐ Enforce explicit file system sync

Scheduled Detach

- ☐ Detach this repository on schedule

Data Size Reduction Settings

Compression level: Fast

- ☒ Store backups in separate files (recommended)

Apply Cancel

Cancel Finish

Backup Repository in Amazon EC2

Choose this option if you want to create a Backup Repository in Amazon EC2. The Backup Repository will be created in the same region where the assigned Transporter is located.

Important

- To avoid disrupting NAKIVO Backup & Replication processes and data corruption, add NAKIVO Backup & Replication to the white/exclusions list of antivirus software running on the machine on which the NAKIVO Backup Repository is set up.
- You may be additionally charged for using a third-party resource. Refer to the third-party resource provider documentation for details.

To create a repository in Amazon EC2, proceed as described in the following sections:

- [Create Backup Repository: Type](#)
- [Create Backup Repository: Vendor](#)
- [Create Backup Repository: Name & Location](#)
- [Create Backup Repository: Options](#)

Create Backup Repository: Type

On the **Type** page of the **Create Backup Repository** wizard, select **Cloud & S3-compatible Storage** and click **Next** to move to the next page of the wizard.

Create Backup Repository

1. Type 2. Vendor 3. Name & Location 4. Options

☐ Local Folder
Directly attached storage or locally mounted share on an assigned transporter.

☐ CIFS Share
Network share used by transporter through CIFS Interface.

☐ NFS Share
Network share used by transporter through NFS Interface.

☒ Cloud & S3-COMPATIBLE STORAGE
Amazon S3, Microsoft Azure, Wasabi, Amazon EC2, Generic S3-compatible Storage ^{BETA}

☐ SaaS
Directly attached storage or locally mounted share on an assigned transporter used for storing Microsoft 365 objects.

☐ Deduplication Appliance
Integration with Dell EMC Data Domain Boost, HPE StoreOnce Catalyst and NEC HYDRASOR.

Cancel **Next**

Create Backup Repository: Vendor

On the **Vendor** page of the wizard, select **Amazon EC2**. Click **Next** to proceed to the next step.

Create Backup Repository

1. Type 2. Vendor 3. Name & Location 4. Options

☐ Amazon S3
 Highly scalable AWS object storage.

☐ Microsoft Azure
 Microsoft Azure object storage. Both hot and cool storage access tiers are supported.

☐ Wasabi
 Cost effective cloud based object storage.

☐ Backblaze
 Secure and reliable low-cost S3 compatible cloud storage

☒ Amazon EC2
 EBS storage attached to transporter running in Amazon EC2 instance.

☐ Generic S3-Compatible Storage
 Object storage that supports S3 protocol.

Cancel Next

Create Backup Repository: Name & Location

On the **Name & Location** page of the wizard, do the following:

1. Enter the name of the Backup Repository in the **Name** box.
2. Select the Transporter from the **Assigned transporter** drop-down list. To add a new Transporter, click **Add new transporter** and [configure a new Transporter](#) in the **Transporters** tab. Once the new Transporter is successfully added, it appears in the **Assigned transporter** drop-down list.
3. Click **Next** to go to the next page of the wizard.

Create Backup Repository

1. Type 2. Vendor 3. Name & Location 4. Options

Name:

Assigned transporter: ⓘ

[Add new transporter](#)

Cancel Finish

Create Backup Repository: Options

On the **Options** page, do the following:

Configure data storage options:

- **Volume type:** Choose one of the following EBS volumes that will be used for creating the Backup Repository:
 - Cold HDD (sc1)
 - Throughput Optimized HDD (st1)
 - General Purpose SDD (gp2)
 - General Purpose SDD (gp3)
 - Magnetic Standard
- **Storage:** Specify a size for the Backup Repository that will be allocated in Amazon EC2 using EBS Volumes. The volumes will be attached to the selected Amazon EC2 Transporter.
- **Storage chunk (GB):** A Backup Repository in Amazon EC2 is created by using multiple EBS Volumes (chunks). The maximum size of the Backup Repository is limited to 50 EBS Volumes (chunks) or 16 TB (whichever occurs first). The size of a storage chunk defines the size of each individual EBS volume. Also, the storage will be resized (either manually or automatically) with the minimal step of the storage chunk specified here. To scale up to 16,000 GB, it is recommended that you have 400 GB storage chunk or bigger. Storage chunk cannot be changed later.
- **Automatically resize storage:** When this option is selected, the cloud storage is automatically increased and reduced as required.

Set up **Storage Savings & Encryption** options:

- **Data size reduction:** When this option is enabled, NAKIVO Backup & Replication enables the use of data size reduction for this repository to save disk space. Note that this may put additional load on the CPU. Disabling data size reduction is required if the target is a deduplication storage appliance. Click **Settings** to configure the settings. A popup window appears. Set the following:
 - **Compression:** Select a compression level to be used to reduce the data size in the Backup Repository. Note that higher compression levels consume considerably more CPU and may slow down VM backup speed. The following options are available:
 - **Disabled:** No compression.
 - **Fast:** Lowest compression level.
 - **Medium:** Medium compression level.
 - **Best:** Maximum compression level.

Note

This option cannot be configured after creating the Backup Repository.

- **Store backups in separate files:** Select this option to enable this Backup Repository to store data of every machine in separate backup files. Enabling this option is highly recommended to ensure better reliability and performance. Leave this option unselected if you wish to enable deduplication on a Backup Repository.
- **Deduplication:** Select this option to enable the backup deduplication method to reduce the backup size by excluding duplicate data blocks from the backup.

Note

This option is not available if the Store backups in separate files checkbox has been selected.

- **Encryption:** This option is available only if the Backup Repository is created locally on the machine on which the Assigned Transporter is installed, and the machine is running a Linux OS. Select **Enabled** from the drop-down list and specify an encryption password (the password is required for importing the Backup Repository to a new instance of the product). The product will encrypt the repository destination using `ecryptfs` for folders and `cryptsetup (crypt-md)` in LUKS mode for devices/partitions before creating the Backup Repository.

Notes

- To avoid `ecryptfs` errors, make sure that there are no other folders and files except the *NakivoBackup* folder in the repository location.
- Backup Repository encryption can significantly affect backup speed.

Set up **Reliability & Maintenance** options:

- **Enable automatic repository self-healing:** Leave this option selected to automatically trigger repository self-healing in case the product detects symptoms of problems in the backup infrastructure (such as incorrect timestamps on metadata and data files). You can deselect this option and [run self-healing manually](#).
- **Run repository self-healing on schedule:** You can select this checkbox to run repository self-healing based on a schedule. You can configure the schedule by clicking the **schedule** link when the option is selected. The default schedule is set to run every day at 11 AM.

When **Stop backup and recovery to run self-healing** is selected, any jobs or recoveries that use this repository are stopped to run scheduled self-healing. Otherwise, scheduled self-healing is skipped if there are running jobs or recoveries on this repository.

- **Run full data verification on schedule:** When this option is selected, NAKIVO Backup & Replication runs full verification of all data available in the Backup Repository based on the specified schedule. The product reads each block of data to ensure that it is identical to the data block that was read on the source VM during the backup. This way, the product verifies each recovery point in the Backup Repository.

When **Stop backup and recovery to run backup verification** is selected, any running jobs which use this Backup Repository are stopped to run scheduled data verification. Otherwise, scheduled data verification is skipped if there are running jobs on this Backup Repository.

Note

Backup verification is a time-consuming process and consumes CPU of the Transporter assigned to the Backup Repository. It is recommended that you schedule backup verification during non-working hours.

- **Reclaim unused space on schedule:** You can select this option to run the Backup Repository [space reclaim](#) process based on a schedule. Space reclaim compacts the data. Unused space is reclaimed. Keep in mind that this process can be time-consuming.

Note

This option is available only when **Store backups in separate files** is not enabled.

When **Stop backup and recovery to run space reclaim** is selected, any running jobs that use this Backup Repository are stopped to run scheduled space reclaiming. Otherwise, scheduled space reclaiming is skipped if there are running jobs on this Backup Repository.

Important

Do not reboot/disconnect the "null" Transporter and storage device while space reclaim is in progress to avoid Backup Repository corruption.

- **Enforce explicit file system sync:** When this option is selected, explicit sync with the file system is enforced during all backup operations to this repository. This setting is considered more reliable but may lead to lower performance on certain storage devices. By default, the option is disabled.

Schedule detaching of the Backup Repository:

- **Detach this repository on schedule:** Select this option if you want to [detach](#) and then [attach](#) the Backup Repository based on a schedule. Detaching a Backup Repository saves the Backup Repository data and metadata in a consistent state and then stops the product's interaction with the Backup Repository (so that the Backup Repository can be copied or moved). You can use this feature, for example, for the disk-to-disk-to-tape (D2D2T) data protection approach: backups are stored on a disk for fast operational recovery and copied to a tape (while the repository is detached) for archiving and long-term storage.
 - **Delete and re-create the repository on attach:** When this option is selected, all data in the Backup Repository is erased prior to attaching it to the product. As a result, jobs that write to this Backup Repository create full VM backups. You can use this option, for example, to create full daily, weekly, or monthly VM backups and write them to tape or removable media.

Click **Finish** to finish creating the Backup Repository.

Create Backup Repository

1. Type

2. Vendor

3. Name & Location

4. Options

Volume type:

Cold HDD (sc1)

Storage (GB):

500

Storage chunk (GB):

500

☒ Automatically resize storage

Storage Savings & Encryption

Data size reduction:

Enabled

settings

Encryption:

Disabled

Reliability & Maintenance

☒ Enable automatic repository self-healing

☐ Run repository self-healing on schedule

☐ Run full data verification on schedule

☐ Enforce explicit file system sync

Scheduled Detach

☐ Detach this repository on schedule

Data Size Reduction Settings

Compression level:

Fast

☒ Store backups in separate files (recommended)

Apply

Cancel

Cancel

Finish

Backup Repository in Amazon S3

Select the **Amazon S3** option if you want to create a Backup Repository in Amazon S3. Before creating a repository, grant the required S3 access permissions to NAKIVO Backup & Replication. For details, refer to [Required AWS IAM Permissions for Amazon S3, Backblaze, and Wasabi](#) and [Permissions for the Amazon S3 Bucket](#).

In addition, make sure to enable the following options for the relevant Amazon S3 bucket:

- Object Lock
- Versioning

Since retention settings are set by NAKIVO Backup & Replication during job creation, disable Object Lock retention mode and retention period on the S3 bucket as well.

Important

- You will be charged for Amazon S3 storage/traffic according to AWS tariffs.
- Forever incremental backups are not supported by this location.
- Only Amazon S3 Standard storage class is supported.

To create a Backup Repository in an Amazon S3 bucket, proceed as described in the following sections:

- [Create Backup Repository: Type](#)
- [Create Backup Repository: Vendor](#)
- [Create Backup Repository: Name & Location](#)
- [Create Backup Repository: Options](#)

Create Backup Repository: Type

On the **Type** page of the **Create Backup Repository** wizard, select **Cloud & S3-compatible Storage** and click **Next** to go to the next page of the wizard.

The screenshot shows the 'Create Backup Repository' wizard with four steps: 1. Type, 2. Vendor, 3. Name & Location, and 4. Options. Step 1 is active. The options listed are:

- ☐ Local Folder
Directly attached storage or locally mounted share on an assigned transporter.
- ☐ CIFS Share
Network share used by transporter through CIFS Interface.
- ☐ NFS Share
Network share used by transporter through NFS Interface.
- ☒ **Cloud & S3-COMPATIBLE STORAGE**
Amazon S3, Microsoft Azure, Wasabi, Amazon EC2, Generic S3-compatible Storage BETA
- ☐ SaaS
Directly attached storage or locally mounted share on an assigned transporter used for storing Microsoft 365 objects.
- ☐ Deduplication Appliance
Integration with Dell EMC Data Domain Boost, HPE StoreOnce Catalyst and NEC HYDRAStor.

At the bottom right, there are 'Cancel' and 'Next' buttons.

Create Backup Repository: Vendor

On the **Vendor** page of the wizard, select **Amazon S3**. Click **Next** to proceed to the next step.

Create Backup Repository

1. Type 2. Vendor 3. Name & Location 4. Options

☒ Amazon S3
Highly scalable AWS object storage.

☐ Microsoft Azure
Microsoft Azure object storage. Both hot and cool storage access tiers are supported.

☐ Wasabi
Cost effective cloud based object storage.

☐ Backblaze
Secure and reliable low-cost S3 compatible cloud storage

☐ Amazon EC2
EBS storage attached to transporter running in Amazon EC2 instance.

☐ Generic S3-Compatible Storage
Object storage that supports S3 protocol.

Cancel Next

Create Backup Repository: Name & Location

On the **Name & Location** page of the wizard, do the following:

1. Enter the name of the Backup Repository in the **Name** box.
2. Select the Transporter from the **Assigned transporter** drop-down list.
3. Select an AWS account from the **Account** drop-down list.
4. Select the **AWS region** connected to the bucket where you want to store your backups.
5. Select the bucket where you want to store your backups from the **Bucket** drop-down list.

6. Click **Next** to go to the next page of the wizard.

Create Backup Repository

1. Type 2. Vendor 3. Name & Location 4. Options

Name: S3 Repository

Assigned transporter: aws ⓘ

Account: AWS ⓘ
[Add new account](#)

AWS Region: EU (Frankfurt) ⓘ

Bucket: aynbr ⓘ

Cancel Next

Create Backup Repository: Options

On the **Options** page, do the following:

1. In the **Storage Savings** section, select a compression level for reducing the data size in the Backup Repository. Note that higher compression levels consume considerably more CPU and may slow down the backup speed. The following options are available:
 - **Disabled:** No compression.
 - **Fast:** Lowest compression level.
 - **Medium:** Medium compression level.
 - **Best:** Maximum compression level.

Note

This option cannot be configured after you create the Backup Repository.

2. Set up **Reliability & Maintenance** options:
 - **Run full data verification on schedule:** When selected, the product runs full verification of all data available in the Backup Repository according to the specified schedule. The product reads each block of data and ensures that it is identical to the data block that was read on the source machine during the backup. This way, the product verifies each recovery point in the Backup Repository.

When **Stop backup and recovery to run full data verification** is selected, any running jobs that use this Backup Repository are stopped to run scheduled data verification. When this option is not selected, scheduled data verification is skipped if there are running jobs on this Backup Repository.

Note

Backup verification is a time-consuming process and utilizes the CPU resources of the Transporter assigned to the Backup Repository. It is recommended that you schedule backup verification during non-working hours.

- **Enforce explicit file system sync:** When selected, explicit sync with the file system is enforced during all backup operations to this repository. This setting is considered more reliable but may lead to lower performance on certain storage devices. By default, the option is disabled.

3. Schedule detaching of the Backup Repository:

- **Detach this repository on schedule:** Select this option if you want to [detach](#) and then [attach](#) the Backup Repository based on a schedule. Detaching a Backup Repository saves the Backup Repository data and metadata in a consistent state and then stops the interaction of the product with the Backup Repository (so that the Backup Repository can be copied or moved). You can use this feature, for example, for the disk-to-disk-to-tape (D2D2T) data protection approach, in which backups are stored on a disk for fast operational recovery and copied to a tape (while the repository is detached) for archiving and long-term storage.
 - **Delete and re-create the repository on attach:** When this option is selected, all the data in the Backup Repository is erased prior to attaching it to the product. As a result, jobs that write to this Backup Repository create full backups. You can use this option, for example, to create full daily, weekly, or monthly VM backups and write them to tape or removable media.

4. Click **Finish** to complete Backup Repository creation.

Backup Repository in Generic S3-Compatible Object Storage

Note

Only specific S3-compatible vendors are supported. Please see [Feature Requirements](#) for more information.

Before creating a repository, enable the following options for the generic S3-compatible storage used:

- Object Lock
- Versioning

To create a Backup Repository in a generic S3-compatible object bucket, proceed as described in the following sections:

- [Create Backup Repository: Type](#)
- [Create Backup Repository: Vendor](#)
- [Create Backup Repository: Name & Location](#)
- [Create Backup Repository: Options](#)

Create Backup Repository: Type

On the **Type** page of the **Create Backup Repository** wizard, select **Cloud & S3-compatible Storage** and click **Next** to go to the next page of the wizard.

Create Backup Repository

1. Type 2. Vendor 3. Name & Location 4. Options

☐ Local Folder
 Directly attached storage or locally mounted share on an assigned transporter.

☐ CIFS Share
 Network share used by transporter through CIFS Interface.

☐ NFS Share
 Network share used by transporter through NFS Interface.

☒ Cloud & S3-COMPATIBLE STORAGE
 Amazon S3, Microsoft Azure, Wasabi, Amazon EC2, Generic S3-compatible Storage BETA

☐ SaaS
 Directly attached storage or locally mounted share on an assigned transporter used for storing Microsoft 365 objects.

☐ Deduplication Appliance
 Integration with Dell EMC Data Domain Boost, HPE StoreOnce Catalyst and NEC HYDRAsstor.

Cancel **Next**

Create Backup Repository: Vendor

On the **Vendor** page of the wizard, select **Generic S3-Compatible Storage**. Click **Next** to proceed to the next step.

Create Backup Repository

1. Type 2. Vendor 3. Name & Location 4. Options

☐ Amazon S3
 Highly scalable AWS object storage.

☐ Microsoft Azure
 Microsoft Azure object storage. Both hot and cool storage access tiers are supported.

☐ Wasabi
 Cost effective cloud based object storage.

☐ Backblaze
 Secure and reliable low-cost S3 compatible cloud storage

☐ Amazon EC2
 EBS storage attached to transporter running in Amazon EC2 instance.

☒ Generic S3-Compatible Storage
 Object storage that supports S3 protocol.

Cancel **Next**

Create Backup Repository: Name & Location

On the **Name & Location** page of the wizard, do the following:

1. Enter the name of the Backup Repository in the **Name** box.
2. Select the Transporter from the **Assigned transporter** drop-down list.
3. Select the existing generic S3-compatible object storage **Account** where the backup repository will be located.
4. Optionally, click the **Add new account** link if you have not yet added a generic S3-compatible object storage account to the Inventory.

5. Select the bucket where you want to store your backups from the **Bucket** drop-down list.
6. Click **Next** to go to the next page of the wizard.

The screenshot shows a wizard titled "Create Backup Repository" with four steps: 1. Type, 2. Vendor, 3. Name & Location (current step), and 4. Options. The form contains the following fields:

- Name:** A text input field with "New" entered.
- Assigned transporter:** A dropdown menu with "Asia Pacific (Singapore) Linux trans" selected.
- Account:** A dropdown menu with "Add new account" selected.
- Bucket:** A dropdown menu with an empty selection.

At the bottom right, there are "Cancel" and "Finish" buttons.

Create Backup Repository: Options

On the **Options** page, do the following:

1. In the **Storage Savings** section, select a compression level for reducing the data size in the Backup Repository. Note that higher compression levels consume considerably more CPU and may slow down the backup speed. The following options are available:
 - Disabled: No compression
 - Fast: Lowest compression level
 - Medium: Medium compression level
 - Best: Maximum compression level

Note

This option cannot be configured after you create the Backup Repository.

2. Set up **Reliability & Maintenance** options:
 - **Run full data verification on schedule:** When this option is selected, the product runs full verification of all data available in the Backup Repository according to the specified schedule. The product reads each block of data and ensures that it is identical to the data block that was read on the source machine during the backup. This way, the product verifies each recovery point in the Backup Repository.

- When **Stop backup and recovery to run full data verification** is selected, any running jobs that use this Backup Repository are stopped to run scheduled data verification. When this option is not selected, scheduled data verification is skipped if there are running jobs on this Backup Repository.

Note

Backup verification is a time-consuming process and utilizes the CPU resources of the Transporter assigned to the Backup Repository. It is recommended that you schedule backup verification during non-working hours.

- **Enforce explicit file system sync:** When this option is selected, explicit sync with the file system is enforced during all backup operations to this repository. This setting is considered more reliable but may lead to lower performance on certain storage devices. By default, the option is disabled.

3. Schedule detaching of the Backup Repository:

- **Detach this repository on schedule:** Select this option if you want to [detach](#) and then [attach](#) the Backup Repository on a schedule. Detaching a Backup Repository saves the Backup Repository data and metadata in a consistent state and then stops the product's interaction with the Backup Repository (so that the Backup Repository can be copied or moved). You can use this feature, for example, for the disk-to-disk-to-tape (D2D2T) data protection approach, in which backups are stored on a disk for fast operational recovery, and copied to a tape (while the repository is detached) for archiving and long-term storage.
 - **Delete and re-create the repository on attach:** When this option is selected, all the data in the Backup Repository is erased prior to attaching the repository to the product. As a result, jobs that write to this Backup Repository create full backups. You can use this option, for example, to create full daily, weekly, or monthly backups and write them to tape or removable media.

4. Click **Finish** to complete Backup Repository creation.

Create Backup Repository

1. Type 2. Vendor 3. Name & Location 4. Options

Storage Savings
Data size reduction: Enabled ⓘ settings

Reliability
☐ Run full data verification on schedule ⓘ
☐ Enforce explicit file system sync ⓘ

Scheduled Detach
☐ Detach this repository on schedule ⓘ

Cancel Finish

Backup Repository in Microsoft Azure Blob Storage

Before creating a Microsoft Azure Blob storage repository, you need to configure your Azure storage account to work with NAKIVO Backup & Replication. For details, refer to [“Configuring a Microsoft Azure Storage Account” on page 414](#).

To create a Backup Repository in Azure Blob storage, proceed as described in the following sections:

- [Create Backup Repository: Type](#)
- [Create Backup Repository: Vendor](#)
- [Create Backup Repository: Name & Location](#)
- [Create Backup Repository: Options](#)

Create Backup Repository: Type

On the **Type** page of the **Create Backup Repository** wizard, select **Cloud & S3-compatible Storage** and click **Next** to go to the next page of the wizard.

Create Backup Repository

1. Type 2. Vendor 3. Name & Location 4. Options

☐ Local Folder
Directly attached storage or locally mounted share on an assigned transporter.

☐ CIFS Share
Network share used by transporter through CIFS Interface.

☐ NFS Share
Network share used by transporter through NFS Interface.

☒ Cloud & S3-COMPATIBLE STORAGE
Amazon S3, Microsoft Azure, Wasabi, Amazon EC2, Generic S3-compatible Storage ^{BETA}

☐ SaaS
Directly attached storage or locally mounted share on an assigned transporter used for storing Microsoft 365 objects.

☐ Deduplication Appliance
Integration with Dell EMC Data Domain Boost, HPE StoreOnce Catalyst and NEC HYDRAStor.

Cancel Next

Create Backup Repository: Vendor

On the **Vendor** page of the wizard, select **Microsoft Azure**. Click **Next** to proceed to the next step.

The screenshot shows the 'Create Backup Repository' wizard at the 'Vendor' step. The wizard has four steps: 1. Type, 2. Vendor, 3. Name & Location, and 4. Options. The 'Vendor' step is currently active. It lists several storage options with radio buttons: Amazon S3, Microsoft Azure (highlighted with a red box), Wasabi, Backblaze, Amazon EC2, and Generic S3-Compatible Storage. Each option has a brief description. At the bottom right, there are 'Cancel' and 'Next' buttons.

Create Backup Repository

1. Type 2. Vendor 3. Name & Location 4. Options

- ☐ Amazon S3
Highly scalable AWS object storage.
- ☒ Microsoft Azure
Microsoft Azure object storage. Both hot and cool storage access tiers are supported.
- ☐ Wasabi
Cost effective cloud based object storage.
- ☐ Backblaze
Secure and reliable low-cost S3 compatible cloud storage
- ☐ Amazon EC2
EBS storage attached to transporter running in Amazon EC2 instance.
- ☐ Generic S3-Compatible Storage
Object storage that supports S3 protocol.

Cancel Next

Create Backup Repository: Name & Location

On the **Name & Location** page of the wizard, do the following:

1. Enter the name of the Backup Repository in the **Name** box.
2. Select the Transporter from the **Assigned transporter** drop-down list.
3. Select a Microsoft Azure storage account from the **Account** drop-down list.
4. In the **Container** drop-down list, select the container within the chosen storage account where you want to store backups.
5. Click **Next** to go to the next page of the wizard.

The screenshot shows the 'Create Backup Repository' wizard at the 'Name & Location' step. The wizard has four steps: 1. Type, 2. Vendor, 3. Name & Location, and 4. Options. The 'Name & Location' step is currently active. It contains four fields: 'Name' (text input with 'azure storage'), 'Assigned transporter' (dropdown with 'Onboard transporter'), 'Account' (dropdown with 'khale001'), and 'Container' (dropdown with 'hellblob01'). There is a link 'Add new account' next to the 'Account' dropdown. At the bottom right, there are 'Cancel' and 'Next' buttons.

Create Backup Repository

1. Type 2. Vendor 3. Name & Location 4. Options

Name:

Assigned transporter:

Account: [Add new account](#)

Container:

Cancel Next

Create Backup Repository: Options

On the **Options** page, do the following:

1. In the **Storage Savings** section, select a compression level for reducing the data size in the Backup Repository. Note that higher compression levels consume considerably more CPU and may slow down the backup process. The following options are available:
 - **Disabled:** No compression.
 - **Fast:** Lowest compression level.
 - **Medium:** Medium compression level.
 - **Best:** Maximum compression level.

Note

This option cannot be configured after you create the Backup Repository.

2. Set up **Reliability & Maintenance** options:
 - **Run full data verification on schedule:** When this option is selected, the product runs full verification of all data available in the Backup Repository based on the specified schedule. The product reads each block of data and ensures that it is identical to the data block that was read on the source machine during the backup. This way, the product verifies each recovery point in the Backup Repository.

When **Stop backup and recovery to run full data verification** is selected, any running jobs that use this Backup Repository are stopped to run scheduled data verification. When this option is not selected, scheduled data verification is skipped if there are running jobs on this Backup Repository.

Note

Backup verification is a time-consuming process and utilizes the CPU resources of the Transporter assigned to the Backup Repository. It is recommended that you schedule backup verification during non-working hours.

- **Enforce explicit file system sync:** When this option is selected, explicit sync with the file system is enforced during all backup operations to this repository. This setting is considered more reliable but may lead to lower performance on certain storage devices. This option is disabled by default.
3. Schedule detaching of the Backup Repository:

- **Detach this repository on schedule:** Select this option if you want to [detach](#) and then [attach](#) the Backup Repository based on a schedule. Detaching a Backup Repository saves the Backup Repository data and metadata in a consistent state and then stops the interaction of the product with the Backup Repository (so that the Backup Repository can be copied or moved).
- **Delete and re-create the repository on attach:** When this option is selected, all the data in the Backup Repository is erased prior to attaching it to the product. As a result, jobs that write to this Backup Repository create full backups. You can use this option, for example, to create full daily, weekly, or monthly VM backups and write them to tape or removable media.

4. Click **Finish** to complete Backup Repository creation.

Create Backup Repository

1. Type 2. Vendor 3. Name & Location 4. Options

Storage Savings
Data size reduction: Enabled [settings](#)

Reliability
☐ Run full data verification on schedule
☐ Enforce explicit file system sync

Scheduled Detach
☐ Detach this repository on schedule

Data Size Reduction Settings
Compression level: Fast
☒ Store backups in separate files (recommended)

Apply Cancel

Cancel Finish

Backup Repository in Backblaze B2 Cloud Storage

To create a Backup Repository in Backblaze B2 storage, proceed as described in the following sections:

- [Create Backup Repository: Type](#)
- [Create Backup Repository: Vendor](#)
- [Create Backup Repository: Name & Location](#)
- [Create Backup Repository: Options](#)

Create Backup Repository: Type

On the **Type** page of the **Create Backup Repository** wizard, select **Cloud** and click **Next** to go to the next page of the wizard.

Create Backup Repository

1. Type 2. Vendor 3. Name & Location 4. Options

☐ Local Folder
Directly attached storage or locally mounted share on an assigned transporter.

☐ CIFS Share
Network share used by transporter through CIFS Interface.

☐ NFS Share
Network share used by transporter through NFS Interface.

☒ Cloud & S3-COMPATIBLE STORAGE
Amazon S3, Microsoft Azure, Wasabi, Amazon EC2, Generic S3-compatible Storage BETA

☐ SaaS
Directly attached storage or locally mounted share on an assigned transporter used for storing Microsoft 365 objects.

☐ Deduplication Appliance
Integration with Dell EMC Data Domain Boost, HPE StoreOnce Catalyst and NEC HYDRASor.

Cancel Next

Create Backup Repository: Vendor

On the **Vendor** page of the wizard, select **Backblaze**. Click **Next** to proceed to the next step.

Create Backup Repository

1. Type 2. Vendor 3. Name & Location 4. Options

☐ Amazon S3
Highly scalable AWS object storage.

☐ Microsoft Azure
Microsoft Azure object storage. Both hot and cool storage access tiers are supported.

☐ Wasabi
Cost effective cloud based object storage.

☒ Backblaze
Secure and reliable low-cost S3 compatible cloud storage

☐ Amazon EC2
EBS storage attached to transporter running in Amazon EC2 instance.

☐ Generic S3-Compatible Storage
Object storage that supports S3 protocol.

Cancel Next

Create Backup Repository: Name & Location

On the **Name & Location** page of the wizard, do the following:

1. Enter the name of the Backup Repository in the **Name** box.
2. Select the Transporter from the **Assigned transporter** drop-down list.
3. Select a Backblaze account from the **Account** drop-down list.
4. In the **Bucket** drop-down list, select the bucket within the chosen storage account where you want to store backups.
5. Click **Next** to go to the next page of the wizard.

Create Backup Repository

1. Type 2. Vendor 3. Name & Location 4. Options

Name: Backblaze Repository

Assigned transporter: Onboard transporter ⓘ

Account: Backblaze ⓘ

Bucket: [Add new account](#) Technical-writer ⓘ

Cancel Finish

Create Backup Repository: Options

On the **Options** page, do the following:

1. In the **Storage Savings** section, select a compression level for reducing the data size in the Backup Repository. Note that higher compression levels consume considerably more CPU and may slow down the backup process. The following options are available:
 - **Disabled:** No compression.
 - **Fast:** Lowest compression level.
 - **Medium:** Medium compression level.
 - **Best:** Maximum compression level.

Note

This option cannot be configured after you create the Backup Repository.

2. Set up **Reliability & Maintenance** options:
 - **Run full data verification on schedule:** When this option is selected, the product runs full verification of all data available in the Backup Repository based on the specified schedule. The product reads each block of data and ensures that it is identical to the data block that was read on the source machine during the backup. This way, the product verifies each recovery point in the Backup Repository.

When **Stop backup and recovery to run full data verification** is selected, any running jobs that use this Backup Repository are stopped to run scheduled data verification. When this option is not selected, scheduled data verification is skipped if there are running jobs on this Backup Repository.

Note

Backup verification is a time-consuming process and utilizes the CPU resources of the Transporter assigned to the Backup Repository. It is recommended that you schedule backup verification during non-working hours.

- **Enforce explicit file system sync:** When this option is selected, explicit sync with the file system is enforced during all backup operations to this repository. This setting is considered more reliable but may lead to lower performance on certain storage devices. This option is disabled by default.

3. Schedule detaching of the Backup Repository:

- **Detach this repository on schedule:** Select this option if you want to [detach](#) and then [attach](#) the Backup Repository based on a schedule. Detaching a Backup Repository saves the Backup Repository data and metadata in a consistent state and then stops the interaction of the product with the Backup Repository (so that the Backup Repository can be copied or moved).
 - **Delete and re-create the repository on attach:** When this option is selected, all the data in the Backup Repository is erased prior to attaching it to the product. As a result, jobs that write to this Backup Repository create full backups. You can use this option, for example, to create full daily, weekly, or monthly VM backups and write them to tape or removable media.

4. Click **Finish** to complete Backup Repository creation.

Create Backup Repository

1. Type

2. Vendor

3. Name & Location

4. Options

Storage Savings

Data size reduction:

Enabled

[settings](#)

Reliability

- ☐ Run full data verification on schedule
- ☐ Enforce explicit file system sync

Scheduled Detach

- ☐ Detach this repository on schedule

Data Size Reduction Settings

Compression level: Fast

☒ Store backups in separate files (recommended)

Apply

Cancel

Cancel

Finish

Backup Repository in Wasabi Hot Cloud Storage

Select the **Wasabi** option if you want to create a Backup Repository in Wasabi. Before creating a repository, grant the required Wasabi access permissions to NAKIVO Backup & Replication. For details, refer to [Required AWS IAM Permissions for Amazon S3, Backblaze, and Wasabi](#).

Important

- You may be charged for Wasabi storage/traffic. Refer to [Cloud Storage Pricing](#) for details.
- Forever incremental backups are not supported by this location.

To create a Backup Repository in a Wasabi bucket, proceed as described in the following sections:

- [Create Backup Repository: Type](#)
- [Create Backup Repository: Vendor](#)
- [Create Backup Repository: Name & Location](#)
- [Create Backup Repository: Options](#)

Create Backup Repository: Type

On the **Type** page of the **Create Backup Repository** wizard, select **Cloud & S3-compatible Storage** and click **Next** to go to the next page of the wizard.

The screenshot shows the 'Create Backup Repository' wizard with four steps: 1. Type, 2. Vendor, 3. Name & Location, and 4. Options. Step 1 is active. The options listed are:

- ☐ Local Folder
Directly attached storage or locally mounted share on an assigned transporter.
- ☐ CIFS Share
Network share used by transporter through CIFS Interface.
- ☐ NFS Share
Network share used by transporter through NFS Interface.
- ☒ Cloud & S3-COMPATIBLE STORAGE
Amazon S3, Microsoft Azure, Wasabi, Amazon EC2, Generic S3-compatible Storage ^{BETA}
- ☐ SaaS
Directly attached storage or locally mounted share on an assigned transporter used for storing Microsoft 365 objects.
- ☐ Deduplication Appliance
Integration with Dell EMC Data Domain Boost, HPE StoreOnce Catalyst and NEC HYDRAsstor.

At the bottom right, there are 'Cancel' and 'Next' buttons. The 'Cloud & S3-COMPATIBLE STORAGE' option is highlighted with a red rectangular box.

Create Backup Repository: Vendor

On the **Vendor** page of the wizard, select **Wasabi**. Click **Next** to proceed to the next step.

Create Backup Repository

1. Type 2. Vendor 3. Name & Location 4. Options

☐ Amazon S3
 Highly scalable AWS object storage.

☐ Microsoft Azure
 Microsoft Azure object storage. Both hot and cool storage access tiers are supported.

☒ Wasabi
 Cost effective cloud based object storage.

☐ Backblaze
 Secure and reliable low-cost S3 compatible cloud storage

☐ Amazon EC2
 EBS storage attached to transporter running in Amazon EC2 instance.

☐ Generic S3-Compatible Storage
 Object storage that supports S3 protocol.

Cancel Next

Create Backup Repository: Name & Location

On the **Name & Location** page of the wizard, do the following:

1. Enter the name of the Backup Repository in the **Name** box.
2. Select the Transporter from the **Assigned transporter** drop-down list.
3. Select a Wasabi account from the **Account** drop-down list.
4. Select the **Wasabi region** connected to the bucket where you want to store your backups.
5. Select the bucket where you want to store your backups from the **Bucket** drop-down list.
6. Click **Next** to go to the next page of the wizard.

Create Backup Repository

1. Type 2. Vendor 3. Name & Location 4. Options

Name:

Assigned transporter: ⓘ

Account: ⓘ
[Add new account](#)

Wasabi region: ⓘ

Bucket: ⓘ

Cancel Next

Create Backup Repository: Options

On the **Options** page, do the following:

1. In the **Storage Savings** section, select a compression level for reducing the data size in the Backup Repository. Note that higher compression levels consume considerably more CPU and may slow down the backup speed. The following options are available:
 - **Disabled:** No compression.
 - **Fast:** Lowest compression level.
 - **Medium:** Medium compression level.
 - **Best:** Maximum compression level.

Note

This option cannot be configured after you create the Backup Repository.

2. Set up **Reliability & Maintenance** options:
 - **Run full data verification on schedule:** When selected, the product runs full verification of all data available in the Backup Repository according to the specified schedule. The product reads each block of data and ensures that it is identical to the data block that was read on the source machine during the backup. This way, the product verifies each recovery point in the Backup Repository.

When **Stop backup and recovery to run full data verification** is selected, any running jobs that use this Backup Repository are stopped to run scheduled data verification. When this option is not selected, scheduled data verification is skipped if there are running jobs on this Backup Repository.

Note

Backup verification is a time-consuming process and utilizes the CPU resources of the Transporter assigned to the Backup Repository. It is recommended that you schedule backup verification during non-working hours.

- **Enforce explicit file system sync:** When selected, explicit sync with the file system is enforced during all backup operations to this repository. This setting is considered more reliable but may lead to lower performance on certain storage devices. By default, the option is disabled.
3. Schedule detaching of the Backup Repository:

- **Detach this repository on schedule:** Select this option if you want to [detach](#) and then [attach](#) the Backup Repository based on a schedule. Detaching a Backup Repository saves the Backup Repository data and metadata in a consistent state and then stops the interaction of the product with the Backup Repository (so that the Backup Repository can be copied or moved).
- **Delete and re-create the repository on attach:** When this option is selected, all the data in the Backup Repository is erased prior to attaching it to the product. As a result, jobs that write to this Backup Repository create full backups. You can use this option, for example, to create full daily, weekly, or monthly VM backups and write them to tape or removable media.

4. Click **Finish** to complete Backup Repository creation.

Create Backup Repository

1. Type

2. Vendor

3. Name & Location

4. Options

Storage Savings

Data size reduction: Enabled settings

Reliability

☐ Run full data verification on schedule
 ☐ Enforce explicit file system sync

Scheduled Detach

☐ Detach this repository on schedule

Data Size Reduction Settings

Compression level: Fast i

☒ Store backups in separate files (recommended) i

Apply

Cancel

Cancel

Finish

Backup Repository on Deduplication Appliance

NAKIVO Backup & Replication allows you to use [advanced deduplication appliances](#) for data protection.

Notes

- Before creating a Backup Repository on a Dell EMC DD, you need to install BoostFS Plugin and create a storage unit on the data domain backup appliance. Refer to [Integrating with EMC DD Boost](#) for details.
- Before creating a Backup Repository on an NEC HYDRAstor, you need to configure the NEC HYDRAstor and the machine on which NAKIVO Transporter is installed. Refer to [Integrating with NEC HYDRAstor](#) for details.
- To create a Backup Repository on other deduplication appliances, refer to [“Backup Repository on NFS Share” on page 482](#).

To create a repository on a deduplication appliance, proceed as described in the following sections:

- [Create Backup Repository: Type](#)
- [Create Backup Repository: Device](#)
- [Create Backup Repository: Name and Location](#)
- [Create Backup Repository: Options](#)

Create Backup Repository: Type

On the **Type** page of the **Create Backup Repository** wizard, select **Deduplication Appliance** and click **Next** to go to the next page of the wizard.

Note

Refer to [“Storage Integration Requirements” on page 123](#) to see the list of supported advanced deduplication appliances.

Create Backup Repository

1. Type 2. Device 3. Name & Location 4. Options

☐ Local Folder
 Directly attached storage or locally mounted share on an assigned transporter.

☐ CIFS Share
 Network share used by transporter through CIFS Interface.

☐ NFS Share
 Network share used by transporter through NFS Interface.

☐ Cloud & S3-Compatible Storage
 Amazon S3, Wasabi, Backblaze B2 Cloud Storage, Microsoft Azure Blob Storage, Amazon EC2, Generic S3-compatible Storage.

☐ SaaS
 Directly attached storage or locally mounted share on an assigned transporter used for storing Microsoft 365 objects.

☒ Deduplication Appliance
 Integration with Dell EMC Data Domain Boost, HPE StoreOnce Catalyst and NEC HYDRAsstor.

Cancel Next

Create Backup Repository: Device

- On the **Device** page, select one of the devices:
 - Dell EMC Data Domain Boost**
 - HP StoreOnce Catalyst**
 - NEC HYDRAsstor**
- Click **Next** to go to the next page of the wizard.

Create Backup Repository

1. Type 2. Device 3. Name & Location 4. Options

☒ Dell EMC Data Domain Boost
 Use NAKIVO Backup & Replication along with the source-side deduplication of Dell/EMC Data Domain Boost.

☐ HPE StoreOnce Catalyst
 Use NAKIVO Backup & Replication along with the source-side deduplication of HPE StoreOnce Catalyst.

☐ NEC HYDRAsstor
 Use NAKIVO Backup & Replication along with the deduplication of NEC HYDRAsstor.

Cancel Next

Create Backup Repository: Name and Location

On the **Name & Location** page, specify the following:

1. **Name:** Enter a name for the Backup Repository.
2. **Assigned transporter:** Choose a Transporter that will manage (that is, write data to and read data from) this Backup Repository.
3. Depending on the deduplication appliance, provide the following information:
 - **Dell EMC Data Domain Boost**
 1. **Name:** Enter the name of your Backup Repository.
 2. **Assigned transporter:** Select the assigned Transporter.
 3. **Path to the share:** Enter the path to the share folder in the following format: <backup_appliance>:/<storage_unit>. Refer to [Creating a NAKIVO Backup & Replication Backup Repository on EMC Data Domain Backup Appliance](#) for details.

Create Backup Repository

1. Type 2. Device 3. Name & Location 4. Options

Name:

Assigned transporter:

Path to the share:

Cancel Next

- **HPE StoreOnce Catalyst**
 1. **Name:** Enter the name of your Backup Repository.
 2. **Assigned transporter:** Select the assigned Transporter.
 3. **Connection type:** Select one of the connection types to be used to access the Backup Repository:
 - **IP address**
 - **Fibre Channel**
 4. Depending on the connection type, do the following:

- **Server name** (if IP address connection type is selected): Enter the server name or IP address of the HPE StoreOnce Catalyst.
 - **COFC identifier** (if Fibre Channel connection type is selected): Enter the COFC identifier. You can find your COFC identifier by going to **Catalyst Settings>Fibre Channel** in the **StoreOnce Management Console**.
5. **Catalyst store name:** Enter the Catalyst store name.
 6. **Username:** Provide the username to the Catalyst store.
 7. **Password:** Provide the password to the Catalyst store.

Create Backup Repository

1. Type
2. Device
3. Name & Location
4. Options

Name:

StoreOnce

Assigned transporter:

Onboard transporter

Connection type:

IP Address

Server name:

192.168.1.1

Catalyst store name:

CatalystName

Username:

admin

Password:

Cancel
Next

- **NEC HYDRAsstor**

1. **Name:** Enter the name of your Backup Repository.
2. **Assigned transporter:** Select the assigned Transporter.
3. **Path to the mount point:** Enter the path to the mount point in the following

format: /opt/nakivo/repository/hsva.

Create Backup Repository

1. Type 2. Device 3. Name & Location 4. Options

Name: HYDRAsstor

Assigned transporter: Onboard transporter ⓘ

Path to the mount point: /opt/nakivo/repository/hydra ⓘ

Cancel Next

4. Click **Next** to go to the next page of the wizard.

Create Backup Repository: Options

On the **Options** page, do the following:

1. Set up *Storage Savings & Encryption* options:
 - **Data size reduction:** If this option is enabled, NAKIVO Backup & Replication enables the use of data size reduction for this repository to save disk space. Note that this may put additional load on the CPU. Disabling data size reduction is required if the target is a deduplication storage appliance. Click settings to configure the settings. A popup window appears. Set the following:
 - **Compression:** Select a compression level that will be used to reduce the data size in the Backup Repository. Note that higher compression levels consume considerably more CPU and may slow down VM backup speed. The following options are available:
 - **Disabled:** The data in the Backup Repository will not be compressed.
 - **Fast:** Lowest compression level.
 - **Medium:** Medium compression level.
 - **Best:** Maximum compression level.

Note

This option cannot be configured after creating the Backup Repository.

- **Store backups in separate files:** Select this option to enable this backup repository to store data of every machine in separate backup files. Enabling this option is highly recommended to ensure higher reliability and performance. Leave this option unchecked if you wish to enable deduplication on a given backup repository.
- **Deduplication:** Select this option to enable the backup deduplication method to reduce the backup size by excluding duplicate data blocks from the backup.

Note

This option is not available if the Store backups in separate files checkbox has been selected.

- **Encryption:** This option is available only if the Backup Repository is created locally on the machine on which the Assigned Transporter is installed, and the machine is running a Linux OS. Select **Enabled** from the drop-down list and specify an encryption password. (The password will be required for importing the Backup Repository into a new instance of the product.) The product will encrypt the repository destination (using `ecryptfs` for folders and `cryptsetup` (`crypt-md`) in LUKS mode for devices/partitions) prior to creating the Backup Repository.

Note

- *Storage Savings and Encryption* settings are locked to the recommended settings.
- To avoid `ecryptfs` errors, make sure that there are no other folders and files except the NakivoBackup folder in the repository location.
- Backup Repository encryption can significantly influence backup speed.

2. Set up *Reliability & Maintenance* options:

- **Enable automatic repository self-healing:** Leave this option selected to automatically trigger repository self-healing in case the product detects symptoms of problems in the backup infrastructure such as incorrect timestamps on metadata and data files. You can deselect this option and [run self-healing manually](#).
- **Run repository self-healing on schedule:** If required, select this checkbox to run repository self-healing on schedule. You can configure the schedule by clicking the **schedule** link when the option is selected. The default schedule is set to run every day at 11 AM.
If **Stop backup and recovery to run self-healing** is selected, any jobs or recoveries which use this repository will be stopped to run scheduled self-healing. Otherwise, scheduled self-healing will be skipped in case there are running jobs or recoveries on this repository.

- **Run full data verification on schedule:** If selected, NAKIVO Backup & Replication will run full verification of all data available in the Backup Repository on the specified schedule. The product will read each block of data and ensure that it is identical to the data block that was read on the source VM during the backup. This way, the product will verify each recovery points in the Backup Repository.

If **Stop backup and recovery to run backup verification** is selected, any running jobs which use this Backup Repository will be stopped to run scheduled data verification. Otherwise, scheduled data verification will be skipped in case there are running jobs on this Backup Repository.

Note

Backup verification is a time-consuming process and consumes CPU of the Transporter assigned to the Backup Repository. It is recommended that you schedule backup verification during non-working hours.

- **Enforce explicit file system sync:** When selected, explicit sync with the file system is enforced during all backup operations to this repository. This setting is considered more reliable but may lead to lower performance on certain storage devices. By default, the option is disabled.

4. Schedule detaching of the Backup Repository:

- **Detach this repository on schedule:** Select this option if you want to [detach](#) and then [attach](#) the Backup Repository on a schedule. Detaching a Backup Repository saves the Backup Repository data and metadata in a consistent state and then stops the product's interaction with the Backup Repository (so that the Backup Repository can be copied or moved). You can use this feature, for example, for the disk-to-disk-to-tape (D2D2T) data protection approach, in which backups are stored on a disk for fast operational recovery, and copied to a tape (while the repository is detached) for archiving and long-term storage.
 - **Delete and re-create the repository on attach:** If this option is selected, all data in the Backup Repository will be erased prior to attaching it to the product. As a result, jobs that write to this Backup Repository will create full VM backups. You can use this option, for example, to create full daily, weekly, or monthly VM backups and write them to tape or removable media.

5. Click **Finish** to finish creating the Backup Repository.

Create Backup Repository

1. Type

2. Device

3. Name & Location

4. Options

Your backup location is a deduplication appliance so recommended settings are applied.

Storage Savings & Encryption

Data size reduction:

Disabled

Encryption:

Disabled

Reliability & Maintenance

☒ Enable automatic repository self-healing

☐ Run repository self-healing on schedule

☐ Run full data verification on schedule

☐ Enforce explicit file system sync

Scheduled Detach

☐ Detach this repository on schedule

Cancel

Finish

Managing Backup Repositories

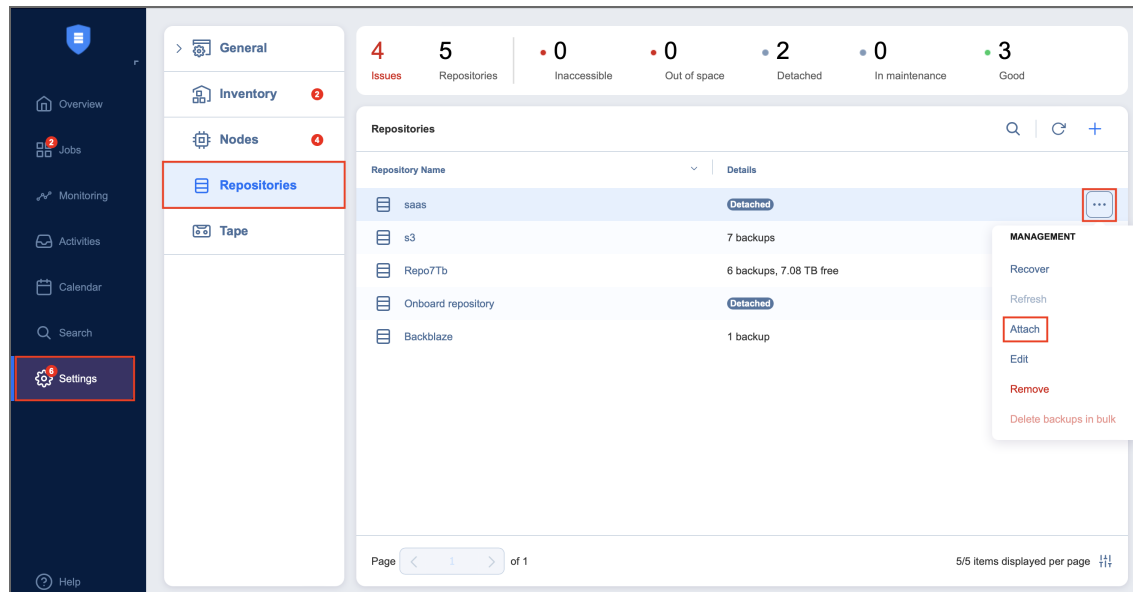
Refer to the following topics:

- [“Attaching Backup Repositories” on page 522](#)
- [“Detaching Backup Repositories” on page 523](#)
- [“Editing Backup Repositories” on page 524](#)
- [“How to Copy Backup Repository to Tape” on page 525](#)
- [“Reclaiming Backup Repository Space” on page 526](#)
- [“Refreshing Backup Repositories” on page 529](#)
- [“Removing and Deleting Backup Repositories” on page 531](#)
- [“Repairing Backup Repository” on page 533](#)
- [“Running Backup Repository Self-Healing” on page 536](#)
- [“Running Block-Level Backup Verification” on page 538](#)

Attaching Backup Repositories

If you have **detached** a Backup Repository, you can reattach it to the product by following the steps below:

1. From the main menu of NAKIVO Backup & Replication, click **Settings**.
2. Go to the **Repositories** tab and hover over a Backup Repository.
3. On the right side, click **...** and then click **Attach**.



The Backup Repository is reattached to NAKIVO Backup & Replication. You can now back up to the attached Backup Repository.

Detaching Backup Repositories

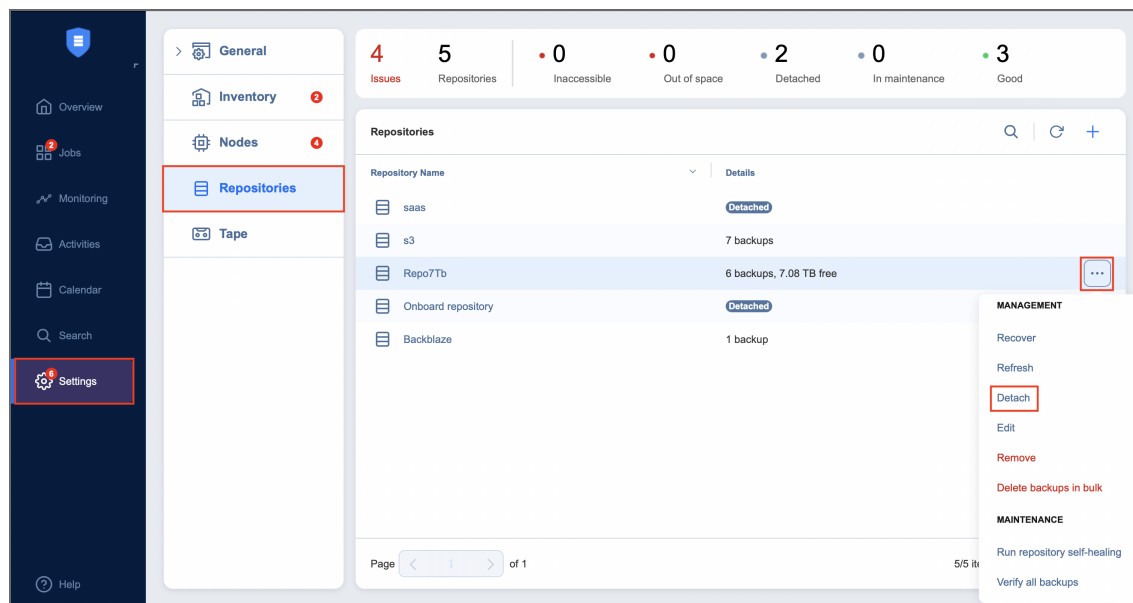
Detaching a Backup Repository saves the Backup Repository data and metadata in a consistent state and stops the product's interaction with the repository (e.g. reading and writing of data or metadata). You may want to detach a Backup Repository in order to move it to a different location or to put the associated storage in maintenance.

Note

As the product does not interact with detached repositories, jobs with detached Backup Repositories as target storage will fail.

To detach a Backup Repository, follow the steps below:

1. From the main menu, click **Settings**.
2. Go to the **Repositories** tab and hover over a Backup Repository.
3. On the right side, click **...** and then click **Detach**.



Note

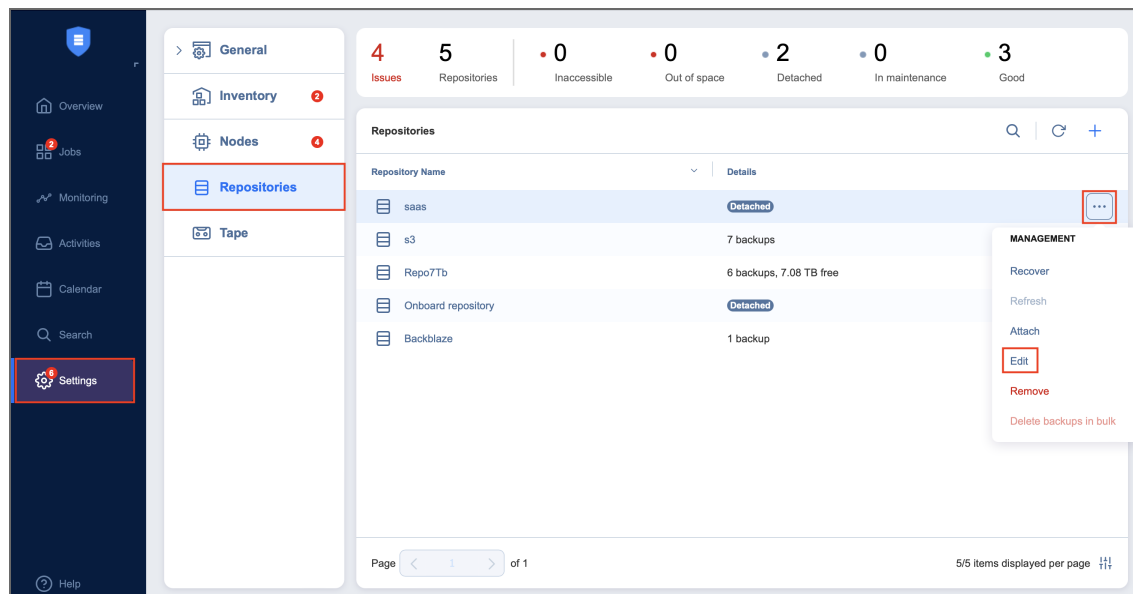
A Backup Repository cannot be detached if a job that backs up to this Backup Repository is running.

The Backup Repository is detached from the product. You can [reattach](#) the Backup Repository to NAKIVO Backup & Replication when needed.

Editing Backup Repositories

To modify the settings of an existing Backup Repository, follow the steps below:

1. From the main menu of NAKIVO Backup & Replication, click **Settings**.
2. Go to the **Repositories** tab and hover over a Backup Repository.
3. On the right side, click **...** and then click **Edit**.



Note

A Backup Repository cannot be edited while a job that backs up to this Backup Repository is running.

4. Update the fields as necessary.
5. Click **Apply**. Changes you have made are applied and the Backup Repository update starts.

How to Copy Backup Repository to Tape

With NAKIVO Backup & Replication, you are able to use a disk-to-disk-to-tape (D2D2T) data protection approach. This approach allows to store backups on a disk for fast operational recovery and copy them to a tape for archival and long-term storage. To achieve this, you need to take these steps:

1. [Create a Backup Repository](#) on a disk or use the Onboard Backup Repository created with the product installation.

Note

By default, the Onboard Backup Repository stores backups in incremental and full backup files (**Store backups in separate files** option is enabled). If you want to store only incremental backups, you should create a new backup repository and configure it as forever incremental. This can be done by deselecting the **Store backups in separate files** option on the **Options** page of the **Create Backup Repository** wizard.

2. [Create](#) and run VM backup jobs to the Backup Repository.
3. After all backup jobs are complete, do either of the following:
 - Manually [detach](#) the Backup Repository to ensure its data is consistent.
 - Enable scheduled repository detach/attach in repository settings.
4. Copy the entire folder with the Backup Repository to a tape.

Note

To automate the folder copy process, you can use [post-job scripts](#) or 3rd-party utilities.

Reclaiming Backup Repository Space

When a backup or recovery point is deleted in a Backup Repository, the space occupied by that backup or recovery point is marked as “free” and can be reused by new data blocks on the next job runs. However, the actual size of the Backup Repository may not change. The size of a Backup Repository can be reduced by rearranging the data blocks so there are no “free” ones occupying storage space. The amount of space that can be freed up is displayed in parentheses after the amount of used space. This is applicable if the repository type is **Forever-incremental**. Otherwise, if the repository type is **Incremental with full backups**, space reclaiming is not required. It is enough to delete the backups or recovery points to free up space and continue backing up to the repository.

For the incremental with full backup Backup Repository type, it is technically impossible to remove recovery points if there is no full backup after them. Make a full backup before deleting older recovery points.

Reclaiming free space can take the same amount of time as copying the entire Backup Repository to the storage where it is located (that is, if your repository size is 500 GB, reclaiming free space can take the same amount of time as copying 500GB of data to the storage where the Backup Repository is located).

Refer to the following topic to learn how to start and stop the reclaiming process:

- [Starting the Space Reclaiming Process](#)
- [Stopping the Space Reclaiming Process](#)

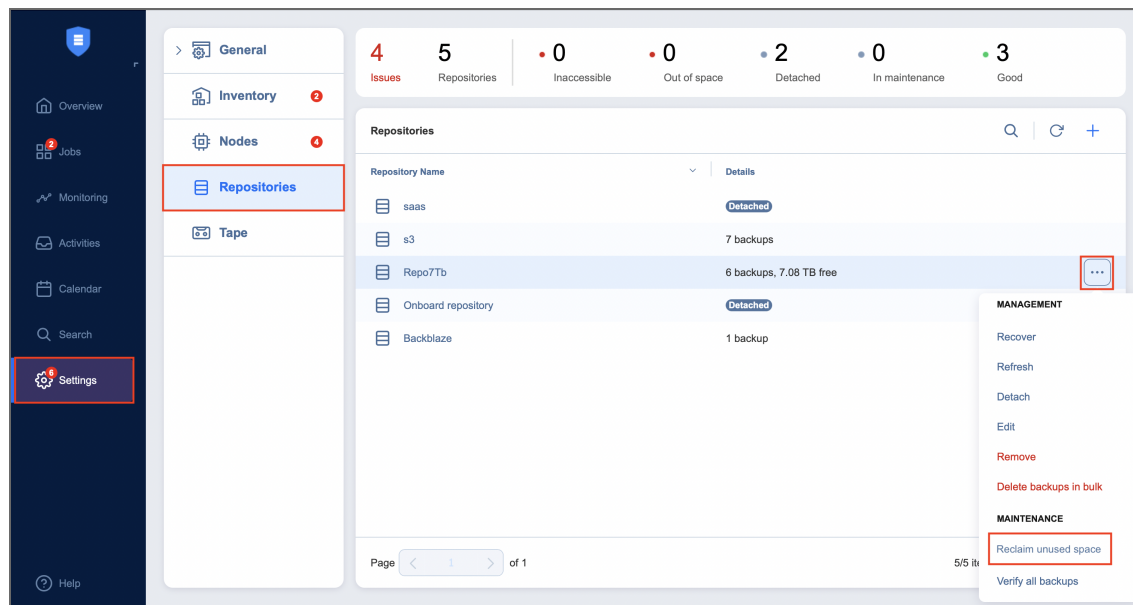
Starting the Space Reclaiming Process

Important

Space reclaim requires at least 500 MB of free space on the repository storage in order to start.

To reclaim free space, follow the steps below:

1. Go to the main menu of NAKIVO Backup & Replication and click **Settings**.
2. Go to the **Repositories** tab and choose a Backup Repository.
3. In the title of the Backup Repository, click ●●● and then click **Reclaim unused space**.



The space reclaiming process cannot be started if a job that backs up to this Backup Repository is concurrently running.

4. In the dialog box that opens, leave the **Interrupt space reclaim task if backup or recovery is started** option selected to pause the space reclaiming process when a backup or recovery is started. The space reclaiming process will be resumed once the backup or recovery job is completed. If you deselect the option, backup jobs will fail and recovery jobs will not start until the space reclaim process is completed.
5. Click **Start**. The process of rearranging data blocks is started, and progress is displayed in the title of the Backup Repository.

Stopping the Space Reclaiming Process

You can stop the space reclaim process at any time (for example to run a recovery job, move your Backup Repository to a new location, or put your backup storage on maintenance).

Before the space reclaiming process begins, the Backup Repository is detached from the product to keep data in a consistent state. The space reclaiming process stops if job that backs up VMs to such a Backup Repository is started and resumes after it is finished.

To stop the space reclaim process, follow the steps below:

1. Go to the main menu of NAKIVO Backup & Replication and click **Settings**.
2. Go to the **Repositories** tab and choose a Backup Repository.

3. In the title of the Backup Repository, click ●●● and then click **Stop space reclaim**.

The screenshot displays the Backup Repository management interface. On the left, a sidebar contains navigation links: Overview, Jobs, Monitoring, Activities, Calendar, Search, and Settings (highlighted with a red box). The main content area is divided into a left sidebar with tabs: General, Inventory, Nodes, Repositories (highlighted with a red box), and Tape. The 'Repositories' tab is active, showing a table of repositories. The table has columns for Repository Name and Details. The repositories listed are: 'saas' (Detached), 's3' (7 backups), 'Repo7Tb' (6 backups, 7.08 TB free), 'Onboard repository' (Detached), and 'Backblaze' (1 backup). The 'Repo7Tb' row is highlighted, and a context menu (three dots) is open, showing options under 'MANAGEMENT' (Recover, Refresh, Detach, Edit, Remove, Delete backups in bulk) and 'MAINTENANCE' (Stop space reclaim, Verify all backups). The 'Stop space reclaim' option is highlighted with a red box. At the top of the main content area, there are status indicators: 4 Issues, 5 Repositories, 0 Inaccessible, 0 Out of space, 2 Detached, 0 In maintenance, and 3 Good. The bottom of the interface shows a pagination bar: Page 1 of 1, 5/5 items.

Repository Name	Details
saas	Detached
s3	7 backups
Repo7Tb	6 backups, 7.08 TB free
Onboard repository	Detached
Backblaze	1 backup

MANAGEMENT

- Recover
- Refresh
- Detach
- Edit
- Remove
- Delete backups in bulk

MAINTENANCE

- Stop space reclaim
- Verify all backups

Refreshing Backup Repositories

By default, NAKIVO Backup & Replication refreshes Backup Repository information hourly. During the refreshing process, the product collects all required information about Backup Repositories, such as the amount of free space, number of backups, and number of recovery points.

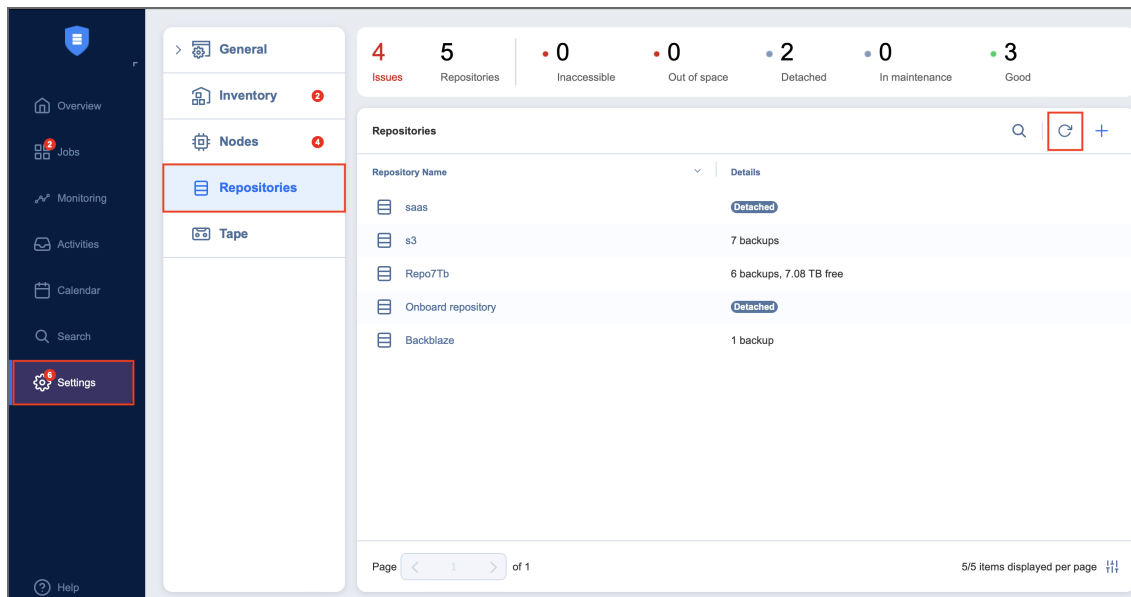
Only one Backup Repository is refreshed at a time. Therefore, if you attempt to refresh multiple Backup Repositories, all but one will be added to a queue.

- [Refreshing All Backup Repositories](#)
- [Refreshing a Single Backup Repository](#)

Refreshing All Backup Repositories

To refresh all backup repositories, follow the steps below:

1. From the main menu of NAKIVO Backup & Replication, click **Settings**.
2. Go to the **Repositories** tab.
3. Click the **Refresh All** button.



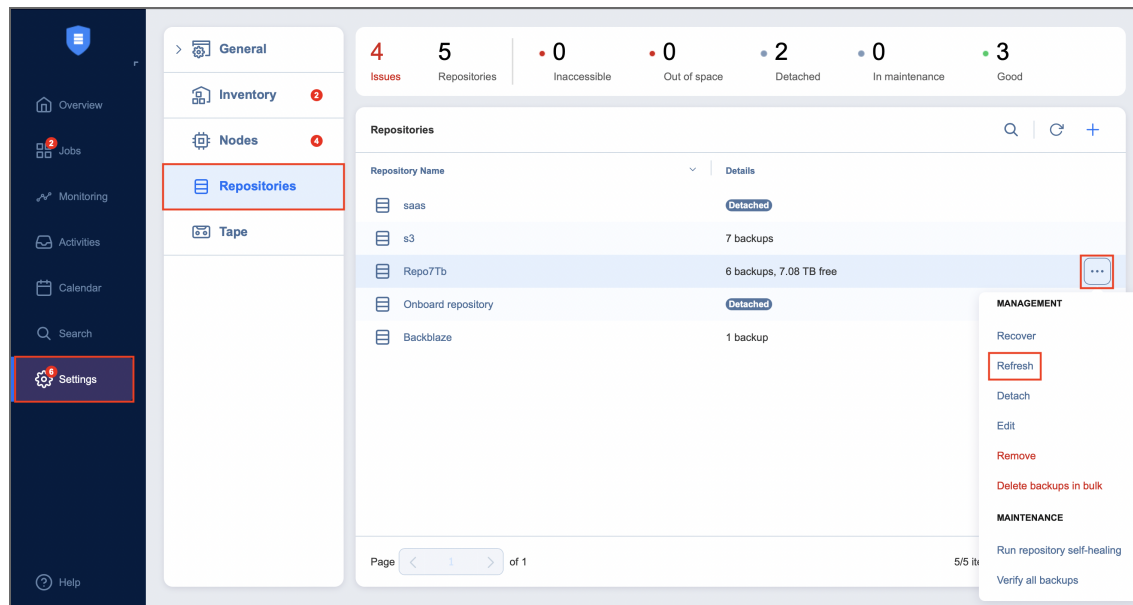
The Backup Repository refresh process begins.

Refreshing a Single Backup Repository

To refresh a single Backup Repository, follow the steps below:

1. From the main menu of NAKIVO Backup & Replication, click **Settings**.
2. Go to the **Repositories** tab.
3. Hover over the Backup Repository that you wish to refresh and click ●●●.

4. Click **Refresh**.



The Backup Repository refresh begins.

Removing and Deleting Backup Repositories

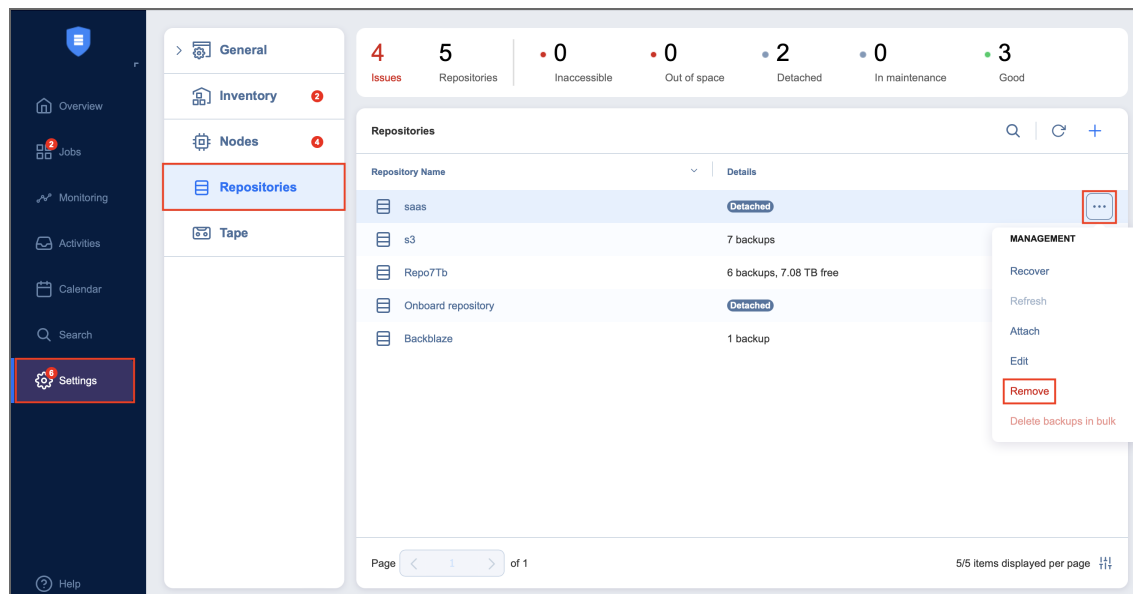
In NAKIVO Backup & Replication, you can either permanently delete a Backup Repository and all of its data or remove only the Backup Repository from the product while maintaining all of its data. After removing a Backup Repository you will be able to import it into the same or a new instance of the product.

Note

You will not be able to remove a Backup Repository if there is a job that backs up to this Backup Repository. To remove such a Backup Repository, delete (or edit) the corresponding jobs so no items are backed up to the aforementioned repository.

To permanently delete or remove a Backup Repository from the product, follow the steps below:

1. From the main menu of NAKIVO Backup & Replication, click **Settings**.
2. Go to the **Repositories** tab.
3. Hover over a Backup Repository.
4. On the right side, click **Manage** and then click **Remove**.



5. Do the following when the confirmation message appears:
 - To remove the Backup Repository from NAKIVO Backup & Replication and keep the Backup Repository on a disk, select **Remove repository and keep backups**.

Note

You can [import](#) the removed Backup Repository back to the same instance or to a new installation.

- To permanently delete the Backup Repository and all its data, select **Remove repository and delete backups**.

Note

- This operation will permanently delete the Backup Repository and all its backups.

Repairing Backup Repository

In case an immutable backup or the Backup Repository itself is corrupted, it is possible to initiate a repair process. During this process, NAKIVO Backup & Replication attempts to revert the Backup Repository or a specific backup to its uncorrupted state.

Refer to the following topics:

- [Running the Repair Process for a Backup Repository](#)
- [Running the Repair Process for a Specific Backup Object](#)

Running the Repair Process for a Backup Repository

To run repair for a Backup Repository, do the following:

1. Go to **Settings > Repositories** and hover over the name of the Backup Repository.
2. Click **•••** and select **Repair**. Alternatively, you can click on the name of the Backup Repository and then go to **Manage > Repair** to start the repair process.

Note

The Repair option is only available in the following cases:

- Non-immutable recovery points have been removed from the Backup Repository of the **Local folder** or **Amazon S3** type.
- The local Backup Repository is inaccessible and meets the conditions specified in the [feature requirements](#) section.
- A **forever incremental** Backup Repository becomes corrupted due to space reclaim interruption. This may occur as a result of rebooting the transporter assigned to the repository or disconnecting storage while space reclaim is in progress.

3. Select the desired options from the following:
 - **Overwrite repository metadata:** When this option is selected, the metadata file is overwritten even if it is present and valid. If the metadata file is not present, the new file is then created regardless of whether this option is selected or not.
 - **Overwrite backup objects:** When this option is selected, the locked backup objects are overwritten with the immutable data during the repair process.

- **Verify backup objects:** When this option is selected, NAKIVO Backup & Replication runs verification of the backup object after the repair process is completed. When this option is not selected, NAKIVO Backup & Replication runs automatic self-healing after the repair process is completed.

Repair Repository

Please select repair options for the ransomware-proof local repository.
If no options are selected, corrupted repository metadata will be overwritten.

☐ Overwrite repository metadata ⓘ

☐ Overwrite backup objects ⓘ

☐ Verify backup objects ⓘ

[Learn more](#)

Repair

Note

When initiating a repair for a **Forever Incremental** repository that has become corrupted as a result of space reclaim interruption, the following dialog will appear instead.

Repair Repository

The repository has become corrupted as the result of space-reclaim interruption. Click Repair to try to repair the repository to an uncorrupted state.
New jobs will not start while the repair is running.

Do not reboot/disconnect the "10.30.31.32" transporter and storage device while the repair is in progress.

[Learn more](#)

Repair

4. Click **Repair** to begin the repair process.

Running the Repair Process for a Specific Backup Object

To run a repair for a specific backup object located in a **Local Folder** or **Amazon S3** type of Backup Repository, do the following:

1. Go to **Settings > Repositories** and can click on the name of the Backup Repository. Hover over the name of the backup and click **Repair** to start the repair process. Alternatively, you can click on the name of the backup and then click **Repair**.

Backups			Search	
Name	Job	Size		
24	Nutanix AHV backup job	5.7 GB		
AD-Exchange2019_ping1	VMware backup job	Inaccessible		
AD-Exchange2019_ping1	Backup copy job 123	Inaccessible		
All2016	VMware backup job	20.6 GB	Recover	Verify Repair Delete

Close

Note

You can also perform the **Repair** process for a backup object when all files except immutable files were manually deleted from the Backup Repository. The **Repair** option is only available in the following cases:

- The Backup Repository is inaccessible, was created in Amazon S3, and has Object Lock enabled.
- The local Backup Repository is inaccessible and meets the conditions specified in the [feature requirements](#) section.

2. Optionally, select the **Verify backup object** option. When you select this option, NAKIVO Backup & Replication runs verification on the backup object after the repair process has completed. In case **Verify backup object** is not selected, NAKIVO Backup & Replication runs automatic self-healing after the repair process is finished.

Repair Backup Object

Clicking Repair will overwrite the backup object and repair only the immutable data.

☐ Verify backup object ?

[Learn more](#)

Repair

3. Click **Repair** to begin the repair process.

Running Backup Repository Self-Healing

The self-healing process verifies Backup Repository integrity and automatically repairs errors wherever possible. Namely, the process performs the following tasks:

- Verifies that the data blocks of each recovery point are present in the Backup Repository.
- Cleans up “in progress” blocks of data from failed/crashed backup job runs that did not have a proper cleanup.
- Verifies and repairs Backup Repository metadata so that it correctly describes available data.
- Restores the consistent state of the Backup Repository to enable subsequent backup jobs.

Before the self-healing process begins, the Backup Repository is detached from the product to keep data in a consistent state. Jobs that back up VMs to such Backup Repository will fail while the self-healing process is in progress.

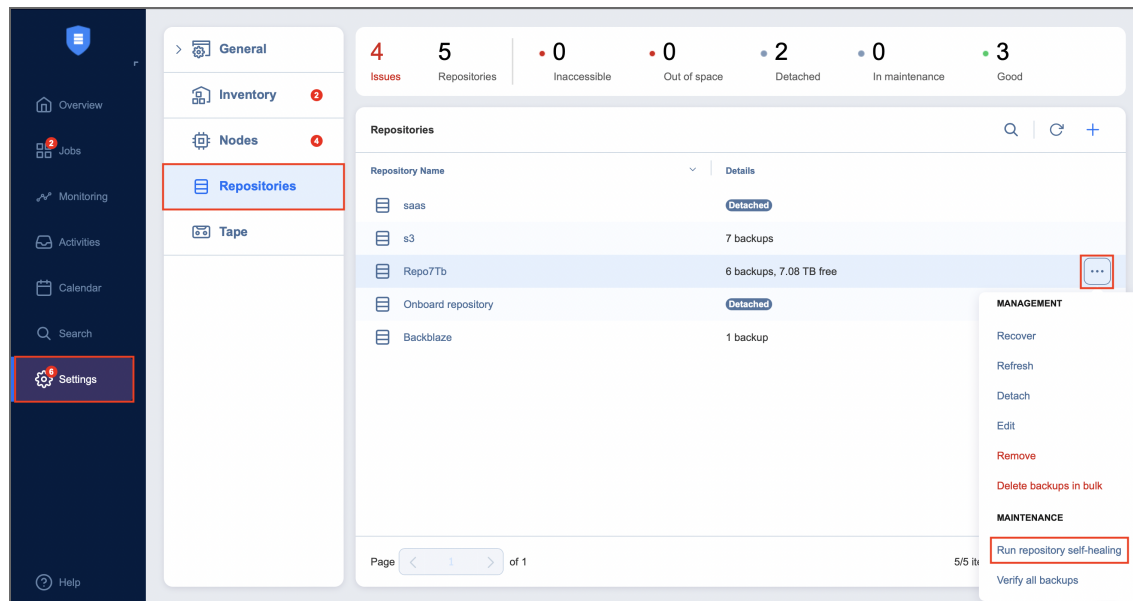
Refer to the following topics to learn more:

- [“Starting the Self-Healing Process” below](#)
- [“Stopping the Self-Healing Process” on the next page](#)

Starting the Self-Healing Process

To run the Backup Repository self-healing, follow the steps below:

1. From the main menu of NAKIVO Backup & Replication, click **Settings**.
2. Go to the **Repositories** tab and hover over a Backup Repository.
3. On the right side, click **•••** and then click **Run repository self-healing**.



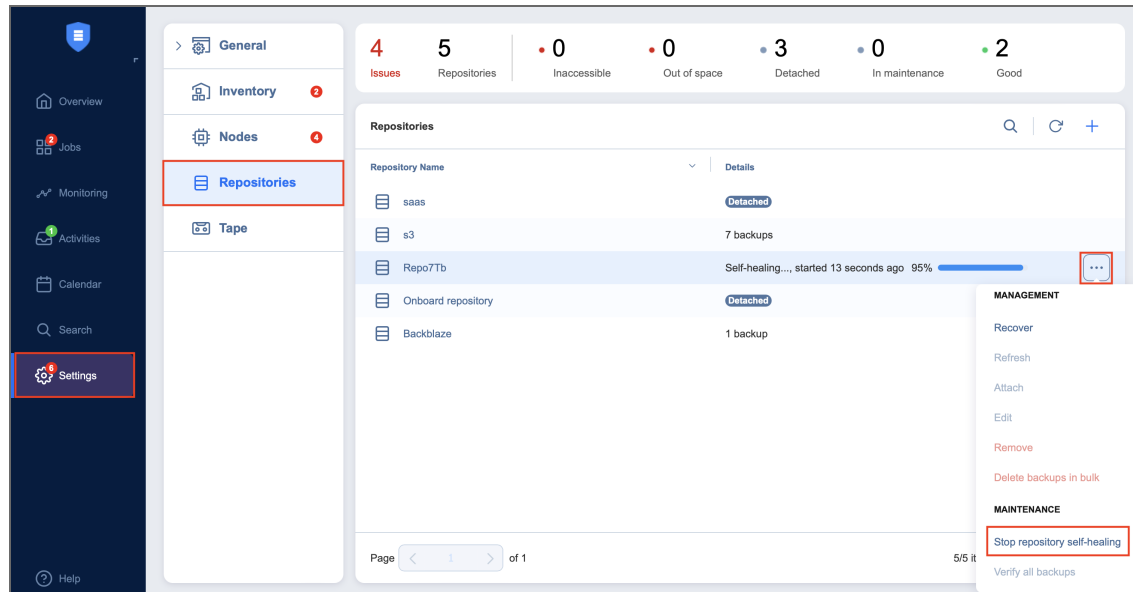
4. In the dialog box that appears, click **Start**. The self-healing process begins.

Stopping the Self-Healing Process

You can stop the self-healing process at any time (for example, to run a recovery job, move your Backup Repository to a new location, or put your backup storage on maintenance).

To stop the self-healing process, follow the steps below:

1. From the main menu of NAKIVO Backup & Replication, click **Settings**.
2. Go to the **Repositories** tab and hover over a Backup Repository.
3. On the right side, click **Manage** and then click **Stop repository self-healing**. The self-healing process stops.



Running Block-Level Backup Verification

Block-level backup verification reads each block of data in a Backup Repository, makes a hash of each data block, and then compares the newly created hashes to the originals that were created during the backup process. If the hashes match, this means that the data blocks in the Backup Repository are identical to the data blocks that were read on the source machines. This way, NAKIVO Backup & Replication verifies that backups are good and recoverable.

Refer to the following topics to learn more:

- [“Verifying Backups” below](#)
 - [“Verifying All VM Backups” below](#)
 - [“Verifying a Single Backup” on the next page](#)
- [“Stopping the Backup Verification Process” on the next page](#)
 - [“Stopping Backup Verification for a Backup Repository” on the next page](#)
 - [“Stopping Backup Verification for a Single Backup” on page 540](#)

Verifying Backups

Note

Before backup verification begins, the Backup Repository is detached from the product to keep data in a consistent state. Backup jobs that write data to such a Backup Repository will fail while the backup verification process is in progress.

Verifying All VM Backups

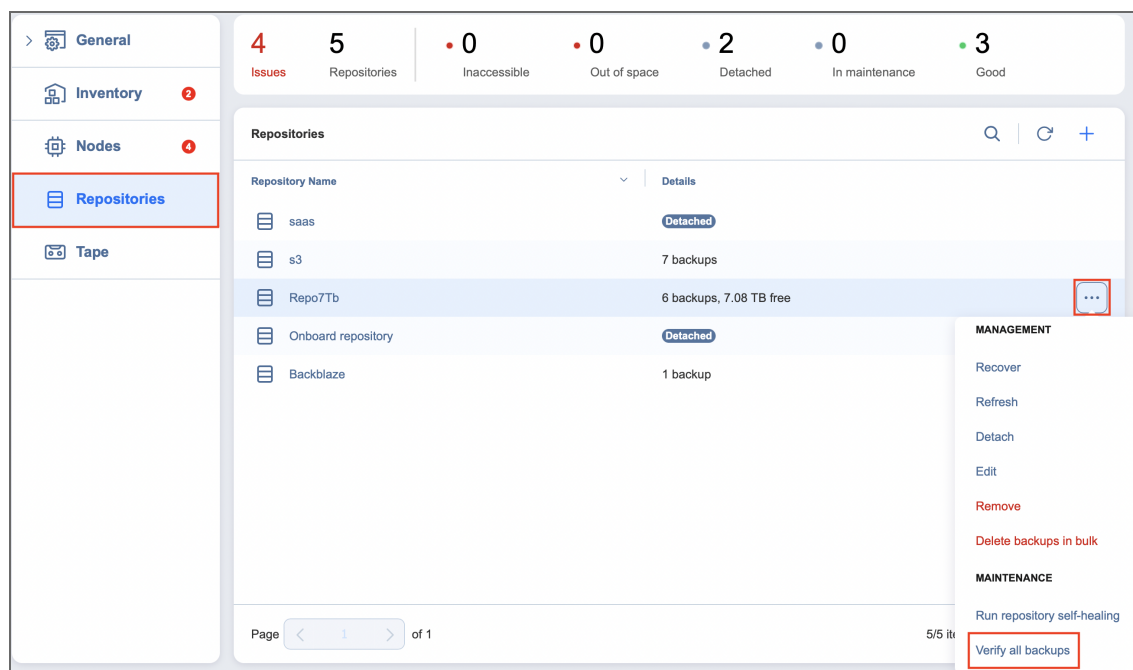
To verify all VM backups in a repository, follow the steps below:

1. From the main menu of NAKIVO Backup & Replication, click **Settings**.
2. Go to the **Repositories** tab and hover over a Backup Repository.
3. On the right side, click **Manage** and then click **Verify all backups**.

Note

The backup verification process cannot be started if a job that backs up to this Backup Repository is running.

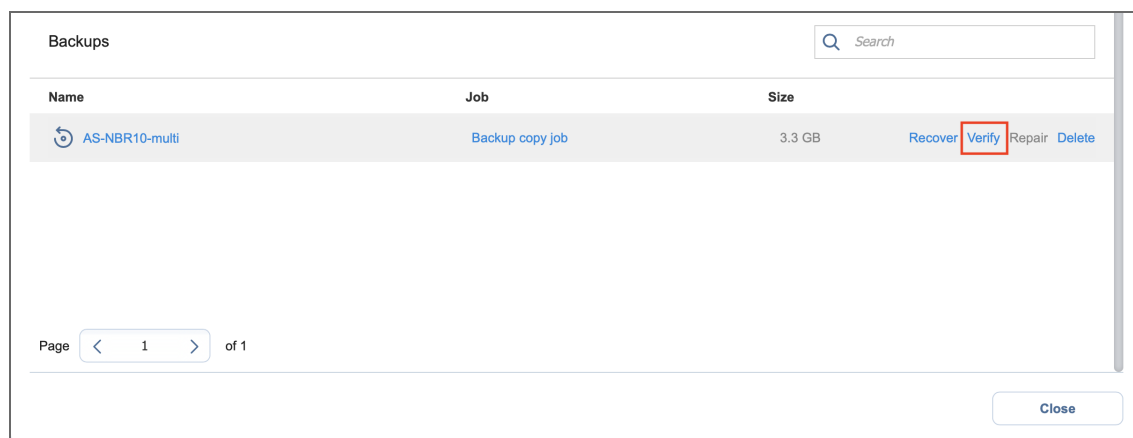
In the dialog box that opens, click **Start**. The backup verification process is started.



Verifying a Single Backup

To verify a single backup in a repository, follow the steps below:

1. From the main menu of NAKIVO Backup & Replication, click **Settings**.
2. Go to the **Repositories** tab and click a Backup Repository to expand it.
3. Hover over the desired backup and click the **Verify** button on the right side.



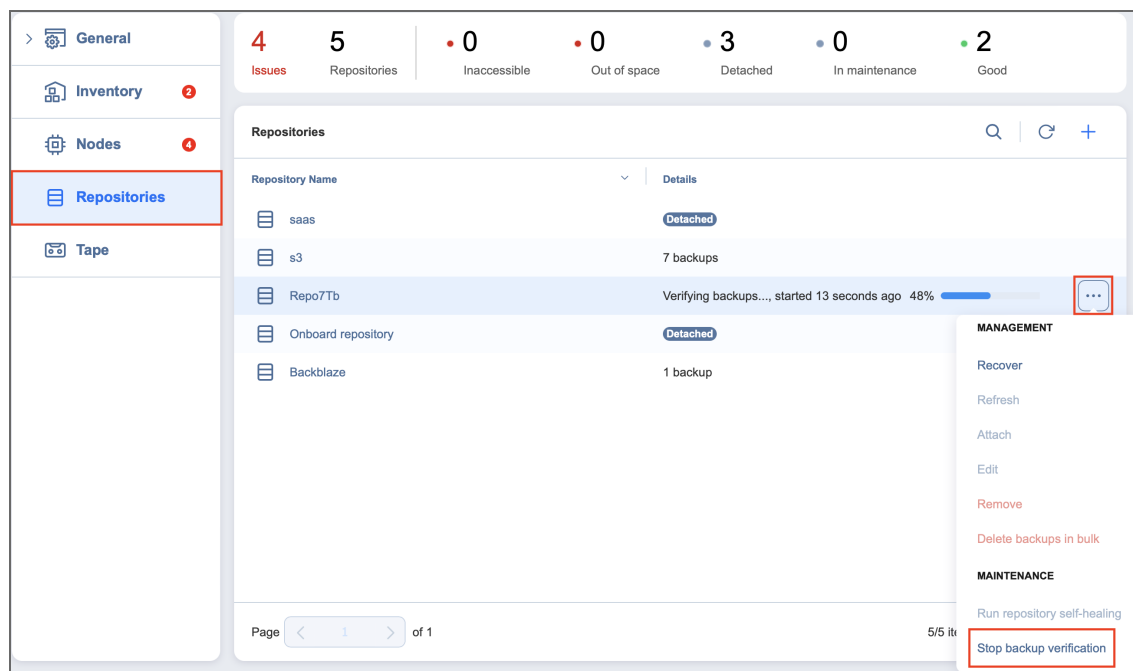
Stopping the Backup Verification Process

You can stop the backup verification process at any time (for example, to run a recovery job, move your Backup Repository to a new location, or put your backup storage on maintenance).

Stopping Backup Verification for a Backup Repository

To stop the backup verification process for a Backup Repository, follow the steps below:

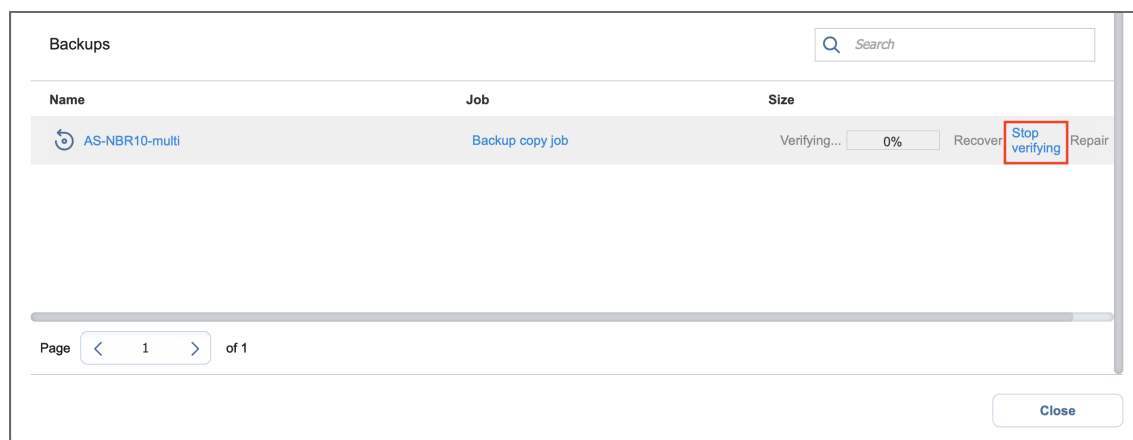
1. From the main menu of NAKIVO Backup & Replication, click **Settings**.
2. Go to the **Repositories** tab and hover over a Backup Repository.
3. On the right side, click **Manage** and then click **Stop backup verification**. The backup verification process is stopped.



Stopping Backup Verification for a Single Backup

To stop the backup verification process for a backup, follow the steps below:

1. From the main menu of NAKIVO Backup & Replication, click **Settings**.
2. Go to the **Repositories** tab and click a Backup Repository to expand it.
3. Hover over the desired backup and click **Stop verifying** on the right side.

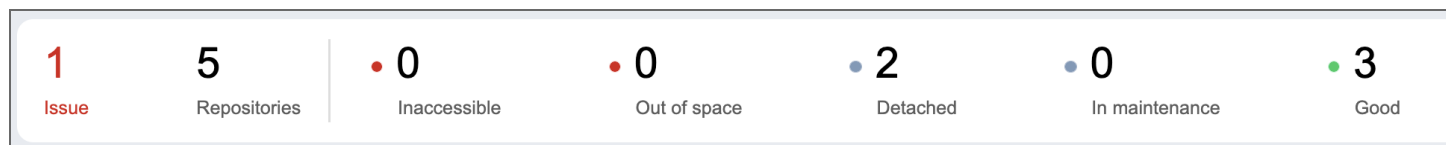


For near-instant backup verification, refer to the [“VM Verification” on page 52](#) feature.

Viewing Backup Repository Details

The **Repositories** tab contains a **Summary** bar, which offers an overview of all backup repositories. The data displayed is as follows:

- **Issues:** Total number of issues/alarms related to repositories
- **Repositories:** Total number of repositories
- **Inaccessible:** Total number of inaccessible repositories
- **Out of Space:** Total number of repositories that are out of storage space
- **Detached:** Total number of detached repositories
- **In Maintenance:** Total number of repositories in maintenance
- **Good:** Total number of usable repositories



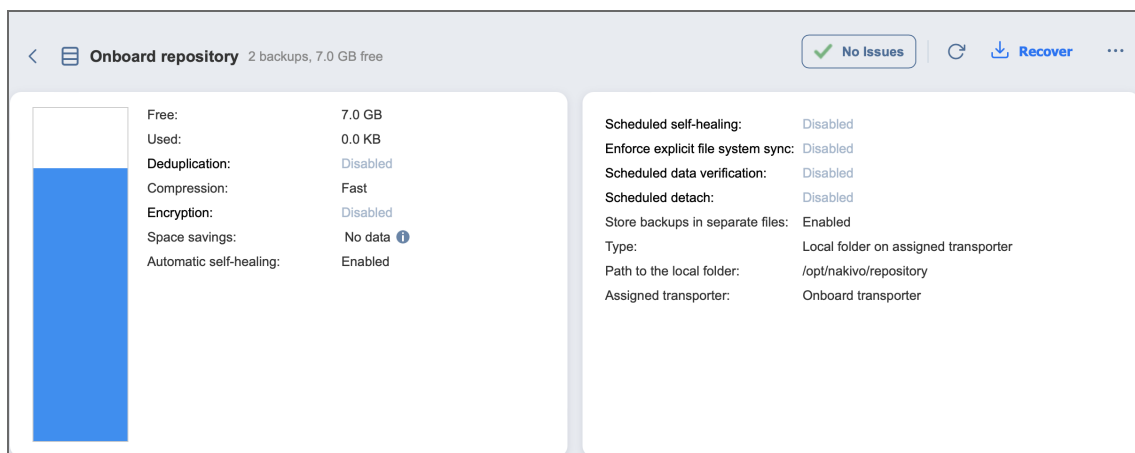
To see information about specific repositories, backups, and recovery points, see the sections below.

Viewing Backup Repository Details

To view Backup Repository details, follow the steps below:

1. Go to the main menu of NAKIVO Backup & Replication and click **Settings**.
2. Go to the **Repositories** tab.
3. Click a Backup Repository.
4. The following data is displayed:
 - **Free:** The amount of free space available for the Backup Repository
 - **Used:** The amount of space that the Backup Repository occupies on a disk. The amount of space that can be reclaimed is displayed in parentheses.
 - **Deduplication:** The status of deduplication in the Backup Repository
 - **Compression:** The compression level specified for the Backup Repository
 - **Encryption:** The status of encryption in the Backup Repository
 - **Space savings:** The estimated percentage and amount of space saved by compression and deduplication. For example, if 200 GB of data were backed up and the size of the backup was reduced to 50 GB, the ratio is calculated as 75%.
 - **Automatic self-healing:** The state of the automatic self-healing option for the Backup Repository
 - **Scheduled self-healing:** The state of the scheduled self-healing option for the Backup Repository
 - **Enforce explicit file system sync:** The state of the enforce explicit file system sync option for the Backup Repository

- **Scheduled data verification:** The state of the scheduled data verification option for the Backup Repository
- **Scheduled space reclaiming:** The state of the scheduled space reclaiming option for the Backup Repository
- **Scheduled detach:** The state of the scheduled detach option for the Backup Repository
- **Store backups in separate files:** The behavior of the Backup Repository on backup data storage
- **Type:** The location of the Backup Repository, which can be one of the following:
 - **Local folder on assigned Transporter**
 - **Remote CIFS Share**
 - **Remote NFS Share**
 - **Amazon EC2**
 - **Microsoft 365**
 - **Microsoft Azure Blob Storage**
 - **Amazon S3**
 - **Generic S3-Compatible Storage**
 - **Wasabi**
 - **Backblaze B2 Cloud Storage**
 - **Deduplication Appliance**
- **Path to the folder:** The path to the Backup Repository folder
- **Assigned transporter:** The Transporter that manages the Backup Repository (that is, the Transporter that reads data from and writes data to the Backup Repository)
- **Backups:** List of available backups in the Backup Repository





Viewing Backup Details

Below, you can view the details of the backups stored in the Backup Repository. The following information is displayed:

- **Name:** Name of the backup
- **Job:** The job type that created this backup
- **Size:** The total size of the backup

Large numbers of backups are separated into pages to reduce clutter. To find a specific backup, you can scroll through the pages manually or simply look it up via the **Search** bar. Hover over the name of a backup and click the ellipsis **Manage** button on the right side to select one of the following options:

- **Recover:** Select this option to proceed with recovery.
- **Verify:** Select this option to verify the backup.
- **Repair:** If the backup is corrupted, this option will attempt to restore it to an uncorrupted state.
- **Delete:** Select this option to delete the backup from the repository.


Backups Q		
Name	Job	Size
 Self-backup	Self-Backup	68.0 MB
 NFS-V	File Share backup job	0.0 KB

Page < 1 > of 1 2/2 items displayed per page ⌵ ⌴

Click on a backup name to view more information about the backup and see the recovery points available.

The following information is displayed:





- **Name:** Name of the backup item
- **Type:** Type of job
- **Points:** Number of recovery points available
- **Last point:** Date of the latest recovery point
- **Size:** The total size of the backup
- **Job name:** Name of the job

<  Self-backup 68.0 MB ✓ ⬇ Recover ⋮	
Name:	Self-backup
Last point:	Wed, 16 Nov 2022 at 2:00 (UTC +02:00)
Size:	68.0 MB
Job name:	Self-Backup

Viewing Recovery Point Details

You can view the details of a recovery point in the lower part of the screen. To find a recovery point for a specific date, you can use the **Search** bar on the right. The following information is displayed:

- **Date:** The date when the recovery point was created
- **Size:** The size of the recovery point
- **Type:** Type of backup used to create the recovery point
- **Schedule:** If applicable, the schedule that was used to create the recovery point
- **Immutable until:** If applicable, the date when the recovery point immutability expires
- **Protected until:** The date until which the recovery point is retained, displayed only for recovery points belonging to jobs that use the schedule retention approach
- **Description:** A description of the recovery point if one was provided

Recovery points 						
Date	Size	Type	Schedule	Immutable until	Protected until	Description
Wed, 16 Nov 20...	13.0 MB	Full		Not applicable	Keep forever	
Tue, 15 Nov 20...	12.6 MB	Full		Not applicable	Keep forever	
Mon, 14 Nov 20...	13.7 MB	Full		Not applicable	Keep forever	
Sun, 13 Nov 20...	14.6 MB	Full		Not applicable	Keep forever	
Page  1  of 1 5/5 items displayed per page 						

Note

- The **Size**, **Type**, and **Immutable until** details are displayed only if the **Store backups in separate files** option (under **Storage Savings & Encryption**) is selected when creating or editing a Backup Repository.
- For recovery points belonging to jobs using legacy retention settings, **Use job retention** is displayed under **Protected until** instead.

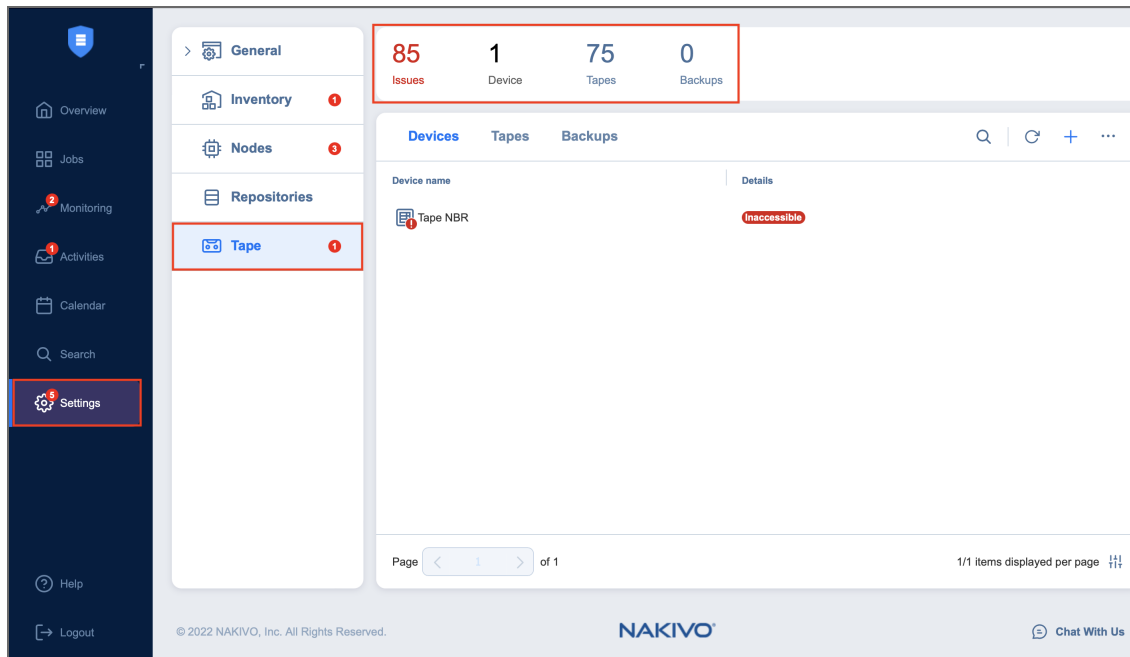
Date, **Type**, and **Description** can also be viewed when selecting recovery points in Recovery Job Wizard. Hover over the name of the recovery point and click the ellipsis **Manage** button on the right side to select one of the following options:

- **Recover:** Select this option to proceed with recovery.
- **Edit:** Select this option to edit the recovery point. Do the following:
 - Optionally, you can add a **Description** to your recovery point.
 - Choose the date until which the recovery point should be kept. The following options are available:
 - **Use job retention:** Choose this option to use the retention settings configured in the job for this recovery point.

- **Keep forever:** Choose this option to keep this recovery point forever.
- **Protect until:** Choose this option to keep this recovery point until a specific date. After selecting this option, choose the date in the calendar pop-up.
- **Delete:** Select this option to delete the recovery point from the repository.

Tape

To start working with tape devices in NAKIVO Backup & Replication, you should first add and configure these devices on the **Tape** page of the **Settings** dashboard.



The **Summary** bar displays information about all tapes. The data displayed is as follows:

- **Issues:** Total number of issues/alarms related to tapes
- **Devices:** Total number of tape devices
- **Tapes:** Total number of tapes
- **Backups:** Total number of tape backups

The default view of the **Tape** page is set to the **Devices** tab. Once you add your tape devices, you can view and manage them on this page. To work with tapes and backups, click the **Tapes** and **Backups** tabs, respectively.

On the **Tape** page, you can perform the following operations:

- [“Adding Robotic Tape Libraries or VTLs” on page 547](#)
- [“Adding Standalone Tape Drives” on page 554](#)
- [“Managing Backups” on page 558](#)
- [“Managing Locations” on page 561](#)
- [“Managing Media Pools” on page 564](#)
- [“Managing Tape Devices” on page 579](#)
- [“Managing Tape Cartridges” on page 567](#)

Adding Robotic Tape Libraries or VTLs

Make sure to observe the following prerequisites before adding Robotic Tape Libraries or Virtual Tape Libraries to Inventory:

- Vendor drivers should be installed on tape devices prior to adding them to NAKIVO Backup & Replication inventory.
- To be able to work with AWS VTL, you need to deploy a Transporter and manually mount VTL targets.

The process of adding a Robotic Tape Library or Virtual Tape Library to NAKIVO Backup & Replication includes the following steps:

- [Launching Wizard](#)
- [Selecting Transporter](#)
- [Selecting Changers](#)
- [Selecting Drives](#)
- [Selecting Options](#)
- [Managing Added Tape Library](#)

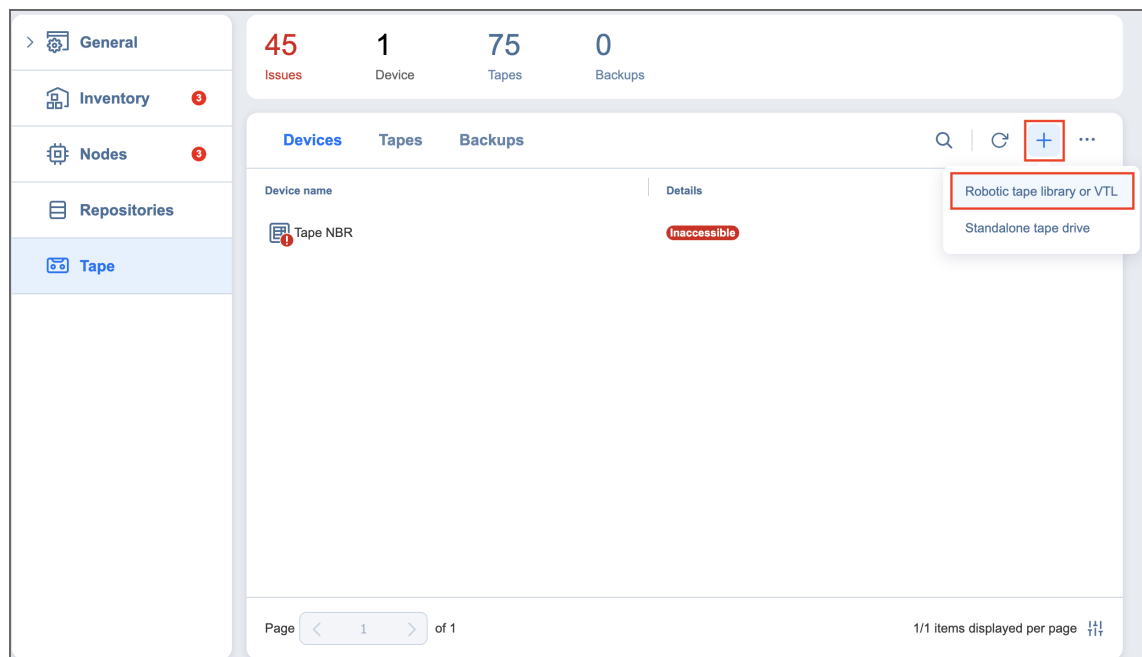
Launching Wizard

Before adding a Robotic tape library or Virtual Tape Library, make sure that the on-premises VM or Amazon EC2 instance meets the necessary [feature requirements](#).

To add a Robotic tape library or VTL to the system:

1. Go to **Settings** and click the **Tape** tab.
2. Go to the **Devices** tab.

3. Click the plus **Add** button and select **Robotic tape library or VTL**.



The **Add New Robotic Tape Library or Virtual Tape Library** wizard opens. Follow the steps below to add a new device.

Note

Before adding a new tape device to NAKIVO Backup & Replication, you need to deploy or add an existing Transporter on a machine that is physically connected to the tape device. For virtual tape libraries, the transporter should run in a separate VM on the same host or in a separate cloud instance in the same network. For more information on Transporter deployment, refer to [“Deploying Transporter as VMware Appliance” on page 449](#) and [“Adding Existing Nodes” on page 439](#).

Selecting Transporter

On the **Select Transporter** step, you need to specify a Transporter assigned to the device or VTL you want to add. This Transporter acts as a network appliance that manages traffic between the tape device and NAKIVO Backup & Replication.

1. From the **Assigned Transporter** drop-down list, select the relevant installed Transporter.

Add New Robotic Tape Library or Virtual Tape Library

1. Select Transporter

2. Select Changer

3. Select Drives

4. Select Options

Assigned transporter:

10.30.30.54

Select the transporter that is installed on the machine to which the tape library is connected.
For virtual tape libraries, the transporter should run in a separate VM on the same host or in a separate cloud instance in the same network.

Cancel

Next

2. Click **Next**.

Selecting Changers

The **Select Changers** page displays the list of media changers on the selected Transporter.

Note



If no media changers were found on the specified transporter, make sure the devices are connected, powered on, and the appropriate drivers are installed.

Select one media charger from the list. Media changers already being used in another discovered tape library are disabled.

Add New Robotic Tape Library or Virtual Tape Library

1. Select Transporter 2. Select Changer 3. Select Drives 4. Select Options

i Select the media changer of the tape library below.

	Device Name	Address	Path	Serial Number
<input type="radio"/>	 DELL PV-132T	[6:0:0:0]	\\.\Changer0	DELL1_3134662N1896
<input type="radio"/>	 IBM 3573-TL	[0:0:7:1]	\\.\Changer1	00X2U78H4185_LL0

Cancel Next

The following information is displayed for each media changer to facilitate the selection:

- **Device name:** Indicates device's vendor and model, separated by space
- **Address:** Indicates the hardware address including the bus and node numbers
- **Path:** Indicates location in the operating system
- **Serial number:** Indicates the serial number of the device

Selecting Drives

On the **Select Drives** page, you can select tape drives from the tape library and specify the actual drive number for each drive. Drives already used in another discovered tape device are disabled and cannot be selected. The table provides the following information:

- **Device name:** Indicates the device's vendor and model.
- **Address:** Displays the hardware address including the bus and node numbers.
- **Path:** Shows the location in the operating system.
- **Serial number:** Shows the serial number of the drive.
- **Drive Number:** Indicates the drive number and allows changing it. Changing the drive number may be required to address situations, where iSCSI targets are assigned incorrectly to the mounted drives.

Note

If more than one drive is selected, such drives should use the same host/buses.

Add New Robotic Tape Library or Virtual Tape Library

1. Select Transporter 2. Select Changer **3. Select Drives** 4. Select Options

Select the tape drives of the tape library and specify the drive number for each drive. [Learn more](#)

<input type="checkbox"/>	Device Name	Address	Path	Serial Number	Drive Number
<input checked="" type="checkbox"/>	IBM ULT3580-HH5	[0:0:7:0]	\\Tape1	1068055225	0
<input checked="" type="checkbox"/>	IBM ULT3580-HH5	[0:0:8:0]	\\Tape2	1068040089	1
<input type="checkbox"/>	HP C7438A	[5:0:3:0]	\\Tape0	0000013891	

Cancel **Next**

Click **Next** to proceed to the next page.

Selecting Options

The last step of adding a tape library is selecting its options.

Add New Robotic Tape Library or Virtual Tape Library

1. Select Transporter 2. Select Changer 3. Select Drives **4. Select Options**

Name:

Compression:

Block size:

Device location: [add location](#)

Default media pool: [add media pool](#)

Default offline location: [add location](#)

Cancel **Finish**

1. Specify the following parameters:

- **Name:** Enter the name for the tape library
- **Compression:** Select a compression level of the tape device:

- Hardware-based (default)
- Software-based (fast)
- Software-based (medium)
- Software-based (best)

Note

Setting hardware compression is not recommended to avoid the issue of increased data size during transfer and long backup/recovery times. Having different types of compression for the tape device and a source/target Backup Repository during backup or recovery can also lead to this issue. For more information, see [this article](#).

- **Block size:** Select the block size of the tape device:

- 32 KB
- 64 KB (default)
- 128 KB
- 256 KBs
- 512 KB
- 1 MB

Note

The system does not automatically detect the block size; make sure to use the correct block size when importing backups.

- **Device location:** Select the location of the device and all tapes inserted into this device. The automatically created **My office** location is selected by default. To create another location, click **Add Location**. For more information on locations management, refer to [“Managing Locations” on page 561](#).
- **Default media pool:** Select a default media pool for all new tapes inserted into this device. To create another media pool, click Add Media Pool. For more information on media pools management, refer to [“Managing Media Pools” on page 564](#).
- **Default offline location:** Select a default location for all tapes ejected from this device.

2. Click **Save** to start adding the tape library to NAKIVO Backup & Replication. After successful addition, the tape library will become available in the **Devices** tab.

Managing Added Tape Library

Clicking the name of the tape library opens its **Parameters** page. In addition to giving the details on the selected tape library, the **Parameters** page provides the following options:

- **Refresh:** Allows for refreshing the device by initiating the process of updating information regarding the content of the tape device. Refreshing involves checking the tapes' barcodes and may include moving tape cartridges within the device
- **Manage:** Allows for performing the following actions with the tape library:
 - **Edit:** Selecting this option opens the same wizard as described in previous sections, but with all fields already predefined. All fields, apart from **Compression** and **Block size**, can be changed.
 - **Detach/Attach:** Allows performing manual tape library attach/detach. Tape cartridges contained in a detached tape device become offline.
 - **Remove:** Removes the device from NAKIVO Backup & Replication. This option is unavailable if the device is currently in use by a job or other process.
- **Tapes:** Clicking this link opens the **Tapes** screen where you can view and manage tape cartridges in the device.



Adding Standalone Tape Drives

The process of adding a standalone tape drive to NAKIVO Backup & Replication includes the following steps:

- [Launching Wizard](#)
- [Selecting Transporter](#)
- [Selecting Options](#)
- [Managing Added Tape Drives](#)

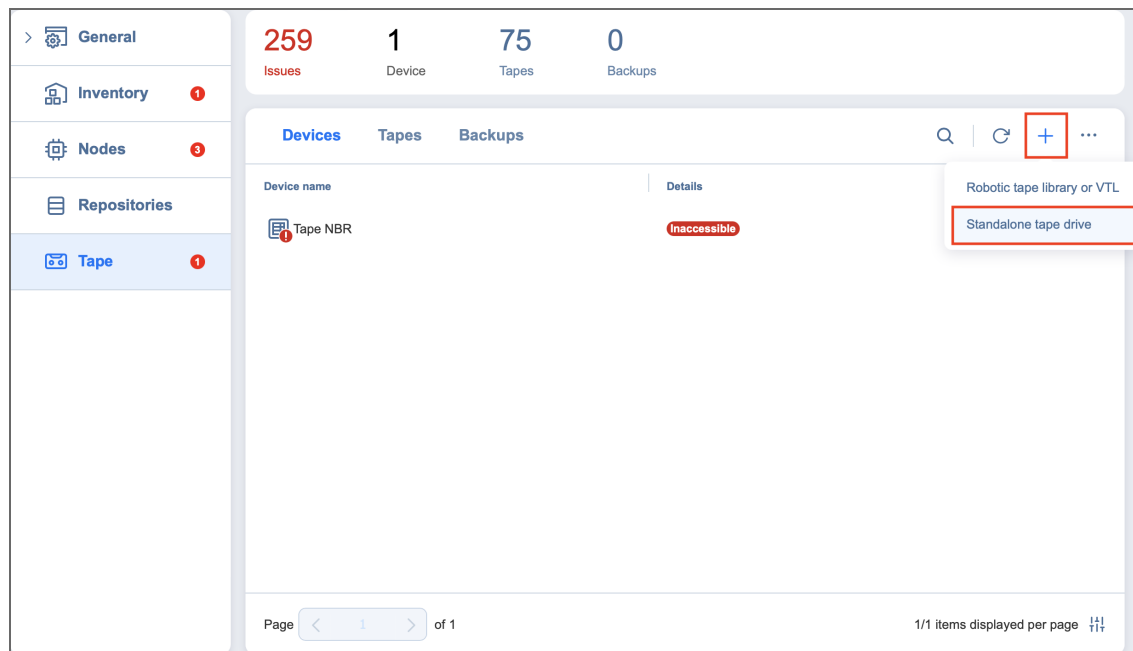
Note

Vendor drivers should be installed on tape devices prior to adding them to the NAKIVO Backup & Replication **Inventory**.

Launching Wizard

To add a standalone tape drive to the system:

1. Go to **Settings** and click the **Tape** tab.
2. Go to the **Devices** tab.
3. Click the plus **Add** button and select **Standalone tape drive**.



The **Add New Standalone Tape Drive** wizard opens. Follow the steps below to add a new tape drive.

Note

Before adding a new tape drive to NAKIVO Backup & Replication, you need to deploy or add an existing [Transporter](#) on a machine that is physically connected to the tape drive. For more information on Transporter deployment, refer to [“Deploying Transporter as VMware Appliance” on page 449](#) and [“Adding Existing Nodes” on page 439](#).

Selecting Transporter

During the **Select Transporter** step, you need to specify a Transporter assigned to the drive that you would like to add. This Transporter acts as a network appliance that manages traffic between the tape drive and NAKIVO Backup & Replication.

1. From the **Assigned Transporter** drop-down list, select the relevant installed Transporter.

Tape /

Add New Standalone Tape Drive

1. Select Transporter

2. Select Options

Assigned transporter:

10.30.30.86

?

Select a transporter installed on the machine to which the standalone tape drive is physically connected.

Next

Cancel

2. Click **Next**.

Selecting Options

The last step of adding a tape drive is selecting its options.

Tape /

Add New Standalone Tape Drive

1. Select Transporter

2. Select Options

Name:

Drive:

HP C7438A V601

Compression:

Hardware-based

Block size:

64 KB

Device location:

My office

Default media pool:

<No default media pool>

Default offline location:

<No default offline location>

?

add location

?

add media pool

?

add location

Finish

Cancel

1. Specify the following parameters:

- **Name:** Enter the name of the tape library
- **Drive:** Select one of the standalone tape drives on the assigned transporter
- **Compression:** Select a compression level of the tape device:
 - Hardware-based (default)
 - Software-based (fast)
 - Software-based (medium)
 - Software-based (best)

Note

Setting hardware compression is not recommended to avoid the issue of increased data size during transfer and long backup/recovery times. Having different types of compression for the tape device and a source/target Backup Repository during backup or recovery can also lead to this issue. For more information, see [this article](#).

- **Block size:** Select the block size of the tape device:
 - 32 KB
 - 64 KB (default)
 - 128 KB
 - 256 KB
 - 512 KB
 - 1 MB

Note

The system does not automatically detect the block size; make sure to use the correct block size when importing backups.

- **Device location:** Select the location of the device and all tapes inserted into this device. The automatically created **My office** location is selected by default. To create another location, click **Add Location**. For more information on locations management, refer to [“Managing Locations” on page 561](#).
- **Default media pool:** Select a default media pool for all new tapes inserted into this device. Optionally, you can select **No default media pool** if you want to skip this step. To create another media pool, click **Add Media Pool**. For more information on media pools management, refer to [“Managing Media Pools” on page 564](#).
- **Default offline location:** Select a default location for all tapes ejected from this device. Optionally, you can select **No default offline location** if you want to skip this step.

2. Click **Save** to start adding the tape drive to NAKIVO Backup & Replication. After successful addition, the tape drive will become available in the **Devices** tab.

Managing Added Tape Drives

Clicking the name of the tape drive opens its **Parameters** page. Apart from giving details on the selected tape drive, the **Parameters** tab provides the following functionality:

- **Refresh:** Allows for refreshing the device by initiating the process of updating information regarding the content of the tape device.
- **Manage:** Allows for performing the following actions with the tape drive:
 - **Edit:** Selecting this option opens the same wizard as described in previous sections, but with all fields already predefined. All fields, apart from **Compression** and **Block size**, can be changed.
 - **Detach/Attach:** Allows for performing manual tape library attach/detach. Tape cartridges contained in a detached tape device become offline.
 - **Remove:** Removes the device from NAKIVO Backup & Replication. This option is unavailable in case the device is currently in use by a job or other process.
- **Tapes:** Clicking this link opens the **Tapes** screen where you can view and manage tape cartridges in the device.

Managing Backups

From the **Tape** tab, you can also manage all backups stored on tape cartridges by clicking the **Backups** tab.

>

General

Inventory

Transporters

Repositories

Tapes

334

Issues

0

Devices

0

Tapes

102

Backups

Devices

Tapes

Backups

Backup Name

▼

Type

Tapes

Points

Last point

0002373

Hyper-V VM

34

43

Wed, Jul 13 at 7:45 PM

0002373

Hyper-V VM

65

234

Wed, Jul 13 at 7:45 PM

0002373

Hyper-V VM

14

5

Wed, Jul 13 at 7:45 PM

0002373

Hyper-V VM

5

24

Wed, Jul 13 at 7:45 PM

0002373

Hyper-V VM

3

432

Wed, Jul 13 at 7:45 PM

0002373

Hyper-V VM

4

56

Wed, Jul 13 at 7:45 PM

Page

< 1 >

of 1

6/6 items displayed per page

In this view, you can search for backups, recover from backups, and view backup details.

- [Searching for Backups](#)
- [Filtering Backups](#)
- [Backups Table](#)
- [Recovering from Backups](#)

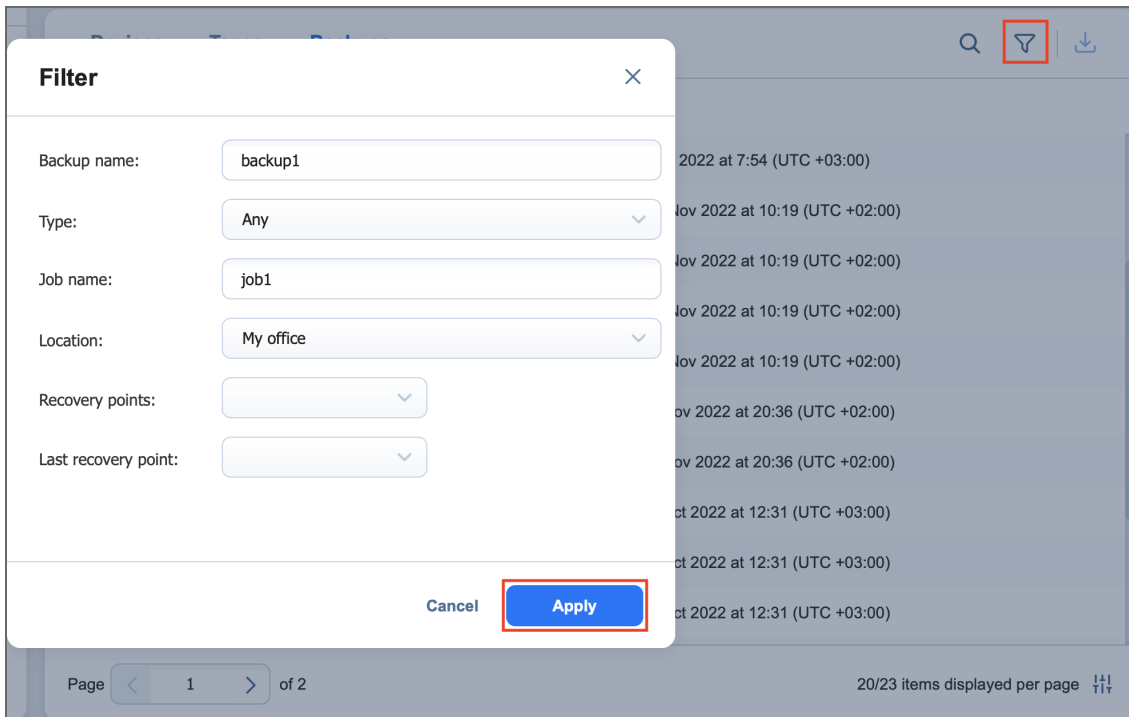
Searching for Backups

You can search for a specific backup by entering its name (or part of its name) into the **Search** box. The table will dynamically change to display the search results matching your query.

Clicking the **Clear** button in the search box clears the query, and the table displays all backups.

Filtering Backups

The Backups tab also provides sophisticated filtering options that can be applied to search for particular backups. To access filtering options, click the **Filter** icon in the top right corner. In the dialog box that opens, you can select one or several filtering criteria that will be applied with the AND statement.



You can apply the following filtering criteria:

- **Backup name:** The backups with the provided name will be displayed. Part of the name can be entered.
- **Type:** Specify the type of backups to be displayed:
 - Any
 - VMware VM
 - Hyper-V VM
 - EC2 instance
 - Nutanix AHV VM
 - Physical machine
- **Location:** Only the backups from the tape cartridges of the specified device location will be displayed
- **Job name:** Only the jobs with the specified string in their name will be displayed
- **Recovery points:** Only the backups with less or more recovery points will be displayed
- **Last recovery point:** Only the backups with the last recovery point created on/newer/older than the date specified will be displayed

Note

The Search and Filter features can only be applied separately; you cannot simultaneously search for a tape cartridge by name and select filtering options.

Backups Table

The **Backups** table provides detailed information about each backup:

- **Backup name:** Displays the name of the backup. Clicking the name opens the **Recovery** screen.
- **Type:** Displays the type of backup
- **Job name:** Displays the name of the job associated with the backup
- **Tapes:** Displays the number of tape cartridges that the backup occupies
- **Points:** Displays the number of recovery points the backup has
- **Last point:** Displays the date of the last recovery point on the backup

Recovering from Backups

You can initiate the recovery process from the **Backups** tab by selecting the checkboxes next to backup names and clicking the **Recover** button.

Note

If you are recovering from multiple backups, you may only select backups of the same **Type**. If you select multiple backup types, the **Recover** button will be disabled.

General

Inventory

Transporters

Repositories

Tapes

334

Issues

0

Devices

0

Tapes

102

Backups

Devices

Tapes

Backups

🔍

🏠

⬇️

<input type="checkbox"/>	Backup Name	Type	Tapes	Point	Last point
<input checked="" type="checkbox"/>	🔄 0002373	Hyper-V VM	34	43	Wed, Jul 13 at 7:45 PM
<input type="checkbox"/>	🔄 0002373	Hyper-V VM	65	234	Wed, Jul 13 at 7:45 PM
<input type="checkbox"/>	🔄 0002373	Hyper-V VM	14	5	Wed, Jul 13 at 7:45 PM
<input type="checkbox"/>	🔄 0002373	Hyper-V VM	5	24	Wed, Jul 13 at 7:45 PM
<input type="checkbox"/>	🔄 0002373	Hyper-V VM	3	432	Wed, Jul 13 at 7:45 PM
<input type="checkbox"/>	🔄 0002373	Hyper-V VM	4	56	Wed, Jul 13 at 7:45 PM

Page

< 1 >

of 1

20/23 items displayed per page

⌵

The **New Recovery Job Wizard** opens with the specified backups and their latest recovery points selected.

Managing Locations

Device location is a logical container representing a geographical place where the tape devices are located. Larger companies can have their tape devices in different locations, e.g. the UK, USA, Australia, etc. By default, the system automatically creates the **My Office** device location, but you can create more device locations if necessary. Refer to these sections for details:

- [Adding Device Locations](#)
- [Managing Device Locations](#)

Adding Device Locations

To add a Location:

1. Go to **Settings > Tape**.
2. In the **Devices** or **Tapes** tab, click the ellipsis **Manage** button and select **Locations**. The **Location Management** dialog box opens.

48
Issues

1
Device

75
Tapes

0
Backups

DevicesTapesBackups

Search

Refresh

+

...

Device name

Details

Tape NBR

Inaccessible

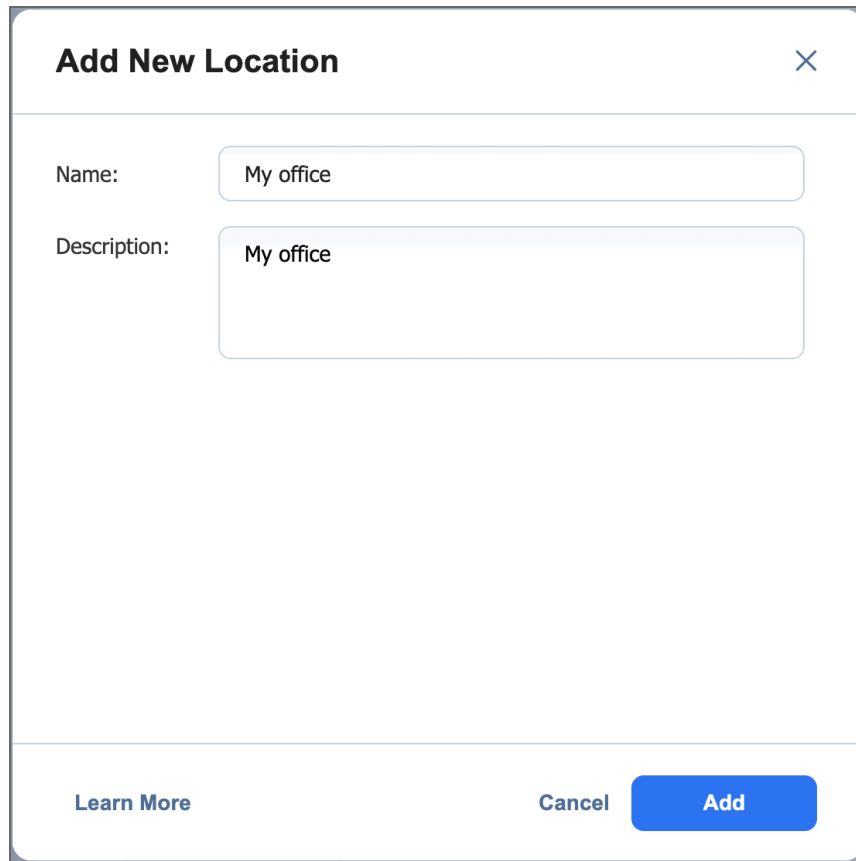
Locations

Media pools

Page < 1 > of 1

1/1 items displayed per page

3. Click the plus **Add New Location** button.
4. In the **Add New Location** dialog box, specify a name for the device location and provide a description (optional).



The image shows a dialog box titled "Add New Location" with a close button (X) in the top right corner. Inside the dialog, there are two input fields. The first is labeled "Name:" and contains the text "My office". The second is labeled "Description:" and also contains the text "My office". At the bottom of the dialog, there are three buttons: "Learn More" (a link), "Cancel", and "Add" (a blue button).

5. Click **Add**. The new device location is added to the list.

Managing Device Locations

From the **Location Management** screen, you can also edit or delete Locations by using the corresponding buttons or search for the location by entering a location name (or a part of its name) into the **Search** box.

Location Management

Q Search

+

Location

Description

📍 My office

My office

⋮

Edit

Delete

Learn More

Close

- 563 -

Managing Media Pools

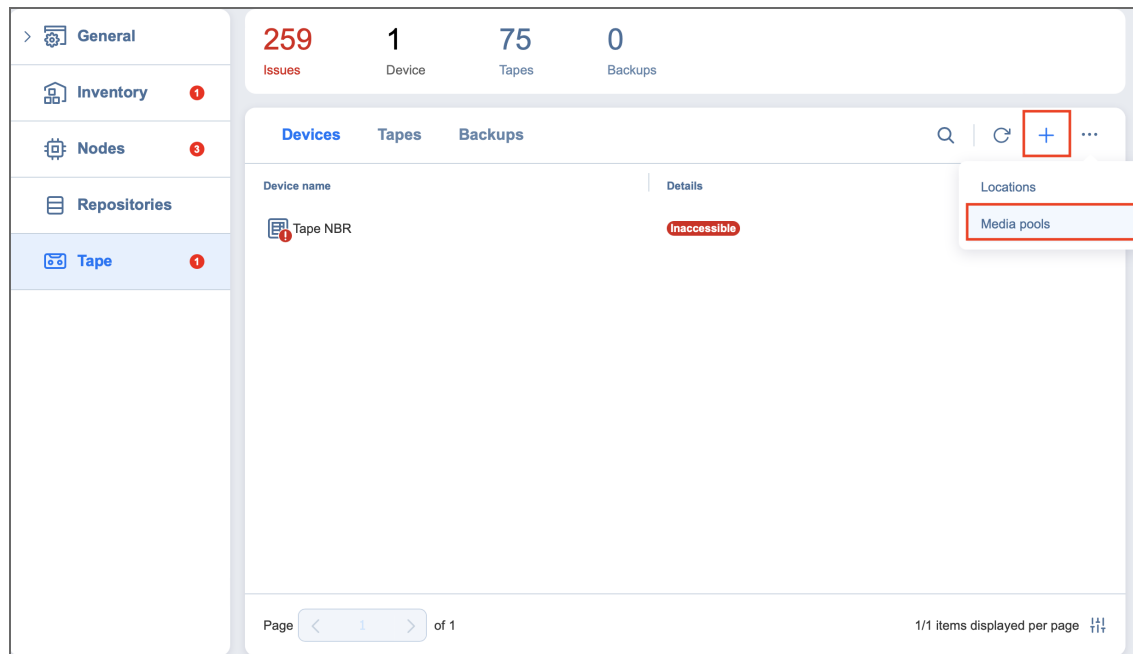
Media pools are logical containers created in NAKIVO Backup & Replication to organize and manage tape cartridges. No Media Pools are created by default, but you can create new ones if necessary. for details, refer to the following sections:

- [Adding Media Pools](#)
- [Managing Media Pools](#)

Adding Media Pools

To create a Media Pool:

1. Go to **Settings > Tape**.
2. In the **Devices** or **Tapes** tab, click the ellipsis **Manage** button and select **Media Pools**. The **Media Pool Management** dialog box opens.



3. Click the plus **Create Media Pool** button.
4. In the **Create Media Pool** dialog box, specify the name for the Media Pool and provide a description (optional).
5. From the **Move Offline Tapes To** drop-down list, select a device location to determine which location is automatically set for all offline tapes from this media pool. If the tape cartridge goes online again, it will return to the initial device location.
6. Select the **Automatically add free tapes to this pool when required** checkbox to automatically add one of the empty available tape cartridges to this media pool if the media pool does not have available tape cartridges.

Create Media Pool

Name:

Media Pool 1

Description:

Office pool 1

Move offline tapes to:

My office

☒ Automatically add free tapes to this pool when required

Learn More

Cancel

Add

- Click **Add**. The new Media Pool is created.

Managing Media Pools

From the **Media Pool Management** screen, you can also edit or delete Media Pools by using the corresponding buttons or search for the media pool by entering its name or a part of its name into the **Search** box.

Media Pool Management

Q Search

+

Media pools

Description

test

⋮

Edit

Delete

Learn More

Close

Managing Tape Cartridges

The **Tapes** view allows you to view and manage all tape cartridges registered in the system. This section covers the following topics:

- [Viewing Tapes](#)
- [Searching for Tape Cartridges](#)
- [Filtering Tape Cartridges](#)
- [Tape Cartridge Management Page](#)
 - [Manage Options](#)
 - [Details Pane](#)
 - [Tape Contents table](#)
 - [Backup Details](#)
- [Bulk Tape Cartridge Management](#)

Viewing Tapes

To navigate to the **Tapes** menu, go to **Settings > Tapes** and click the **Tapes** tab.

The **Tapes** menu provides you with the following information about the tape cartridges in the table:

- **Name:** Displays the tape cartridge name. Clicking the name opens the tape cartridge management page. For more information, see [Tape Cartridge Management Page](#).
- **Label:** Displays the label assigned to the tape cartridge ("none" for tape cartridges without labels)
- **Status:** Displays the current status of the tape cartridge—Scanning / Online / Reading / Writing / Erasing / Warning / Error / Offline
- **Device:** Displays the name of the tape device that contains the tape cartridge
- **Slot/Drive:** Displays the slot/drive number of the tape cartridge
- **Last Written:** Displays the date of the last recording on the tape cartridge
- **Overwritable:** Displays the date when all recovery points on this tape cartridge will expire
- **Media Pool:** Displays the name of the media pool that the tape cartridge belongs to
- **Location:** Displays the name of the device location that the tape cartridge belongs to
- **Contents:** Indicates the contents of the tape cartridge (e.g. number of backups on the tape cartridge)
- **Capacity:** Displays the amount of free space relative to the total tape capacity. Hovering over this row also reveals the amount of used space. In case the capacity cannot be retrieved, **Not available** will be displayed instead.

Note

If hardware compression is enabled when writing data to a tape cartridge, NAKIVO Backup & Replication may display twice the amount of total, free, and used space.

- **Type:** Displays the type of the tape cartridge:
 - Read/Write Tape
 - Write Protected Tape
 - Cleaning Tape

Name	Status	Capacity	Device	Slot/Drive	Media pool	Location
NFA5B58	Offline	1 TB/5 TB			test	My office
NF75B55	Offline	1 TB/5 TB			test	My office
NF65B54	Online	1 TB/5 TB	Tape NBR	6	test	My office
NF55B57	Offline	1 TB/5 TB			test	My office
NF45B56	Online	1 TB/5 TB	Tape NBR	21	test	My office
ND87B79	Online	1 TB/5 TB	Tape NBR	18	test	My office
NDA7B78	Online	1 TB/5 TB	Tape NBR	17	test	My office
ND87B7A	Online	1 TB/5 TB	Tape NBR	19	test	My office
ND57B77	Online	1 TB/5 TB	Tape NBR	16	test	My office
ND47B76	Online	1 TB/5 TB	Tape NBR	5	test	My office

The column availability in the table can be managed by clicking the small config button in the bottom right of the table and checking/unchecking the boxes next to the column names.

Tapes Config

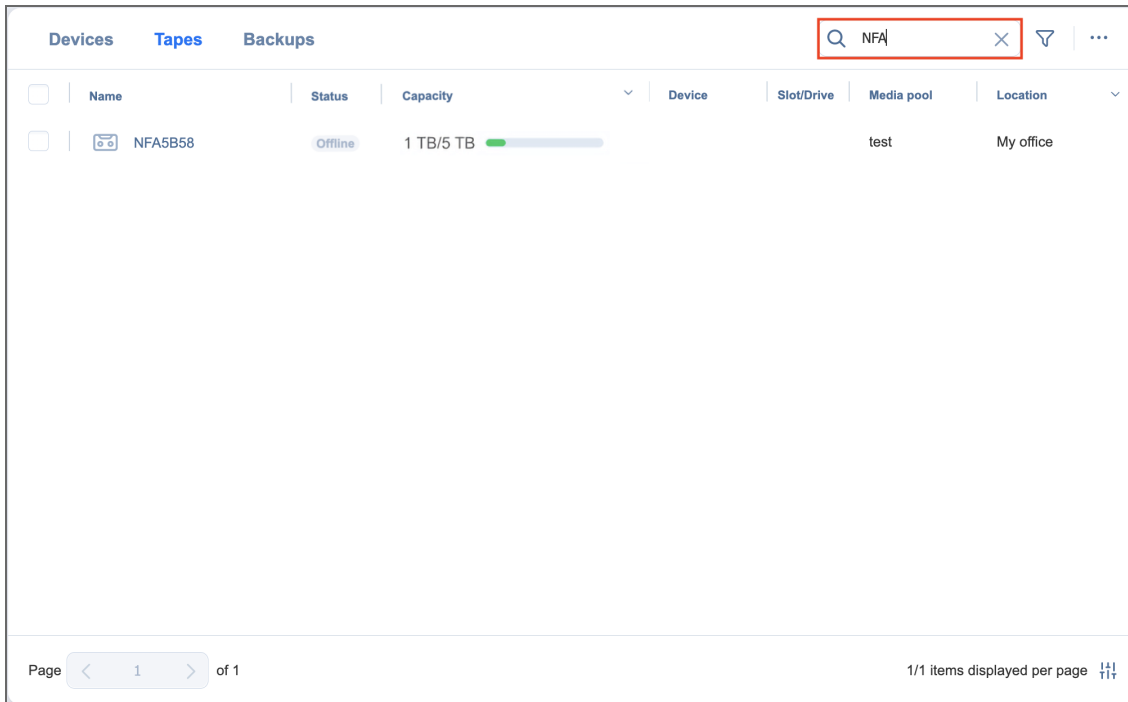
Number of items per page:

Columns:

<input checked="" type="checkbox"/> Name	<input checked="" type="checkbox"/> Status
<input checked="" type="checkbox"/> Capacity	<input type="checkbox"/> Label
<input checked="" type="checkbox"/> Device	<input checked="" type="checkbox"/> Slot/Drive
<input type="checkbox"/> Last written	<input checked="" type="checkbox"/> Overwritable
<input checked="" type="checkbox"/> Media pool	<input checked="" type="checkbox"/> Location
<input checked="" type="checkbox"/> Contents	<input type="checkbox"/> Type

Searching for Tape Cartridges

You can search for a specific tape cartridge by entering its name (or part of its name) into the **Search** box. The table will dynamically change to display the search results matching your query.



The screenshot shows a web interface for managing tape cartridges. At the top, there are tabs for 'Devices', 'Tapes', and 'Backups'. A search bar is located at the top right, containing the text 'NFA'. Below the search bar is a table with columns: Name, Status, Capacity, Device, Slot/Drive, Media pool, and Location. The table contains one row with the following data: Name: NFA5B58, Status: Offline, Capacity: 1 TB/5 TB, Device: (empty), Slot/Drive: test, Media pool: My office, Location: (empty). At the bottom of the interface, there is a pagination bar showing 'Page 1 of 1' and '1/1 items displayed per page'.

	Name	Status	Capacity	Device	Slot/Drive	Media pool	Location
<input type="checkbox"/>	NFA5B58	Offline	1 TB/5 TB		test	My office	

Clicking the **Clear** button in the search field will clear the query and the table will display all tape cartridges.

Filtering Tape Cartridges

The **Tapes** view also provides sophisticated filtering options that can be applied to search for particular tape cartridges. To access filtering options, click the **Filter** button next to the **Search** box. In the **Filter** pop-up, select one or several filtering criteria that will be applied with the AND statement.

The image shows a 'Filter' dialog box on the left and a table of backup data on the right. The dialog box contains various filters for backup name, status, capacity, device, media pool, location, last written, overwritable, in slot, in drive, and type. The 'Apply' button is highlighted with a red box. The table on the right shows columns for Location, Status, and Capacity, with a filter icon highlighted by a red box in the header area.

Filter

Backup name: 10.10

Status: Online

Capacity: Total space More than (>) 2 GB

Device: Tape NBR

Media pool: test

Location: My office

Last written: Before 02 Nov 2022

Overwritable: On 07 Nov 2022

In slot: Range 5 - 25

In drive: Range 10 - 20

Type: Read/Write Tape

Cancel Apply

Location	Status	Capacity
office	Offline	2.0 GB/0.0 KB
office	Offline	2.0 GB/0.0 KB
office	Online	2.0 GB/0.0 KB
office	Offline	2.0 GB/0.0 KB
office	Online	2.0 GB/0.0 KB
office	Online	2.0 GB/0.0 KB
office	Online	2.0 GB/0.0 KB
office	Online	2.0 GB/0.0 KB
office	Online	2.0 GB/0.0 KB
office	Online	2.0 GB/0.0 KB

10/75 items displayed per page

You can apply the following filtering criteria:

- **Backup name:** Tape cartridges containing the backups with the provided name will be displayed.
- **Status:** Tape cartridges in one of the following statuses will be displayed:
 - Offline
 - Online
 - Scanning...
 - Erasing...
 - Cleaning...
 - Reading...
 - Writing...
 - Moving...
 - Warning
 - Error
- **Capacity:** Filter by capacity by configuring the following options:
 - Select one of **Total space**, **Free space**, or **Used space**.
 - Select one of **More than (>)**, **Less than (<)**, or **Equal to (=)**.
 - Enter a value corresponding to the desired capacity in GB or TB.
 - Select either **GB** or **TB**.
- **Device:** Only the tape cartridges from the specified type device will be displayed.
- **Media Pool:** Only the tape cartridges from the specified media pool will be displayed.

- **Location:** Only the tape cartridges from the specified device location will be displayed.
- **Last Written:** Displays the tape cartridges that have the data written to it on/before/after a specified date
- **Overwritable:** Displays the date when the tape cartridge can be overwritten (calculated using the age and retention of all recovery points on this tape cartridge)
- **In Slot:** Displays the tape cartridges in a specified slot or range of slots
- **In Drive:** Displays the tape cartridges in a specified tape drive or range of tape drives
- **Type:** Displays the tape cartridges according to their type:
 - Read/Write Tape
 - Write Protected Tape
 - Cleaning Tape

Note

The Search and Filter features can only be applied separately; you cannot simultaneously search for a tape cartridge by name and select filtering options.

Tape Cartridge Management Page

Clicking a tape cartridge name opens the tape cartridge management page where you can apply certain actions to the tape cartridge or get extensive information about it.

The tape cartridge management page consists of the following functional blocks:

- **Manage** button
- Detailed tape cartridge information

- Tape Contents table

0002373

...

Status:

Moving From Slot 3 to Drive 4 in HP Library

Name:

0002373

Barcode:

002373

Last written:

Wed, Jul 13 at 7:45 PM

Overwritable:

No (until Wed, Aug 14)

Type:

Read/Write Tape

Capacity:

1.3/2.5 TB

Label:

0035L5

Media pool:

Oracle tape

Location:

Office

Tape Contents

Q

Backup Name	Type	Job name	Tapes	Points	Last point
SQL Server 01	Hyper-V VM	Backup copy job	1	1	Wed, 20 Jul 2022 at 18:16 (UT...
SQL Server 02	VMware VM	Backup copy job	2	2	Wed, 20 Jul 2022 at 18:16 (UT...
SQL Server 03	Hyper-V VM	Backup copy job	1	1	Wed, 20 Jul 2022 at 18:16 (UT...

Page

< 30 >

of 1

Manage Options

The ellipsis **Manage** button allows you to perform particular actions with the tape cartridge. Depending on the tape cartridge state, type, status, etc., the button's availability may vary. The button can be disabled if a certain action cannot be applied to the tape cartridge. Hovering over the disabled button displays a tooltip describing the reason for action unavailability.

Some of the actions can be applied to several tapes at once. For more information, refer to [“Bulk Tape Cartridge Management” on page 577](#).

The following actions are available:

- **Scan:** Scans the tape cartridge for its contents. The system recognizes the contents to be:
 - Known NAKIVO Backup & Replication backups: Such content requires no scanning. The backups contained on this tape cartridge are displayed in the Tape Cartridge Contents Table and can be used for VM restoring.
 - Unknown NAKIVO Backup & Replication backups: The system recognizes the contents as created by NAKIVO Backup & Replication (that is, on another product instance) but cannot be used for VM restores until scanned.
 - Empty: The tape cartridge contains no data and is ready to be used for backup.

- **Third Party Data:** The tape cartridge contains some third party data that cannot be recognized by NAKIVO Backup & Replication. Such tape cartridges cannot be used unless their contents are erased.
- **Incomplete Backups:** The tape cartridge contains incomplete backup(s), the result of an inappropriately finished backup job (for example, in the case that a backup copy job was stopped by the user and the backup copy was not completed). Incomplete backups cannot be used for recovery.
- **Unidentified:** The contents of a newly introduced tape cartridge is unknown to the system and must be scanned first.

When you insert new tape cartridges into the tape device, and these tape cartridges contain backups created using another instance of NAKIVO Backup & Replication, the application opens the **Scan new tape cartridges?** notification box, asking if you'd like to scan the new tape cartridges. Clicking the **Scan all** link initiates the scanning action for all newly discovered tape cartridges.

- **Edit:** Clicking the **Edit** button opens the **Edit Tape** dialog where you can:
 - Create or change a label for the tape for easier tape identifying
 - Assign the tape to a pre-created media pool
 - Allocate the tape to a pre-created location

The newly added details are displayed in the **Options** pane.

- **Move:** This action allows you to move the tape cartridge to an available drive slot or tape drive. Occupied drive slots or tape drives are disabled in the menu.
- **Protect:** Applying this action to the tape cartridge protects it from data overwriting. This action is only available on tape cartridges that contain recovery points. Recovery from protected tape cartridges is available. Protected tape cartridges can be reverted by clicking the **Unprotect** button. Clicking the **Protect** or **Unprotect** button requires confirmation.
- **Mark as free:** Marking the tape cartridge as free makes it eligible for writing backups to it. Marking the tape cartridge as free does not erase the data right away: the next time the product needs a tape cartridge for writing data, it can take this tape cartridge and do a quick-erase before writing new data to it. The button is not available in case the tape cartridge is protected or empty. Marking the tape cartridge as free requires confirmation. The confirmation box displays detailed information about the data that is about to be deleted. This action cannot be undone.

- **Mark as cleaning:** Specialized tape cartridges designed for tape drive cleaning need to be marked as cleaning tapes. For tape cartridges that have been marked as cleaning tapes, this option is replaced by the **Mark as data** button. Selecting **Mark as data** reverts a cleaning tape cartridge to a regular data tape cartridge.

Important

Currently, cleaning tapes inserted into a device are not automatically recognized by the system as cleaning. Instead, the system identifies the tapes to contain third party data. It is the user's responsibility to mark the tape as cleaning once the tape is inserted into the device and discovered. Otherwise, the cartridge will perform cleaning of the drive automatically every time the library is refreshed.

- **Retire:** The tape cartridges marked as retired will not be used for new backups. Recovery from retired tape cartridges is still available. The action is not available for tape cartridges marked as free or do not contain recovery points. This action requires confirmation.
- **Erase:** The contents of the tape can be erased using:
 - Quick erase: The data is marked as deleted without actual data deletion. Such data can still be recovered if necessary.
 - Full erase: Deletes the data from the tape forever.

Keep in mind that both methods can be very time-consuming.

Clicking the **Erase** button opens the **Erase selected tape?** dialog providing detailed information about the data that is about to be deleted and allows choosing the erase method.

- **Clean drive:** This action is only available for cartridges marked as *cleaning*. Select a drive from the drop-down menu and click **Clean Drive** to initiate the drive cleaning cycle and move the cleaning cartridge to the selected drive for cleaning.
- **Remove:** Clicking this button will physically remove the tape cartridge from the tape device. The button is only available for the offline tape cartridges. The action requires your confirmation.

Details Pane

The **Details** pane provides full information about the tape:

- **Status:** Displays the status of the tape cartridge and the current tape device name and drive slot/tape drive number. The tape cartridge can be in one of the following statuses: Scanning, Online, Reading, Writing, Erasing, Warning, Moving, Error, or Offline.
- **Name:** Displays the name of the tape cartridge; can be modified by clicking the **Edit** button
- **Barcode:** Displays the tape cartridge barcode if available
- **Last written:** Displays the date of the last write operation
- **Overwritable:** Displays the date when all recovery points on this tape cartridge expire

- **Type:** Displays the type of the tape cartridge: Read/Write Tape, WORM Tape, Write Protected Tape, or Cleaning Tape
- **Capacity:** Displays the amount of free space relative to the total tape capacity. Hovering over this row also reveals the amount of used space. In case the capacity cannot be retrieved, **Not available** will be displayed instead.
- **Label:** Displays the tape cartridge label, if any
- **Media pool:** Displays the assigned media pool, if any
- **Location:** Displays the assigned location, if any

Tape Contents Table

The **Tape Contents** table provides information about the backups residing on the tape cartridge and allows for recovering VMs from backups right from the table. In case the tape cartridge contains no backups or has not yet been scanned, the table displays generic information about the tape cartridge contents, such as:

- "This tape contains third party data."
- "This tape cannot be identified. Scan the tape in order to discover its content."
- "This tape is empty."
- "This tape contains backups. Scan the tape to view the list of backups."

If the tape cartridge contains backups and has been scanned already, the **Tape Contents** table displays the backups and provides the following information:

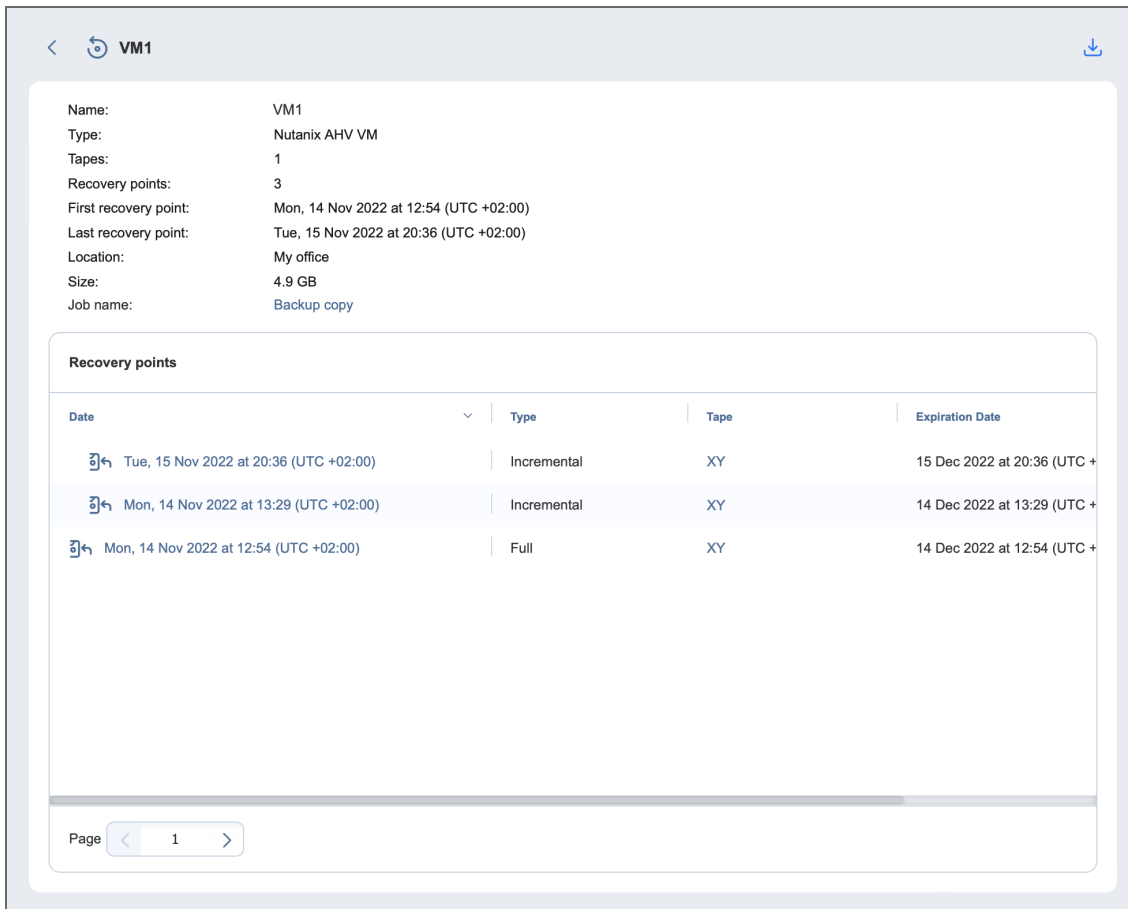
- **Backup name:** Displays the name of the backup. Clicking the name of the backup opens the **Recovery** page.
- **Type:** Displays the type of a backup: VMware VM, Hyper-V VM or EC2 instance
- **Job:** Displays the name of the last known job
- **Tapes:** Shows the number of tape cartridges this backup is stored on
- **Points:** Displays the number of recovery points in the backup
- **Last point:** Displays the date of the most recent recovery point in the backup

The **Tape Contents** table can be modified to display the column you need by clicking the arrow icon in the table header and selecting the required columns.

Clicking the column's header sorts the contents of the column.

Backup Details

Clicking a backup name in the **Tape Cartridge Contents** table opens the **Backup Details** page where you can view the backup information and see all recovery points available for this backup. You can also initiate the recovery process from here.



The **Backup Details** section provides the following information about the backup:

- **Name:** Displays the name of the backup
- **Type:** Displays the type of backup: VMware VM, Hyper-V VM, EC2 instance or physical machine
- **Tapes:** Displays the number of tape cartridges this backup is stored on
- **Recovery points:** Displays the number of recovery points within the backup
- **First recovery point:** Displays the date of the latest recovery point of the backup
- **Last recovery point:** Displays the date of the most recent recovery point of the backup
- **Location:** Displays the location the backup is assigned to
- **Job name:** Displays the name of the job the backup belongs to

The **Recovery points** table lists all the recovery points available for the current backup and provides the following information:

- **Date:** Indicates the date the recovery point was created. Clicking this parameter initiates recovery for this recovery point.
- **Type:** Indicates the type of backup: Full or Incremental
- **Tape:** Indicates the name of the tape cartridge the backup is stored on
- **Expiration date:** Indicates the date when the recovery point expires

Clicking either the **Recover** button or the date of the recovery point in the table opens the Recovery from Tape Wizard for the selected backup object. For more information about recovering from a tape cartridge, refer to [“Starting Recovery from Tape” on page 831](#) .

Bulk Tape Cartridge Management

Certain actions can be applied to several tape cartridges simultaneously. While in the **Tapes** tab, select the checkbox next to the tape cartridges you need to apply an action to and click the ellipsis **Manage** button. In the dialog box that opens, select an action to apply. Note that the availability of actions depends on various factors, so not all actions may be available. For action descriptions, refer to the **Manage Options** section above.

Devices Tapes Backups									
Q ND X									
<input type="checkbox"/>	Name	Status	Capacity	Device	Slot/Drive	Media pool	Locat	APPLY ACTION	
<input checked="" type="checkbox"/>	NDB7...	Offline	1 TB/5 TB			test	My o	Scan	
<input checked="" type="checkbox"/>	NDA7...	Offline	1 TB/5 TB			test	My o	Edit	
<input checked="" type="checkbox"/>	ND87...	Online	1 TB/5 TB	Tape NBR	6	test	My o	Move	
<input type="checkbox"/>	ND57...	Offline	1 TB/5 TB			test	My o	Protect	
<input type="checkbox"/>	ND47...	Online	1 TB/5 TB	Tape NBR	21	test	My o	Mark as free	
								Mark as cleaning	
								Retire	
								Erase	
								Remove	
								Clean drive	
								Create report	
								MANAGE	
								Locations	
								Media pools	

Page < 1 > of 1

5/5 item

The **Create report** action is unique to the bulk tape cartridge management and is used to generate reports about selected tape cartridges. The report is created as a PDF file and is stored locally on your computer.



2 tapes

56

Barcode: none
Last written: Not applicable
Tape Label: none
Media pool: none
Location: My office
Capacity: 780.5 GB
Contents: Incomplete backup(s)

Alarms & Notifications

No alarms or notifications

45

Barcode: none
Last written: Wed, 30 Nov at 22:12
Tape Label: none
Media pool: none
Location: My office
Capacity: 780.5 GB
Contents: 2 backups

Name	Date	Type	Expires
VM1	02 Nov 2022 at 11:00	Full	02 Dec 2022
VM1	11 Oct 2022 at 11:31	Full	10 Nov 2022

Alarms & Notifications

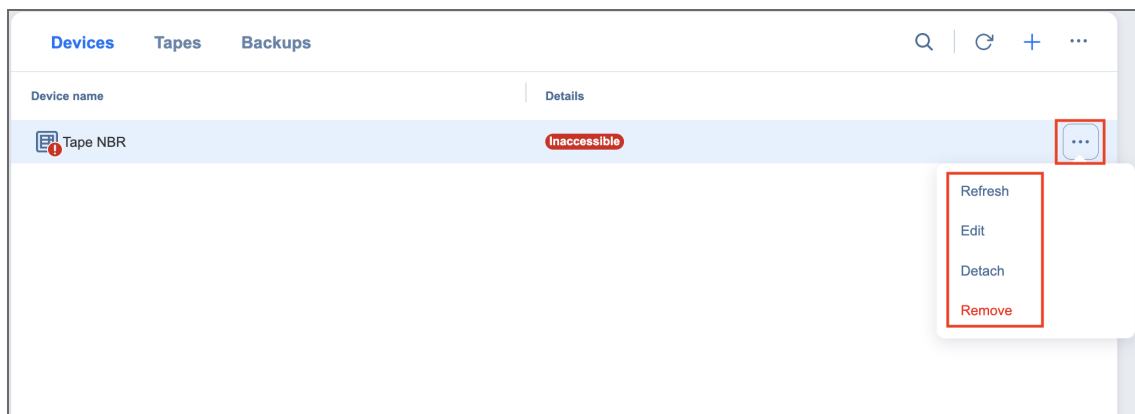
No alarms or notifications

Managing Tape Devices

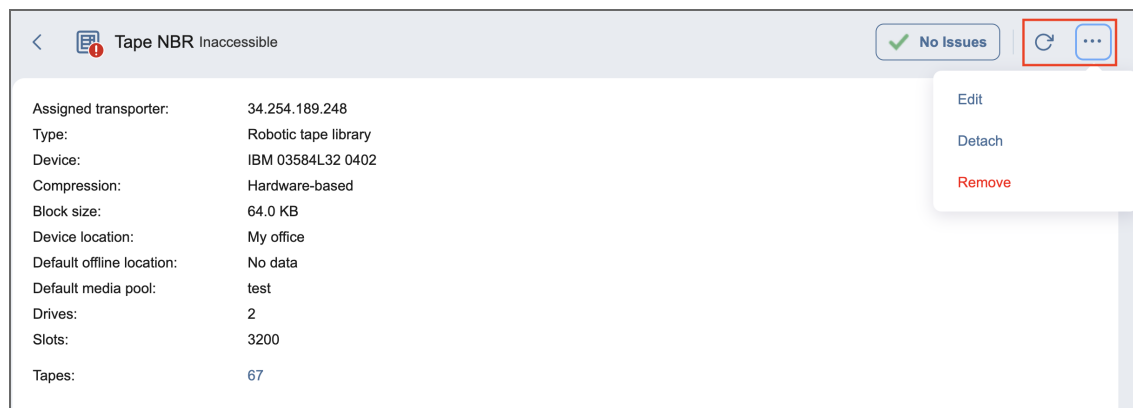
Once the tape devices are added to the system, you can view and manage them in the **Devices** tab.

Hovering the mouse cursor over the device name opens the management controls:

- **Manage:** opens the following options:
 - **Refresh:** Refresh action initiates the process of updating information regarding content of the tape device.
 - **Edit:** Opens the **Edit Tape Library** or **Edit Standalone Tape Drive** wizard, depending on the type of the device, where you can change the device's properties. Detached devices are greyed out in the interface and cannot be interacted with
 - **Detach:** Detaching a tape device saves the device's data and metadata in a consistent state and then stops the product's interaction with the device (such as read and write of data and metadata, and so on). You may want to detach a tape device to move it to a different location or to put it on maintenance.
 - **Remove:** Removes the tape device from the inventory. The device may be then added again, for example, if you need to change the block size or compression type of the device.



- Clicking the name of the tape device opens the device's details window where you can manage it and view the device's detailed information.



Expert Mode

For advanced NAKIVO Backup & Replication configuration, you can enable the Expert mode.

To do this, take the following steps:

1. Log in to your NAKIVO Backup & Replication instance.
2. Add the word “expert” to the URL parameters of the **Settings** page.

Examples:

https://localhost:4443/c/configuration?expert or

https://localhost:4443/c/configuration?action=&targetId=&backUrl=&wizard=false&expert

3. Click the **Expert** tab.

Configuring Settings

To configure advanced product settings, make the necessary changes in the following parameters:

Parameters	Description	Possible Values
system.email.smtp.localhost.mode	Specifies how to determine the name of the localhost that is used in the SMTP HELO or EHLO commands.	<ul style="list-style-type: none">• Default• Use DNS• Provide custom hostname
system.email.smtp.localhost.name	Specifies the name of the localhost that is used in the SMTP HELO or EHLO commands. This setting is valid for custom hostname resolution mode only.	
system.email.smtp.tls.version	Specifies the TLS version to use for SMTP server communication when TLS is configured in the Email Settings .	<ul style="list-style-type: none">• Default• TLS10• TLS11• TLS12• TLS13

system.email.notifications.skip.event.list	List of event names to skip when creating an email digest. Use space or "," or ";" as separators. The event names can be found in events.log.	Event names (example: error60)
system.vmware.esxi.ssh.port	For VMware only. Specifies the SSH port to connect to ESXi (global setting).	<ul style="list-style-type: none"> • Default value: 22 • Minimum value: 1 • Maximum value: 65535
system.vmware.skip.outdated.tools.checking	For VMware only. When enabled, the system does not check VMware Tools outdated status when creating quiescing snapshot.	<ul style="list-style-type: none"> • Unchecked (default) • Checked
system.vmware.skip.tag.discovery	VMware only. When enabled, the system does not discover VMware Tags. This is applied to all tenants.	<ul style="list-style-type: none"> • Unchecked (default) • Checked
system.debug.mode.log.vmware.api.incoming.requests	VMware only. When enabled, the incoming message will be printed for VIJAYA API received response. The option only works if system.debug.mode.enabled is checked.	<ul style="list-style-type: none"> • Unchecked (default) • Checked
system.debug.mode.log.vmware.api.outgoing.requests	VMware only. When enabled, the outgoing message will be printed for VIJAYA API sent request. The option only works if system.debug.mode.enabled is checked.	<ul style="list-style-type: none"> • Unchecked (default) • Checked

http.max.upload.size	Specifies the max upload size for file upload operations, bytes (global setting). If multiple files are uploaded, this is the total size. Use -1 for unlimited. Example: 200MB: 200000000	<ul style="list-style-type: none"> • Default value: 1073741824 • Minimum value: 1 • Maximum value: 9999999999999999
system.auth.use.lockout	Enables or disables the login lockout feature. When enabled, the offending IP address is not allowed to login after several failed attempts.	<ul style="list-style-type: none"> • Unchecked (default) • Checked
system.auth.max.login.attempt.count	Specifies the maximum number of failed login attempts to trigger the login lockout feature for the offending IP.	<ul style="list-style-type: none"> • Default value: 5 • Minimum value: 1 • Maximum value: 9999
system.auth.lockout.timeout	Specifies the timeout (minutes) for the login lockout feature. The offending IP is allowed to login again after the timeout expires.	<ul style="list-style-type: none"> • Default value: 15 • Minimum value: 1 • Maximum value: 9999
system.auth.login.history.period	Specifies the period (minutes) to calculate the maximum number of failed login attempts for the login lockout feature.	<ul style="list-style-type: none"> • Default value: 5 • Minimum value: 1 • Maximum value: 9999

system.auth.ad.integration.follow.referrals	<p>Defines LDAP/Active Directory behavior for referrals. When set to follow, all referrals are resolved (can be slow); otherwise they are ignored.</p> <p>What are the implications of the ignore option?</p> <p>* If you only have one domain, there should be no effects.</p> <p>* If you have multiple domains joined in a forest, then any cross-domain memberships will not be resolved.</p> <p>More info: https://docs.oracle.com/javase/jndi/tutorial/ldap/referral/jndi.html </p>	<ul style="list-style-type: none"> • follow (default) • ignore
system.auth.ad.integration.connect.timeout	Specifies the timeout (milliseconds) for connecting LDAP/Active Directory.	<ul style="list-style-type: none"> • Default value: 2000 • Minimum value: 2000 • Maximum value: 100000
system.auth.ad.integration.read.timeout	Specifies the timeout (milliseconds) for reading LDAP/Active Directory operations.	<ul style="list-style-type: none"> • Default value: 10000 • Minimum value: 10000 • Maximum value: 100000
system.auth.max.login.2fa.attempt.count	Specifies the attempts for the login lockout feature. The offending IP is allowed to login again after the timeout expires.	<ul style="list-style-type: none"> • Default value: 100 • Minimum value: 1 • Maximum value: 9999

system.auth.lockout.2fa.timeout	Specifies the timeout (minutes) for the login lockout feature. The offending IP is allowed to login again after the timeout expires.	<ul style="list-style-type: none"> • Default value: 5 • Minimum value: 1 • Maximum value: 9999
system.job.block.size	<p>Select block size for processing data.</p> <p>Notes</p> <ul style="list-style-type: none"> • Deduplication can only be efficient with recovery points using the same block size. • Once the value is changed, the existing backup jobs, previously using a different block size, will produce a full backup on the next run. • Mapping to a backup with a different block size will be skipped 	<ul style="list-style-type: none"> • 4 MB (default) • 2 MB • 1 MB • 512 KB • 256 KB • 128 KB • 64 KB • 32 KB • 16 KB • 8 KB • 4 KB
system.job.map.new.source.item.scope	The scope to search for the existing backup when adding a new source item to the job.	<ul style="list-style-type: none"> • Default location (default) • Default transporter's locations • All locations
system.job.pool.queue.length	Specifies the length of the job queue. A job is placed in a queue before execution. Requires restart.	<ul style="list-style-type: none"> • Default value: 200 • Minimum value: 10 • Maximum value: 9999

system.job.pool.thread.min	Specifies the minimum thread pool size for jobs. A job requires 1 thread from the job pool to start running. Requires restart.	<ul style="list-style-type: none"> • Default value: 30 • Minimum value: 10 • Maximum value: 9999
system.job.pool.thread.max	<p>Specifies the maximum thread pool size for jobs. A job requires 1 thread from the job pool to start running. When the pool thread limit is reached, the job is placed in the job queue. Requires restart.</p> <p>If using Linux and systemd, please add the following to the service startup script: TasksMax=infinity</p>	<ul style="list-style-type: none"> • Default value: 200 • Minimum value: 10 • Maximum value: 9999
system.job.resolve.host.hostname.on.transporter	<p>If set, sends the source and/or target host hostname as is to Transporter. Transporter will resolve the hostname to the IP address(es) and check if it is reachable. This is done during the Transporter to host checks on a job run.</p> <p>The default behavior is to do the resolution locally and send the IP addresses to Transporter. This can be a problem in complex network topologies (VPN, etc).</p>	<ul style="list-style-type: none"> • Unchecked (default) • Checked

system.job.resolve.transporter.hostname.on.transporter	<p>If set, sends the source and/or target Transporter hostname as is to Transporter. Transporter will resolve the hostname to the IP address(es) and check if it is reachable. This is done during Transporter to Transporter checks on job run.</p> <p>The default behavior is to do the resolution locally, get hostnames for all resolved IP addresses, and then send them to Transporter. This can be a problem in complex network topologies (VPN, etc).</p>	<ul style="list-style-type: none"> • Unchecked (default) • Checked
system.job.bandwidth.throttling.source	If set, applies bandwidth throttling for data reading from source.	<ul style="list-style-type: none"> • Checked (default) • Unchecked
system.job.bandwidth.throttling.target	If set, applies bandwidth throttling for data writing to target.	<ul style="list-style-type: none"> • Checked (default) • Unchecked
system.job.bandwidth.throttling.network	If set, applies bandwidth throttling for data transfer between source and target.	<ul style="list-style-type: none"> • Checked (default) • Unchecked
system.job.ict.skip.new.disk	If set, new disks added to the source item will not be added to the job automatically.	<ul style="list-style-type: none"> • Checked (default) • Unchecked
system.job.replica.vm.suffix	<p>The default suffix to append to replica VMs.</p> <p>This setting is global and can only be changed inside the master tenant.</p>	Can be between 1 and 20 characters ("-replica" by default)

system.job.recovered.vm.suffix	The default suffix to append to recovered/flash-booted VMs. This setting is global and can only be changed inside the master tenant.	Can be between 1 and 20 characters ("-recovered" by default)
system.job.skip.manual.transporter.data.path.validation	If set, transporter data path validation will be skipped for manually configured transporters.	<ul style="list-style-type: none"> • Unchecked (default) • Checked
system.metadata.disable.ec2.instance.id.update	Disables EC2 instance ID detection on product startup. The detection is done via a HTTP request to http://169.254.169.254/latest/metadata/instance-id This is required for proper product functioning in the AWS cloud.	<ul style="list-style-type: none"> • Unchecked (default) • Checked
system.task.pool.queue.length	Specifies the length of the task queue. A task is placed in the queue before execution. Requires restart.	<ul style="list-style-type: none"> • Default value: 200 • Minimum value: 10 • Maximum value: 9999
system.task.pool.thread.min	Specifies the minimum thread pool size for tasks. A task requires 1 thread from the task pool to start running. Task example: repository refresh, Transporter refresh, support bundle creation. Requires restart.	<ul style="list-style-type: none"> • Default value: 30 • Minimum value: 10 • Maximum value: 9999

system.task.pool.thread.max	Specifies the maximum thread pool size for tasks. A task requires 1 thread from the task pool to start running. When the pool thread limit is reached, the task is placed in the task queue. Task example: repository refresh, Transporter refresh, support bundle creation. Requires restart.	<ul style="list-style-type: none"> • Default value: 200 • Minimum value: 10 • Maximum value: 9999
system.repository.min.free.space.byte	Specifies the minimum free space (bytes) for the repository. If the free space goes below this value, an alarm is generated.	<ul style="list-style-type: none"> • Default value: 5368709120 • Minimum value: 1024 • Maximum value: 1099511627776
system.repository.min.free.space.percent	Specifies the minimum free space (percent) for the Backup repository. If the free space goes below this value, an alarm is generated.	<ul style="list-style-type: none"> • Default value: 5 • Minimum value: 1 • Maximum value: 99
system.repository.ec2.min.free.space.resize.percent	In case the free space is less than the set percentage of the total current storage, one minimum chunk will be added to the storage.	<ul style="list-style-type: none"> • Default value: 10 • Minimum value: 1 • Maximum value: 100

system.repository.ec2.max.free.space.size.percent	In case the free space is more than the set percentage of the total current storage, one minimum chunk will be removed from the storage.	<ul style="list-style-type: none"> • Default value: 15 • Minimum value: 1 • Maximum value: 100
system.repository.maintenance.interrupt.timeout.seconds	Specifies the timeout (seconds) to wait for repository maintenance stop during job run.	<ul style="list-style-type: none"> • Default value: 300 • Minimum value: 1 • Maximum value: 86400
system.repository.refresh.backup.size.calculation	Specifies the backup size calculation on the repository refreshing. True: Always calculates backup size. False: Skips backup size calculation and only calculates backup size with necessary backups.	<ul style="list-style-type: none"> • Checked (default) • Unchecked
system.repository.refresh.timeout.seconds	Specifies the timeout (seconds) to wait for repository refresh.	<ul style="list-style-type: none"> • Default value: 600 • Minimum value: 1 • Maximum value: 86400
system.repository.remove.backups.used.by.job	The setting allows to remove backup objects associated with existing jobs, and remove the last RP of a backup object in case such RP is due to be removed according to the retention policy. If enabled, removal of the aforesaid objects can be done manually or automatically, in accordance with the configured retention policy.	<ul style="list-style-type: none"> • Unchecked (default) • Checked

system.product.skip.update.server.ssl.certificate.verification	The product update check process requires the remote server certificate to be trusted. This parameter disables such check. It can be useful when secure (SSL/TLS) connections are being intercepted by third-party software. A product restart is required to apply.	<ul style="list-style-type: none"> • Unchecked (default) • Checked
system.debug.mode.enabled	The debug mode prints more information into the logs, including some sensitive one (hardware UUIDs, MAC addresses, etc). The passwords are not printed unless they are present in raw communication dumps (e.g., SOAP/XML/JSON).	<ul style="list-style-type: none"> • Unchecked (default) • Checked
system.debug.mode.log.passwords	When debug mode is enabled, also log passwords. This can be a security risk.	<ul style="list-style-type: none"> • Unchecked (default) • Checked
system.debug.mode.log.api.requests	When debug mode is enabled, also log product API requests/responses. The data is logged as is and will contain plaintext passwords. This can be a security risk.	<ul style="list-style-type: none"> • Unchecked (default) • Checked
system.hyperv.optimize.queries	Hyper-V only. Instructs to use a faster query method to read VM and host information. This will speed up the refresh process in large environments.	<ul style="list-style-type: none"> • Checked (default) • Unchecked
system.hyperv.discovery.host.thread.count	Hyper-V only. Sets the max parallel threads to run when refreshing cluster hosts during discovery. Each cluster host can be refreshed separately. This will speed up the refresh process in large environments.	<ul style="list-style-type: none"> • Default value: 2 • Minimum value: 1 • Maximum value: 20

system.hyperv.discovery.vm.thread.count	Hyper-V only. Sets the max parallel threads to run when refreshing host VMs during discovery. When increasing the setting value, make sure to test its impact on host CPU usage during refresh. This will speed up the refresh process in large environments.	<ul style="list-style-type: none"> • Default value: 2 • Minimum value: 1 • Maximum value: 10
system.database.scheduled.backup.path	Specifies the target path for database backups. The tenant databases will be stored in subfolders, if present. The path can be local or absolute. The folder will be created automatically if it does not exist.	
system.database.scheduled.backup.max.count	Specifies the maximum number of files for periodic database backups. The number is applied separately to each tenant database. The master and tenants product databases are backed up each day.	<ul style="list-style-type: none"> • Default value: 5 • Minimum value: 0 • Maximum value: 365
system.logging.max.index	Specifies the maximum index of log files. This works globally for all log files. Set 0 to use default value (configured in log4j.xml).	<ul style="list-style-type: none"> • Default value: 0 • Minimum value: 0 • Maximum value: 999
system.product.min.free.space.byte	Specifies the minimum free space (bytes) for the product installation folder. If the free space goes below this value, an alarm is generated.	<ul style="list-style-type: none"> • Default value: 2147483648 • Minimum value: 10485760 • Maximum value: 10737418240

system.product.free.memory.threshold	Specifies the minimum ratio for JVM free memory. If the free JVM memory goes below this value, an alarm is generated.	<ul style="list-style-type: none"> • Default value: 0.1 • Minimum value: 0.01 • Maximum value: 0.9
system.nutanix.discovery.vm.thread.count	Nutanix AHV only. Sets the max parallel threads to run when refreshing host VMs during discovery. When increasing the setting value, make sure to test its impact on host CPU usage during refresh. This will speed up the refresh process in large environments.	<ul style="list-style-type: none"> • Default value: 2 • Minimum value: 1 • Maximum value: 10
system.aws.discovery.region.thread.count	AWS only. Sets the max parallel threads to run when refreshing the AWS Regions during discovery. When increasing the setting value, make sure to test its influence on host CPU usage during refresh. This will speed up the refresh process in large environments.	<ul style="list-style-type: none"> • Default value: 4 • Minimum value: 1 • Maximum value: 10
system.aws.discovery.other.thread.count	AWS only. Sets the max parallel threads to run when refreshing other AWS entities inside the Region during discovery. When increasing the setting value, make sure to test its influence on host CPU usage during refresh. This will speed up the refresh process in large environments.	<ul style="list-style-type: none"> • Default value: 4 • Minimum value: 1 • Maximum value: 10

system.plugin.flr.operation.timeout.seconds	Specifies the timeout (seconds) to wait for plugin session FLR/OLR. This is a low-level setting that is only sent to Transporter and used during iSCSI interaction.	<ul style="list-style-type: none"> • Default value: 900 • Minimum value: 1 • Maximum value: 86400
system.physical.skip.os.checking	Physical Windows host discovery only. When enabled, the system will not check the supported OS version.	<ul style="list-style-type: none"> • Checked • Unchecked (default)
system.transporter.agent.injection.skip.vc.redist	When enabled, the system will not automatically install VC redistributable during Transporter/agent injection.	<ul style="list-style-type: none"> • Checked • Unchecked (default)
system.transporter.load.max.time.created.state.hours	Specifies the timeout (hours) to wait for getting Transporter load request. Default is 5 hours.	<ul style="list-style-type: none"> • Default value: 5 • Minimum value: 1 • Maximum value: 72
system.transporter.modern.min.heap.size.megabyte	<p>Megabytes.</p> <p>The -Xms option sets the initial and minimum Java heap size. The Java heap (the “heap”) is the part of the memory where blocks of memory are allocated to objects and freed during garbage collection.</p> <p>Note: Transporter restart is required to apply the setting.</p>	<ul style="list-style-type: none"> • Default value: 512 • Minimum value: 256 • Maximum value: 65536

system.transporter.modern.max.heap.size.megabyte	<p>Megabytes.</p> <p>This option sets the maximum Java heap size. The Java heap (the “heap”) is the part of the memory where blocks of memory are allocated to objects and freed during garbage collection.</p> <p>Depending on the kind of operating system you are running, the maximum value you can set for the Java heap can vary.</p> <p>Notes:</p> <ul style="list-style-type: none"> -Xmx does not limit the total amount of memory that the JVM can use. Transporter restart is required to apply the setting. 	<ul style="list-style-type: none"> • Default value: 3072 • Minimum value: 256 • Maximum value: 65536
system.transporter.modern.thread.stack.size.kilobyte	<p>Kilobytes.</p> <p>-Xss sets the thread stack size. Thread stacks are memory areas allocated for each Java thread for their internal use. This is where the thread stores its local execution state.</p> <p>Note: Transporter restart is required to apply the setting.</p>	<ul style="list-style-type: none"> • Default value: 512 • Minimum value: 64 • Maximum value: 2048
system.transporter.modern.job.handler.max.thread.count	<p>Specifies the job thread count for modern Transporter.</p> <p>Notes:</p> <ul style="list-style-type: none"> • 1 job thread equals ~200MB of memory, consider changing the related setting. • Transporter restart is required to apply the setting. 	<ul style="list-style-type: none"> • Default value: 10 • Minimum value: 1 • Maximum value: 128

system.transporter.modern.service.handler.max.thread.count	Specifies the service thread count for modern Transporter. Note: Transporter restart is required to apply the setting.	<ul style="list-style-type: none"> • Default value: 10 • Minimum value: 1 • Maximum value: 128
system.transporter.jvm.ram.requirement	Bytes. For NASes only. Specifies the minimal ram required on NASes to create a SaaS repository.	<ul style="list-style-type: none"> • Default value: 4294967296 • Minimum value: 0 • Maximum value: 1099511627776
system.transporter.modern.thread.pool.size	Specifies the session factory thread pool size for modern Transporter. Note: Transporter restart is required to apply the setting.	<ul style="list-style-type: none"> • Default value: 1000 • Minimum value: 100 • Maximum value: 1000
system.deleted.users.groups.remove.frequency	Specifies the scheduled time for removing unnecessary deleted users, groups (in second).	<ul style="list-style-type: none"> • Default value: 86400 • Minimum value: 300 • Maximum value: 1.7976931348623157e+308
system.inventory.allow.duplicated	Microsoft 365 and physical machines only. When enabled, the system allows duplicated discovery items.	<ul style="list-style-type: none"> • Unchecked (default) • Checked

system.inventory.optimize.discovery.time	Microsoft 365 (SharePoint Online) only. When enabled, the system skips some attributes to optimize the discovery time.	<ul style="list-style-type: none"> • Unchecked (default) • Checked
system.o365.suppress.throttling.event	Suppress throttling warning.	<ul style="list-style-type: none"> • Unchecked (default) • Checked
system.event.skip.creating.event.list	List of event/alarm/notification names to skip when creating an event. The event is still logged and handled. Use space or , or ; as separators. The names can be found in events.log.	Event names (example: error60)
system.events.use.windows.event.integration	Use Windows Event log integration. Some product events will also be created in the Application log. This setting is global and can only be changed inside the master tenant.	<ul style="list-style-type: none"> • Unchecked (default) • Checked
system.exchange.enable.direct.recovery	<p>When enabled, you can recover Exchange items without using a recovery server. For example, you can download items to the browser or forward them to a certain email. To do this, select Download items or forward via email on the Destination page of the job wizard and then select the appropriate recovery type on the Options page.</p> <p>Note that Google limits the total size of attachments within a message to 25 MB. Forwarding messages containing attachments that exceed this limit will fail.</p>	<ul style="list-style-type: none"> • Unchecked (default) • Checked

system.olr.dsamain.mount.port	TCP port where DSAMAIN mounts NTDS.dit (AD database) for.	<ul style="list-style-type: none"> • Default value: 5000 • Minimum value: 1 • Maximum value: 65535
system.product.register.disable.periodic.data.collection	When enabled, the product will not send data bundles every 30 days.	<ul style="list-style-type: none"> • Unchecked (default) • Checked
system.repository.skip.periodic.refresh.on.transporter.busy.with.job	When enabled and any Transporter repository is locked by a running job, the product skips periodic refresh for this Transporter repository.	<ul style="list-style-type: none"> • Unchecked (default) • Checked
system.pql.custom.file.name	PQL file name in the userdata folder. Empty by default. If empty, the file will be downloaded from web.	
system.pql.cache.ttl.hours	Time to keep PQL file cache, in hours. Use 0 to disable the cache.	<ul style="list-style-type: none"> • Default value: 8 • Minimum value: 0 • Maximum value: 72
system.transporter.allow.new	Allows using newer Transporter versions.	<ul style="list-style-type: none"> • Unchecked (default) • Checked
system.transporter.allow.old	Allows using older (outdated) Transporter versions.	<ul style="list-style-type: none"> • Unchecked (default) • Checked

system.transporter.modern.idle.timeout	<p>Specifies the timeout (milliseconds) for modern Transporter IDLE. If you set it to 0, it will be an unlimited timeout, meaning the transporter can only be stopped manually.</p> <p>Note: Transporter restart is required to apply the setting.</p>	<ul style="list-style-type: none"> • Default value: 3600000 • Minimum value: 0 • Maximum value: 86400000
system.volatile.object.processing.type	<p>Default: try to remove the volatile objects periodically until their time to live (fixed) is reached. Alternative: fine-tune the settings. See the other system.volatile.object variables. The setting is global and can be changed inside the master tenant only.</p>	<ul style="list-style-type: none"> • Default (default option) • Alternative
system.volatile.object.retry.count	<p>Alternative processing type only. The maximum number of retries for volatile objects removal. 0 means no retries, so only one removal attempt will happen. The setting is global and can be changed inside the master tenant only.</p>	<ul style="list-style-type: none"> • Default value: 7 • Minimum value: 0 • Maximum value: 256
system.volatile.object.retry.interval	<p>Alternative processing type only. Minutes. The desired delay between each removal retry. The real delay depends on the queue and on the exponential retry factor (configurable). The setting is global and can be changed inside the master tenant only.</p>	<ul style="list-style-type: none"> • Default value: 60 • Minimum value: 5 • Maximum value: 14400

system.volatile.object.exponential.retry.interval.factor	<p>Alternative processing type only. The ratio to use when calculating the delay time for the next retry. The next delay equals $\text{interval} * (\text{factor}^{\text{retry}})$.</p> <p>Example: the interval is 60 minutes, the factor is 2. The first retry will happen in +60 minutes, the second in +240 minutes, The setting is global and can be changed inside the master tenant only.</p>	<ul style="list-style-type: none"> • Default value: 2 • Minimum value: 1 • Maximum value: 10
system.visual.notification.service.disable	<p>Disables the visual notification service. This can speed up the UI when the database contains many event entries. This setting is global and can be changed inside the master tenant only.</p>	<ul style="list-style-type: none"> • Unchecked (default) • Checked
system.msp.console.listening.port	<p>TCP port used by the MSP product for listening to remote tenants. Port 6702 is used by default.</p>	<ul style="list-style-type: none"> • Default: 6702 • Minimum value: 1 • Maximum value: 65535
system.events.use.windows.event.integration	<p>Use Windows Event log integration. Some product events will also be created in the Application log. The setting is global and can be changed inside the master tenant only.</p>	<ul style="list-style-type: none"> • Unchecked (default) • Checked

system.transporter.load.path.cost.variation.percent	<p>Percent. Specifies the allowed data path cost variation.</p> <p>During the job run, automatic transporter selection may happen. The first step is to choose the top N (by cost) data paths. The second step is to choose the best data path based on the lowest transporter load.</p> <p>For example, if the setting is 10% and the best path cost is 1.5, then only paths with cost=1.5 ... (1.5+0.15) will be chosen on the first step.</p> <p>The setting is global and can be changed inside the master tenant only.</p>	<ul style="list-style-type: none"> • Default value: 10 • Minimum value: 1 • Maximum value: 10000
system.vmware.discovery.vm.detect.ipaddress.by.dns.skip	<p>The setting is applicable only to VMware vSphere infrastructure.</p> <p>If enabled, the detection of VM IP address via DNS resolution will be skipped.</p> <p>Note: Detection of VM IP address via DNS resolution is applied in case VMware Tools are not installed on the VM.</p>	<ul style="list-style-type: none"> • Checked (default) • Unchecked
system.job.default.retention.approach	<p>Schedule-retention fusion: New backup and backup copy jobs will use the new schedule-retention step.</p> <p>Legacy: New backup and backup copy jobs will use the legacy schedule and retention steps.</p>	<ul style="list-style-type: none"> • Schedule-retention fusion • Legacy

Configuring Actions View

Click the **Actions** tab to configure the following actions:

- **Remove all events:** By clicking the link, you can remove all events/alarms/etc for the current tenant.
- **Forget all passwords (except users):** By clicking the link, you can set the stored passwords to "" for the current tenant items. The only exception is user passwords; they must be set manually.

- **Clean up job history:** By clicking the link, you can immediately apply the configured **Store job history for the last** setting.

In the text box, you can see the report on the actions.

Example 1

Request 1: sending (Remove all events)...

Request 1: success=true (Remove all events).

Example 2

Request 1: sending (Forget all passwords (except users))...

Request 1: success=true (Forget all passwords (except users)).

Example 3

Request 1: sending (Clean up job history)...

Request 1: success=true (Clean up job history).

Packages

By clicking the **Packages** tab, you can see the following information:

- **Base local path:** packages. Location of packages in product installation directory
- List of **Existing packages**
- List of **Supported packages**

Virtual Appliance Configuration

This section covers the following topics:

- [“Configuring Network Settings of Virtual Appliance” on page 603](#)
- [“Increasing Backup Repository Size on Virtual Appliance” on page 604](#)
- [“Removing the Disk with Backup Repository from Virtual Appliance” on page 605](#)

Configuring Network Settings of Virtual Appliance

To configure networking on the Virtual Appliance (VA), follow the steps below:

1. Open the VA console.
2. On the main menu, select the **Network Settings** option and press **Enter**.
3. Do either of the following:
 - To change the Virtual Appliance hostname, select the **Hostname** option, press **Enter**, enter a new hostname, and press **Enter** again.
 - To configure a network card, select it and press **Enter**. Press **Enter** to switch between DHCP and manual network settings. If you set the **DHCP** option to **disabled**, you can manually set up network settings by selecting an option, pressing **Enter**, entering a new value, and pressing **Enter** again. Press **F10** to save your changes and exit.

Increasing Backup Repository Size on Virtual Appliance

A Backup Repository on a Virtual Appliance (VA) is located in a logical volume (that can spread across multiple physical volumes). To extend the Backup Repository size on the VA, you need to add a new disk to the VA and then use the VA console to extend the Backup Repository to the new disk.

The Backup Repository size on the VA cannot be increased by extending existing VA disks.

The backup repository size on the VA cannot be increased by extending existing VA disks. To increase the size of the backup repository on the Virtual Appliance, follow the steps below:

1. Attach a new disk to the VA.
2. Open the VA console in your hypervisor's client.
3. Run the following commands in the VA console depending on the NAKIVO Backup & Replication version you use:
 - For the product Version 8.1 and higher:
 - a. Select **Manage NAKIVO services** in the main menu and press **Enter**.
 - b. Select **Onboard repository storage** and press **Enter**.
 - For earlier product versions, select **Backup storage** in the main menu and press **Enter**.
4. Refresh the list of disks by pressing **F5**.
5. Select the disk that you have created and press **Enter**.
6. Press **Enter** again to confirm the procedure. The disk is formatted and added to the Backup Repository on the VA.

Removing the Disk with Backup Repository from Virtual Appliance

The Virtual Appliance (VA) comes with a 500 GB disk on which a Backup Repository is created. If you have deployed the Virtual Appliance disks using the **Thin Provision** option, then the disk does not consume 500 GB of space on your datastore – only the space occupied by VM backups is consumed.

If you still would like to delete the 500GB disk after you have deployed the Virtual Appliance, follow the steps below:

1. Log in to NAKIVO Backup & Replication.
2. Go to the **Configuration > Repositories** tab.
3. Click **Onboard repository**
4. Click **Manage** and choose **Remove** from the menu.
5. In the message that opens, click the **Remove Repository and Delete Backups** button.
6. Click **Remove** to confirm that you wish to remove the Backup Repository.
7. Open the vSphere client and launch the console of the VA.
8. In the Virtual Appliance interface, select the **Exit to system console** option and press **Enter**.
9. Enter a login and password (default are `root/root`).
10. Run the following command to unmount the volume on which the Backup Repository is located:
`umount /opt/nakivo/repository`
11. Open the configuration file with the `nano` editor by running the following command:
`nano/etc/fstab`
12. In the editor, delete the line:
`dev/mapper/Volume_Group_Backup_Repository_500GB/Logical_Volume_Backup_Repository_500GB /opt/nakivo ext4 defaults 0 2`
13. Save changes by pressing **Ctrl+O**, and then pressing **Enter**.
14. Exit the editor by pressing **Ctrl+X**.
15. Power off the VA and delete the 500 GB disk.

Multi-Tenant Mode Configuration

This section covers the following topics:

- [“Changing Login and Password in Multi-Tenant Mode” on page 607](#)
- [“Configuring Branding Settings in Multi-Tenant Mode” on page 608](#)
- [“Configuring Email Notifications in Multi-Tenant Mode” on page 610](#)
- [“Configuring Email Settings in Multi-Tenant Mode” on page 611](#)
- [“Configuring System Settings in Multi-Tenant Mode” on page 612](#)
- [“Exporting and Importing Configuration in Multi-Tenant Mode” on page 614](#)

Changing Login and Password in Multi-Tenant Mode

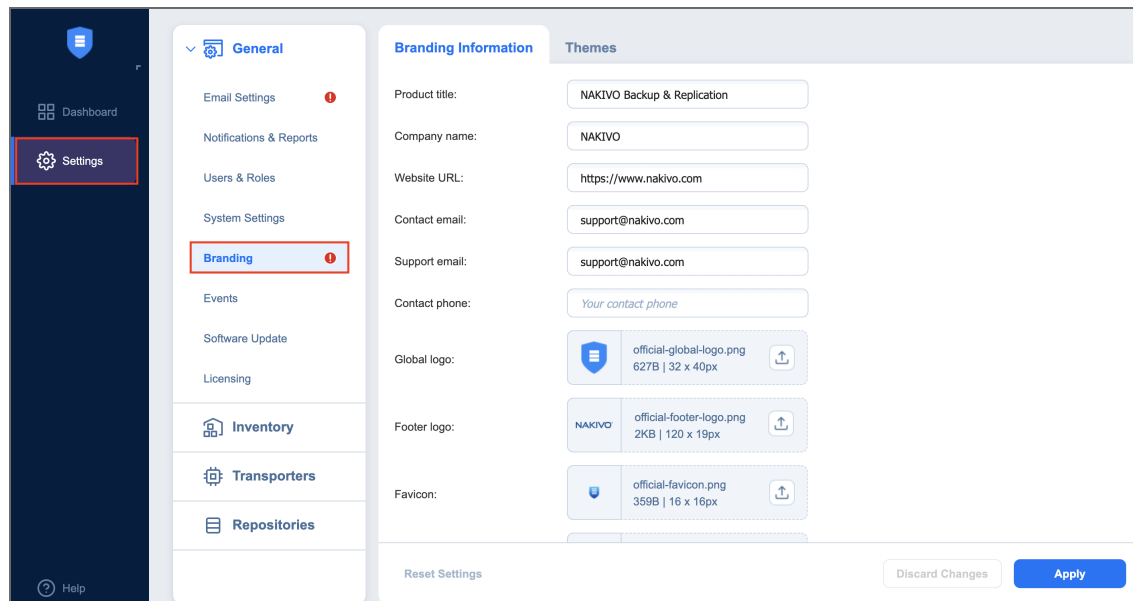
To change the login and password of the Master Admin, follow the steps below:

1. Log in to NAKIVO Backup & Replication as a Master Admin.
2. Click **Configuration** in the upper right corner of the product.
3. Go to the **General** tab and click **Users and Roles**.
4. In the list of users that opens, click the Master Admin user.
5. For the Master Admin, enter data in the **Login**, **Password**, **Confirm Password**, and **Admin email** boxes and click **Apply**.

Configuring Branding Settings in Multi-Tenant Mode

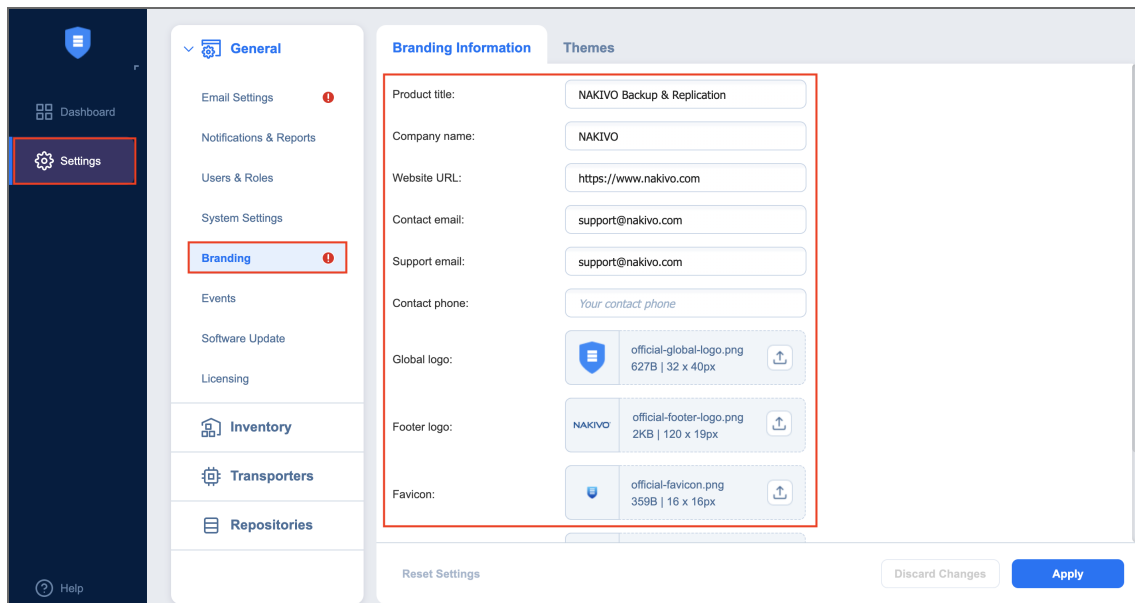
In the multi-tenant mode, you can change the product branding settings such as product name, logo, background, and so on. To configure the system settings, follow the steps below:

1. Log in to NAKIVO Backup & Replication as a Master Admin.
2. Click **Settings** in the left pane of the product.
3. Go to the **General** tab and click **Branding**.



4. Do the following:
 - To change the product title, company name, website URL, contact email, support email, and contact phone, type a new value in the appropriate field

- To change the product logo, background, and default tenant logo, click **Change** click on the appropriate box, select a new image, and click **Open**.



5. Click **Apply**.

NOTE: During upload, the logo and bookmark icon images are resized internally while preserving the aspect ratio. The background image is used as it is. To get the best image quality, follow the recommendations below:

Image	Best format	Best resolution
Global logo	.png	40x40
Page background	.jpeg	1920x1440
Bookmark icon	.png	16x16
Default tent logo	.png	120x95

Configuring Email Notifications in Multi-Tenant Mode

NAKIVO Backup & Replication can send notifications and reports over email. To configure the email notifications, follow the steps below:

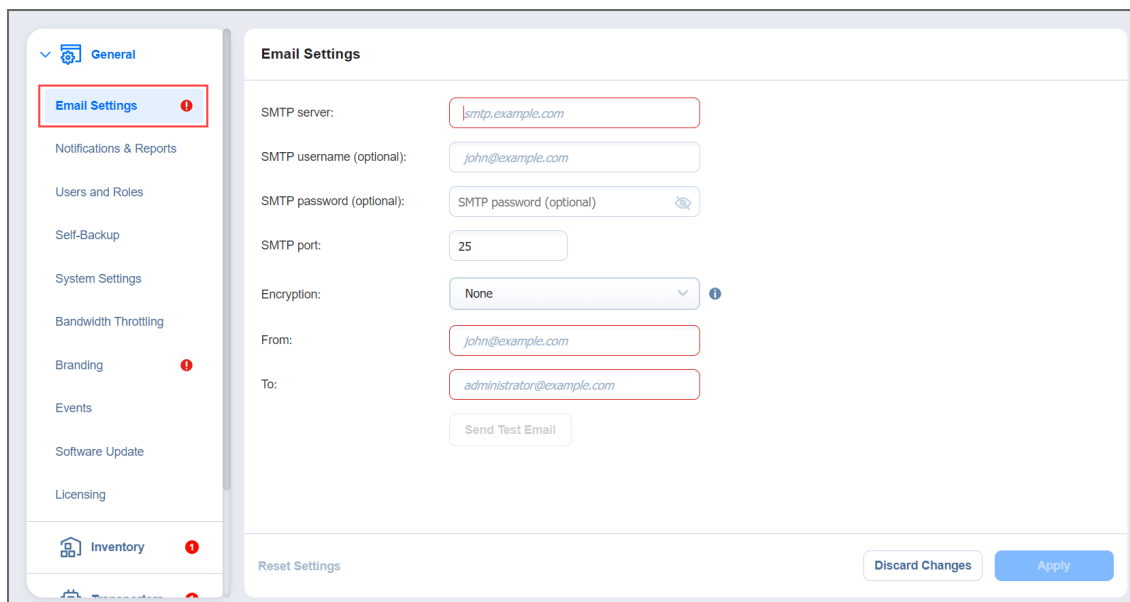
1. Make sure you have configured your [email settings](#).
2. Log in to NAKIVO Backup & Replication as a Master Admin.
3. Click **Settings** in the left pane of the product and go to the **General** tab.
4. Click **Email settings**.
5. In the **Email Notifications** section, select the options as appropriate:
 - a. **Send alarm (error) notifications:** If selected, this will send notifications about a job, repository, infrastructure, connection, and other failures to email addresses specified in the text field. Use a semicolon to separate multiple email addresses.
 - b. **Send warning notifications:** If selected, this will send warning notifications on non-critical events, such as infrastructure change, to email addresses specified in the text field. Use a semicolon to separate multiple email addresses.
 - c. **Limit email notification frequency to:** Set a limit to how often email notifications are sent.
6. In the **Automatic Reports** section, select or deselect the following automatic reports options:
 - **Attach PDF copy to automatic reports:** Specify whether you wish to include a copy of the PDF report with notifications.
 - **Send tenant Overview reports on schedule to:** If this option is selected, NAKIVO Backup & Replication will generate an Overview report (which includes information about all jobs and groups in the product) on the date and time specified in the scheduler and will send the report to the recipients specified in the text field. Use a semicolon to separate multiple email addresses.
 - **Send tenant Protection Coverage reports on schedule to:** If this option is selected, NAKIVO Backup & Replication will generate the Protection Coverage report (which includes information about all VMs & instances protected by backup and/or replication jobs as well as the information about all unprotected VMs & instances) on the date and time specified in the scheduler and will send the report to the recipients specified in the text field. Use a semicolon to separate multiple email addresses.
 - Click **Apply**.

Configuring Email Settings in Multi-Tenant Mode

Configure email settings so that NAKIVO Backup & Replication can send email notifications as well as reports over email. If email settings are not configured, tenants will not be able to configure email notifications for their jobs. To configure email settings, follow the steps below:

1. Log in to NAKIVO Backup & Replication as a Master Admin.
2. Click **Settings** in the left pane of the product.
3. Go to the **General** tab and click **Email notifications**.
4. In the **Email Settings** section, enter data in the boxes, and click **Send Test Email** to verify the settings are correct.

After the email settings are configured, you can configure the product [email notifications](#).



The screenshot displays the 'Email Settings' configuration page within the NAKIVO Backup & Replication interface. On the left, a sidebar menu shows 'General' as the active tab, with 'Email Settings' highlighted. The main content area is titled 'Email Settings' and contains the following fields:

- SMTP server:
- SMTP username (optional):
- SMTP password (optional):
- SMTP port:
- Encryption:
- From:
- To:

Below the 'To' field is a 'Send Test Email' button. At the bottom of the form, there are two buttons: 'Reset Settings' and 'Apply' (with a 'Discard Changes' button next to it).

Configuring System Settings in Multi-Tenant Mode

To configure the system settings, follow the steps below:

1. Log in to NAKIVO Backup & Replication as a Master Admin.
2. Click **Settings** in the left pane of the product.
3. Go to the **General** tab and click **System settings**.
4. Select or deselect the following options:
 - **Store system events for the last X days:** This option specifies the time period (from 10 to 365 days) during which the application events will be kept. Older events are automatically deleted.
 - **Auto log out after X minutes of inactivity:** If this option is selected, the current user will be automatically logged out of the product after the specified period of inactivity.
 - **Auto upload support bundles to support team server:** If this option is enabled, NAKIVO Backup & Replication will automatically create, encrypt, and upload support bundles once a day to a NAKIVO support server during the evaluation period. The NAKIVO Support team may use this information to improve the product experience and will be able to identify and resolve product issues faster.
 - **Enable built-in support chat:** If selected, this will allow you to chat with the NAKIVO support team.
 - **Display special offers:** If selected, this will show a toolbar with special offers in the GUI.
 - **Continue product update if self-backup fails:** If selected, product update will proceed even if automatic self-backup cannot be performed.
 - **Tape options:** These present you with setting options for tape devices:
 - **Auto erase expired tapes:** If selected, expired tape cartridges will be erased automatically.
 - **Wait for next tape for:** Specify for how long the system needs to wait for the next tape cartridge if there is no appropriate one. Select the **Send email notification** checkbox to allow you to receive email notifications.
 - **Auto refresh tapes every:** Select how often the contents of tape cartridges are to be refreshed in minutes or hours. Deselect if no refreshing is required.
 - **Regional options:** Set the clock format, short date format, long date format, first day of the week, decimal symbol, and default time zone in the corresponding fields.
- In the **Web Interface TLS/SSL Certificate** section, you can either:
 - **View current certificate:** A dialog containing the current certificate information opens.
 - **Install new certificate:** A dialog opens, allowing you to install a new TLS/SSL certificate for the NAKIVO Backup & Replication web interface. Certificates are generated either internally or through certification authorities. Proceed as follows to install a new certificate:

- Click **Browse** and navigate to the location of either of the following certificate file types:
 - **Private key:** A file in the *.key format.
 - **Private key password (optional):** A password for your private key.
 - **Certificate file:** A file in the *.pem, *.crt, *.cer, *.p7b, or *.p7s format.
 - **Intermediate certificate (optional):** A file in the *.pem, *.crt, *.cer, *.p7b, *.p7s format.
- Click Install.

Note

In the Web Interface TLS/SSL Certificate section, you can see a notification about imminent TLS/SSL certificate expiration in 30 days and onwards. If your certificate has expired, you will be asked to install a valid certificate.

Exporting and Importing Configuration in Multi-Tenant Mode

System configuration export and import are recommended for easy migration to new product deployment. System configuration, such as jobs, user credentials, inventory items, Transporter and Backup Repository settings, is all exported into a single export bundle.

The export bundle can be applied to a new deployment.

To export system configuration from the old deployment, follow the steps below:

1. Open **Settings** in the old deployment.
2. Go to the **General** tab and click **System migration**.
3. Click **Export system configuration**.
4. In the dialog box that opens, click **Export**.
5. Click **Proceed** to confirm the operation.

Note

All activities in the old deployment (such as jobs and recovery sessions) will be automatically stopped and disabled.

6. Wait until the export is completed, and download the export bundle.

To import system configuration into the new deployment, follow the steps below:

1. Open **Settings** in the new deployment.
2. Go to the **General** tab and click **System migration**.
3. Click **Import system configuration**.
4. In the dialog window that appears, locate the export bundle using the **Browse** button.
5. Click **Import**.
6. Click **Proceed** to confirm the operation.

Note

If there is any existing data in the new deployment, it will be overwritten with the import operation.

7. Wait until the import is completed, and close the dialog box.

Notes

- Data contained in backup repositories is not migrated to the new location automatically. If you are using a locally attached Backup Repository, the physical data must be [copied or moved](#) to the new location manually.

After moving the files you may need to [edit](#) the Backup Repository settings in the new deployment so that the new settings refer to the actual Backup Repository location.

- If a custom TLS/SSL certificate of the Web server was used in the old deployment, a manual service restart will be required in the new deployment.

Support Bundles

NAKIVO Backup & Replication provides you with the ability to create support bundles – a zipped collection of the product logs and system information. Sending a support bundle to the NAKIVO Support Team allows them to quickly identify the root cause of issues and suggest a proper solution.

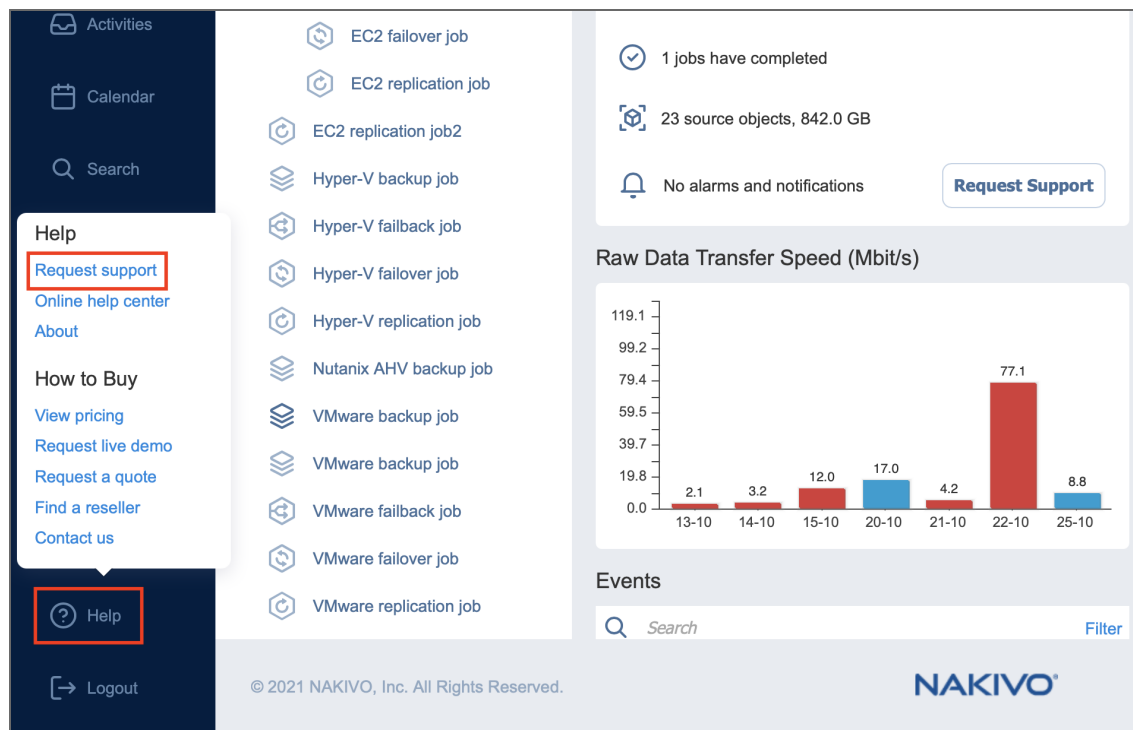
- [Creating Support Bundles](#)
- [Sending Support Bundles](#)

Creating Support Bundles

Before creating a support bundle, make sure [Email settings](#) are configured. To create a support bundle, follow these steps:

1. Click the "?" (**Help**) icon in the lower-left corner of the web UI.
2. Select and click **Request support**. The dialog box will appear.
3. Enter a description of your problem in the **Please describe the problem you're experiencing** box.
4. Enter your email address in the **Contact email** box.
5. If necessary, upload an attachment by clicking **Browse**.
6. Select **Include logs of all tenants** if you wish to include log files of all tenants to the support bundle.
7. Select **Include main database** if you want to include your main database.
8. Select **Include tenant databases** if you wish to include tenant databases containing most of the tenant configuration, including inventory, transporters, repositories, and jobs.
9. Click **Create & Send Support Bundle** to send the support bundle to NAKIVO Support Team. You will receive an answer from the NAKIVO Support Team within one business day.

10. Optionally, click **Download** to save the support bundle on your machine.



Sending Support Bundles Manually

Some support bundles may become overly large in size. This can occur due to large log files or file dumps. In such cases, it is recommended to upload these files manually.

To do this, follow these steps:

1. Open the [Upload Files to NAKIVO Support](#) page.
2. In the *Files* section, click **Browse** and select up to three files. You can select more than three files by clicking **Add Another File**.

Note

You can upload any files relevant to your issue: logs, file dumps, or the support bundles that you have manually downloaded from the product's UI.

3. Enter your email address in the **Contact email** field.
4. You can also enter the ID of your support ticket in the **Ticket ID** field if you have one opened.
5. Optionally, enter a description in the **Description** field.
6. Click **Upload** when you're done uploading the file(s).

Note

Wait for a successful upload notification before closing the page.

Built-in Support Chat

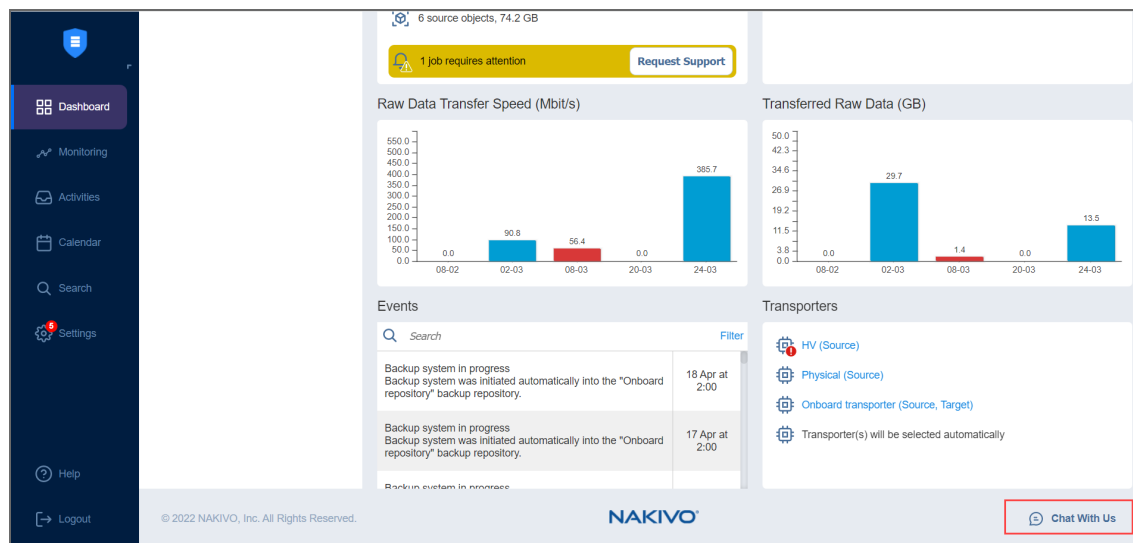
You have the possibility to contact a NAKIVO representative via chat in the NAKIVO Backup & Replication interface.

- [Opening Built-in Support Chat](#)
- [Sending Files in Built-in Support Chat](#)
- [Sending Feedback to Built-in Support Chat](#)
- [Sending Email Transcript of Built-in Support Chat](#)
- [Disabling/Enabling Sound Notifications](#)
- [Disabling Built-in Support Chat](#)

Opening Built-in Support Chat

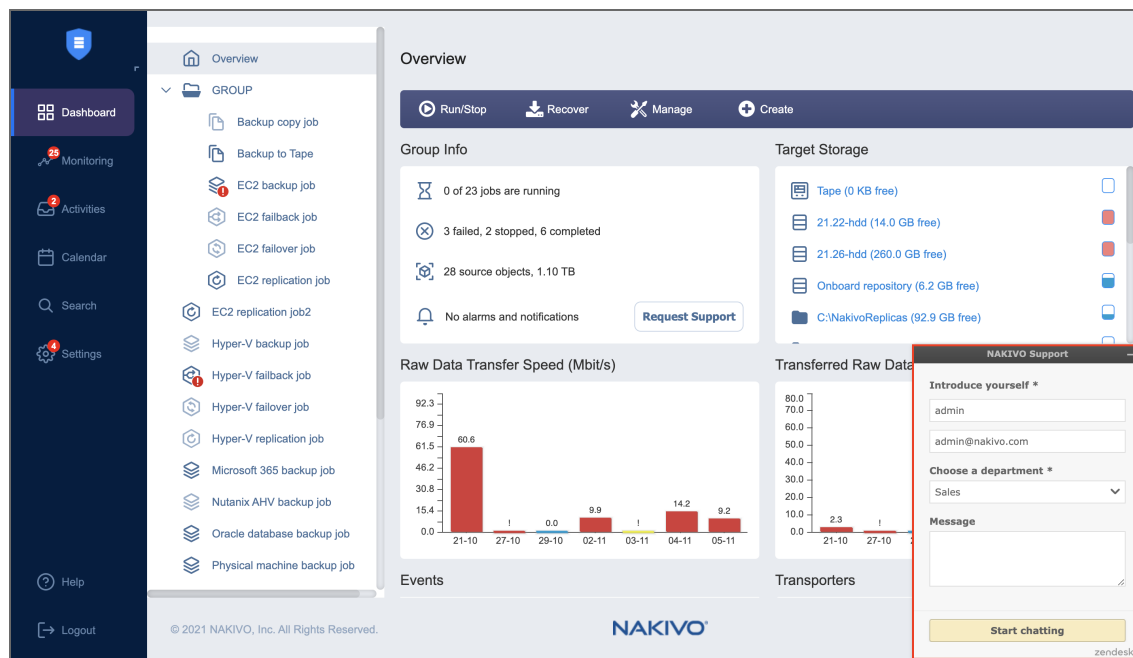
To open Built-in Support Chat, follow the steps below:

1. In the lower right corner of the NAKIVO Backup & Replication interface, click the chat button.



2. The **NAKIVO Support** dialog box opens. Introduce yourself by providing the following information:
 - a. In the upper box of the dialog box, enter your name.
 - b. In the box below, enter your email address.
3. Choose a department from the list of available departments.

4. Enter your message text and click **Start Chatting**.



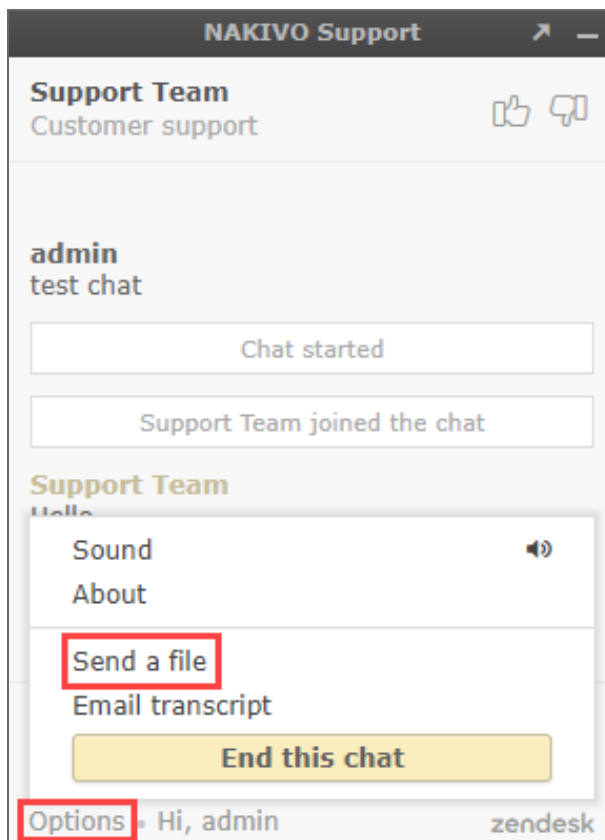
5. Your message is sent to a NAKIVO representative and will be processed as soon as possible. If needed, click the **Send Another** button to proceed with sending another chat message.

Sending Files in Built-in Support Chat

Please use either of the following ways to send your files in Built-in Support Chat:

- Drag and drop: open **Windows File Explorer**, select necessary files, and then drag them and drop to the chat dialog.
- Built-in Support Chat interface:
 1. In the upper left corner of the Built-in Support Chat dialog, click **Options**.
 2. In the dialog that opens, click **Send a file**.

3. The **Open** dialog opens. Navigate to the location of your files, select them and then click **Open**.



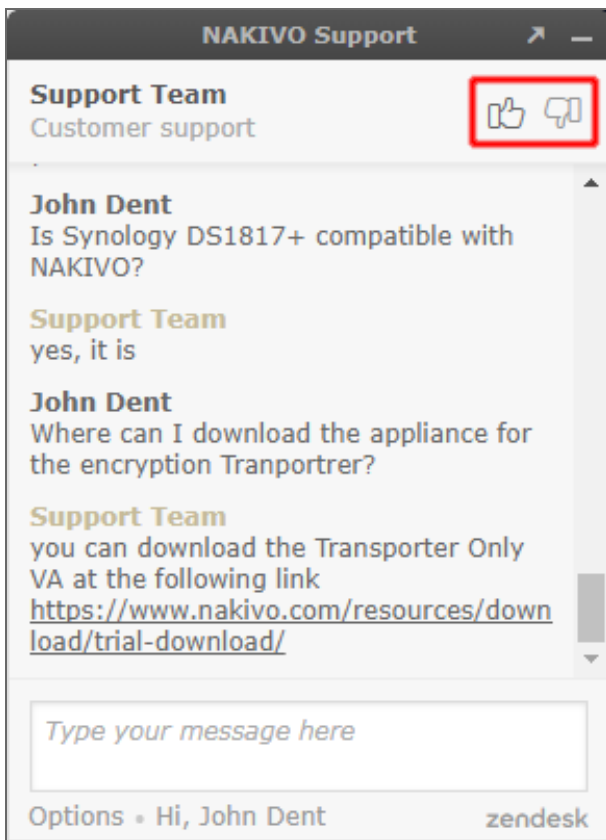
Note

The following file formats are allowed: .pdf, .png, .jpeg, .gif, .txt. The maximum file size is 20 MB.

Sending Feedback to Built-in Support Chat

You have the possibility of sending feedback to Built-in Support Chat: in the upper right corner of the dialog, click **Good** or **Bad**, as you deem appropriate.

If appropriate, leave a comment for NAKIVO Support Team: click **Leave a comment** and in the text box that opens, enter your comment about the chat service. Then click **Send**.

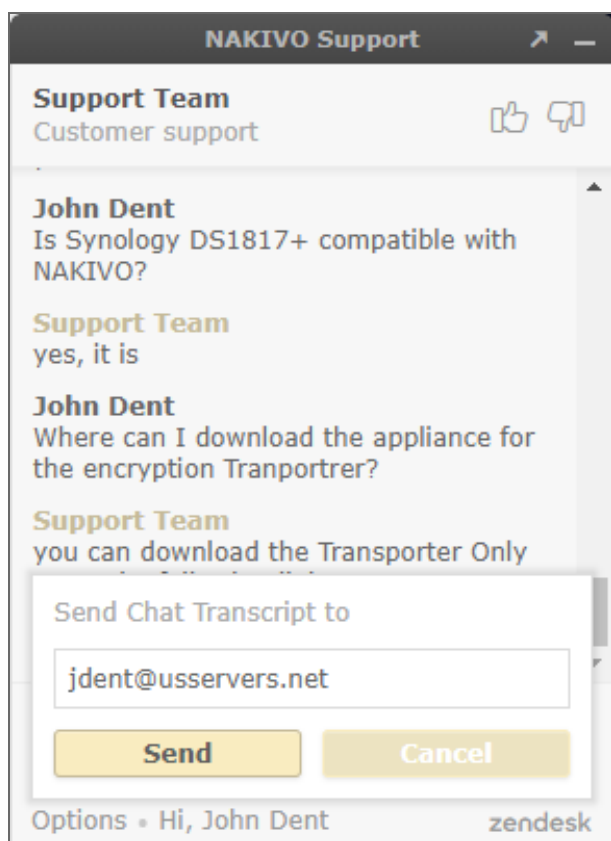


Sending Email Transcript of Built-in Support Chat

Follow the steps below to send the transcript of your Built-in Support Chat session:

1. In the upper left corner of the Built-in Support Chat dialog, click **Options**.
2. In the dialog that opens, click **Email transcript**.
3. In the dialog that opens, make sure the email address of the recipient is correct, and then click **Send**.

Your Built-in Support Chat transcript will be sent to the specified email recipient.



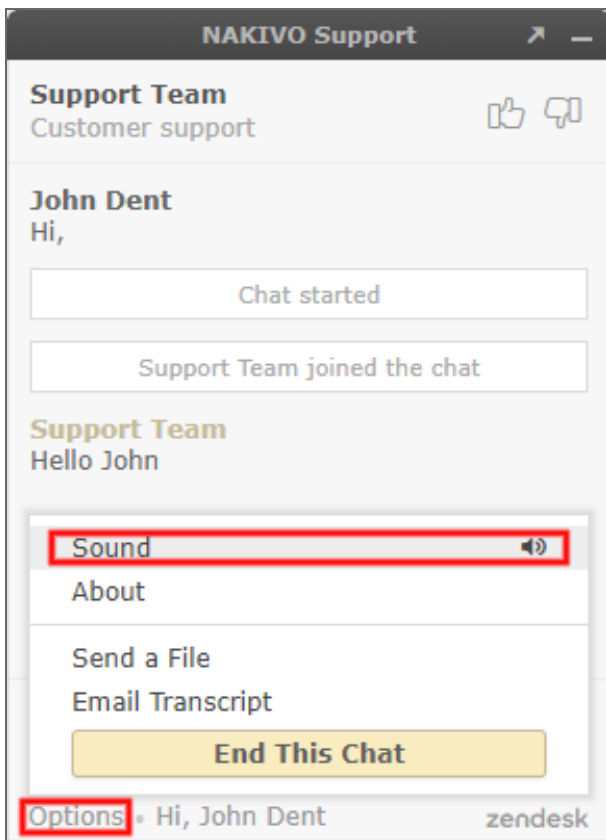
Disabling/Enabling Sound Notifications

By default, sound notifications are enabled for Built-in Support Chat.

Do the following to disable sound notifications in Built-in Support Chat:

1. In the upper left corner of the Built-in Support Chat dialog, click **Options**.
2. In the dialog that opens, click **Sound**.
3. Close the options dialog.

Sound notifications will be disabled for Built-in Support Chat.



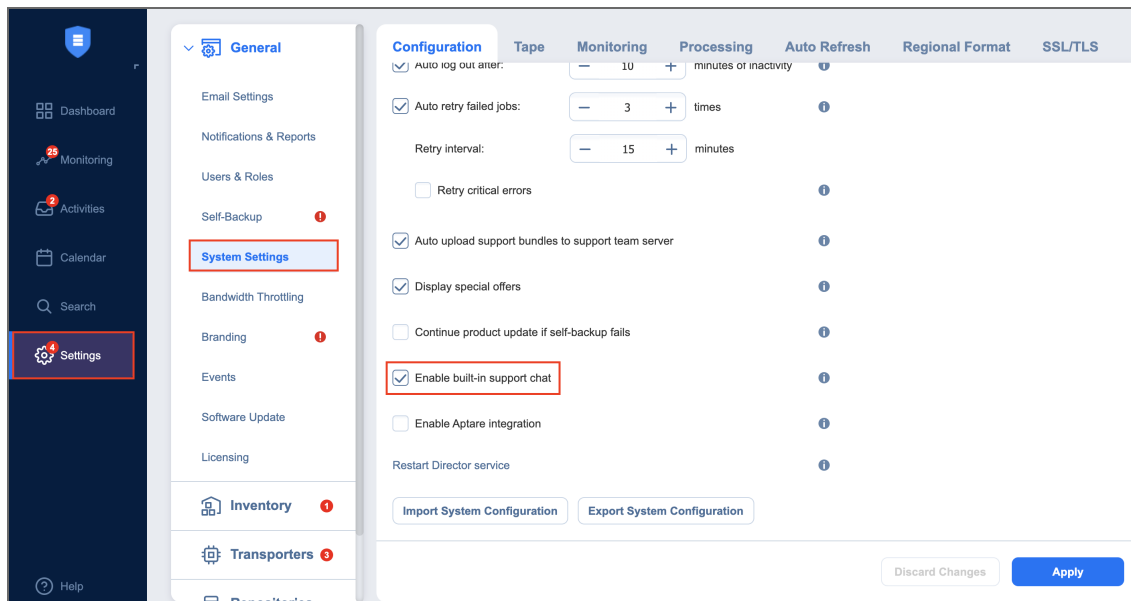
Disabling Built-in Support Chat

By default, the built-in support chat is enabled in your instance of NAKIVO Backup & Replication.

Do the following to disable built-in support chat:

1. Go to **Settings > General > System settings**.
2. Click **Edit** to make system settings editable and then deselect the **Enable built-in support chat** checkbox.

3. Click the **Apply** button.



Note

When disabled, the Built-in Support Chat will not be available in all tenants of the NAKIVO Backup & Replication instance in multi-tenant mode.

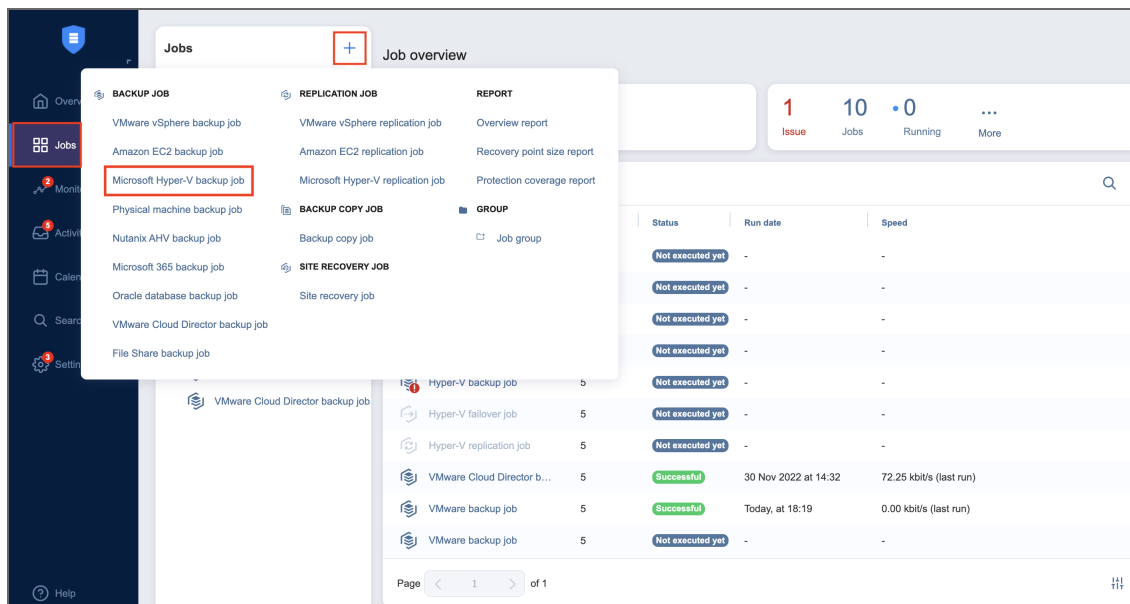
Backup

This section contains the following topics:

- [“Creating Hyper-V Backup Jobs” on page 626](#)
- [“Creating Backup Copy Jobs” on page 658](#)
- [“Backing Up to Tape” on page 686](#)
- [“Staging \(Seeding\) Initial Backup” on page 717](#)
- [“Deleting Backups” on page 710](#)

Creating Hyper-V Backup Jobs

With NAKIVO Backup & Replication, you can [back up](#) Hyper-V VMs by creating a backup job that specifies which VMs should be backed up, where the backups should be located, how often the backup should occur, and what backup options should be used. To create a Hyper-V backup job, click the plus **Create** button in the **Jobs** menu and then click **Microsoft Hyper-V backup job**.



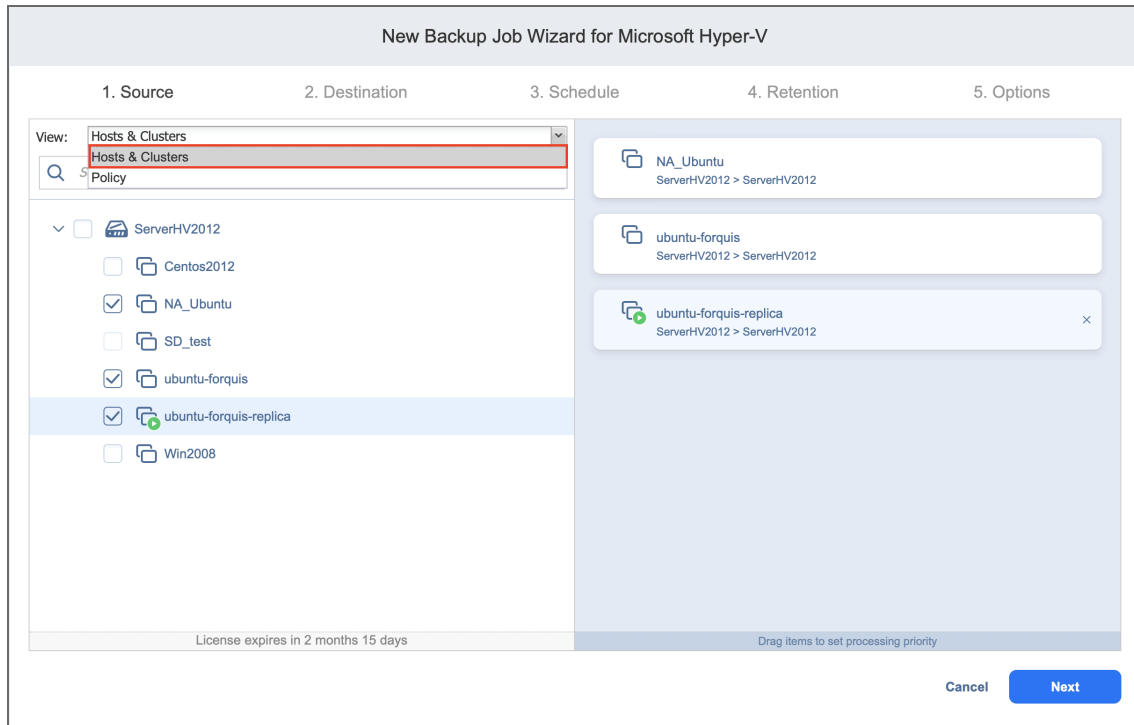
The **New Backup Job Wizard for Microsoft Hyper-V** opens. Complete the wizard as described in the sections below:

- [“Backup Job Wizard for Hyper-V: Source”](#) on page 627
- [“Backup Job Wizard for Hyper-V: Destination”](#) on page 631
- [“Backup Job Wizard for Hyper-V: Schedule”](#) on page 635
- [“Backup Job Wizard for Hyper-V: Retention”](#) on page 645
- [“Backup Job Wizard for Hyper-V: Options”](#) on page 647

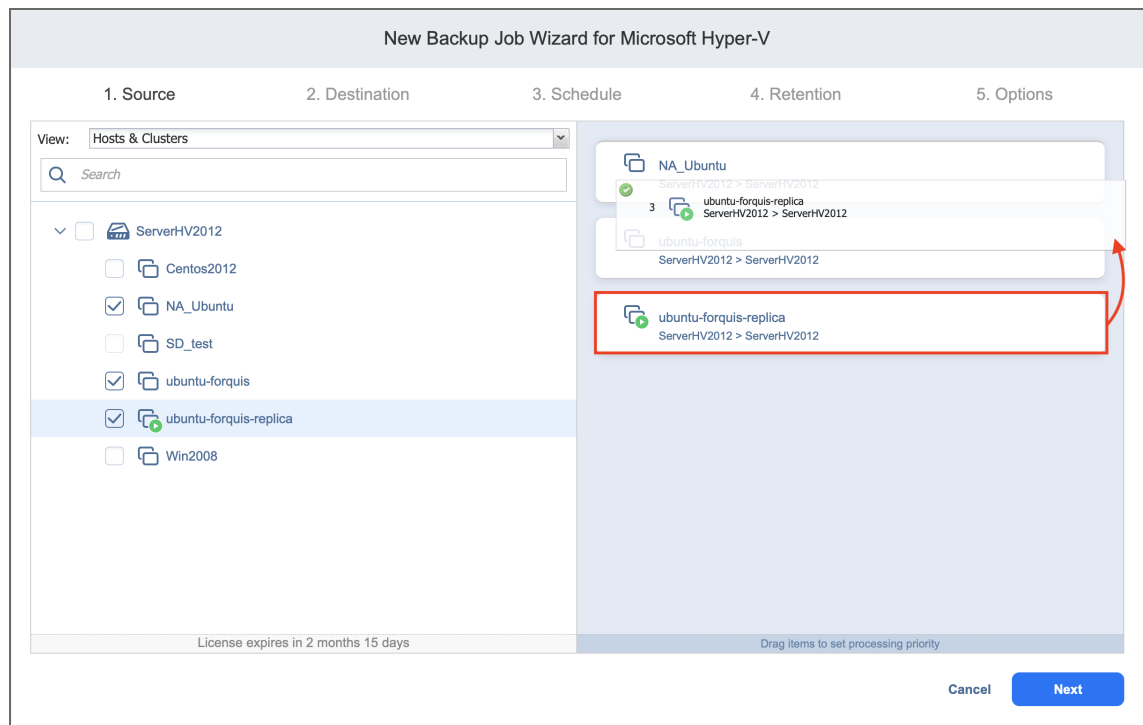
Backup Job Wizard for Hyper-V: Source

On the **Source** page of the wizard, you can add Hyper-V VMs to your backup job. Proceed as follows:

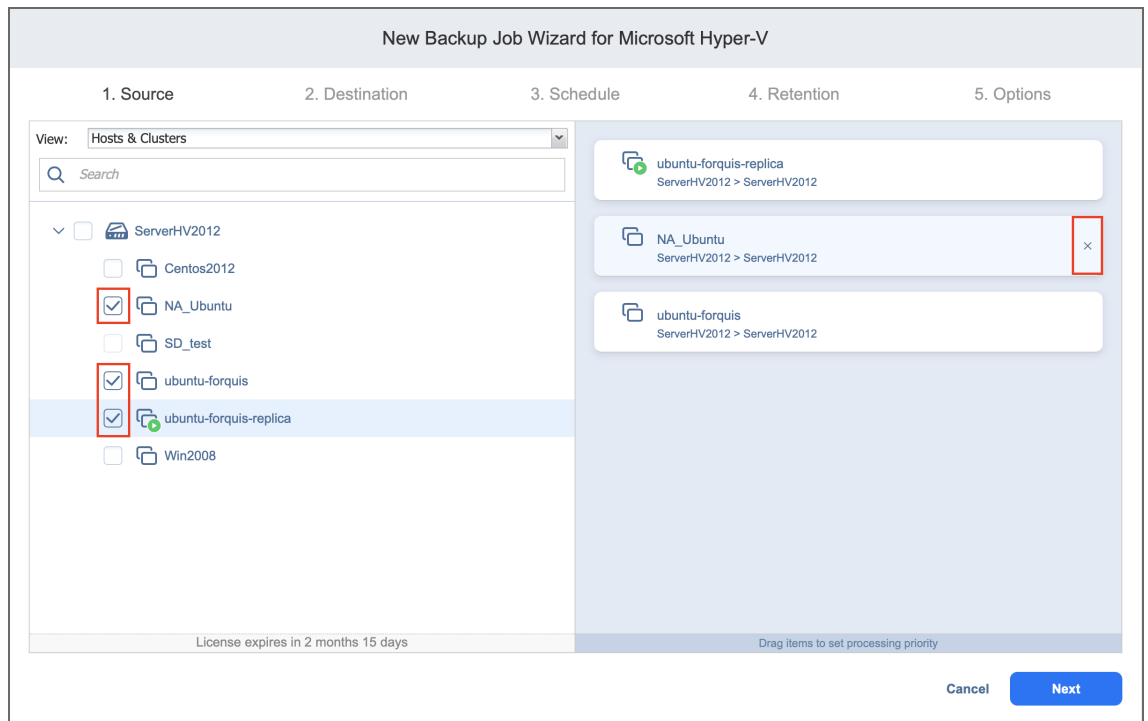
1. In the left pane of the page, choose either of the following inventory views:
 - **Hosts & Clusters:** If chosen, the inventory tree opens in the left pane and shows all of the Hyper-V items: clusters, servers, and VMs. Proceed as follows:



- a. Optionally, filter the inventory tree by entering a string to the **Search** box. You can enter a part or the whole item name.
- b. Select Hyper-V items by selecting the checkbox next to the item.
- c. The selected items appear in the right pane of the page. If necessary, reorder the selected items by dragging a VM or a container to a new position. By doing so, you can specify that you wish to back up the most important VMs first.



- d. Review the list of selected Hyper-V items. If needed, remove a selected VM or a container from the backup job in either of the following ways:
- Cancel the selection of the item in the left pane. This will remove the item from the right pane.
 - In the right pane, hover over the item you wish to remove and click the red “X” to the right. This will cancel the selection of the item in the left pane.



- **Policy:** If selected, this allows you to use job policies; for details, refer to [“Managing Job Policies” on page 309](#). Please follow the steps below:
 - a. If items are selected in the alternate view, a dialog opens warning you that switching to the **Policy** view will reset your current selection. Click **Switch View** to confirm switching to the **Policy** view.
 - b. Make sure that at least one item matches the available set of policy rules. For details, refer to [“Managing Policy Rules” on page 312](#).

The screenshot shows the 'New Backup Job Wizard for Microsoft Hyper-V' interface. The wizard is on the '1. Source' step. The 'View' dropdown is set to 'Policy', and 'Policy' is selected in the list below it. A search rule is defined: 'Rule #1' with search criteria 'win'. The right pane shows a 'Policy Container' with 'Win2008' listed. The bottom right has 'Cancel' and 'Next' buttons.

2. Click **Next** to confirm that you wish to add the selected VMs to the backup job.

The wizard will display the next page.

Notes

- If you cannot find a particular VM or container, try the following:
 - Make sure the corresponding Hyper-V server or cluster is added to the [inventory](#).
 - [Refresh the Inventory](#).
- If you add a Hyper-V server or clusters to the job:
 - All VMs currently available on the selected server or cluster will be backed up
 - All new VMs that will be created in (or moved to) the server or cluster in the future will be automatically added to the job and backed up.
 - All VMs are tracked during backup jobs to prevent failures resulting from live migrations within Hyper-V clusters.

- The order in which VMs are backed up is important if the Transporter performing the backup cannot process all VMs of the job simultaneously – either because the Transporter is processing other jobs at the same time or because the number of VM disks in the job exceeds the Transporter's Maximum Load specified during the Transporter creation.
- If all disks of a given VM are unsupported, said VM will be disabled in the inventory tree, and it will not be possible to select that VM.

Backup Job Wizard for Hyper-V: Destination

On the **Destination** page of the wizard, you can select one or multiple different Backup Repositories to back up your Hyper-V VMs.

- [Setting Single Backup Repository for All VMs](#)
- [Setting Different backup Repositories for VMs](#)
- [Mapping Source VMs to Existing Backups](#)
- [Excluding VM Disks from the Backup Job](#)

Setting Single Backup Repository for All VMs

To back up all VMs to a single Backup Repository, choose a Backup Repository from the **Destination** drop-down list.

New Backup Job Wizard for Microsoft Hyper-V

1. Source 2. Destination 3. Schedule 4. Retention 5. Options

Destination: Onboard repository

Advanced setup... Search

Size of selected VMs: 21.3 GB

Onboard repository
12.4 GB free (57% of 21.5 GB)

S3_Object_Lock
10,240.00 TB free (100% of 10,240.00 TB)

To re-use existing backups, expand the Advanced setup and specify target backup for each VM.

Cancel Next

Setting Different Backup Repositories for VMs

To back up the selected VMs to different Backup Repositories, follow the steps below:

1. Click **Advanced setup**.
2. In the VM boxes, choose a Backup Repository for each VM individually.

New Backup Job Wizard for Microsoft Hyper-V

1. Source 2. Destination 3. Schedule 4. Retention 5. Options

Destination: ☰ Different backup repositories ... ℹ To re-use existing backups, expand the Advanced setup and specify target backup for each VM.

VM	VM disks	Target destination	Use existing backup as a target
Win2008	<input checked="" type="checkbox"/> win2008-quietse.vhdx: 40.0 GB (9.7 GB allocated)	☰ Onboard repository	<input type="checkbox"/>
ubuntu-forquis-replica	<input checked="" type="checkbox"/> e71abb5d-b86b-4c48-a0f6-4d6f4e072601.vhdx: 25.0 GB (5.8 GB allocated)	☰ S3_Object_Lock	<input type="checkbox"/>
ubuntu-forquis	<input checked="" type="checkbox"/> ubuntu-hv.vhdx: 25.0 GB (5.8 GB allocated)	☰ Onboard repository	<input type="checkbox"/>

Cancel **Next**

Mapping Source VMs to Existing Backups

If you have previously backed up a VM and then lost the backup job due to accidental job deletion or because you needed to recreate jobs in a new copy of the product, you can map the source VMs to existing backups to avoid running full VM backups again.

To map source VMs to existing backups, follow the steps below:

1. Click **Advanced setup**.
2. From the **Destination** drop-down list, choose a Backup Repository that contains an existing VM backup.
3. Select the **Use existing backup as a target** option and choose an existing backup from the drop-down

list.

New Backup Job Wizard for Microsoft Hyper-V

1. Source 2. Destination 3. Schedule 4. Retention 5. Options

Destination: Different backup repositories ... To re-use existing backups, expand the Advanced setup and specify target backup for each VM.

Win2008

ubuntu-forquis-replica Click to collapse

VM disks

- ☒ e71abb5d-b86b-4c48-a0f6-4d6f4e072601.vhdx: 25.0 GB (5.8 GB allocated)

Target destination: S3_Object_Lock

☒ Use existing backup as a target

Select backup

Backup name	Job name
24	Nutanix AHV backup job
AD-Exchange2019_ping1	VMware backup job
AD-Exchange2019_ping1	Backup copy job 123
Ali2016	VMware backup job
AndreyY-Win2016AD	VMware backup job
AndreyY-Win2016AD-replica	VMware backup job
AS-NBR10-multi	VMware backup job

Cancel Next

When you run the job, the product will analyze the target VM you have selected, determine how it is different from the source VM, and transfer only the differential data. VM backup mapping can be a time-consuming process that can be equal to the time required to create a full VM backup. After the job is completed, a new recovery point will be created and existing recovery points will not be changed or overwritten.

Excluding VM Disks from the Backup Job

If you do not want to back up certain VM disks, you can exclude those disks from the backup job by following the steps below:

1. Click **Advanced setup**.
2. Cancel the selection of the VM disks that you would not like to back up.

New Backup Job Wizard for Microsoft Hyper-V

1. Source 2. Destination 3. Schedule 4. Retention 5. Options

Destination: Different backup repositories ... To re-use existing backups, expand the Advanced setup and specify target backup for each VM.

Win2008 Click to collapse

VM disks

win2008-quiesce.vhdx: 40.0 GB (9.7 GB allocated)

Target destination

Onboard repository

☐ Use existing backup as a target

Select backup

ubuntu-forquis-replica Click to collapse

VM disks

e71abb5d-b86b-4c48-a0f6-4d6f4e072601.vhdx: 25.0 GB (5.8 GB allocated)

Target destination

S3_ Object _Lock

☒ Use existing backup as a target

Select backup

ubuntu-forquis

Cancel **Next**

Backup Job Wizard for Hyper-V: Schedule

On the **Schedule** page of the wizard, select to run the backup job manually or schedule the job to run on a regular basis.

Proceed as described in the sections below:

- [Switching to the improved retention approach](#)
- [Creating New Schedules](#)
 - [Weekly](#)
 - [Monthly](#)
 - [Yearly](#)
 - [Periodical](#)
 - [After another job](#)
- [Creating Legacy Schedules](#)
 - [Daily or Weekly Backup](#)
 - [Monthly or Yearly Backup](#)
 - [Periodic Backup](#)
 - [Chained Job](#)

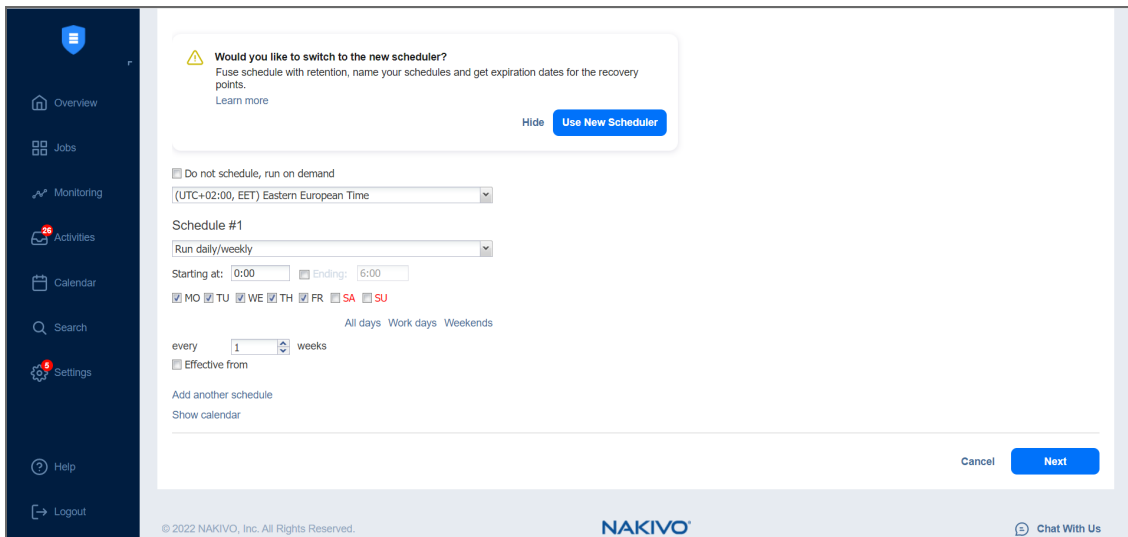
Switching to Improved Retention Approach

NAKIVO Backup & Replication offers two approaches to retention and scheduling: the legacy or the improved approach. To learn more about how the legacy and improved approaches work, go [here](#). If you create a new job or edit the existing one that uses the legacy approach, a popup appears offering that you to switch to the improved retention approach in the following cases:

- You have updated your instance of the product to v10.8 or later from an older version.
- You have imported a configuration to an instance of NAKIVO Backup & Replication v10.8 or later from an older version.

Note

If you install NAKIVO Backup & Replication v10.8 or higher, the new approach is enabled by default.



After the popup appears, do one of the following actions:

- If you do not want to switch to the new scheduler, click **Hide** to close the popup. You can later click **Use New Scheduler** on the **Schedule** page to proceed with the change if you change your mind.
- Alternatively, click **Use New Scheduler** in the popup. Next, choose one of the following options:
 - **MIGRATE SETTINGS:** When you select this option, the existing schedules are automatically converted to new schedules and the existing retention settings are mapped to the new schedules.
 - **CREATE NEW SCHEDULES:** When you select this option, you can create new schedules using the existing retention settings. Old schedules will be deleted.
 - **CONFIGURE SETTINGS ANEW:** Select this option to reset all existing schedules and retention settings and configure them from scratch.

Notes

- After switching to the new scheduler, the legacy schedule and retention settings are displayed on the right side of the page.
- After switching to the new scheduler, reverting to the legacy schedule and retention settings is impossible.
- You can learn how expiration dates are assigned to recovery points after migration [here](#).

Creating New Schedules

Before creating a new schedule, you can optionally enable the following settings:

- **Do not schedule, run on demand:** Enable this option if you want to start the job manually.
- **Prioritize schedules:** When this option is selected, NAKIVO Backup & Replication starts treating schedules based on their priority. The **Yearly** schedule will have higher priority than the **Monthly** schedule, etc. In case 2 or more schedules overlap, the schedules with lower priority will be skipped.
- Optionally, when creating any type of schedule, click **Show Calendar** to show the calendar or **Hide Calendar** to hide it.

When **Amazon EC2, Amazon S3, Wasabi, Azure Blob Storage, Backblaze B2 Cloud Storage, or Local Folder** is selected as the Backup Repository Type and the only backup destination, you can make recovery points in these repositories immutable during schedule creation. With immutability enabled, the recovery points are immutable and stored using the write-once-read-many (WORM) model. With **Amazon EC2, Amazon S3, Wasabi, Azure Blob Storage, or Backblaze B2 Cloud Storage** types of Backup Repository, immutable recovery points cannot be overwritten, deleted, or changed by the root user until the specified period has expired. For Local Folder type of Backup Repository, the root user can still clear immutability.

Notes

For the Immutability section to be available, the following conditions must be met:

- **Amazon EC2, Amazon S3, Wasabi, Azure Blob Storage, Backblaze B2 Cloud Storage, or Local Folder** must be selected for Backup Repository Type on the Destination page of the wizard.
- When **Amazon EC2, Amazon S3, Wasabi, Azure Blob Storage, or Backblaze B2 Cloud Storage** is selected as the Backup Repository Type, the bucket or blob container with the repository must have Object Lock or version-level immutability enabled respectively as well as Versioning.
- For **Local Folder** type of Backup Repository, see [feature requirements](#).

When creating the schedules, you can create schedules of the following types:

Weekly

You can configure the following options for this schedule type:

- **Schedule title:** Designates the number of a schedule.
- **Name:** Enter the name of your schedule.
- **Repeat every X weeks:** Indicates how often the schedule is repeated.
- **Days:** Select specific days when the schedule executes the job.
- **Start at:** Specify the time when the job should start.
- **End at:** Specify the time when the job should end.
- Optionally, select the **Effective from** checkbox and choose the date when the schedule should come into effect.

- **Keep backups for:** Specify how many days, months, or years NAKIVO Backup & Replication should retain the backups.
- **Immutable for X days:** Enabling this option makes the recovery points immutable for the specified number of days.
- Optionally, click **Add another schedule** if you want to add more than one schedule.

☐ Do not schedule, run on demand

☒ Prioritize schedules ⓘ

(UTC+02:00, EET) Eastern European Time

Schedule #1

Name:

Type: Weekly

Repeat Every: 1 week

Days: ☒ MO ☒ TU ☒ WE ☒ TH ☒ FR ☐ SA ☐ SU
All days Work days Weekends

Start at: 0:00 end at: 6:00

☐ Effective from

Keep backups for: 10 days ⓘ

☐ Immutable for: 30 days ⓘ

[Add another schedule](#)

[Show calendar](#)

Cancel Next

Monthly

You can configure the following options for this schedule type:

- **Schedule title:** Designates the number of a schedule.
- **Name:** Enter the name of your schedule.
- **Repeat every X months:** Indicates how often the schedule is repeated.
- **Run every:** Select specific days of the month when NAKIVO Backup & Replication executes the job.
- **Start at:** Specify the time when the job should start.
- **End at:** Specify the time when the job should end.
- Optionally, select the **Effective from** checkbox and choose the date when the schedule should come into effect.
- **Keep backups for:** Specify how many days, months, or years NAKIVO Backup & Replication should keep the backups.
- **Immutable for X days:** Enabling this option makes the recovery points immutable for the specified number of days.

- Optionally, click **Add another schedule** if you want to add more than one schedule.

☐ Do not schedule, run on demand
☒ Prioritize schedules ⓘ
 (UTC+02:00, EET) Eastern European Time

Schedule #1
 Name:
 Type: Monthly
 Repeat Every: 1 month
 Run every: last Friday
 Start at: 0:00 ☐ end at: 6:00
☐ Effective from
 Keep backups for: 6 months ⓘ
☐ Immutable for: 30 days ⓘ
[Add another schedule](#)
[Show calendar](#)

Cancel **Next**

Yearly

You can configure the following options for this schedule type:

- **Schedule title:** Designates the number of a schedule.
- **Name:** Enter the name of your schedule.
- **Run every:** Select specific days of the specific month when NAKIVO Backup & Replication executes the job.
- Optionally, select the **Effective from** checkbox and choose the date when the schedule should come into effect.
- **Keep backups for:** Specify how many days, months, or years NAKIVO Backup & Replication should keep the backups.
- **Immutable for X days:** Enabling this option makes the recovery points immutable for the specified number of days.
- Optionally, click **Add another schedule** if you want to add more than one schedule.

☐ Do not schedule, run on demand
☒ Prioritize schedules ⓘ
 (UTC+02:00, EET) Eastern European Time

Schedule #1
 Name:
 Type: Yearly
 Run every: last Friday of every month
 Start at: 0:00 ☐ end at: 6:00
☐ Effective from
 Keep backups for: 3 years ⓘ
☐ Immutable for: 30 days ⓘ
[Add another schedule](#)
[Show calendar](#)

Cancel **Next**

Periodical

You can configure the following options for this schedule type:

- **Schedule title:** Designates the number of a schedule.
- **Name:** Enter the name of your schedule.
- **Run every:** Select the period measured in minutes, hours, or days when NAKIVO Backup & Replication executes the job.
- **Start at:** Specify the time when the job should start.
- **End at:** Specify the time when the job should end.
- **Days:** Select specific days when the schedule executes the job.
- Optionally, select the **Effective from** checkbox and choose the date when the schedule should come into effect.
- **Keep backups for:** Specify how many days, months, or years NAKIVO Backup & Replication should keep the backups.
- **Immutable for X days:** Enabling this option makes the recovery points immutable for the specified number of days.
- Optionally, click **Add another schedule** if you want to add more than one schedule.
- Optionally, when creating any type of schedule, click **Show Calendar** to show the calendar or **Hide Calendar** to hide it.

The screenshot shows the configuration window for a 'Periodic' schedule. At the top, there are checkboxes for 'Do not schedule, run on demand' (unchecked) and 'Prioritize schedules' (checked). Below this is a time zone dropdown set to '(UTC+02:00, EET) Eastern European Time'. The 'Schedule #1' section includes a 'Name' field, a 'Type' dropdown set to 'Periodic', and a 'Run every' spinner set to '30 minutes'. The 'Days' section has checkboxes for days of the week (MO, TU, WE, TH, FR, SA, SU) and radio buttons for 'All days', 'Work days', and 'Weekends'. The 'Start at' field is set to '0:00' and 'end at' is '6:00'. There is an 'Effective from' checkbox and a 'Keep backups for' spinner set to '10 days'. An 'Immutable for' spinner is set to '30 days'. At the bottom, there are links for 'Add another schedule' and 'Show calendar'. The window ends with 'Cancel' and 'Next' buttons.

After Another Job

You can configure the following options for this schedule type:

Note

This option is disabled if there are no other jobs.

- **Schedule title:** Designates the number of a schedule.
- **Name:** Enter the name of your schedule.
- **Parent job:** Select the job after which this job starts running.
- **Run this job:** Select one of the following options:
 - **Immediately:** The schedule starts right after the parent job is completed.
 - **Delayed:** The schedule starts after the specified number of **minutes** or **hours** following parent job completion.
- Optionally, select the **Effective from** checkbox and choose the date when the schedule should come into effect.
- **Keep backups for:** Specify how many days, months, or years NAKIVO Backup & Replication should keep the backups.
- **Immutable for X days:** Enabling this option makes the recovery points immutable for the specified number of days.
- Optionally, click **Add another schedule** if you want to add more than one schedule.
- Optionally, click **Show Calendar** to show the calendar or **Hide Calendar** to hide it.

Creating Legacy Schedules

Before creating a new schedule, you can optionally enable the following settings:

- Click **Use New Scheduler** to switch to the Improved retention approach.
- **Do not schedule, run on demand:** Enable this option if you want to start the job manually.
- Optionally, when creating any type of schedule, click **Show Calendar** to show the calendar or **Hide Calendar** to hide it.
- Optionally, click **Add another schedule** if you want to add more than one schedule.

Daily or Weekly Backup

To run the job once a day, choose **Run daily/weekly** from the schedule drop-down list and do the following:

- Specify the time when the job should be started in the **Starting** box.
- Specify the end time for the job in the **Ending** box. If the job has not completed by the time specified, the job will be stopped.
- Choose a time zone that should be used for the job start and end times from the time zone drop-down list.
- Select the days of the week during which the job will be started.
- If necessary, select the **Effective from** checkbox and pick the date when the schedule comes into effect.

The screenshot shows a 'Use New Scheduler' dialog box with the following elements:

- A blue button labeled 'Use New Scheduler' at the top left.
- A checkbox labeled 'Do not schedule, run on demand' which is unchecked.
- A time zone dropdown menu currently showing '(UTC+02:00, EET) Eastern European Time'.
- A section titled 'Schedule #1' with a dropdown menu showing 'Run daily/weekly'.
- Two time input fields: 'Starting at: 0:00' and 'Ending: 6:00'.
- A row of checkboxes for days of the week: MO (checked), TU (checked), WE (checked), TH (checked), FR (checked), SA (unchecked), and SU (unchecked).
- Below the day checkboxes are three tabs: 'All days' (selected), 'Work days', and 'Weekends'.
- A frequency section with 'every 1 weeks'.
- An 'Effective from' checkbox which is unchecked.
- Two links at the bottom left: 'Add another schedule' and 'Show calendar'.
- At the bottom right, there are 'Cancel' and 'Next' buttons.

Monthly or Yearly Backup

To run the job monthly or yearly, choose **Monthly/yearly** from the schedule drop-down list and do the following:

- Specify the job start schedule in the appropriate boxes.
- Specify the day and month when the job should be started in the **Run every** boxes.
- Specify the time when the job should be started in the **Starting** box.
- Specify the end time for the job in the **Ending** box. If the job has not completed by the time specified, the job will be stopped.

- If necessary, select the **Effective from** checkbox and pick the date when the schedule comes into effect.

The screenshot shows a 'Use New Scheduler' dialog box. At the top is a blue button labeled 'Use New Scheduler'. Below it is a checkbox 'Do not schedule, run on demand' which is unchecked. A time zone dropdown menu is set to '(UTC+02:00, EET) Eastern European Time'. Under 'Schedule #1', the frequency is set to 'Run monthly/yearly'. The 'Run every' section is configured with 'last' of every 'month' on 'Friday'. The 'Starting at' time is '0:00' and the 'Ending' time is '6:00'. There is an unchecked checkbox for 'Effective from'. At the bottom left are links for 'Add another schedule' and 'Show calendar'. At the bottom right are 'Cancel' and 'Next' buttons.

Periodic Backup

To run the job multiple times per day, choose **Run periodically** from the schedule drop-down list and then choose a time period from the appropriate boxes:

- Specify the time when the job should be started in the **Starting** box.
- Specify the end time for the job in the **Ending** box. If the job has not completed by the time specified, the job will be stopped.
- Select the days of the week during which the job will be started.
- If necessary, select the **Effective from** checkbox and pick the date when the schedule comes into effect.

The screenshot shows the same 'Use New Scheduler' dialog box, but with 'Run periodically' selected in the frequency dropdown. The 'Run every' section is now set to 'every 30 minutes'. The 'Starting at' time is '0:00' and the 'Ending' time is '6:00'. The day selection is expanded, showing checkboxes for 'MO', 'TU', 'WE', 'TH', 'FR', 'SA', and 'SU'. The 'All days' radio button is selected. There is an unchecked checkbox for 'Effective from'. At the bottom left are links for 'Add another schedule' and 'Show calendar'. At the bottom right are 'Cancel' and 'Next' buttons.

Chained Job

To run the job after a previous one has completed, choose **Run after another job** from the schedule drop-down list and set the options as follows:

- **After the job:** Select a job after which the current job will be started.
- **Run this job:** Choose whether to run the current job immediately after the previous one has completed or within a delay.
- **After successful runs:** If selected, the job will run if the previous one has completed successfully.
- **After failed runs:** If selected, the job will run if the previous one has failed.
- **After stopped runs:** If selected, the job will run if the previous one has been stopped.
- **Effective from:** If selected, the schedule will come into effect on the date picked.

Use New Scheduler

☐ Do not schedule, run on demand

(UTC+02:00, EET) Eastern European Time

Schedule #1

Run after another job

After the job: EC2 backup job

Run this job: Immediately

☒ After successful runs
 ☐ After failed runs
 ☐ After stopped runs
 ☐ Effective from

[Add another schedule](#)
[Show calendar](#)

Cancel

Next

Backup Job Wizard for Hyper-V: Retention

Important

This page is not displayed if the new scheduler is enabled.

After each job run, NAKIVO Backup & Replication creates a recovery point in the Backup Repository for each instance. A recovery point represents the backed-up instance as of a particular moment in time and allows you to recover individual files, application objects, or the entire instance from the Backup Repository. You can specify how many recovery points to retain in the Backup Repository. The recovery points are retained based on the grandfather-father-son (GFS) backup rotation scheme.

When **Amazon EC2, Amazon S3, generic S3-compatible storage, Wasabi, Azure Blob Storage, Backblaze B2 Cloud Storage**, or **Local Folder** is selected as the Backup Repository Type for the only backup destination, you can make recovery points in these repositories immutable. With immutability enabled, the recovery points are immutable and stored using the *write-once-read-many* (WORM) model. In case of **Amazon EC2, Amazon S3, generic S3-compatible storage, Wasabi, Azure Blob Storage**, or **Backblaze B2 Cloud Storage** types of Backup Repository, immutable recovery points cannot be overwritten, deleted, or changed by the root user, until the specified period has expired. For **Local Folder** type of Backup Repository, the root user can still clear immutability.

Retention Settings

Here you can set the retention settings for the backup job. Set the following options:

- **Keep x last recovery points:** Retains the specified number of last recovery points for each VM in the job.
- **Keep one recovery point per day for x days:** Retains one last recovery point per day for the specified number of days.
- **Keep one recovery point per week for x weeks:** Retains the last available backup of every week for the specified number of weeks.
- **Keep one recovery point per month for x months:** Retains the last available backup of every month for the specified number of months.
- **Keep one recovery point per year for x years:** Retains the last available backup of every year for the specified number of years.

Immutability

In this section, you can configure the **Make recovery points immutable for x days** option. The recovery points remain [immutable](#) for the specified number of days.

Note

For the *Immutability* section to be available, the following conditions must be met:

- **Amazon EC2, Amazon S3, generic S3-compatible storage, Wasabi, Azure Blob Storage, Backblaze B2 Cloud Storage, or Local Folder** must be selected for Backup Repository Type on the Destination page of the wizard.
- If **Amazon EC2, Amazon S3, generic S3-compatible storage, Wasabi, Azure Blob Storage, or Backblaze B2 Cloud Storage** is selected as the Backup Repository type, Object Lock or version-level immutability support and Versioning must be enabled bucket or blob container respectively where your Backup Repository is located.
- For **Local Folder** type of Backup Repository, see [feature requirements](#).

1. Sources

2. Destination

3. Schedule

4. Retention

Retention Settings

☒ Keep

10

last recovery points

☒ Keep one recovery point per day for

10

days

☒ Keep one recovery point per week for

4

weeks

☐ Keep one recovery point per month for

12

months

☐ Keep one recovery point per year for

3

years

Learn more

Immutability

☒ Make recovery points immutable for

10

days

For more details and an example of job retention settings, refer to the [Keeping Recovery Points](#) article in the Knowledge Base.

Backup Job Wizard for Hyper-V: Options

On the **Options** page of the wizard, you can set up backup job options. Proceed as described in the sections below:

- [Job Options](#)
- [Full Backup Settings](#)
- [Pre and Post Job Actions](#)
- [Completing New Backup Job Wizard for Hyper-V](#)

Job Options

In the *Job Options* section, you can give a name to the backup job and enable/disable [app-aware mode](#), change tracking, [network acceleration](#), [encryption](#), [VM verification](#), and other.

New Backup Job Wizard for Microsoft Hyper-V				
1. Source	2. Destination	3. Schedule	4. Retention	5. Options
Job Options				
Job name:	<input type="text" value="Hyper-V backup job"/>			
Job priority:	<input type="text" value="5"/>			
Use installed VM agents:	<input type="text" value="Enabled"/>			settings
App-aware mode:	<input type="text" value="Disabled"/>			
Use agent for OS quiescing:	<input type="text" value="Disabled"/>			
Change tracking:	<input type="text" value="Use Hyper-V RCT"/>			settings
Network acceleration:	<input type="text" value="Disabled"/>			
Network encryption:	<input type="text" value="Disabled"/>			
VM verification:	<input type="text" value="Disabled"/>			
Exclude swap files and partitions:	<input type="text" value="Enabled"/>			
Exclude unused blocks:	<input type="text" value="Enabled"/>			

Job Name

Enter a name for the backup job.

Job Priority

Select a job priority level between 1 and 5, with 1 being the highest priority. Jobs with higher priority levels are prioritized by Transporters during job processing.

Note

This option is only available in the Enterprise, Enterprise Essentials, Enterprise Plus, MSP Enterprise, and MSP Enterprise Plus editions.

Use Installed VM Agents

Enable this option if you wish to use installed VM agents for this job. Proceed as follows:

1. With the option enabled, click **settings** to open the **Manage VM Agents** pop-up menu.
2. Click **Scan All** to scan each VM in the job for installed VM agents.
3. Once the scan is complete, select the master password you wish to use for the discovered VM agents from the **Select credentials** drop-down list.
4. In the **Certificate** column, click **Verify** to verify the validity of a VM agent's certificate.

For more information on setting up VM agents, see [“Using a VM Agent” on page 462](#). For more information on setting up master passwords, see [“Managing Credentials” on page 433](#).

App-Aware Mode

If the **App-aware mode** option is enabled, NAKIVO Backup & Replication will trigger the Volume Shadow Copy Service (VSS) inside guest OS of source VMs prior to making a VM snapshot. The VSS service will instruct VSS-aware applications and databases to flush data from memory to disk and save data in a consistent state. Thus, the VM snapshot taken after triggering the VSS service will contain consistent data. We also recommend reading the support articles about the App-aware mode requirements:

- [Hyper-V Server configuration](#)
- [Linux and FreeBSD guest OS configuration](#).

Select one of the following options from the **App-aware mode** drop-down list:

- **Disabled:** VM backup will be performed without application awareness.
- **Enabled (fail on error):** In the dialog box that opens, select the checkboxes next to the VMs for which you want to create application-aware backups, and then select credentials next to each VM. These credentials will be used to log in to VMs you have selected and trigger the VSS service. When this option is selected, NAKIVO Backup & Replication will fail the backup if the app-aware mode fails (for example, due to wrong credentials).
- **Enabled (proceed on error):** In the dialog box that opens, select checkboxes next to the VMs for which you want to create application-aware backups, and then select credentials next to each VM. These credentials will be used to log in to the VMs you have selected and trigger the VSS service. When this option is selected, NAKIVO Backup & Replication will proceed with the backup even if the app-aware mode fails (for example, due to wrong credentials).
- Under **Settings**, you can select VMs for which the App-aware mode will be enabled. You need to specify credentials for them.

Use Agent for OS Quiescing

When this option is enabled, NAKIVO Backup & Replication injects an agent into VMs to perform OS quiescing. This option is only available with App-aware mode enabled.

Note

Enabling this option may generate additional data transfer for the creation of shadow copies during job runs.

Change Tracking

Select one of the options from the **Change tracking** drop-down list:

- **Use Hyper-V RCT:** Native Hyper-V change tracking method. This option enables the fastest incremental backup.
- **Use proprietary method:** When selected, NAKIVO Backup & Replication reads the entire contents of all VM disks in order to determine what data has changed since the last job run.
- **No change tracking (always full):** When selected, NAKIVO Backup & Replication always performs a full VM backup of all source VMs.

Network Acceleration

If the **Network Acceleration** option is enabled, NAKIVO Backup & Replication uses compression and traffic reduction techniques to speed up data transfer. Select this option if you plan to back up over WAN or slow LAN links.

Encryption

If the **Encryption** option is enabled, VM data will be protected with AES 256 encryption while traveling over the network. Data encryption increases the backup time and CPU load on machines running Transporters. Select this option if you are backing up over WAN without a VPN connection.

You need at least one Transporter at the source and target sites to enable encryption.

VM Verification

VM Verification allows you to check the integrity of the backup by starting it and interacting with it. For more details, refer to [“VM Verification” on page 52](#).

You can choose one of the following VM verification options:

- **Disabled:** VM Verification is disabled.
- **Screenshot verification:** When enabled, all VM backups created by the job are verified: After a backup of a VM is completed, the VM will be recovered from the backup using Flash VM Boot (and will be disconnected from networks) and a screenshot of the recovered VM will be taken once the VM OS has booted, after which the VM will be discarded. VM screenshots will be included in email notifications (if they're configured. See [“Notifications & Reports” on page 349](#)) and displayed on the Dashboard.
- **Boot verification:** When enabled, all VM backups created by the job are verified as follows. After a VM backup is completed, NAKIVO Backup & Replication recovers the VM using Flash VM Boot, disables networking to prevent network connections, and verifies that system start is successful.

Important

Hyper-V Integration Services must be running on the source VMs to successfully enable screenshot verification for your backup job.

After choosing **Screenshot verification**, do the following in the dialog box that opens:

1. Provide a location of the VMs to be booted:
 - **Target Container:** Choose a target container (cluster, host, or resource pool) where VMs will be run using Flash VM Boot.
 - **Target Datastore:** Choose a datastore that will host changes to the recovered VMs.
 - **Proxy transporter:** Choose a proxy Transporter from the list of available Transporters.
2. Set verification options:
 - **Verify not more than x VMs simultaneously:** Specify the maximum number of VMs that can be started on the Target Container simultaneously.
 - **Recovery time objective:** Specify the amount of time allocated for verification of each VM backup. If a VM OS does not start within the specified amount of time, verification will be considered failed.
 - **Screenshot delay:** The amount of time that the product should wait after the guest OS starts before taking a screenshot. The specified time must be sufficient to fully start the VM OS. Try

increasing this amount if the default amount is not sufficient.

The screenshot shows the 'New Backup Job Wizard for Microsoft Hyper-V' with the 'Options' tab selected. The 'Job Options' section includes 'Job name' (Hyper-V backup job), 'App-aware mode' (Enabled), 'Use agent for OS quiescing' (Disabled), 'Change tracking' (Use Hyper-V RCT), 'Network acceleration' (Disabled), 'Network encryption' (Disabled), and 'VM verification' (Screenshot verification, highlighted with a red box). Below these are 'Full Backup Settings' and 'Pre and Post Actions'. A 'VM Boot Location' dialog box is open, showing 'Target container' (Choose target container), 'Target path' (C:\NakivoRecovered), 'Proxy transporter' (Do not use proxy transporter), and 'Verification Options' (Verify not more than 2 VMs simultaneously, Recovery time objective: 5 minutes, Screenshot delay: 30 seconds). The 'Finish' button is highlighted in blue.

After selecting **Boot verification**, do the following in the dialog box that opens:

1. Provide a location of the VMs to be booted as described for the **Screenshot verification** option.
2. Set verification options:
 - **Verify not more than x VMs simultaneously:** Specify the maximum number of VMs that can be started on the Target Container simultaneously.
 - **Recovery time objective:** Specify the amount of time allocated for verification of each VM backup. If a VM OS does not start within the specified amount of time, verification will be

considered failed.

The screenshot shows the 'New Backup Job Wizard for Microsoft Hyper-V' dialog box. The '1. Source' tab is selected. In the 'Job Options' section, 'VM verification' is highlighted with a red box. A sub-dialog 'VM Boot Location' is open, showing 'Target container' as 'Choose target container', 'Target path' as 'C:\NakivoRecovered', and 'Proxy transporter' as 'Do not use proxy transporter'. The 'Verification Options' section in the sub-dialog shows 'Verify not more than' set to 2 VMs simultaneously and 'Recovery time objective' set to 5 minutes. The 'Boot verification' dropdown is set to 'settings'. The main dialog has sections for 'Job Options', 'Full Backup Settings', and 'Pre and Post Actions'. The 'Finish' button is highlighted in blue.

Exclude Swap Files and Partitions

With this option enabled, NAKIVO Backup & Replication automatically [excludes swap files and partitions](#) during the backup process.

Exclude Unused Blocks

With this option enabled, NAKIVO Backup & Replication automatically [excludes unused disk blocks](#) and blocks occupied by deleted files during processing of source objects running Windows OS. This feature allows for reducing backup storage space and object processing time.

Full Backup Settings

If the type of the Backup Repository that you selected on the Destination page is set to **Incremental with full backups** (**Store backups in separate files** option is selected), you can specify the following options:

- **Create full backup:** Specify how often full backups should be created.
- **Full backup mode:** Specify how the full backup should be created. You can choose one of the following options:
 - **Synthetic Full:** When this option is selected, NAKIVO Backup & Replication first performs an incremental backup (that is, transfers only the data that has changed since the last backup) and then transforms the available data into a full backup file. The benefits of this approach are:

- The Synthetic Full backup is usually faster than the Active Full backup.
- The load on the network is lower as less data is transferred.
- The load on the source datastores running your production VMs is lower.
- **Active Full:** When this option is selected, NAKIVO Backup & Replication reads all VM data from the source datastore and transfers it to the Backup Repository.
- **If a full backup fails, create a full backup on the next job run:** With this option selected, the next job run creates a full backup if the current job run fails to do so.

Note

On a full active backup, the entire source disks will be read even if Hyper-V RCT is selected.

New Backup Job Wizard for Microsoft Hyper-V

1. Source 2. Destination 3. Schedule 4. Retention 5. Options

Change tracking: Use Hyper-V RCT [settings](#)

Network acceleration: Disabled [i](#)

Network encryption: Disabled [i](#)

VM verification: Disabled [i](#)

Exclude swap files and partitions: Enabled [i](#)

Exclude unused blocks: Enabled [i](#)

Full Backup Settings

Create full backup: Every Friday [i](#)

Full backup mode: Synthetic full [i](#)

☒ If a full backup fails, create a full backup on the next job run [i](#)

Pre and Post Actions

☐ Send job run reports to [i](#)

☐ Truncate Exchange logs On successful VM processing only [i](#)

☐ Truncate SQL Server logs On successful VM processing only [i](#)

☐ Run local pre job script [i](#)

☐ Run local post job script [i](#)

Data Transfer

☐ Limit transporter load to 3 concurrent tasks [i](#)

Bandwidth throttling: Disabled [i](#)

☐ Bottleneck detection [i](#)

Cancel Finish Finish & Run

Pre and Post Job Actions

NAKIVO Backup & Replication provides you with the ability to enable certain actions before a backup job begins and after it has completed. You can choose to send job run reports, [truncate Exchange and SQL Server logs](#) on specified VMs, and run local [pre- and post- job scripts](#).

Email Notifications

NAKIVO Backup & Replication can send email notifications on job completion status to specified recipients. This feature complements global notifications and provides you with the ability to configure notifications on a per-job level. To enable this option, configure your [Email settings](#).

To send email notifications, do the following:

1. In the *Pre and Post Actions* section, select the **Send job run reports to** option.
2. Specify one or more email addresses in the text box. The semi-colon character should be used to separate multiple email addresses.

Truncation of Microsoft Exchange Server Transaction Logs

Microsoft Exchange Server database transaction logs record all changes to a Microsoft Exchange server database. Over time, these log files accumulate and can consume all of the available disk space, if not periodically removed. NAKIVO Backup & Replication provides you with the option of deleting (or truncating) Microsoft Exchange Server logs on the source VMs after job completion.

The transaction logs are deleted after the job is completed so that the log files are available in the VM backup. Note that the product deletes only those transactions which have already been committed to (available in) the Microsoft Exchange database.

To set up Microsoft Exchange log truncation, do the following:

1. In the *Pre and Post Actions* section, select the **Truncate Exchange logs** option.
2. In the dialog box that opens, select the checkboxes next to the VMs running Microsoft Exchange and then select credentials next to each VM. These credentials will be used to log in to VMs you have selected.

Truncation of Microsoft SQL Server Transaction Logs

Microsoft SQL Server database transaction logs record all changes to a Microsoft SQL Server database. Over time, these logs accumulate and can consume all of the available disk space if not periodically removed. NAKIVO Backup & Replication provides you with the option for deleting (or truncating) Microsoft SQL Server logs on the source VMs after job completion.

The transaction logs are deleted after the job is completed so that the original log records are available in the VM backup. Note that the product deletes only those transaction logs that are already committed to (available in) the Microsoft SQL Server database.

To set up Microsoft SQL Server log truncation, do the following:

1. In the *Pre and Post Actions* section, select the **Truncate SQL logs** option.
2. In the dialog box that opens, select the checkboxes next to the VMs running Microsoft SQL Server and then select credentials next to each VM. These credentials will be used to log in to the VMs you have selected.

Pre Job Script

To run a script before the product begins backing up VMs, do the following:

1. Place a script file on the machine on which the Director is installed.
2. In the *Pre and Post Actions* section, select the **Run local pre job script** option.
3. Specify the following parameters in the dialog box that opens:

- **Script path:** Specify a local path to the script on the machine on which the Director is installed. Script interpreter should be specified.
 - **Example (Windows):** `cmd.exe /c D:\script.bat`
 - **Example (Linux):** `bash /root/script.sh`
- **Job behavior:** Choose either of the following job behaviors in relation to script completion:
 - **Wait for the script to finish:** If this option is selected, VM backup will not be started until the script is completed.
 - **Do not wait for the script to finish:** If this option is selected, the product will run the script and will start backing up VMs at the same time.
- **Error handling:** Choose either of the following job behaviors in relation to script failure:
 - **Continue the job on script failure:** If this option is selected, the job will perform VM backup even if the script has failed.
 - **Fail the job on script failure:** If this option is selected and the script fails, the job will be failed and VM backup will not be performed.

Post Job Script

To run a script after the product has finished backing up all VMs, do the following:

1. Place a script file on the machine on which the Director is installed.
2. In the *Pre and Post Actions* section, select the **Run local post job script** option.
3. Specify the following parameters in the dialog box that opens:
 - **Script path:** Specify a local path to the script on the machine on which the Director is installed. Script interpreter should be specified.
 - **Example (Windows):** `cmd.exe /c D:\script.bat`
 - **Example (Linux):** `bash /root/script.sh`
 - **Job behavior:** Choose one of the following job behaviors in relation to script completion:
 - **Wait for the script to finish:** When selected, the job will be in the "running" state until the script is completed.
 - **Do not wait for the script to finish:** When selected, the job will be completed even if the script execution is still in progress.
 - **Error handling:** Choose either of the following job behaviors in relation to script failure:
 - **Continue the job on script failure:** When selected, script failure will not influence the status of the job.
 - **Fail the job on script failure:** When selected and the script has failed, the job status will be set to "failed" even if the VM backup has been successful.

Note

- Pre- and post-job scripts can be executed only on the machine on which the Director is installed.
- When Integration Services are used on Hyper-V 2016 and above, custom pre/post scripts are unavailable for Windows VMs.

The screenshot shows the 'New Backup Job Wizard for Microsoft Hyper-V' window, specifically the 'Options' tab. The wizard is divided into five sections: 1. Source, 2. Destination, 3. Schedule, 4. Retention, and 5. Options. The 'Options' section contains several settings:

- Change tracking:** Use Hyper-V RCL (with a 'settings' link).
- Network acceleration:** Disabled.
- Network encryption:** Disabled.
- VM verification:** Disabled.
- Exclude swap files and partitions:** Enabled.
- Exclude unused blocks:** Enabled.
- Full Backup Settings:**
 - Create full backup:** Every Friday.
 - Full backup mode:** Synthetic full.
 - ☐ If a full backup fails, create a full backup on the next job run.
- Pre and Post Actions (highlighted with a red box):**
 - ☐ Send job run reports to (with a text input field).
 - ☐ Truncate Exchange logs (Always).
 - ☐ Truncate SQL Server logs (Always).
 - ☐ Run local pre job script.
 - ☐ Run local post job script.
- Data Transfer:**
 - ☐ Limit transporter load to 3 concurrent tasks.
 - Bandwidth throttling:** Disabled.
 - ☐ Bottleneck detection.

At the bottom right, there are three buttons: 'Cancel', 'Finish', and 'Finish & Run'.

Data Transfer

In the *Data Transfer* section of the **Options** page, you can specify a Transporter load and configure [bandwidth throttling](#).

Transporter Load

You can limit the maximum number of Transporter tasks used by the job. By default, it is set to 3 concurrent tasks.

To change the default number of tasks, do the following:

1. In the *Data Transfer* section, select the **Limit transporter load to** checkbox.
2. Specify the number of concurrent tasks in the corresponding box.

Bandwidth Throttling

Follow the steps below to regulate the speed of data transfer over the network for your backup job:

1. For the **Bandwidth throttling** option, choose **Enabled**.

Note

If bandwidth throttling is disabled for the current job, global bandwidth rules may still apply to your job. Refer to [“Bandwidth Throttling” on page 331](#) for details.

2. Click the **Settings** link that becomes available.
3. The **Job Bandwidth Rules** dialog box opens displaying you the list of available rules. You have the following options:
 - Create a new bandwidth rule for your backup job:
 - a. Click the **Create New Rule** button.
 - b. The **New Bandwidth Rule** dialog box opens. Refer to [“Bandwidth Throttling” on page 331](#) for details on creating a bandwidth rule.
 - c. Click **Save**.
 - Activate an existing bandwidth rule for your job. Select the checkbox to the left of the necessary bandwidth rule. To deactivate a bandwidth rule for your job, clear the corresponding checkbox.
 - Edit a bandwidth rule. Click the **Edit** link for a bandwidth rule and modify it in the **Edit Bandwidth Rule** dialog box that opens.
 - Disable a bandwidth rule. Click the **Disable** link. The bandwidth rule will be disabled for all jobs.
 - Remove a bandwidth rule. Click the **Remove** link and then click **Delete** to confirm your operation.

Bottleneck detection

When the **Bottleneck detection** option is enabled, additional information is collected and recorded in NAKIVO Backup & Replication logs in the course of data transfer for the purpose of bottleneck detection. Check this option to enable the **Bottleneck detection** capability of the Transporters engaged in the job.

Completing New Backup Job Wizard for Microsoft Hyper-V

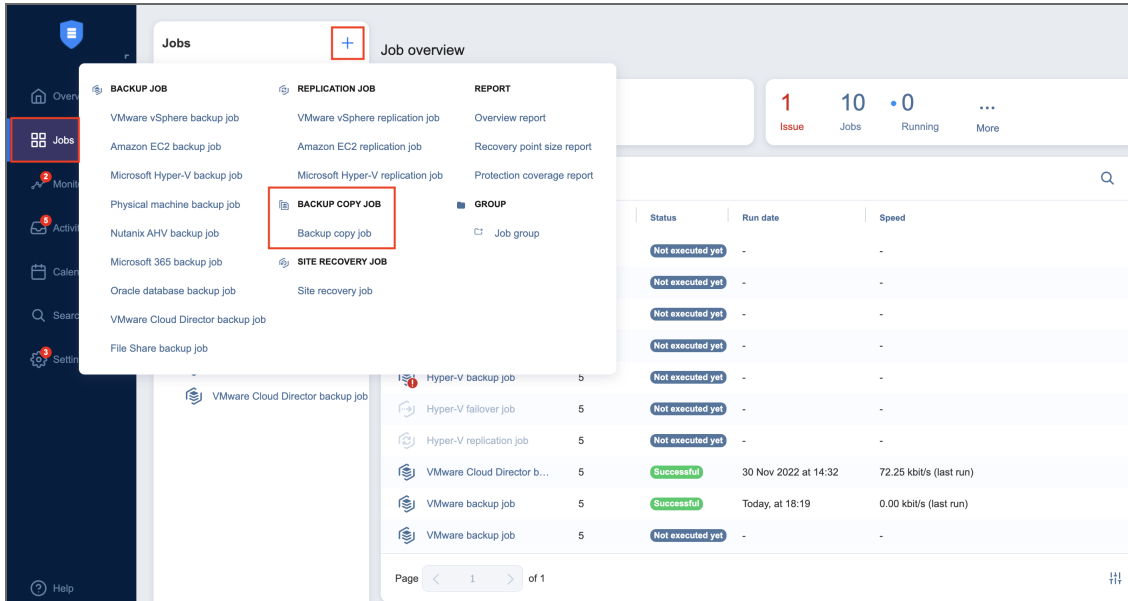
Click **Finish** or **Finish & Run** to complete the job creation.

Note

If you click **Finish & Run**, you will have to define the scope of your job. Please refer to [“Running Jobs on Demand” on page 295](#) for details.

Creating Backup Copy Jobs

To create a [backup copy](#) job, click the plus **Create** button in the **Jobs** menu, and then click **Backup copy job**.



The **New Backup Copy Job Wizard** opens. Complete the wizard as described in the sections below:

- “Backup Copy Job Wizard: Backups” on page 659
- “Backup Copy Job Wizard: Destination” on page 662
- “Backup Copy Job Wizard: Schedule” on page 665
- “Backup Copy Job Wizard: Retention” on page 675
- “Backup Copy Job Wizard: Options” on page 677

Backup Copy Job Wizard: Backups

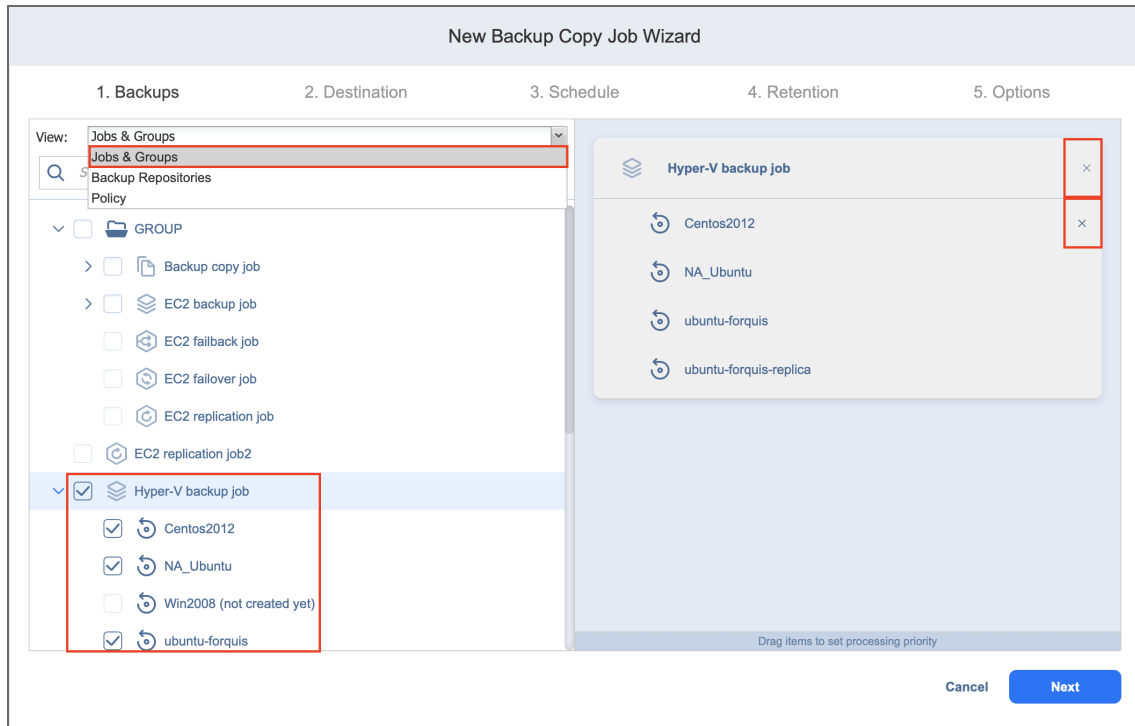
On the **Backups** page of the wizard, you can add items to your backup copy job using one of the inventory views. Proceed as described in the sections below:

- [Creating Backup Copies Using Jobs and Groups](#)
- [Creating Backup Copies Using Backup Repositories](#)
- [Creating Backup Copies Using Policies](#)

Creating Backup Copies Using Jobs and Groups

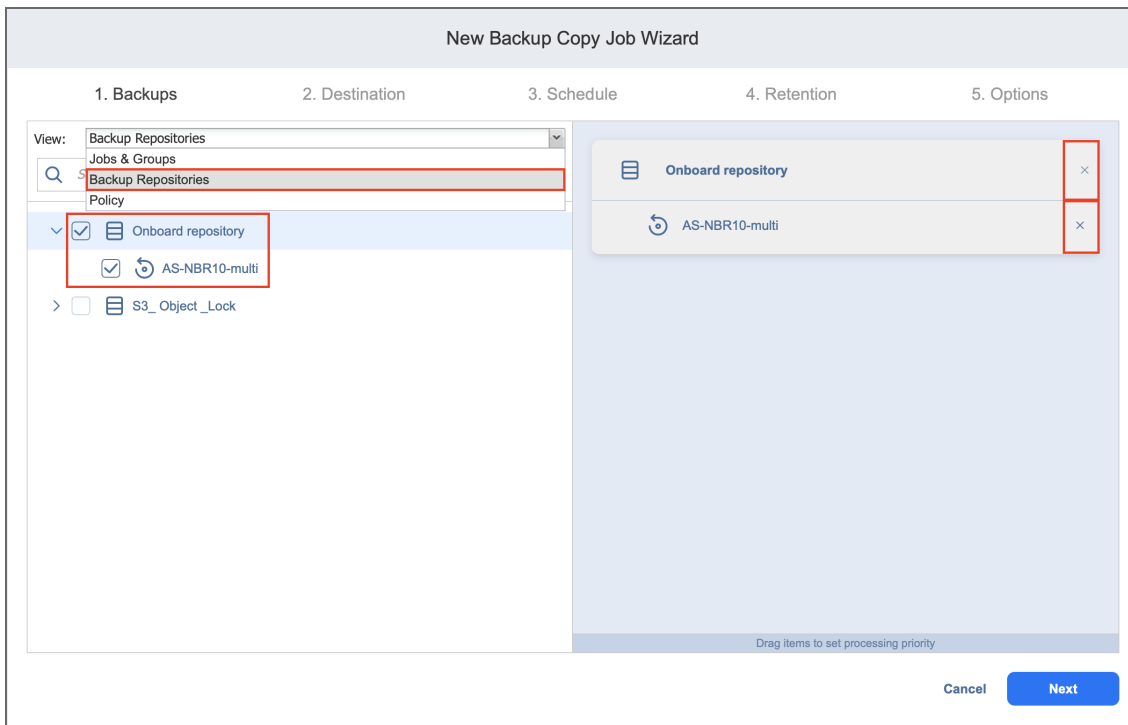
In the left pane of the page, select the **Jobs & Groups** view to use existing backup jobs and groups. The inventory tree opens in the left pane and displays the backup groups along with backups. Proceed as follows:

1. Optionally, you can filter the inventory tree by entering a string into the **Search** box. You can enter a part of the entire name of the item.
2. Select backup items by selecting the checkbox next to the item.
3. The selected items appear in the right pane of the page. If necessary, reorder the selected items by dragging them to a new position. By doing so, you can specify what items you wish to back up first.
4. Review the list of the selected items. If needed, remove a selected backup from the backup copy job in either of the following ways:
 - Cancel the selection of the item(s) in the left pane. This will remove the item(s) from the right pane.
 - In the right pane, hover over the item you wish to remove and click the “x” to the right. This will cancel the selection of the item(s) in the left pane.



Creating Backup Copies Using Backup Repositories

When the **Backup Repositories** view is selected, the inventory tree displays the Backup Repositories along with backups. Proceed as described for the **Jobs & Groups** view above.



Creating Backup Copies Using Policies

When the **Policy** view is selected, it allows you to use job policies; refer to [“Managing Job Policies” on page 309](#) for details. Follow the steps below:

1. When the items are selected in alternate views, a dialog box opens, warning you that switching to the **Policy** view will reset your current selection. Click **Switch View** to confirm that you wish to switch to the **Policy** view.
2. Make sure that at least one item matches the available set of policy rules. Refer to [“Managing Policy Rules” on page 312](#) for details.

The screenshot shows the 'New Backup Copy Job Wizard' with five steps: 1. Backups, 2. Destination, 3. Schedule, 4. Retention, and 5. Options. In the 'Backups' step, the 'View' dropdown is set to 'Policy'. Below it, there is a search filter: 'Include items if ALL rules are matched'. Under 'Rule #1', the search criteria are 'Backup name' containing 'win10'. A list of items is shown on the right, including AY-Win10NBR9.2, ayunt_Win10-Support-nvme, ayunt_Win10_pro_UEFI, CT-win10-sql, CT-win10nbr, CT-win10nbr10.2, Sales-Win10PRO, SK-NBR10-win10, and SK-NBR10-win10. The 'Next' button is visible at the bottom right.

Click **Next** to confirm that you wish to add selected items to the backup copy job. The wizard will display the next page.

Notes

- When you add a container—a group, job, or Backup Repository—to the backup copy job, the following happens:
 - All backups currently available in the selected container will be backed up.
 - All new backups that will be created in (or moved to) the container in the future will be automatically added to the job and backed up.
- The order in which backups are copied is important if the Transporter running the job cannot process all items simultaneously: either because the Transporter is processing other tasks at the same time or because the number of backups in the job exceeds the Transporter’s Maximum Load specified during Transporter creation.

Backup Copy Job Wizard: Destination

On the **Destination** page of the wizard, select a target location for backup copies.

- [Selecting a Tape Storage](#)
- [Selecting A Target Backup Repository](#)
- [Mapping Source Backups to Existing Backups](#)

Selecting a Tape Storage

The Backup Copy Job Wizard allows you to copy backups to tape devices or to media pools. To do this, select **Tape** from the **Destination type** drop-down list.

New Backup Copy Job Wizard

1. Backups 2. Destination 3. Schedule 4. Retention 5. Options

Destination type:

Destination:

[Advanced setup...](#)

To re-use existing backups, expand the Advanced setup and specify target backup for each VM.

[Cancel](#) [Next](#)

Selecting a Target Backup Repository

Backup Copy jobs can copy backups from one Backup Repository to another. Select a target Backup Repository as described below:

- To copy all backups you have selected on the Backups page to a single Backup Repository, select **Disk** from the **Destination type** drop-down list and then select a Backup Repository from the **Destination** drop-down list.

New Backup Copy Job Wizard

1. Backups 2. Destination 3. Schedule 4. Retention 5. Options

Destination type: Disk

Destination: Select target destination

Advanced setup... Size of selected VMs: 87.0 GB

Onboard repository 11.3 GB free (53% of 21.5 GB)	<input type="checkbox"/>
S3_Object_Lock 10,240.00 TB free (100% of 10...)	<input type="checkbox"/>

To re-use existing backups, expand the Advanced setup and specify target backup for each VM.

Cancel Next

- To copy backups to different Backup Repositories, follow the steps below:
 - a. Click **Advanced setup**.
 - b. For each backup, select a target Backup Repository.

New Backup Copy Job Wizard

1. Backups 2. Destination 3. Schedule 4. Retention 5. Options

Destination type: Disk

Destination: Different backup repositories ...

To re-use existing backups, expand the Advanced setup and specify target backup for each VM.

Hyper-V backup job Click to collapse

Default Destination: Onboard repository

Centos2012 Click to collapse

VM disks

☒ Hard disk 1: 0 KB (12.0 GB allocated)

Target destination Onboard repository

☒ Use existing backup as a target

Select backup

NA_Ubuntu Click to collapse

VM disks

☒ Hard disk 1: 0 KB (25.0 GB allocated)

Target destination S3_Object_Lock

☐ Use existing backup as a target

Select backup

Cancel Next

Mapping Source Backups to Existing Backups

If you have previously copied backups to a different Backup Repository and then lost the Backup Copy job (due to accidental job deletion or because you need to recreate jobs in a new copy of the product) you can map source backups to existing backups in the target Backup Repository to avoid transferring all backup data again.

To map source backups to existing backups in a target Backup Repository, follow the steps below:

1. Click **Advanced setup**.
2. From the **Backup repository** drop-down list, choose a Backup Repository that contains a copy of the source backup.
3. Select the **Use existing backup as a target** option and select the existing backup copy from the drop-down list.

The screenshot displays the 'New Backup Copy Job Wizard' interface. At the top, there are five tabs: '1. Backups', '2. Destination', '3. Schedule', '4. Retention', and '5. Options'. The '1. Backups' tab is active. Below the tabs, there are two dropdown menus: 'Destination type' set to 'Disk' and 'Destination' set to 'Different backup repositories ...'. A yellow information box states: 'To re-use existing backups, expand the Advanced setup and specify target backup for each VM.' Below this, there are two sections for VM backup jobs. The first section is for 'Centos2012' and the second is for 'NA_Ubuntu'. Each section has a 'VM disks' list and a 'Target destination' dropdown. For 'Centos2012', the 'Target destination' is 'Onboard repository' and the 'Use existing backup as a target' checkbox is checked. For 'NA_Ubuntu', the 'Target destination' is 'S3_Object_Lock' and the 'Use existing backup as a target' checkbox is unchecked. A red box highlights the 'Use existing backup as a target' checkbox and the 'Select backup' dropdown for the 'Centos2012' VM. At the bottom right, there are 'Cancel' and 'Next' buttons.

When running the job, the product analyzes the existing backup copy you have selected, determines how it is different from the source backup, and transfers only the differential data.

Backup Copy Job Wizard: Schedule

On the **Schedule** page of the wizard, select to run the backup job manually or schedule the job to run on a regular basis.

Proceed as described in the sections below:

- [Switching to the improved retention approach](#)
- [Creating New Schedules](#)
 - [Weekly](#)
 - [Monthly](#)
 - [Yearly](#)
 - [Periodical](#)
 - [After another job](#)
- [Creating Legacy Schedules](#)
 - [Daily or Weekly Backup](#)
 - [Monthly or Yearly Backup](#)
 - [Periodic Backup](#)
 - [Chained Job](#)

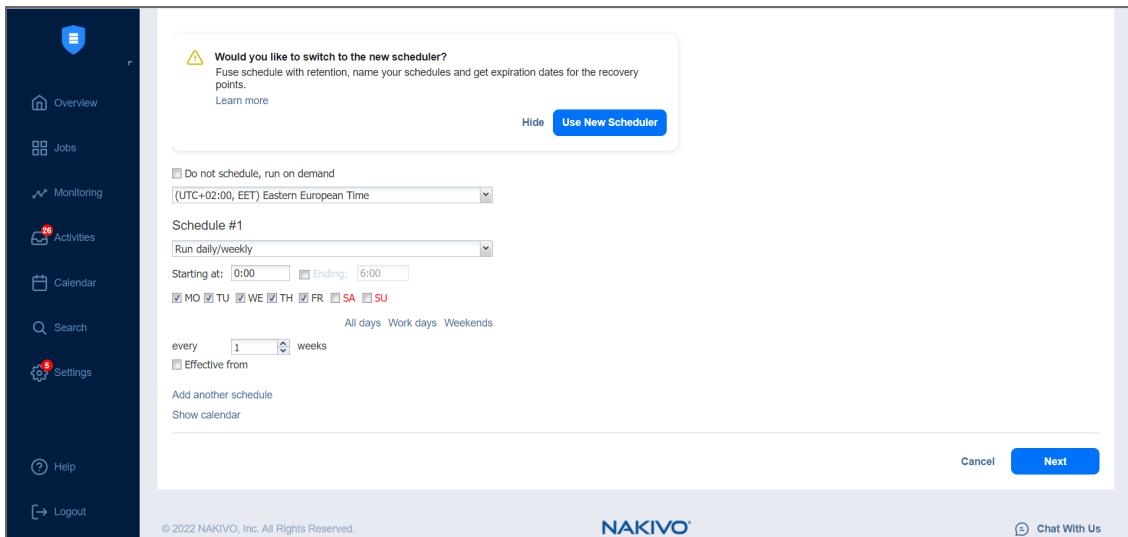
Switching to Improved Retention Approach

NAKIVO Backup & Replication offers two approaches to retention and scheduling: the legacy or the improved approach. To learn more about how the legacy and improved approaches work, go [here](#). If you create a new job or edit the existing one that uses the legacy approach, a popup appears offering that you to switch to the improved retention approach in the following cases:

- You have updated your instance of the product to v10.8 or later from an older version.
- You have imported a configuration to an instance of NAKIVO Backup & Replication v10.8 or later from an older version.

Note

If you install NAKIVO Backup & Replication v10.8 or higher, the new approach is enabled by default.



After the popup appears, do one of the following actions:

- If you do not want to switch to the new scheduler, click **Hide** to close the popup. You can later click **Use New Scheduler** on the **Schedule** page to proceed with the change if you change your mind.
- Alternatively, click **Use New Scheduler** in the popup. Next, choose one of the following options:
 - **MIGRATE SETTINGS:** When you select this option, the existing schedules are automatically converted to new schedules and the existing retention settings are mapped to the new schedules.
 - **CREATE NEW SCHEDULES:** When you select this option, you can create new schedules using the existing retention settings. Old schedules will be deleted.
 - **CONFIGURE SETTINGS ANEW:** Select this option to reset all existing schedules and retention settings and configure them from scratch.

Notes

- After switching to the new scheduler, the legacy schedule and retention settings are displayed on the right side of the page.
- After switching to the new scheduler, reverting to the legacy schedule and retention settings is impossible.
- You can learn how expiration dates are assigned to recovery points after migration [here](#).

Creating New Schedules

Before creating a new schedule, you can optionally enable the following settings:

- **Do not schedule, run on demand:** Enable this option if you want to start the job manually.
- **Maintain exact copy of the source backup:** When this option is selected, the backup copy job creates and maintains an exact copy of the source backup and recovery points. To set a different retention

policy, deselect this option and choose one of the options below. This option only appears if **Disk** was selected in the **Destination** step.

- **Keep all recovery points forever:** When this option is selected, the backup copy job keeps all available recovery points until they are manually removed. To set a different retention policy, deselect this option and choose one of the options below. This option only appears if **Tape** was selected in the **Destination** step.
- **Prioritize schedules:** When this option is selected, NAKIVO Backup & Replication starts treating schedules based on their priority. The **Yearly** schedule will have higher priority than the **Monthly** schedule, etc. In case 2 or more schedules overlap, the schedules with lower priority will be skipped.
- Optionally, when creating any type of schedule, click **Show Calendar** to show the calendar or **Hide Calendar** to hide it.

When **Amazon EC2**, **Amazon S3**, **Wasabi**, **Azure Blob Storage**, **Backblaze B2 Cloud Storage**, or **Local Folder** is selected as the Backup Repository Type and the only backup destination, you can make recovery points in these repositories immutable during schedule creation. With immutability enabled, the recovery points are immutable and stored using the write-once-read-many (WORM) model. With **Amazon EC2**, **Amazon S3**, **Wasabi**, **Azure Blob Storage**, or **Backblaze B2 Cloud Storage** types of Backup Repository, immutable recovery points cannot be overwritten, deleted, or changed by the root user until the specified period has expired. For Local Folder type of Backup Repository, the root user can still clear immutability.

Notes

For the Immutability section to be available, the following conditions must be met:

- **Amazon EC2**, **Amazon S3**, **Wasabi**, **Azure Blob Storage**, **Backblaze B2 Cloud Storage**, or **Local Folder** must be selected for Backup Repository Type on the Destination page of the wizard.
- When **Amazon EC2**, **Amazon S3**, **Wasabi**, **Azure Blob Storage**, or **Backblaze B2 Cloud Storage** is selected as the Backup Repository Type, the bucket or blob container with the repository must have Object Lock or version-level immutability enabled respectively as well as Versioning.
- For **Local Folder** type of Backup Repository, see [feature requirements](#).

When creating the schedules, you can create schedules of the following types:

Weekly

You can configure the following options for this schedule type:

- **Schedule title:** Designates the number of a schedule.
- **Name:** Enter the name of your schedule.
- **Repeat every X weeks:** Indicates how often the schedule is repeated.
- **Days:** Select specific days when the schedule executes the job.
- **Start at:** Specify the time when the job should start.

- **End at:** Specify the time when the job should end.
- Optionally, select the **Effective from** checkbox and choose the date when the schedule should come into effect.
- **Keep backups for:** Specify how many days, months, or years NAKIVO Backup & Replication should retain the backups. This option is disabled if **Maintain exact copy of the source backup** is selected.
- **Immutable for X days:** Enabling this option makes the recovery points immutable for the specified number of days. This option is disabled if **Maintain exact copy of the source backup** is selected.
- Optionally, click **Add another schedule** if you want to add more than one schedule.

Monthly

You can configure the following options for this schedule type:

- **Schedule title:** Designates the number of a schedule.
- **Name:** Enter the name of your schedule.
- **Repeat every X months:** Indicates how often the schedule is repeated.
- **Run every:** Select specific days of the month when NAKIVO Backup & Replication executes the job.
- **Start at:** Specify the time when the job should start.
- **End at:** Specify the time when the job should end.
- Optionally, select the **Effective from** checkbox and choose the date when the schedule should come into effect.
- **Keep backups for:** Specify how many days, months, or years NAKIVO Backup & Replication should keep the backups. This option is disabled if **Maintain exact copy of the source backup** is selected.
- **Immutable for X days:** Enabling this option makes the recovery points immutable for the specified number of days. This option is disabled if **Maintain exact copy of the source backup** is selected.

- Optionally, click **Add another schedule** if you want to add more than one schedule.

☐ Do not schedule, run on demand
☒ Prioritize schedules ⓘ
 (UTC+02:00, EET) Eastern European Time

Schedule #1
 Name:
 Type: Monthly
 Repeat Every: 1 month
 Run every: last Friday
 Start at: 0:00 ☐ end at: 6:00
☐ Effective from
 Keep backups for: 6 months ⓘ
☐ Immutable for: 30 days ⓘ
[Add another schedule](#)
[Show calendar](#)

Cancel **Next**

Yearly

You can configure the following options for this schedule type:

- **Schedule title:** Designates the number of a schedule.
- **Name:** Enter the name of your schedule.
- **Run every:** Select specific days of the specific month when NAKIVO Backup & Replication executes the job.
- Optionally, select the **Effective from** checkbox and choose the date when the schedule should come into effect.
- **Keep backups for:** Specify how many days, months, or years NAKIVO Backup & Replication should keep the backups. This option is disabled if **Maintain exact copy of the source backup** is selected.
- **Immutable for X days:** Enabling this option makes the recovery points immutable for the specified number of days. This option is disabled if **Maintain exact copy of the source backup** is selected.
- Optionally, click **Add another schedule** if you want to add more than one schedule.

☐ Do not schedule, run on demand
☒ Prioritize schedules ⓘ
 (UTC+02:00, EET) Eastern European Time

Schedule #1
 Name:
 Type: Yearly
 Run every: last Friday of every month
 Start at: 0:00 ☐ end at: 6:00
☐ Effective from
 Keep backups for: 3 years ⓘ
☐ Immutable for: 30 days ⓘ
[Add another schedule](#)
[Show calendar](#)

Cancel **Next**

Periodical

You can configure the following options for this schedule type:

- **Schedule title:** Designates the number of a schedule.
- **Name:** Enter the name of your schedule.
- **Run every:** Select the period measured in minutes, hours, or days when NAKIVO Backup & Replication executes the job.
- **Start at:** Specify the time when the job should start.
- **End at:** Specify the time when the job should end.
- **Days:** Select specific days when the schedule executes the job.
- Optionally, select the **Effective from** checkbox and choose the date when the schedule should come into effect.
- **Keep backups for:** Specify how many days, months, or years NAKIVO Backup & Replication should keep the backups. This option is disabled if Maintain exact copy of the source backup is selected.
- **Immutable for X days:** Enabling this option makes the recovery points immutable for the specified number of days. This option is disabled if Maintain exact copy of the source backup is selected.
- Optionally, click **Add another schedule** if you want to add more than one schedule.
- Optionally, when creating any type of schedule, click **Show Calendar** to show the calendar or **Hide Calendar** to hide it.

The screenshot shows the configuration window for a 'Periodic' schedule. At the top, there are checkboxes for 'Do not schedule, run on demand' (unchecked) and 'Prioritize schedules' (checked). Below this is a time zone dropdown set to '(UTC+02:00, EET) Eastern European Time'. The 'Schedule #1' section includes a 'Name' field, a 'Type' dropdown set to 'Periodic', and a 'Run every' spinner set to '30 minutes'. Under 'Days', checkboxes for MO, TU, WE, TH, FR, SA, and SU are shown, with 'All days' selected. 'Start at' is set to '0:00' and 'end at' to '6:00'. There are checkboxes for 'Effective from' (unchecked), 'Keep backups for' (set to '10 days'), and 'Immutable for' (set to '30 days'). At the bottom, there are links for 'Add another schedule' and 'Show calendar'. 'Cancel' and 'Next' buttons are in the bottom right corner.

After Another Job

You can configure the following options for this schedule type:

Note

This option is disabled if there are no other jobs.

- **Schedule title:** Designates the number of a schedule.
- **Name:** Enter the name of your schedule.
- **Parent job:** Select the job after which this job starts running.
- **Run this job:** Select one of the following options:
 - **Immediately:** The schedule starts right after the parent job is completed.
 - **Delayed:** The schedule starts after the specified number of **minutes** or **hours** following parent job completion.
- Optionally, select the **Effective from** checkbox and choose the date when the schedule should come into effect.
- **Keep backups for:** Specify how many days, months, or years NAKIVO Backup & Replication should keep the backups.
- **Immutable for X days:** Enabling this option makes the recovery points immutable for the specified number of days.
- Optionally, click **Add another schedule** if you want to add more than one schedule.
- Optionally, click **Show Calendar** to show the calendar or **Hide Calendar** to hide it.

Creating Legacy Schedules

Before creating a new schedule, you can optionally enable the following settings:

- Click **Use New Scheduler** to switch to the Improved retention approach.
- **Do not schedule, run on demand:** Enable this option if you want to start the job manually.
- Optionally, when creating any type of schedule, click **Show Calendar** to show the calendar or **Hide Calendar** to hide it.
- Optionally, click **Add another schedule** if you want to add more than one schedule.

Daily or Weekly Backup

To run the job once a day, choose **Run daily/weekly** from the schedule drop-down list and do the following:

- Specify the time when the job should be started in the **Starting** box.
- Specify the end time for the job in the **Ending** box. If the job has not completed by the time specified, the job will be stopped.
- Choose a time zone that should be used for the job start and end times from the time zone drop-down list.
- Select the days of the week during which the job will be started.
- If necessary, select the **Effective from** checkbox and pick the date when the schedule comes into effect.

The screenshot shows a 'Use New Scheduler' dialog box with the following elements:

- A blue button labeled 'Use New Scheduler' at the top left.
- A checkbox labeled 'Do not schedule, run on demand'.
- A time zone dropdown menu showing '(UTC+02:00, EET) Eastern European Time'.
- A 'Schedule #1' label above a dropdown menu showing 'Run daily/weekly'.
- 'Starting at:' and 'Ending:' time input fields, both set to '0:00' and '6:00' respectively.
- Day selection checkboxes: ☒ MO, ☒ TU, ☒ WE, ☒ TH, ☒ FR, ☐ SA, ☐ SU.
- Links for 'All days', 'Work days', and 'Weekends'.
- 'every' 1 weeks (with a dropdown arrow).
- An 'Effective from' checkbox.
- Links for 'Add another schedule' and 'Show calendar'.
- 'Cancel' and 'Next' buttons at the bottom right.

Monthly or Yearly Backup

To run the job monthly or yearly, choose **Monthly/yearly** from the schedule drop-down list and do the following:

- Specify the job start schedule in the appropriate boxes.
- Specify the day and month when the job should be started in the **Run every** boxes.
- Specify the time when the job should be started in the **Starting** box.
- Specify the end time for the job in the **Ending** box. If the job has not completed by the time specified, the job will be stopped.

- If necessary, select the **Effective from** checkbox and pick the date when the schedule comes into effect.

The screenshot shows a dialog box titled "Use New Scheduler". It contains the following elements:

- A blue button labeled "Use New Scheduler".
- A checkbox labeled "Do not schedule, run on demand" which is unchecked.
- A time zone dropdown menu showing "(UTC+02:00, EET) Eastern European Time".
- A section labeled "Schedule #1" with a dropdown menu set to "Run monthly/yearly".
- A frequency section with "Run every" set to "last", "Friday" selected from a day dropdown, and "of every" set to "month".
- Time input fields: "Starting at: 0:00" and "Ending: 6:00".
- An "Effective from" checkbox which is unchecked.
- Links at the bottom: "Add another schedule" and "Show calendar".
- Navigation buttons at the bottom right: "Cancel" and "Next".

Periodic Backup

To run the job multiple times per day, choose **Run periodically** from the schedule drop-down list and then choose a time period from the appropriate boxes:

- Specify the time when the job should be started in the **Starting** box.
- Specify the end time for the job in the **Ending** box. If the job has not completed by the time specified, the job will be stopped.
- Select the days of the week during which the job will be started.
- If necessary, select the **Effective from** checkbox and pick the date when the schedule comes into effect.

The screenshot shows the same "Use New Scheduler" dialog box, but with the "Run periodically" option selected. It contains the following elements:

- A blue button labeled "Use New Scheduler".
- A checkbox labeled "Do not schedule, run on demand" which is unchecked.
- A time zone dropdown menu showing "(UTC+02:00, EET) Eastern European Time".
- A section labeled "Schedule #1" with a dropdown menu set to "Run periodically".
- A frequency section with "every" set to "30", "minutes" selected from a unit dropdown.
- Time input fields: "Starting at: 0:00" and "Ending: 6:00".
- Day selection: Checkboxes for MO, TU, WE, TH, FR, SA, and SU. MO, TU, WE, TH, and FR are checked. Below them are links for "All days", "Work days", and "Weekends".
- An "Effective from" checkbox which is unchecked.
- Links at the bottom: "Add another schedule" and "Show calendar".
- Navigation buttons at the bottom right: "Cancel" and "Next".

Chained Job

To run the job after a previous one has completed, choose **Run after another job** from the schedule drop-down list and set the options as follows:

- **After the job:** Select a job after which the current job will be started.
- **Run this job:** Choose whether to run the current job immediately after the previous one has completed or within a delay.
- **After successful runs:** If selected, the job will run if the previous one has completed successfully.
- **After failed runs:** If selected, the job will run if the previous one has failed.
- **After stopped runs:** If selected, the job will run if the previous one has been stopped.
- **Effective from:** If selected, the schedule will come into effect on the date picked.

Use New Scheduler

☐ Do not schedule, run on demand

(UTC+02:00, EET) Eastern European Time

Schedule #1

Run after another job

After the job: EC2 backup job

Run this job: Immediately

☒ After successful runs
 ☐ After failed runs
 ☐ After stopped runs
 ☐ Effective from

[Add another schedule](#)
[Show calendar](#)

Cancel

Next

Backup Copy Job Wizard: Retention

Important

This page is not displayed if the new scheduler is enabled.

After each job run, NAKIVO Backup & Replication creates a recovery point in the Backup Repository for each instance. A recovery point represents the backed-up instance as of a particular moment in time and allows you to recover individual files, application objects, or the entire instance from the Backup Repository. You can specify how many recovery points to retain in the Backup Repository. The recovery points are retained based on the grandfather-father-son (GFS) backup rotation scheme.

When **Amazon EC2**, **Amazon S3**, **generic S3-compatible storage**, **Wasabi**, **Azure Blob Storage**, **Backblaze B2 Cloud Storage**, or **Local Folder** is selected as the Backup Repository Type for the only backup destination, you can make recovery points in these repositories immutable. With immutability enabled, the recovery points are immutable and stored using the *write-once-read-many* (WORM) model. In case of **Amazon EC2**, **Amazon S3**, **generic S3-compatible storage**, **Wasabi**, **Azure Blob Storage**, or **Backblaze B2 Cloud Storage** types of Backup Repository, immutable recovery points cannot be overwritten, deleted, or changed by the root user, until the specified period has expired. For **Local Folder** type of Backup Repository, the root user can still clear immutability.

Retention Settings

Here you can set the retention settings for the backup job. Set the following options:

- **Maintain exact copy of the source backup:** When this option is selected, the backup copy job creates and maintains an exact copy of the source backup and recovery points. To set a different retention policy, deselect this option and choose one of the options below. This option only appears if **Disk** was selected in the **Destination** step.
- **Keep all recovery points forever:** When this option is selected, the backup copy job keeps all available recovery points until they are manually removed. To set a different retention policy, deselect this option and choose one of the options below. This option only appears if **Tape** was selected in the **Destination** step.
- **Keep x last recovery points:** Keeps the specified number of last recovery points for each VM in the job.
- **Keep one recovery point per day for x days:** Retains one last recovery point per day for the specified number of days.
- **Keep one recovery point per week for x weeks:** Retains the last available backup of every week for the specified number of weeks.

- **Keep one recovery point per month for x months:** Retains the last available backup of every month for the specified number of months.
- **Keep one recovery point per year for x years:** Retains the last available backup of every year for the specified number of years.

Immutability

In this section, you can configure the **Make recovery points immutable for x days** option. The recovery points remain **immutable** for the specified number of days.

Note

For the *Immutability* section to be available, the following conditions must be met:

- **Amazon EC2, Amazon S3, generic S3-compatible storage, Wasabi, Azure Blob Storage, Backblaze B2 Cloud Storage, or Local Folder** must be selected for Backup Repository Type on the Destination page of the wizard.
- If **Amazon EC2, Amazon S3, generic S3-compatible storage, Wasabi, Azure Blob Storage, or Backblaze B2 Cloud Storage** is selected as the Backup Repository type, Object Lock or version-level immutability support and Versioning must be enabled bucket or blob container respectively where your Backup Repository is located.
- For **Local Folder** type of Backup Repository, see [feature requirements](#).

1. Sources 2. Destination 3. Schedule 4. Retention

Retention Settings

☒ Keep 10 last recovery points

☒ Keep one recovery point per day for 10 days

☒ Keep one recovery point per week for 4 weeks

☐ Keep one recovery point per month for 12 months

☐ Keep one recovery point per year for 3 years

[Learn more](#)

Immutability

☒ Make recovery points immutable for 10 days ?

For more details and an example of job retention settings, refer to the [Keeping Recovery Points](#) article in the Knowledge Base.

Backup Copy Job Wizard: Options

On the **Options** page of the wizard, you can set up job options. Proceed as described in these sections:

- [Job Options](#)
 - [Job Name](#)
 - [Job Priority](#)
 - [Network Acceleration](#)
 - [Encryption](#)
 - [VM Verification](#)
- [Full Backup Settings](#)
- [Pre and Post Actions](#)
 - [Email Notifications](#)
 - [Pre Job Script](#)
 - [Post Job Script](#)
- [Data Transfer](#)
 - [Transporter Load](#)
 - [Bandwidth Throttling](#)
- [Completing the New Backup Copy Job Wizard](#)

Job Options

In this section, you can give a name to the backup copy job and enable/disable [network acceleration](#), change tracking, [encryption](#), and [VM Verification](#). Proceed as described below.

New Backup Copy Job Wizard

1. Backups 2. Destination 3. Schedule 4. Retention 5. Options

Job Options

Job name: Backup copy job

Job priority: 5 ⓘ

Network acceleration: Disabled ⓘ

Network encryption: Disabled ⓘ

VM verification: Disabled ⓘ

Full Backup Settings

Create full backup: Job runs # 5 ⓘ

Full backup mode: Synthetic full ⓘ

☐ If a full backup fails, create a full backup on the next job run ⓘ

Pre and Post Actions

☒ Send job run reports to admin@nakivo.com ⓘ

☐ Run local pre job script ⓘ

☐ Run local post job script ⓘ

Data Transfer

☐ Limit transporter load to 3 concurrent tasks ⓘ

Bandwidth throttling: Disabled ⓘ

☐ Bottleneck detection ⓘ

Cancel Finish Finish & Run

Job Name

Specify a name for the backup copy job in the **Job Name** box.

Job Priority

Select a job priority level between 1 and 5, with 1 being the highest priority. Jobs with higher priority levels are prioritized by Transporters during job processing.

Note

This option is only available in the Enterprise, Enterprise Essentials, Enterprise Plus, MSP Enterprise, and MSP Enterprise Plus editions.

Network Acceleration

If network acceleration is enabled, NAKIVO Backup & Replication uses compression and traffic reduction techniques to speed up data transfer. Select this option if you plan to back up over WAN or slow LAN links.

Encryption

If the **Encryption** option is selected, backup data will be protected with AES 256 encryption while traveling over the network. Data encryption increases the backup time and CPU load on machines running Transporters. Select this option if you are backing up over WAN without a VPN connection.

Note

You need at least one [Transporter](#) at the source and target sites to enable encryption.

VM Verification

VM Verification allows you to check the integrity of the backup by starting it and interacting with it. For more details, refer to [“VM Verification” on page 52](#).

You can choose one of the following VM verification options:

- **Disabled:** VM verification is disabled.
- **Screenshot verification:** When enabled, all VM backups created by the job are verified: After a backup of a VM is completed, the VM will be recovered from the backup using Flash VM Boot (and will be disconnected from networks) and a screenshot of the recovered VM will be taken once the VM OS has booted, after which the VM will be discarded. VM screenshots will be included in [email notifications](#) (if they're configured) and displayed on the **Dashboard**.
- **Boot verification:** When enabled, all VM backups created by the job are verified as follows. After a VM backup is completed, NAKIVO Backup & Replication recovers the VM using Flash VM Boot, disables networking to prevent network connections, and verifies that system start is successful.

After choosing **Screenshot verification**, provide the following information in the dialog box that opens:

1. Provide a location of the VMs that need to be booted:
 - a. **Target Container:** Choose a target container (cluster, host, or resource pool) where VMs will be run using [Flash VM Boot](#).
 - b. **Target Datastore:** Choose a datastore that will host changes to the recovered VMs.
 - c. **Proxy transporter:** Choose a proxy transporter from the list of available Transporters.

Note

NAKIVO Backup & Replication will use a proxy Transporter in the following cases:

The Transporter assigned to the Backup Repository cannot use iSCSI port 3260 because it is occupied by other services.

iSCSI packages are missing on the Transporter assigned to the Backup Repository.

2. Set verification options:
 - **Verify not more than X VMs simultaneously:** Specify the maximum number of VMs that can be started on the Target Container simultaneously.
 - **Recovery time objective:** Specify the amount of time allocated for the verification of each VM backup. If a VM OS does not start within the specified amount of time, verification will be considered failed.
 - **Screenshot delay:** The amount of time that the product should wait after the guest OS starts before taking a screenshot.

The specified time must be sufficient to fully start the VM OS. Try increasing this amount if the default amount is not sufficient.

The screenshot shows the 'New Backup Copy Job Wizard' with the 'Options' tab selected. The 'VM verification' section is highlighted with a red box. A 'VM Boot Location' dialog box is open, showing settings for 'Target container', 'Target datastore', 'Proxy transporter', and 'Verification Options'. The 'Verification Options' section includes 'Verify not more than 2 VMs simultaneously', 'Recovery time objective: 5 minutes', and 'Screenshot delay: 30 seconds'.

After selecting **Boot verification**, do the following in the dialog box that opens:

1. Provide the location of the VMs to be booted as described for the **Screenshot verification** option.
2. Set verification options:
 - **Verify not more than x VMs simultaneously:** Specify the maximum number of VMs that can be started on the Target Container simultaneously.
 - **Recovery time objective:** Specify the amount of time allocated for verification of each VM backup. If a VM OS does not start within the specified amount of time, verification will be considered failed.

The screenshot shows the 'New Backup Copy Job Wizard' window, specifically the '5. Options' step. The 'VM verification' option is highlighted with a red box. A 'VM Boot Location' dialog box is open, showing 'Target container' and 'Target datastore' dropdowns, 'Proxy transporter' set to 'Do not use proxy transporter', and 'Verification Options' with 'Verify not more than' set to 2 and 'Recovery time objective' set to 5 minutes.

Full Backup Settings

If the type of the Backup Repository that you selected on the Destination page is set to **Incremental with full backups** (Store backups in separate files option is selected), you can specify the following options:

- **Create full backup:** Specify how often full backups should be created.
- **Full backup mode:** Specify how the full backup should be created. You can choose between the following options:
 - **Synthetic full:** If this option is selected, NAKIVO Backup & Replication will first perform an incremental backup (that is, will transfer only the data that changed since the last backup) and will then transform the available data into a full backup file. This approach has the following benefits:
 - The synthetic full backup is usually faster than the active full backup.
 - The load on the network is lower, as less data is transferred.
 - The load on the source datastores running your production VMs is lower.

- **Active full:** If this option is selected, NAKIVO Backup & Replication will read all data from the source and transfer it to the Backup Repository.
- **If a full backup fails, create a full backup on the next job run:** With this option selected, the next job run creates a full backup if the current job run fails to do so.

New Backup Copy Job Wizard

1. Backups 2. Destination 3. Schedule 4. Retention 5. Options

Job Options

Job name:

Job priority: ⓘ

Network acceleration: ⓘ

Network encryption: ⓘ

VM verification: ⓘ

Full Backup Settings

Create full backup: ⓘ

Full backup mode: ⓘ

☐ If a full backup fails, create a full backup on the next job run ⓘ

Pre and Post Actions

☒ Send job run reports to ⓘ

☐ Run local pre job script ⓘ

☐ Run local post job script ⓘ

Data Transfer

☐ Limit transporter load to concurrent tasks ⓘ

Bandwidth throttling: ⓘ

☐ Bottleneck detection ⓘ

Cancel **Finish** Finish & Run

Pre and Post Actions

NAKIVO Backup & Replication allows you to set up certain actions before a backup copy job begins and after it has completed. You can choose to send job run reports to the email provided and run local [pre and post job scripts](#).

New Backup Copy Job Wizard

1. Backups
2. Destination
3. Schedule
4. Retention
5. Options

Job Options

Job name:

Job priority: ⓘ

Network acceleration: ⓘ

Network encryption: ⓘ

VM verification: ⓘ

Full Backup Settings

Create full backup:

Full backup mode: ⓘ

☐ If a full backup fails, create a full backup on the next job run ⓘ

Pre and Post Actions

☒ Send job run reports to ⓘ

☐ Run local pre job script ⓘ

☐ Run local post job script ⓘ

Data Transfer

☐ Limit transporter load to concurrent tasks ⓘ

Bandwidth throttling: ⓘ

☐ Bottleneck detection ⓘ

Cancel
Finish
Finish & Run

Email Notifications

NAKIVO Backup & Replication can send email notifications on job completion status to specified recipients. This feature complements global notifications and provides you with the ability to configure notifications on a per-job level.

To enable this option, configure your [Email settings](#).

To send email notifications, do the following:

1. In the *Pre and Post Actions* section, select the **Send job run reports to** option.
2. Specify one or more email addresses in the text box. Separate multiple email addresses with a semicolon.

Pre Job Script

To run a script before the product begins copying backups, do the following:

1. Place a script file on the machine where the Director is installed.
2. In the *Pre and Post Actions* section, select the **Run local pre job script** option and click the **settings** link. Specify the following parameters in the dialog box that opens:
 - **Script path:** Specify a local path to the script on the machine where the Director is installed. Script interpreter should be specified.

Example (Windows): `cmd.exe /c D:\script.bat`

Example (Linux): `bash /root/script.sh`

- **Job behavior:** Choose either of the following job behaviors in relation to script completion:
 - **Wait for the script to finish:** If this option is selected, the backup copy will not be started until the script is completed.
 - **Do not wait for the script to finish:** If this option is selected, the product will run the script and will start copying backups at the same time.
- **Error handling:** Choose either of the following job behaviors in relation to script failure:
 - **Continue the job on script failure:** If this option is selected, the job will perform backup copy even if the script has failed.
 - **Fail the job on script failure:** If this option is selected and the script fails, the job will be failed and the backup copy will not be performed.

Post Job Script

To run a script after the product has finished copying all backups, do the following:

1. Place a script file on the machine on which the Director is installed.
2. In the *Pre and Post Actions* section, select the **Run local post job script** option and click the **settings** link. Specify the following parameters in the dialog box that opens:
 - **Script path:** Specify a local path to the script on the machine on which the Director is installed. Script interpreter should be specified.
Example (Windows): `cmd.exe /c D:\script.bat`
Example (Linux): `bash /root/script.sh`
 - **Job behavior:** Choose either of the following job behaviors in relation to script completion:
 - **Wait for the script to finish:** If this option is selected, the job will be in the “running” state until the script is completed.
 - **Do not wait for the script to finish:** If this option is selected, the job will be completed even if the script execution is still in progress.
 - **Error handling:** Choose either of the following job behaviors in relation to script failure.
 - **Continue the job on script failure:** If this option is selected, script failure will not influence the status of the job.
 - **Fail the job on script failure:** If this option is selected and the script has failed, the job status will be set to “failed” even if VM backup has been successful.

Notes

- Pre- and post-job scripts can be executed only on the machine on which the Director is installed.
- When Integration Services are used on Hyper-V 2016 and above, custom pre/post scripts are unavailable for Windows VMs.

Data Transfer

In the *Data Transfer* section of the **Options** page, you can specify a Transporter load and configure [bandwidth throttling](#).

New Backup Copy Job Wizard

1. Backups

2. Destination

3. Schedule

4. Retention

5. Options

Job Options

Job name:

Backup copy job

Job priority:

5

Network acceleration:

Disabled

Network encryption:

Disabled

VM verification:

Disabled

Full Backup Settings

Create full backup:

Job runs #

5

Full backup mode:

Synthetic full

☐ If a full backup fails, create a full backup on the next job run

Pre and Post Actions

☒ Send job run reports to

admin@nakivo.com

☐ Run local pre job script

☐ Run local post job script

Data Transfer

☐ Limit transporter load to

3

concurrent tasks

Bandwidth throttling:

Disabled

☐ Bottleneck detection

Cancel

Finish

Finish & Run

Transporter Load

You can limit the maximum number of Transporter tasks used by the job. By default, it is set to 3 concurrent tasks.

To change the default number of tasks, do the following:

1. In the *Data Transfer* section, select the **Limit transporter load to checkbox**.
2. Specify the number of concurrent tasks in the corresponding box.

Bandwidth Throttling

Follow the steps below to regulate the speed of data transfer over the network for your backup copy job:

1. For the **Bandwidth throttling** option, choose **Enabled**.

Note

If bandwidth throttling is disabled for the current job, global bandwidth rules may still apply to your job.

2. Click the **settings** link that becomes available.
3. The **Job Bandwidth Rules** dialog box opens displaying you the list of available rules. You have the following options:

- Create a new bandwidth rule for your backup copy job:
 - a. Click the **Create New Rule** button.
 - b. The **New Bandwidth Rule** dialog box opens. Refer to [“Bandwidth Throttling” on page 331](#) for details on creating a bandwidth rule.
 - c. Click **Save**.
- Activate an existing bandwidth rule for your job. Select the checkbox to the left of the necessary bandwidth rule. To deactivate a bandwidth rule for your job, clear the corresponding checkbox.
- Edit a bandwidth rule. Click the **Edit** link for a bandwidth rule and modify it in the **Edit Bandwidth Rule** dialog box that opens.
- Disable a bandwidth rule. Click the **Disable** link. The bandwidth rule will be disabled for all jobs.
- Remove a bandwidth rule. Click the **Remove** link and then click **Delete** to confirm your operation.

Bottleneck detection

When the **Bottleneck detection** option is enabled, additional information is collected and recorded in NAKIVO Backup & Replication logs in the course of data transfer for the purpose of bottleneck detection. Check this option to enable the **Bottleneck detection** capability of the Transporters engaged in the job.

Note

This option is available only if the **Disk** destination type was chosen on the **Destination** page of the wizard.

Completing the New Backup Copy Job Wizard

Click **Finish** or **Finish & Run** to complete the job creation.

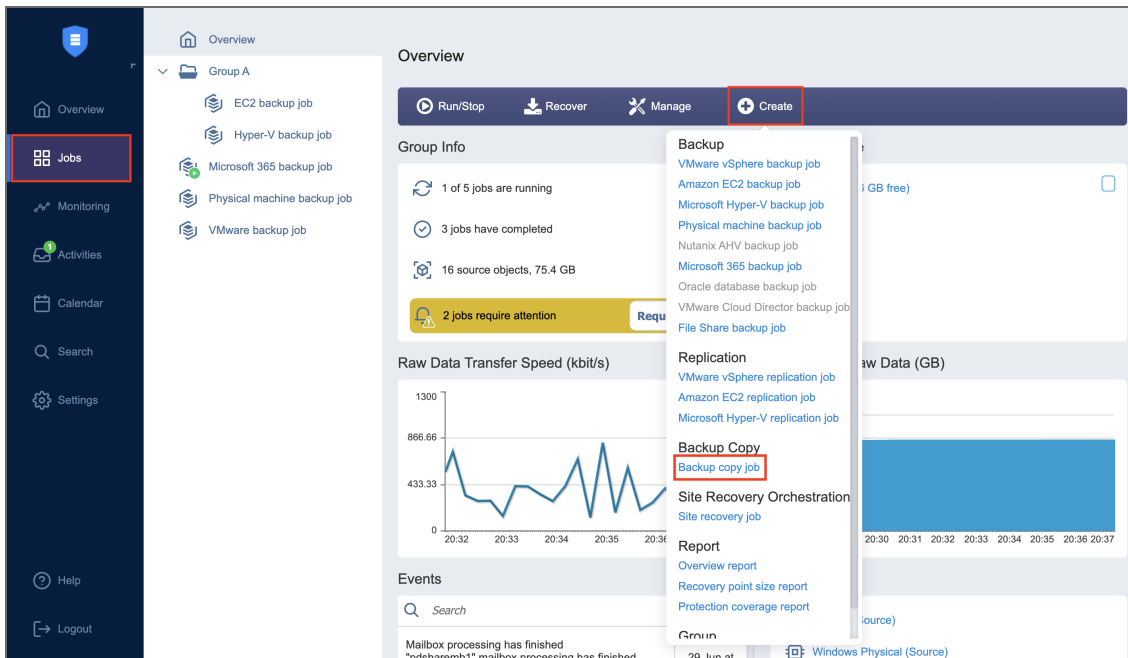
Note

If you click **Finish & Run**, you will have to define the scope of your job. Please refer to [“Running Jobs on Demand” on page 295](#) for details.

Backing Up to Tape

Backing up to tape is, in essence, performing a [backup copy](#) job with the destination set to a [tape device](#) or [media pool](#). Currently, the direct backing up to tape is not supported, instead, it is done in stages: the backup is first put into a Backup Repository and then moved to tape via a Backup copy job.

To create a backup copy job, click **Create** in the **Jobs** menu and then click **Backup copy job**.



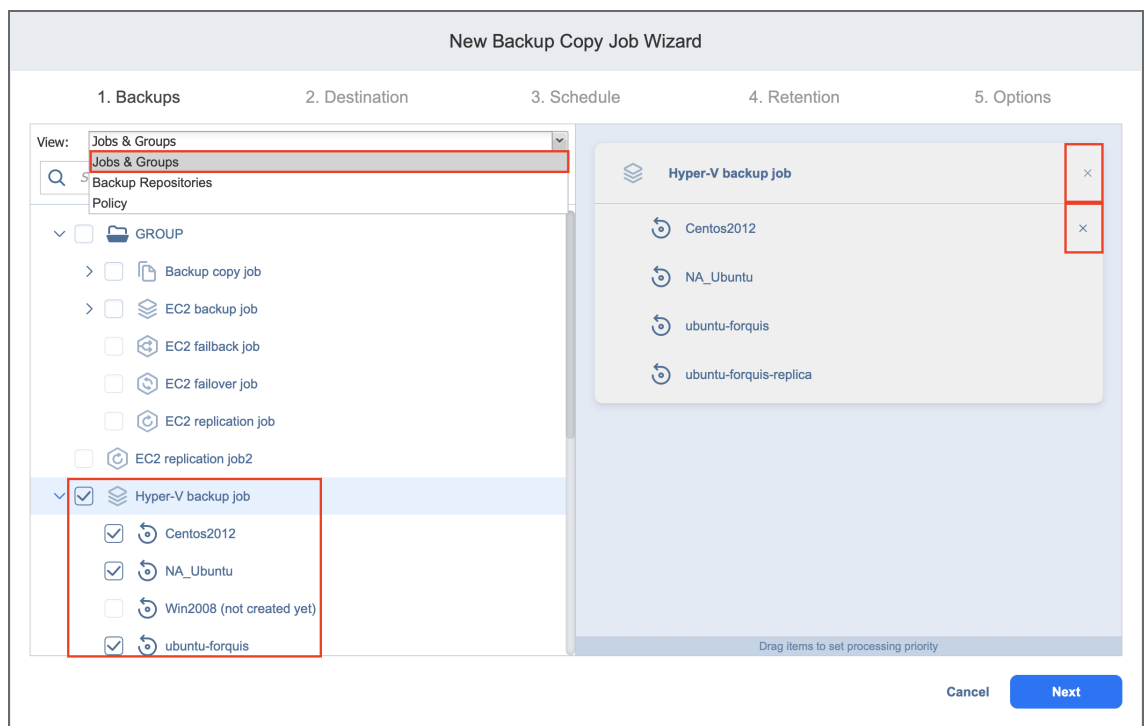
The **New Backup Copy Job Wizard** opens. Complete the wizard as described in the sections below:

- [“Tape Backup Wizard: Backups” on page 687](#)
- [“Tape Backup Wizard: Destination” on page 690](#)
- [“Tape Backup Wizard: Schedule” on page 691](#)
- [“Tape Backup Wizard: Retention” on page 700](#)
- [“Tape Backup Wizard: Options” on page 701](#)

Tape Backup Wizard: Backups

On the **Backups** page of the wizard, you can add items to your backup copy job. Proceed as follows:

1. In the left pane of the page, choose either of the following inventory views:
 - **Jobs & Groups:** If chosen, the inventory tree opens in the left pane and shows the backup groups along with backups. Proceed as follows:
 - a. Optionally, filter the inventory tree by entering a string to the **Search** box. You can enter a part or the entire item name.
 - b. Select backup items by selecting the checkbox next to the them.
 - c. The selected items appear in the right pane of the page. If necessary, reorder the selected items by dragging them to a new position. By doing so, you can specify the order in which the items should be backed up.
 - d. Review the list of the selected items. If needed, remove a selected backup in the backup copy job in either of the following ways:
 - Cancel the selection of the item(s) in the left pane. This will remove the item(s) from the right pane.
 - In the right pane, hover over the item you want to remove and click the red “X” to the right. This will cancel the selection of the item(s) in the left pane.



- **Backup Repositories:** If chosen, the inventory tree shows available Backup Repositories along with the backups in them. Proceed as it is described for the **Jobs & Groups** view above.

The screenshot shows the 'New Backup Copy Job Wizard' interface. At the top, there are five tabs: '1. Backups', '2. Destination', '3. Schedule', '4. Retention', and '5. Options'. The '1. Backups' tab is active. On the left, there is a 'View:' dropdown menu with options: 'Backup Repositories', 'Jobs & Groups', 'Backup Repositories', and 'Policy'. The 'Backup Repositories' option is selected. Below the dropdown is a search bar and a list of items. The 'Onboard repository' and 'AS-NBR10-multi' items are checked. On the right, there is a list of items with 'Onboard repository' and 'AS-NBR10-multi' highlighted. At the bottom right, there are 'Cancel' and 'Next' buttons.

- **Policy:** If selected, this allows you to use job policies; refer to [“Managing Job Policies” on page 309](#) for details. Please follow the steps below:
 - a. If items were selected in alternate views, a dialog box opens warning you that switching to the **Policy** view will reset your current selection. Click **Switch View** to confirm switching to the **Policy** view.

- b. Make sure that at least one item matches the available set of policy rules. Refer to [“Managing Policy Rules” on page 312](#) for details.

The screenshot shows the 'New Backup Copy Job Wizard' interface. The wizard has five steps: 1. Backups, 2. Destination, 3. Schedule, 4. Retention, and 5. Options. In the '1. Backups' step, the 'View' dropdown is set to 'Policy', and the 'Policy' option is highlighted in the list. Below this, there is a section for 'Rule #1' with search criteria for 'win10'. To the right, the 'Policy Container' list contains several items, including 'AY-Win10NBR9.2', 'ayunt_Win10-Support-nvme', 'ayunt_Win10_pro_UEFI', 'CT-win10-sql', 'CT-win10nbr', 'CT-win10nbr10.2', 'Sales-Win10PRO', 'SK-NBR10-win10', and 'SK-NBR10-win10'. The 'Next' button is visible at the bottom right.

2. Click **Next** to confirm adding selected items to the backup copy job.

The wizard will display the next page.

Notes

1. If you add a container—a group, job, or Backup Repository—to the backup copy job, the following actions will occur:
 - All backups currently available in the selected container will be backed up.
 - All new backups that are created in (or moved to) the container in the future will be automatically added to the job and backed up.
2. The order in which backups are copied is important if the Transporter that is running the job cannot process all items simultaneously: either because the Transporter is processing other tasks at the same time or because the number of backups in the job exceeds the Transporter’s Maximum Load specified during the Transporter creation.

Tape Backup Wizard: Destination

On the **Destination** page, you can specify where the backup will be stored. You can select a device or a media pool. The job allows for copying a backup from a Backup Repository to tape cartridges or a [virtual tape library](#).

To specify a destination for the selected backups:

1. From the **Destination type** drop-down list, select **Tape**.
2. From the **Destination** drop-down list, select one of the configured devices or media pools.
3. To see the space and disks the individual backups take, click the name of the job and expand the backups in the list.

New Backup Copy Job Wizard

1. Backups

2. Destination

3. Schedule

4. Retention

5. Options

Destination type: Tape

Destination: Tape

NT-dummy

Click to collapse

VM disks

☒ Hard disk 1 (0 KB (2.0 GB allocated) on S3_ Object _Lock)

NA_Ubuntu

Click to collapse

VM disks

☒ Hard disk 1: 0 KB (25.0 GB allocated)

NBR10.4

Click to collapse

VM disks

☒ Hard disk 1 (0 KB (40.0 GB allocated) on S3_ Object _Lock)

☒ Hard disk 2 (0 KB (200.0 GB allocated) on S3_ Object _Lock)

NT-SQL2-recovered

Click to collapse

VM disks

☒ Hard disk 1 (0 KB (5.0 GB allocated) on S3_ Object _Lock)

Cancel

Next

4. Click **Next** to proceed to the next page.

Tape Backup Wizard: Schedule

On the **Schedule** page of the wizard, select to run the backup job manually or schedule the job to run on a regular basis.

Proceed as described in the sections below:

- [Switching to the improved retention approach](#)
- [Creating New Schedules](#)
 - [Weekly](#)
 - [Monthly](#)
 - [Yearly](#)
 - [Periodical](#)
 - [After another job](#)
- [Creating Legacy Schedules](#)
 - [Daily or Weekly Backup](#)
 - [Monthly or Yearly Backup](#)
 - [Periodic Backup](#)
 - [Chained Job](#)

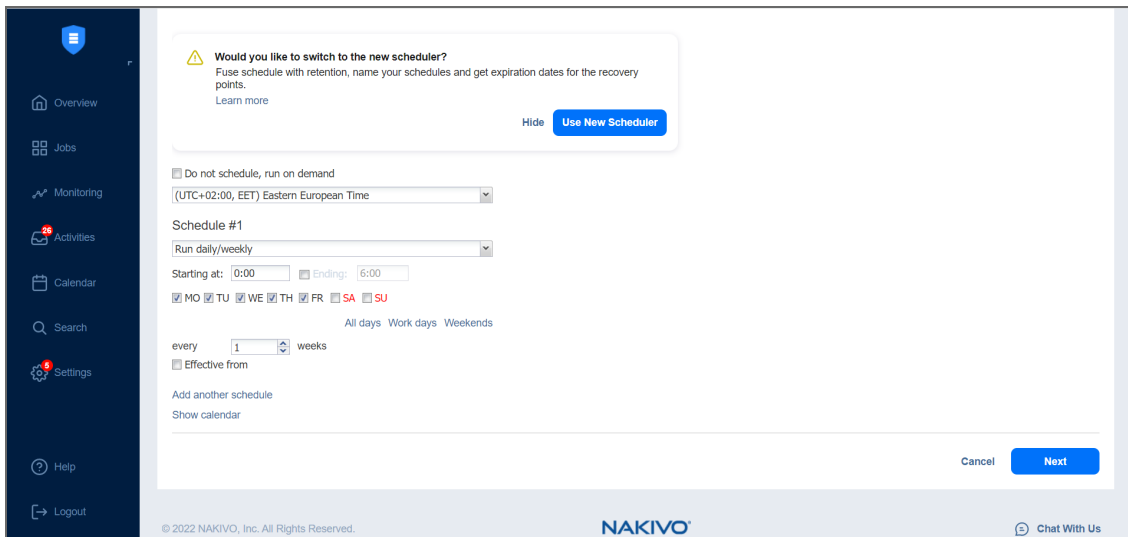
Switching to Improved Retention Approach

NAKIVO Backup & Replication offers two approaches to retention and scheduling: the legacy or the improved approach. To learn more about how the legacy and improved approaches work, go [here](#). If you create a new job or edit the existing one that uses the legacy approach, a popup appears offering that you to switch to the improved retention approach in the following cases:

- You have updated your instance of the product to v10.8 or later from an older version.
- You have imported a configuration to an instance of NAKIVO Backup & Replication v10.8 or later from an older version.

Note

If you install NAKIVO Backup & Replication v10.8 or higher, the new approach is enabled by default.



After the popup appears, do one of the following actions:

- If you do not want to switch to the new scheduler, click **Hide** to close the popup. You can later click **Use New Scheduler** on the **Schedule** page to proceed with the change if you change your mind.
- Alternatively, click **Use New Scheduler** in the popup. Next, choose one of the following options:
 - **MIGRATE SETTINGS:** When you select this option, the existing schedules are automatically converted to new schedules and the existing retention settings are mapped to the new schedules.
 - **CREATE NEW SCHEDULES:** When you select this option, you can create new schedules using the existing retention settings. Old schedules will be deleted.
 - **CONFIGURE SETTINGS ANEW:** Select this option to reset all existing schedules and retention settings and configure them from scratch.

Notes

- After switching to the new scheduler, the legacy schedule and retention settings are displayed on the right side of the page.
- After switching to the new scheduler, reverting to the legacy schedule and retention settings is impossible.
- You can learn how expiration dates are assigned to recovery points after migration [here](#).

Creating New Schedules

Before creating a new schedule, you can optionally enable the following settings:

- **Do not schedule, run on demand:** Enable this option if you want to start the job manually.
- **Keep all recovery points forever:** When this option is selected, the job keeps all available recovery points until they are manually removed.

- **Prioritize schedules:** When this option is selected, NAKIVO Backup & Replication starts treating schedules based on their priority. The **Yearly** schedule will have higher priority than the **Monthly** schedule, etc. In case 2 or more schedules overlap, the schedules with lower priority will be skipped.
- Optionally, when creating any type of schedule, click **Show Calendar** to show the calendar or **Hide Calendar** to hide it.

When creating the schedules, you can create schedules of the following types:

Weekly

You can configure the following options for this schedule type:

- **Schedule title:** Designates the number of a schedule.
- **Name:** Enter the name of your schedule.
- **Repeat every X weeks:** Indicates how often the schedule is repeated.
- **Days:** Select specific days when the schedule executes the job.
- **Start at:** Specify the time when the job should start.
- **End at:** Specify the time when the job should end.
- Optionally, select the **Effective from** checkbox and choose the date when the schedule should come into effect.
- **Keep backups for:** Specify how many days, months, or years NAKIVO Backup & Replication should retain the backups.
- Optionally, click **Add another schedule** if you want to add more than one schedule.

The screenshot shows the configuration window for a Weekly schedule. At the top, there are checkboxes for "Do not schedule, run on demand" (unchecked) and "Prioritize schedules" (checked). Below this is a time zone dropdown set to "(UTC+02:00, EET) Eastern European Time". The "Schedule #1" section includes a "Name:" text field, a "Type:" dropdown set to "Weekly", and a "Repeat Every" spinner set to "1" with the unit "week". The "Days" section shows checkboxes for days of the week: MO, TU, WE, TH, FR, SA, and SU. The "All days" tab is selected. The "Start at:" field is set to "0:00" and the "end at:" field is set to "6:00". There are checkboxes for "Effective from", "Keep backups for" (set to "10" days), and "Immutable for" (set to "30" days). At the bottom, there are links for "Add another schedule" and "Show calendar". The window has "Cancel" and "Next" buttons at the bottom right.

Monthly

You can configure the following options for this schedule type:

- **Schedule title:** Designates the number of a schedule.
- **Name:** Enter the name of your schedule.
- **Repeat every X months:** Indicates how often the schedule is repeated.

- **Run every:** Select specific days of the month when NAKIVO Backup & Replication executes the job.
- **Start at:** Specify the time when the job should start.
- **End at:** Specify the time when the job should end.
- Optionally, select the **Effective from** checkbox and choose the date when the schedule should come into effect.
- **Keep backups for:** Specify how many days, months, or years NAKIVO Backup & Replication should keep the backups.
- Optionally, click **Add another schedule** if you want to add more than one schedule.

☐ Do not schedule, run on demand

☒ Prioritize schedules ⓘ

(UTC+02:00, EET) Eastern European Time

Schedule #1

Name:

Type: Monthly

Repeat Every: 1 month

Run every: last Friday

Start at: 0:00 end at: 6:00

☐ Effective from

Keep backups for: 6 months ⓘ

☐ Immutable for: 30 days ⓘ

[Add another schedule](#)

[Show calendar](#)

Cancel Next

Yearly

You can configure the following options for this schedule type:

- **Schedule title:** Designates the number of a schedule.
- **Name:** Enter the name of your schedule.
- **Run every:** Select specific days of the specific month when NAKIVO Backup & Replication executes the job.
- Optionally, select the **Effective from** checkbox and choose the date when the schedule should come into effect.
- **Keep backups for:** Specify how many days, months, or years NAKIVO Backup & Replication should keep the backups.

- Optionally, click **Add another schedule** if you want to add more than one schedule.

☐ Do not schedule, run on demand
☒ Prioritize schedules ⓘ
 (UTC+02:00, EET) Eastern European Time
 Schedule #1
 Name:
 Type: Yearly
 Run every: last Friday of every month
 Start at: 0:00 ☐ end at: 6:00
☐ Effective from
 Keep backups for: 3 years ⓘ
☐ Immutable for: 30 days ⓘ
[Add another schedule](#)
[Show calendar](#)
 Cancel Next

Periodical

You can configure the following options for this schedule type:

- **Schedule title:** Designates the number of a schedule.
- **Name:** Enter the name of your schedule.
- **Run every:** Select the period measured in minutes, hours, or days when NAKIVO Backup & Replication executes the job.
- **Start at:** Specify the time when the job should start.
- **End at:** Specify the time when the job should end.
- **Days:** Select specific days when the schedule executes the job.
- Optionally, select the **Effective from** checkbox and choose the date when the schedule should come into effect.
- **Keep backups for:** Specify how many days, months, or years NAKIVO Backup & Replication should keep the backups.
- Optionally, click **Add another schedule** if you want to add more than one schedule.
- Optionally, when creating any type of schedule, click **Show Calendar** to show the calendar or **Hide**

Calendar to hide it.

☐ Do not schedule, run on demand

☒ Prioritize schedules ⓘ

(UTC+02:00, EET) Eastern European Time

Schedule #1

Name:

Type:

Run every:

Days: ☒ MO ☒ TU ☒ WE ☒ TH ☒ FR ☒ SA ☒ SU
All days Work days Weekends

Start at: ☐ end at:

☐ Effective from

Keep backups for: ⓘ

☐ Immutable for: ⓘ

[Add another schedule](#)

[Show calendar](#)

Cancel **Next**

After Another Job

You can configure the following options for this schedule type:

Note

This option is disabled if there are no other jobs.

- **Schedule title:** Designates the number of a schedule.
- **Name:** Enter the name of your schedule.
- **Parent job:** Select the job after which this job starts running.
- **Run this job:** Select one of the following options:
 - **Immediately:** The schedule starts right after the parent job is completed.
 - **Delayed:** The schedule starts after the specified number of **minutes** or **hours** following parent job completion.
- Optionally, select the **Effective from** checkbox and choose the date when the schedule should come into effect.
- **Keep backups for:** Specify how many days, months, or years NAKIVO Backup & Replication should keep the backups.
- Optionally, click **Add another schedule** if you want to add more than one schedule.

- Optionally, click **Show Calendar** to show the calendar or **Hide Calendar** to hide it.

☐ Do not schedule, run on demand

☒ Prioritize schedules ⓘ

(UTC+02:00, EET) Eastern European Time

Schedule #1

Name:

Type:

Parent job:

Run this job:

After: ☒ successful runs ☐ failed runs ☐ stopped runs

☐ Effective from

Keep backups for: days ⓘ

☐ Immutable for: days ⓘ

[Add another schedule](#)

[Show calendar](#)

[Cancel](#) [Next](#)

Creating Legacy Schedules

Before creating a new schedule, you can optionally enable the following settings:

- Click **Use New Scheduler** to switch to the Improved retention approach.
- **Do not schedule, run on demand:** Enable this option if you want to start the job manually.
- Optionally, when creating any type of schedule, click **Show Calendar** to show the calendar or **Hide Calendar** to hide it.
- Optionally, click **Add another schedule** if you want to add more than one schedule.

Daily or Weekly Backup

To run the job once a day, choose **Run daily/weekly** from the schedule drop-down list and do the following:

- Specify the time when the job should be started in the **Starting** box.
- Specify the end time for the job in the **Ending** box. If the job has not completed by the time specified, the job will be stopped.
- Choose a time zone that should be used for the job start and end times from the time zone drop-down list.
- Select the days of the week during which the job will be started.

- If necessary, select the **Effective from** checkbox and pick the date when the schedule comes into effect.

The screenshot shows the 'Use New Scheduler' dialog box. At the top is a blue button labeled 'Use New Scheduler'. Below it is a checkbox 'Do not schedule, run on demand' which is unchecked. A time zone dropdown menu is set to '(UTC+02:00, EET) Eastern European Time'. Under 'Schedule #1', the dropdown is set to 'Run daily/weekly'. Below this, there are input fields for 'Starting at: 0:00' and 'Ending: 6:00'. A row of checkboxes for days of the week is shown: MO, TU, WE, TH, FR, SA, and SU. The checkboxes for MO, TU, WE, TH, and FR are checked, while SA and SU are unchecked. Below the day checkboxes are three links: 'All days', 'Work days', and 'Weekends'. Further down, there is a section for 'every 1 weeks' with a dropdown for 'Effective from' which is currently unchecked. At the bottom left are links for 'Add another schedule' and 'Show calendar'. At the bottom right are 'Cancel' and 'Next' buttons.

Monthly or Yearly Backup

To run the job monthly or yearly, choose **Monthly/yearly** from the schedule drop-down list and do the following:

- Specify the job start schedule in the appropriate boxes.
- Specify the day and month when the job should be started in the **Run every** boxes.
- Specify the time when the job should be started in the **Starting** box.
- Specify the end time for the job in the **Ending** box. If the job has not completed by the time specified, the job will be stopped.
- If necessary, select the **Effective from** checkbox and pick the date when the schedule comes into effect.

The screenshot shows the 'Use New Scheduler' dialog box with the 'Run monthly/yearly' option selected. The 'Do not schedule, run on demand' checkbox is unchecked. The time zone is '(UTC+02:00, EET) Eastern European Time'. Under 'Schedule #1', the dropdown is set to 'Run monthly/yearly'. Below this, the 'Run every' section has three dropdowns: 'last', 'Friday', and 'of every month'. Below these are input fields for 'Starting at: 0:00' and 'Ending: 6:00'. The 'Effective from' checkbox is unchecked. At the bottom left are links for 'Add another schedule' and 'Show calendar'. At the bottom right are 'Cancel' and 'Next' buttons.

Periodic Backup

To run the job multiple times per day, choose **Run periodically** from the schedule drop-down list and then choose a time period from the appropriate boxes:

- Specify the time when the job should be started in the **Starting** box.
- Specify the end time for the job in the **Ending** box. If the job has not completed by the time specified, the job will be stopped.
- Select the days of the week during which the job will be started.
- If necessary, select the **Effective from** checkbox and pick the date when the schedule comes into effect.

The screenshot shows the 'Use New Scheduler' dialog box. At the top is a blue button labeled 'Use New Scheduler'. Below it is a checkbox 'Do not schedule, run on demand' which is unchecked. A dropdown menu shows '(UTC+02:00, EET) Eastern European Time'. Under 'Schedule #1', there is a dropdown 'Run periodically', followed by 'every 30 minutes'. There are input fields for 'Starting at: 0:00' and 'Ending: 6:00'. Below these are checkboxes for days of the week: MO, TU, WE, TH, FR, SA, and SU. The 'All days' tab is selected. There is an 'Effective from' checkbox which is unchecked. At the bottom left are links 'Add another schedule' and 'Show calendar'. At the bottom right are 'Cancel' and 'Next' buttons.

Chained Job

To run the job after a previous one has completed, choose **Run after another job** from the schedule drop-down list and set the options as follows:

- **After the job:** Select a job after which the current job will be started.
- **Run this job:** Choose whether to run the current job immediately after the previous one has completed or within a delay.
- **After successful runs:** If selected, the job will run if the previous one has completed successfully.
- **After failed runs:** If selected, the job will run if the previous one has failed.
- **After stopped runs:** If selected, the job will run if the previous one has been stopped.
- **Effective from:** If selected, the schedule will come into effect on the date picked.

The screenshot shows the 'Use New Scheduler' dialog box configured for a chained job. The 'Do not schedule, run on demand' checkbox is unchecked. The time zone dropdown shows '(UTC+02:00, EET) Eastern European Time'. Under 'Schedule #1', the dropdown is set to 'Run after another job'. Below it, the 'After the job:' dropdown shows 'EC2 backup job'. The 'Run this job:' dropdown is set to 'Immediately'. There are three checkboxes: 'After successful runs' (checked), 'After failed runs' (unchecked), and 'After stopped runs' (unchecked). The 'Effective from' checkbox is unchecked. At the bottom left are links 'Add another schedule' and 'Show calendar'. At the bottom right are 'Cancel' and 'Next' buttons.

Tape Backup Wizard: Retention

Important

This page is not displayed if the new scheduler is enabled.

Specify how many recovery points you need to be copied by the job. Use the following options:

- **Keep all recovery points forever:** When this option is selected, the job keeps all available recovery points until they are manually removed. To set a different retention policy, deselect this option and choose one of the options below.
- **Keep X last recovery points:** Keeps the specified number of last recovery points for each machine in the job.
- **Keep one recovery point per day for X days:** Keeps one last recovery point per day for the specified number of days.
- **Keep one recovery point per week for X weeks:** Keeps the last available backup of every week for the specified number of weeks.
- **Keep one recovery point per month for X months:** Keeps the last available backup of every month for the specified number of months.
- **Keep one recovery point per year for X years:** Keeps the last available backup of every year for the specified number of years.

New Backup Copy Job Wizard

1. Backups 2. Destination 3. Schedule 4. Retention 5. Options

☐ Keep all recovery points forever

☒ Keep 10 last recovery points

☐ Keep one recovery point per day for 10 days

☐ Keep one recovery point per week for 4 weeks

☐ Keep one recovery point per month for 12 months

☐ Keep one recovery point per year for 3 years

[Learn more](#)

Next Cancel

For an example of job retention settings and further explanation, refer to the [Keeping Recovery Points](#) Knowledge Base article.

Tape Backup Wizard: Options

On the **Options** page of the wizard, you can name the job and enable/disable network acceleration and encryption. In addition, you can set up pre and post actions and enable bandwidth throttling.

- [Job Options](#)
 - [Job Name](#)
 - [Job Priority](#)
 - [Network Acceleration](#)
 - [Data Encryption](#)
- [Tape Backup Settings](#)
 - [Create Full Backup](#)
 - [Tape Appending](#)
- [Pre and Post Job Actions](#)
 - [Email Notifications](#)
 - [Pre Job Script](#)
 - [Post Job Script](#)
- [Data Transfer](#)
 - [Bandwidth Throttling](#)
 - [Bottleneck Detection](#)
- [Completing Tape Backup Wizard](#)

Job Options

In this section, you can give a name to the tape backup job and enable/disable app-aware mode, change tracking, network acceleration, and encryption.

New Backup Copy Job Wizard

1. Backups 2. Destination 3. Schedule 4. Retention 5. Options

Job Options

Job name: Backup copy job

Job priority: 5

Network acceleration: Disabled

Network encryption: Disabled

Tape Backup Settings

Create full backup: Job runs # 5

☐ If a full backup fails, create a full backup on the next job run

Tape appending: Append previous tape, if possible

Pre and Post Actions

☒ Send job run reports to admin@nakivo.com

☐ Run local pre job script

☐ Run local post job script

Data Transfer

Bandwidth throttling: Disabled

☐ Bottleneck detection

Cancel Finish Finish & Run

Job Name

Specify a name for the tape backup job in the **Job name** box.

Job Priority

Select a job priority level between 1 and 5, with 1 being the highest priority. Jobs with higher priority levels are prioritized by Transporters during job processing.

Note

- This option is only available in the Enterprise, Enterprise Essentials, Enterprise Plus, MSP Enterprise, and MSP Enterprise Plus editions.
- If a tape backup job contains multiple backup objects, setting its **Job Priority** to 1 does not necessarily mean that the job will finish before lower priority jobs. This is because backup objects in Tape backup jobs are processed one by one, meaning that a Transporter is released after processing a given backup object. After the target tape cartridge for a subsequent backup object is found, a Transporter is assigned to the backup object with the highest priority.

Network Acceleration

Once Network Acceleration is enabled, NAKIVO Backup & Replication will use compression and traffic reduction techniques to speed up data transfer. Select this option if you are backing up over WAN without a VPN connection. For more information, refer to [Network Acceleration](#). If the source backup is already compressed, it is recommended to enable Network Acceleration and make sure that the source Backup Repository and target tape device have the same compression level. For more information, see [this article](#).

Data Encryption

If the **Encryption** option is selected, backup data will be protected with AES 256 encryption while traveling over the network. Data encryption increases the backup time and CPU load on machines running Transporters. Select this option if you back up over WAN without a VPN connection. For more information, refer to [“Encryption in Flight and at Rest” on page 44](#).

Note

You need at least one Transporter at the source and target sites to enable encryption.

Tape Backup Settings

In this section, select when you want the system to create full backups and set up the rules for data appending.

New Backup Copy Job Wizard

1. Backups 2. Destination 3. Schedule 4. Retention 5. Options

Job Options

Job name:

Job priority: ⓘ

Network acceleration: ⓘ

Network encryption: ⓘ

Tape Backup Settings

Create full backup: ⓘ

☐ If a full backup fails, create a full backup on the next job run ⓘ

Tape appending: ⓘ

Pre and Post Actions

☒ Send job run reports to ⓘ

☐ Run local pre job script ⓘ

☐ Run local post job script ⓘ

Data Transfer

Bandwidth throttling: ⓘ

☐ Bottleneck detection ⓘ

Creating Full Backup

With the **Create full backup** list, you can specify how often the system should perform a full (not incremental) backup to tape. The following options are available:

- **Always:** Every backup will be full
- **Every:** Select a day of the week. The full backup will be performed once a week on a specified day
- **Every 2nd:** Select a day of the week. The full backup will be performed once in 2 weeks on a specified day
- **First:** Select a day of the week. The full backup will be performed once per month starting with the first specified day of the month
- **Second:** Select a day of the week. The full backup will be performed once per month starting with the second specified day of the month
- **Third:** Select a day of the week. The full backup will be performed once per month starting with the third specified day of the month
- **Fourth:** Select a day of the week. The full backup will be performed once per month starting with the fourth specified day of the month
- **Last:** Select a day of the week. The full backup will be performed once per month starting with the last specified day of the month
- **Day #:** Select the day number. The full backup will be performed once per month on the specified day number
- **Job runs #:** Specify the number of backup jobs to pass before running a full backup

With the **If a full backup fails, create a full backup on the next job run** option selected, the next job run creates a full backup if the current job run fails to do so.

Note

Only **Always** and **Job runs #** options are always available for selection. The rest of the options' availability depends on the scheduling settings specified on the Schedule page.

Tape Appending

The **Tape appending** feature allows you to set up the rules for data appending. The following options are available:

- **Append previous tape if possible:**
 - The job run appends data to the last tape cartridge.
 - If the tape cartridge that was last written during the last job run is not available in the device or is full, the job starts with an empty cartridge:
 - All job objects within the job run are written to the selected tape cartridge one by one.
 - If the selected tape cartridge runs out of space, the next empty tape cartridge is selected and the process repeats until all job objects are written.
- **Start full backup with an empty tape:**
 - In case the backup modes of all job objects within the job run are defined as **full**:
 - The job run starts with an empty tape cartridge.
 - All job objects within the job run are written to the selected tape cartridge one by one.
 - If the selected tape cartridge runs out of space, the next empty tape cartridge is selected and the process repeats until all job objects are written.
 - In case the backup modes of all job objects within the job run are defined as **incremental**:
 - The job run appends data to the last tape cartridge.
 - All job objects within the job run are written to the selected tape cartridge one by one.
 - If the selected tape cartridge runs out of space, the next empty tape cartridge is selected and the process repeats until all job objects are written.
 - In case the backup modes of all job objects within the job run are defined as a **mix of full and incremental** modes:
 - The job run appends data to the last tape cartridge.
 - All job objects within the job run are written to the selected tape cartridge one by one.
 - If the selected tape cartridge runs out of space, the next empty tape cartridge is selected and the process repeats until all job objects are written.
- **Always start with an empty tape:**

- The job starts with an empty tape cartridge.
- All job objects within the job run are written to the selected tape cartridge one by one.
- In case the selected tape cartridge runs out of space, the next empty tape cartridge is selected and the process repeats until all job objects are written.

Pre and Post Job Actions

NAKIVO Backup & Replication provides you with the ability to enable certain actions before a tape backup job begins and after it has completed. You can choose to send job run reports to the email provided and run local [pre and post job scripts](#).

New Backup Copy Job Wizard

1. Backups 2. Destination 3. Schedule 4. Retention 5. Options

Job Options

Job name: Backup copy job

Job priority: 5 ⓘ

Network acceleration: Disabled ⓘ

Network encryption: Disabled ⓘ

Tape Backup Settings

Create full backup: Job runs # 5 ⓘ

☐ If a full backup fails, create a full backup on the next job run ⓘ

Tape appending: Append previous tape, if possible ⓘ

Pre and Post Actions

☒ Send job run reports to admin@nakivo.com ⓘ

☐ Run local pre job script ⓘ

☐ Run local post job script ⓘ

Data Transfer

Bandwidth throttling: Disabled ⓘ

☐ Bottleneck detection ⓘ

Cancel Finish Finish & Run

Email Notifications

NAKIVO Backup & Replication can send email notifications on job completion status to specified recipients. This feature complements global notifications and provides you with the ability to configure notifications on a per-job level.

To enable this option, configure your [Email settings](#).

To send email notifications, do the following:

- In the *Pre- and Post- Actions* section, select the **Send job run reports to** option and specify one or more email addresses in the text box. Separate multiple email addresses with a semicolon.

Pre Job Script

To run a script before the product begins copying backups, do the following:

1. Place a script file on the machine on which the Director is installed.
2. In the *Pre and Post Actions* section, select the **Run local pre job script** option and click the **settings** link. Specify the following parameters in the dialog that opens:
 - **Script path:** Specify a local path to the script on the machine on which the Director is installed. Script interpreter should be specified.
Example (Windows): `cmd.exe /c D:\script.bat`
Example (Linux): `bash /root/script.sh`
 - **Job behavior:** Choose either of the following job behaviors in relation to script completion:
 - **Wait for the script to finish:** If this option is selected, tape backup will not be started until the script is completed.
 - **Do not wait for the script to finish:** If this option is selected, the product will run the script and will start copying backups at the same time.
 - **Error handling:** Choose either of the following job behaviors in relation to script failure:
 - **Continue the job on script failure:** If this option is selected, the job will perform tape backup even if the script has failed.
 - **Fail the job on script failure:** If this option is selected and the script fails, the job will be failed and tape backup will not be performed.

Post Job Script

To run a script after the product has finished copying all backups, do the following:

1. Place a script file on the machine on which the Director is installed.
2. In the *Pre and Post Actions* section, select the **Run local post job script** option and click the **settings** link. Specify the following parameters in the dialog box that opens:

- **Script path:** Specify a local path to the script on the machine on which the Director is installed. Script interpreter should be specified.
Example (Windows): `cmd.exe /c D:\script.bat`
Example (Linux): `bash /root/script.sh`
- **Job behavior:** Choose either of the following job behaviors in relation to script completion:
 - **Wait for the script to finish:** If this option is selected, the job will be in the “running” state until the script is completed.
 - **Do not wait for the script to finish:** If this option is selected, the job will be completed even if the script execution is still in progress.
- **Error handling:** Choose either of the following job behaviors in relation to script failure:
 - **Continue the job on script failure:** If this option is selected, script failure will not influence the status of the job.
 - **Fail the job on script failure:** If this option is selected and the script has failed, the job status will be set to “failed” even if VM backup has been successful.

Important

Pre and post job scripts can be executed only on the machine where the Director is installed.

Data Transfer

In the *Data Transfer* section of the Options page, you can configure [bandwidth throttling](#).

New Backup Copy Job Wizard

1. Backups

2. Destination

3. Schedule

4. Retention

5. Options

Job Options

Job name:

Backup copy job

Job priority:

5

Network acceleration:

Disabled

Network encryption:

Disabled

Tape Backup Settings

Create full backup:

Job runs #

5

☐ If a full backup fails, create a full backup on the next job run

Tape appending:

Append previous tape, if possible

Pre and Post Actions

☒ Send job run reports to

admin@nakivo.com

☐ Run local pre job script

☐ Run local post job script

Data Transfer

Bandwidth throttling:

Disabled

☐ Bottleneck detection

Cancel

Finish

Finish & Run

Bandwidth Throttling






Follow the steps below to regulate the speed of data transfer over the network for your tape backup job:

1. For the **Bandwidth throttling** option, choose **Enabled**.

Note

If bandwidth throttling is disabled for the current job, global bandwidth rules may still apply to your job. Refer to [“Bandwidth Throttling” on page 331](#) for details.

2. Click the **Settings** link that becomes available.
3. The *Job Bandwidth Rules* dialog box opens displaying you the list of available rules. You have the following options:
 - Create a new bandwidth rule for your tape backup job:
 1. Click the **Create New Rule** button.
 2. The *New Bandwidth Rule* dialog box opens. Refer to [“Bandwidth Throttling” on page 331](#) for details on creating a bandwidth rule.
 3. Click **Save**.
 - Activate an existing bandwidth rule for your job. Select the checkbox to the left of the necessary bandwidth rule. To deactivate a bandwidth rule for your job, clear the corresponding checkbox.
 - Edit a bandwidth rule. Click the **Edit** link for a bandwidth rule and modify it in the *Edit Bandwidth Rule* dialog box that opens.
 - Disable a bandwidth rule. Click the **Disable** link. The bandwidth rule will be disabled for all jobs.
 - Remove a bandwidth rule. Click the **Remove** link and then click **Delete** to confirm your operation.

Job Bandwidth Rules				
 Search				
	Rule Name	Limit	Schedule	Status
<input checked="" type="checkbox"/>	 BS19804 Rule	10 Mbit/s	None	Active
<input checked="" type="checkbox"/>	 BS19805 Rule	5 Mbit/s	2:00 on MON, TUE	Waiting on schedule
<input checked="" type="checkbox"/>	 BS19805 Rule2	7 Mbit/s	2:00 on WED, THU	Active
<input checked="" type="checkbox"/>	 BS19805 Rule3	9 Mbit/s	2:00 on FRI	Waiting on schedule
<div>Create New Rule</div>				

Bottleneck detection

When the **Bottleneck detection** option is enabled, additional information is collected and recorded in NAKIVO Backup & Replication logs in the course of data transfer for the purpose of bottleneck detection. Check this option to enable the **Bottleneck detection** capability of the physical machine agent engaged in the job.

Completing Tape Backup Wizard

Click **Finish** or **Finish & Run** to complete the job creation.

Note

If you click **Finish & Run**, you will have to define the scope of your job. Refer to [“Running Jobs on Demand” on page 295](#) for details.

Deleting Backups

With NAKIVO Backup & Replication, you can permanently delete a backup with all of its recovery points if this backup is available in a Backup Repository. You can also delete specific recovery points in a backup without affecting any of the other recovery points. The option to delete a specific recovery point can be used if you get an alert about corrupted recovery points in a backup.

Note

You can delete a backup only if you have deleted the corresponding backup job or edited the backup job to not include the backup's source VM or physical machine.

Refer to one of the following sections:

- [Deleting a Single Backup](#)
- [Deleting Backups in Bulk](#)
- [Deleting Recovery Points](#)
 - [Deleting a Single Recovery Point](#)
 - [Bulk Recovery Points Deletion](#)

Deleting a Single Backup

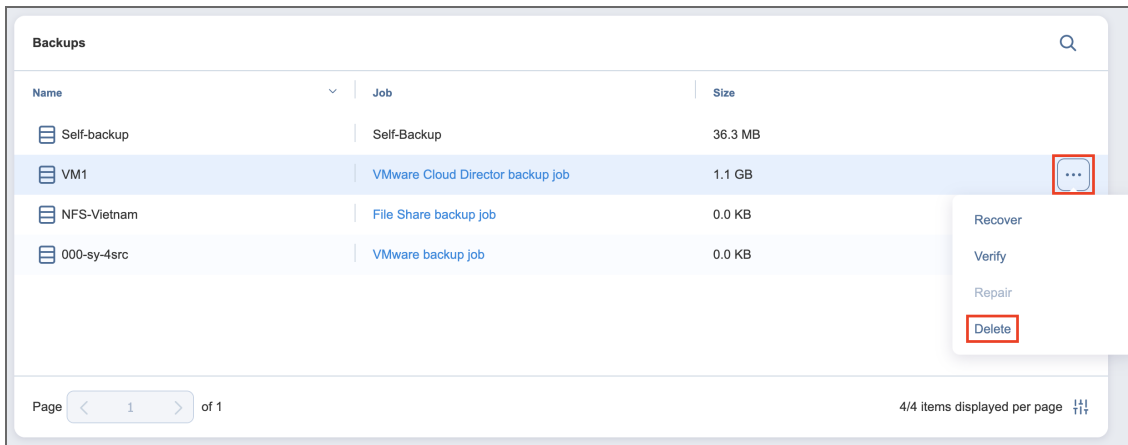
To delete a backup permanently, follow the steps below:

1. In the main menu, click **Settings**.
2. Go to the **Repositories** tab and click the Backup Repository you need.
3. Hover over the backup you want to delete, and on the right side, click **Delete**.
4. Click **Delete** in the dialog box that opens.

Note

For a **Forever-incremental** Backup Repository (that is, when the **Store backups in separate files** option is not selected), the space that was occupied by the deleted backup is marked “free” and reused by new data blocks on subsequent job runs. However, the actual size of the Backup Repository may not change. To free up the space that was occupied by the deleted backup, you can [reclaim the free space](#).

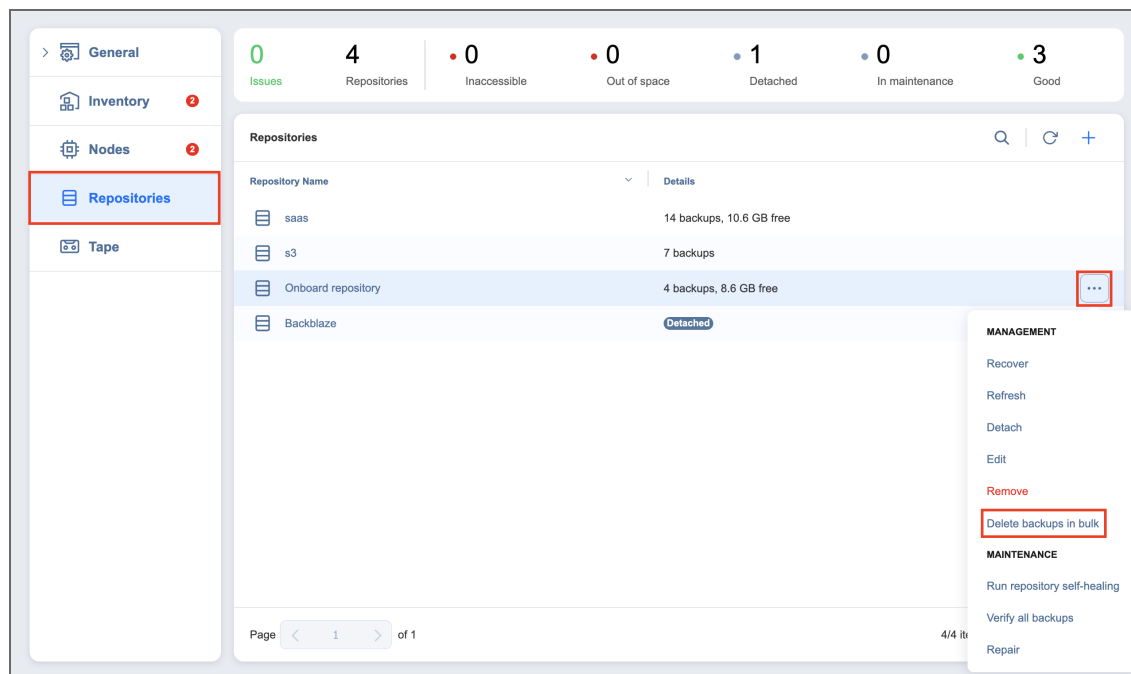
For SaaS Backup Repositories, manually removing backup data may not return space to the operating system correctly.



Deleting Backups in Bulk

To permanently delete several backups that match specific criteria, follow the steps below:

1. In the main menu, click **Settings**.
2. Go to the **Repositories** tab and hover over the Backup Repository you need.
3. Click the ellipsis **Manage** button and then click **Delete backups in bulk**.



4. In the **Bulk Delete Backup** dialog box that opens, select one of the available options:
 - **All backups not belonging to any job**
 - **All backups not belonging to any job and older than X <time_units>**, where X is an integer and <time_units> is either days, weeks, or months

The dialog shows the number of backups to be deleted.

Bulk Delete Backups

Please select what items must be deleted:

☒ All backups not belonging to any job
 ☐ All backups not belonging to any job and older than

☐ All recovery points older than
☐ All corrupted recovery points
 ☐ All missing recovery points


2 backups will be deleted.


[Learn More](#)
[Next](#)

- Click **Next**.
- The **Bulk Delete Backups** dialog box opens displaying the list of backups to be deleted. Click **Delete** to confirm the deletion of backups.

Bulk Delete Backups

The following 2 backups will be deleted:

 24

 AS-NBR10-multi

[Learn more](#)
[Back](#)
[Delete](#)

Note

For a **Forever-incremental** Backup Repository (that is, when the **Store backups in separate files** option is not selected), the space that was occupied by the deleted backup is marked “free” and reused by new data blocks on subsequent job runs. However, the actual size of the Backup Repository may not change. To free up the space that was occupied by the deleted backup, you can [reclaim the free space](#).

For SaaS Backup Repositories, manually removing backup data may not return space to the operating system correctly.

Deleting Recovery Points

You can delete a single recovery point, all corrupted recovery points, or all recovery points older than a specified number of days.

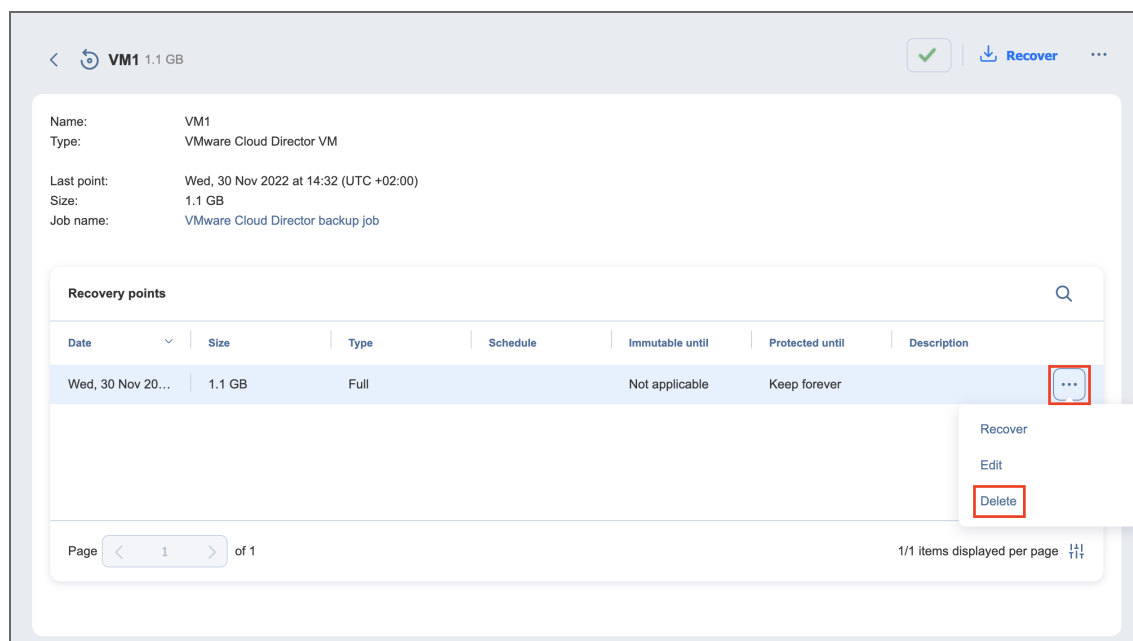
Note

1. If a backup is used by a VM/EC2 instance/physical machine backup job, you cannot delete the last recovery point in that backup.
2. A recovery point cannot be deleted while the source VM/EC2 instance/physical machine backup job is running.

Deleting a Single Recovery Point

To delete a single recovery point in response to a corruption alert or for functional requirements, do the following:

1. In the main menu, click **Settings**.
2. Go to the **Repositories** tab and click the Backup Repository you need.
3. Click the backup with the recovery point you want to delete.
4. Hover over the recovery point that you want to delete, and on the right side, click **Delete**.



5. Click **Delete Recovery Point** in the message box that opens.

Note

For a **Forever-incremental** Backup Repository (that is, when the **Store backups in separate files** option is not selected), the space that was occupied by the deleted recovery point is marked “free” and reused by new data blocks on subsequent job runs. However, the actual size of the Backup Repository may not change. To free up the space that was occupied by the deleted recovery point, you can [reclaim the free space](#).

Bulk Recovery Points Deletion

1. In the main menu, click **Settings**.
2. Go to the **Repositories** tab and click the Backup Repository you need.
3. Click **Manage** and then click **Delete backups in bulk**.
4. In the **Bulk Delete Backups** dialog box that opens, select criteria for recovery points to be deleted:
 - **All recovery points older than X** <time_units>, where X is an integer and <time_units> is either days, weeks, or months. When selected, the recovery points that are older than the specified time interval are deleted.

Note

The following deletion exclusions are applicable:

- For **Forever-incremental** repositories (that is, when the **Store backups in separate files** option is not selected): If all recovery points of a backup match the deletion criteria, the latest recovery point – whether corrupted or not – is not deleted.
- For **Incremental-with-full-backups** repositories (that is, when the **Store backups in separate files** option is selected):
 - Recovery points that are older than the end of the time interval that have dependent recovery points that are newer than the beginning of the time interval are not deleted.
 - If all recovery points in a backup match the deletion criteria, the latest full recovery point – whether corrupted or not – is not deleted.
- **All corrupted recovery points**: When this option is selected, all recovery points that are corrupted are deleted. Recovery point selection criteria include the following:
 - For **Forever-incremental** repositories (that is, when the **Store backups in separate files** option is not selected), if a backup is used by a backup job and all its recovery points are corrupted, the latest recovery point is not deleted.

- For **Incremental-with-full-backups** repositories (that is, when the **Store backups in separate files** option is selected), this option also deletes all recovery points that are dependent on corrupted recovery points. If all recovery points in a backup are corrupted or depend on a corrupted recovery point and match the deletion criteria, the latest full recovery point is not deleted.

Note

This option is not available for Microsoft 365 backups.

- **All missing recovery points:** When selected, all missing recovery points are deleted. Recovery point selection criteria include the following:
 - For **Forever-incremental** repositories (that is, when the **Store backups in separate files** option is not selected), this option deletes all missing recovery points. If all recovery points in a backup are missing, the latest recovery point is not deleted.
 - For **Incremental-with-full-backups** repositories (that is, when the **Store backups in separate files** option is selected), this option deletes all missing recovery points and any recovery points that are dependent on them. If all recovery points in a backup are missing or depend on missing recovery points, the latest full recovery point is not deleted.

The dialog box shows the number of recovery points to be deleted.

Bulk Delete Backups

Please select what items must be deleted:

☐ All backups not belonging to any job
☐ All backups not belonging to any job and older than
☒ All recovery points older than
☐ All corrupted recovery points
☐ All missing recovery points

1 recovery points will be deleted.

[Learn More](#)

5. The **Bulk Delete Recovery Points** dialog box opens displaying the list of recovery points to be deleted. Click **Delete** to confirm deleting the recovery points.

Bulk Delete Recovery Points

The following 1 recovery points will be deleted:



24

Wed, 22 Dec 2021 at 19:55 (UTC +02:00)

[Learn more](#)

Back

Delete

Staging (Seeding) Initial Backup

Since initial backups are often large, the first backup job run can be slow and time-consuming when done over WAN, and it can also put an undesirable load on the network when done over LAN. To speed up the initial backup and save network bandwidth, you can perform a staged backup (seed backups): run the initial backup on a removable media device (such as an external USB hard drive), transfer the media to a new location, and then run an incremental backup to the new location.

To perform a staged backup, follow the steps below:

1. [Create a new Backup Repository](#).
2. Create and run a new backup job.
3. After the job has completed, [move the Backup Repository](#) to a new location.
4. If required, [edit the backup job](#) and specify a schedule for the backup job.

Replication

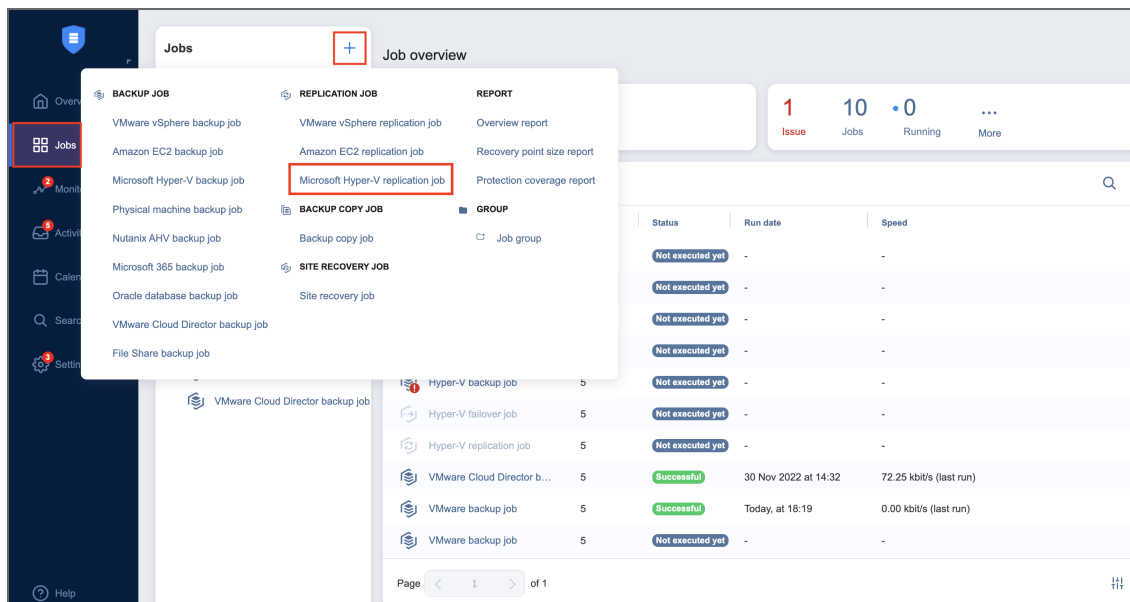
With NAKIVO Backup & Replication, you can perform replication of virtual machines. Replication creates and maintains an identical copy of the source VM at the target location.

Refer to the following topics for more information:

- [“Creating Hyper-V Replication Jobs” on page 719](#)
- [“Staging \(Seeding\) VM Replication” on page 750](#)

Creating Hyper-V Replication Jobs

With NAKIVO Backup & Replication, you can replicate Hyper-V VMs using the workflow with a broad range of options. To create a replication job, click the plus **Create** button in the **Jobs** menu and then click **Microsoft Hyper-V replication job**.



The **New Replication Job Wizard for Microsoft Hyper-V** opens. Complete the wizard to create a replication job.

- [“Replication Job Wizard for Hyper-V: Source” on page 720](#)
- [“Replication Job Wizard for Hyper-V: Destination” on page 724](#)
- [“Replication Job Wizard for Hyper-V: Networks” on page 730](#)
- [“Replication Job Wizard for Hyper-V: Re-IP” on page 732](#)
- [“Replication Job Wizard for Hyper-V: Schedule” on page 734](#)
- [“Replication Job Wizard for Hyper-V: Retention” on page 738](#)
- [“Replication Job Wizard for Hyper-V: Options” on page 739](#)

Replication Job Wizard for Hyper-V: Source

On the **Source** page in the wizard, you can add Hyper-V items to your replication using one of the inventory views. Proceed as described in these sections:

- [Hosts and Clusters](#)
- [Jobs and Groups](#)
- [Backup Repositories](#)
- [Policy](#)

Host and Clusters

When the **Host & Clusters** view is selected, the inventory tree opens in the left pane and shows you all Hyper-V items: servers, clusters, and VMs. Proceed as follows:

1. Optionally, you can filter the inventory tree by entering a string into the **Search** box. You can enter a part of or the entire name of the item.
2. Select Hyper-V items by selecting the checkbox next to the item.
3. The selected items appear in the right pane of the page. You can reorder the selected items by dragging a VM or a container with the pointer to a new position. By doing that, you can specify to replicate the most important VMs first.
4. Review the list of selected Hyper-V items. You can remove a selected VM or a container from the replication job in one of the following ways:
 - Deselect the item in the left pane. This will remove the item from the right pane.
 - In the right pane, hover the pointer over the item you want to remove and click the “x” on the right. This will deselect the item in the left pane.

5. Click **Next** to confirm adding selected VMs to the replication job.

New Replication Job Wizard for Microsoft Hyper-V

1. Source 2. Destination 3. Networks 4. Re-IP 5. Schedule 6. Retention 7. Options

View: Hosts & Clusters

Search

ServerHV2012

- ☐ Centos2012
- ☒ NA_Ubuntu
- ☐ SD_test
- ☒ ubuntu-forquis
- ☒ ubuntu-forquis-replica
- ☐ Win2008

NA_Ubuntu
ServerHV2012 > ServerHV2012

ubuntu-forquis-replica
ServerHV2012 > ServerHV2012

ubuntu-forquis
ServerHV2012 > ServerHV2012

License expires in 2 months 16 days

Drag items to set processing priority

Cancel Next

Jobs and Groups

When the **Jobs & Groups** view is selected, the inventory tree shows groups, jobs, and backups of the appropriate hypervisor. Proceed as described for the **Hosts & Clusters** view above.

New Replication Job Wizard for Microsoft Hyper-V

1. Backups 2. Destination 3. Schedule 4. Retention 5. Options

View: Jobs & Groups

Search

Jobs & Groups

- ☐ Backup copy job
- ☐ EC2 backup job
- ☐ EC2 fallback job
- ☐ EC2 failover job
- ☐ EC2 replication job
- ☐ EC2 replication job2
- ☒ Hyper-V backup job

Centos2012

NA_Ubuntu

ubuntu-forquis

ubuntu-forquis-replica

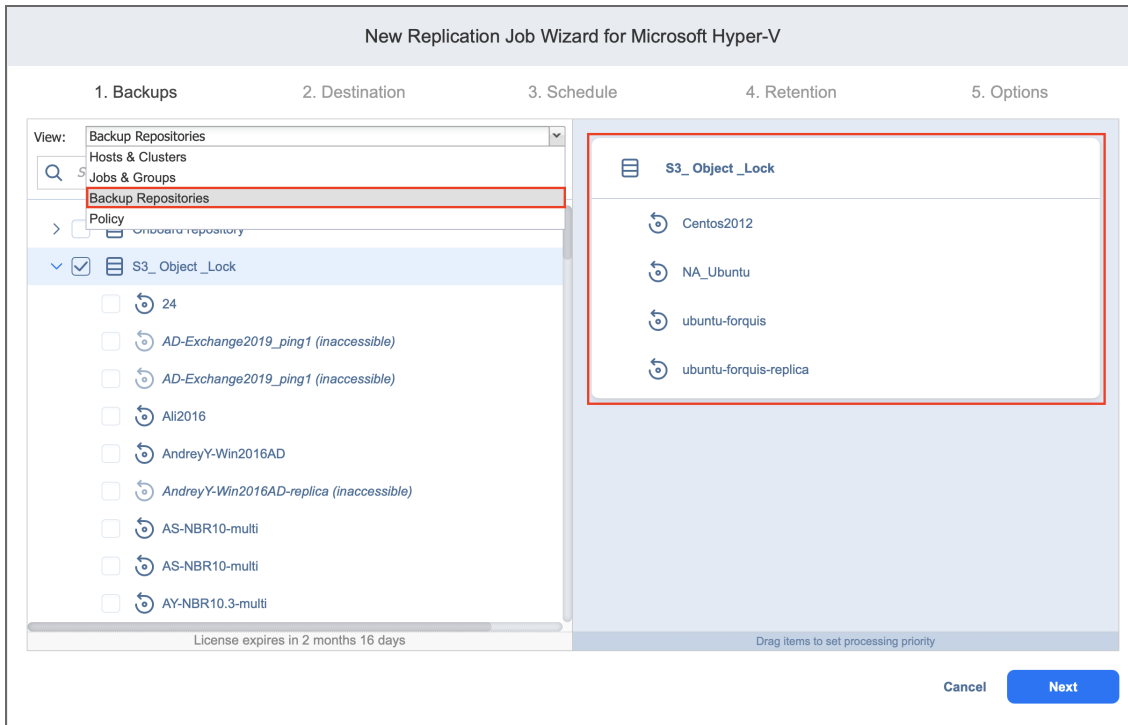
License expires in 2 months 16 days

Drag items to set processing priority

Cancel Next

Backup Repositories

When the **Backup Repositories** view is selected, the inventory tree shows the Backup Repositories that contain backups of the appropriate hypervisor. Proceed as described for the **Hosts & Clusters** view above.



Policy

When the **Policy** view is selected, job policies can be used. Refer to [“Managing Job Policies” on page 309](#) for details. If the items were selected in alternate views, a dialog box opens warning you that switching to the **Policy** view will reset your current selection. Click **Switch View** to confirm switching to the **Policy** view. Make sure that at least one item matches the available set of policy rules. Refer to [“Managing Policy Rules” on page 312](#) for details.

New Replication Job Wizard for Microsoft Hyper-V

1. Source 2. Destination 3. Networks 4. Re-IP 5. Schedule 6. Retention 7. Options

View: Policy
Hosts & Clusters
Jobs & Groups
Backup Repositories
Policy

Include items if ALL rules are matched

Rule #1
Search by: VM name
Which: Contains
Search criteria: win

+ Add rules

License expires in 2 months 16 days

Policy Container
Win2008

Drag items to set processing priority

Cancel Next

Notes

- If you cannot find a VM or a container:
 - Make sure the corresponding Hyper-V server or failover cluster has been added to the [inventory](#).
 - [Refresh the Inventory](#).
- If you add a Hyper-V server or cluster to the job:
 - All VMs currently available in the selected container will be replicated.
 - All new VMs that will be created in (or moved to) the container in the future will be automatically added to the job and replicated.
- If all disks of a VM are unsupported, this VM will be disabled in the inventory tree and it will not be possible to select it. Refer to [“Supported Platforms” on page 120](#) for details.
- The order in which VMs are replicated is important if the Transporter performing replication cannot process all VMs of the job simultaneously — either because the Transporter is processing other jobs at the same time or because the job contains more VM disks than a Transporter’s maximum load specified during the Transporter creation.

Replication Job Wizard for Hyper-V: Destination

On the **Destination** page, select a location for your Hyper-V replicas.

- [Setting the Same Host and Path for All Replicas](#)
- [Setting the Default Destination for Replicas](#)
- [Setting Different Options for Replicas](#)
- [Mapping Source VMs to Existing Replicas](#)
- [Excluding a VM Disk from the Replication Job](#)

Setting the Same Host and Path for All Replicas

To replicate all VMs to the same server and location, and to connect all replicas to the same network:

1. Choose a server from the **Container** drop-down list.
2. Enter a path to the location where you want to store VM replicas in the **Path** field. Optionally, use the **Browse** button to navigate to the path. It can be either a local or shared path.

Notes

To connect to a shared path successfully, make sure that the following requirements are met:

- The shared path is created with the same credentials as the corresponding Hyper-V container.
See [“Adding Microsoft Hyper-V Servers” on page 403](#) for details on adding Hyper-V containers to the inventory of NAKIVO Backup & Replication.
- The logon session in which you created the shared path has not ended. As a workaround, create a symbolic link to the shared path from the Hyper-V container. Refer to Step 7 in [High Availability of NAKIVO Backup & Replication](#) for details.

As a workaround, create a symbolic link to the shared path from the Hyper-V container. Refer to [High Availability of NAKIVO Backup & Replication – Step 7 of the procedure](#),– for an explanation.

3. If you are creating a Replication job from an existing Backup job, select the target network from the **Network** drop-down list. For more details, see [“Replication Job Wizard for Hyper-V: Source” on page 720](#).

The screenshot shows the 'New Replication Job Wizard for Microsoft Hyper-V' window, specifically the '2. Destination' step. The wizard has five steps: 1. Backups, 2. Destination, 3. Schedule, 4. Retention, and 5. Options. The 'Container' dropdown is set to 'Hyper-V test'. The 'Path' field contains 'C:\NakivoReplicas' with a 'Browse...' button next to it. The 'Network' dropdown is set to 'Select target network'. A yellow information box contains the text: 'To use existing VMs as targets, expand the Advanced setup and specify the target VM for each source VM.' Below this box is a link 'Advanced setup...'. At the bottom right, there are 'Cancel' and 'Next' buttons.

Setting the Default Destination for Replicas

If you have chosen a host, cluster, folder, or a resource pool as a source for your replication job on the **Source** wizard page, you can set a default container, datastore, and VM folder for replicas. To do this:

1. Click **Advanced setup** and then click on the name of the chosen host, cluster, folder, or resource pool.
2. Choose a **Default container**.

3. If you have chosen a Backup job on the **Source** page, you can choose a **Default Network**.

New Replication Job Wizard for Microsoft Hyper-V

1. Backups 2. Destination 3. Schedule 4. Retention 5. Options

Container:

Path: [Browse...](#)

Network:

To use existing VMs as targets, expand the Advanced setup and specify the target VM for each source VM.

Hyper-V backup job [Click to collapse](#)

Default container: ⓘ

Default path: [Browse...](#) ⓘ

Default network: ⓘ

[Cancel](#) [Next](#)

Setting Different Options for Replicas

To specify different replication options for VMs, follow the steps below:

1. Click **Advanced setup**.
2. Set a target server, path, and network for each VM.

New Replication Job Wizard for Microsoft Hyper-V

1. Backups 2. Destination 3. Schedule 4. Retention 5. Options

Container: Hyper-V test

Path: C:\NakivoReplicas Browse...

Network: Select target network

1 To use existing VMs as targets, expand the Advanced setup and specify the target VM for each source VM.

Hyper-V backup job Click to collapse

Default container: Hyper-V test

Default path: C:\NakivoReplicas Browse...

Default network: Select default network

SUB_Win2016_Win2008R2 Click to collapse

Source	Target
VM location: Repo7Tb VM resources: 1 CPU, 1.0 GB RAM Disks <input checked="" type="checkbox"/> Hard disk 2: 1.0 GB VM configuration Network adapters Network adapter 1	<input checked="" type="checkbox"/> Use existing target VM Container: Hyper-V test Virtual Machine: A new VM will be created Disks Hard disk 2: C:\NakivoReplicas Browse... VM configuration: C:\NakivoReplicas Browse... Network adapters Network adapter 1: Select target network

SUB_WinSrv2019

Mapping Source VMs to Existing Replicas

If you want to perform [staged replication](#) or if you lose the replication job (due to accidental job deletion or because you need to recreate jobs in a new copy of the product), you can map source VMs to existing replicas to avoid running full VM replication again.

To map source VMs to existing VMs, follow the steps below:

1. Click **Advanced setup**.
2. Select the **Use existing target VM** option.

3. From the **Virtual Machine** drop-down list, select the VM that should be used as a target for replication.

New Replication Job Wizard for Microsoft Hyper-V

1. Backups 2. Destination 3. Schedule 4. Retention 5. Options

Container: Hyper-V test

Path: C:\NakivoReplicas [Browse...](#)

Network: Select target network

Information: To use existing VMs as targets, expand the Advanced setup and specify the target VM for each source VM.

Hyper-V backup job [Click to collapse](#)

Default container: Hyper-V test

Default path: C:\NakivoReplicas [Browse...](#)

Default network: Select default network

SUB_Win2016_Win2008R2 [Click to collapse](#)

Source

VM location: Repo7Tb

VM resources: 1 CPU, 1.0 GB RAM

Disks

☒ Hard disk 2: 1.0 GB

VM configuration

Network adapters

Network adapter 1

Target ☒ Use existing target VM

Container: Hyper-V test

Virtual Machine: NT-Ubuntu-22.04

Disks

Hard disk 2: D:\VM\NT-Ubuntu-22.04\Virtual Hard Disks [Browse...](#)

VM configuration: D:\VM\NT-Ubuntu-22.04 [Browse...](#)

Network adapters

Network adapter 1: EXTERNAL

SUB_WinSrv2019

When you run the job, the product analyzes the target VM you have selected, determines how it is different from the source VM, and transfers only the differential data. VM replication mapping can be a time-consuming process that can be equal to the time required to create a full VM replication. After job completion, a new recovery point is created and existing recovery points are not changed or overwritten.

Excluding a VM Disk from the Replication Job

If you do not want to replicate some disks of a VM, you can exclude those disks from the replication job. Follow the steps below:

1. Click **Advanced setup**.
2. In the VM box, uncheck the disks you want to exclude from the replication job.

New Replication Job Wizard for Microsoft Hyper-V

1. Backups

2. Destination

3. Schedule

4. Retention

5. Options

Container:

Hyper-V test

Path:

Different paths entered

Browse...

Network:

Different networks selected

To use existing VMs as targets, expand the Advanced setup and specify the target VM for each source VM.

Hyper-V backup job

Click to collapse

Default container:

Hyper-V test

Default path:

C:\NakivoReplicas

Browse...

Default network:

Select default network

SUB_Win2016_Win2008R2

Click to collapse

Source

VM location:

Repo7Tb

VM resources:

1 CPU, 1.0 GB RAM

Disks

Hard disk 2:

1.0 GB

VM configuration

Network adapters

Network adapter 1

Target

Use existing target VM

Container:

Hyper-V test

Virtual Machine:

NT-Ubuntu-22.04

Disks

Hard disk 2:

Will not be processed

Browse...

VM configuration:

D:\VM\NT-Ubuntu-22.04

Browse...

Network adapters

Network adapter 1:

EXTERNAL

SUB_WinSrv2019

- 729 -

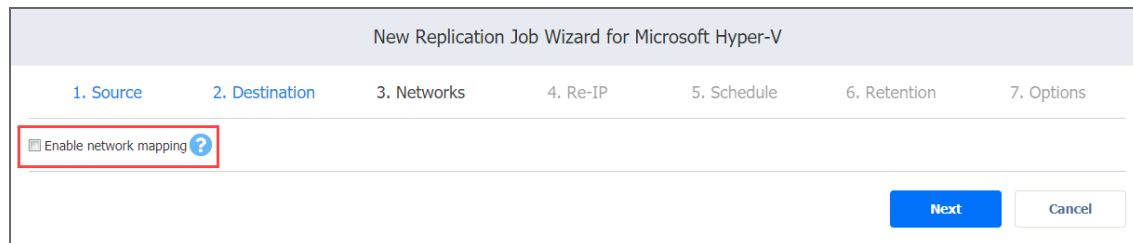
Replication Job Wizard for Hyper-V: Networks

Note

The **Networks** page is skipped if you have chosen an existing backup as the source for your replication job on the **Source** wizard page.

To map source VM virtual networks to appropriate target virtual networks, please do the following on the **Networks** page of the wizard:

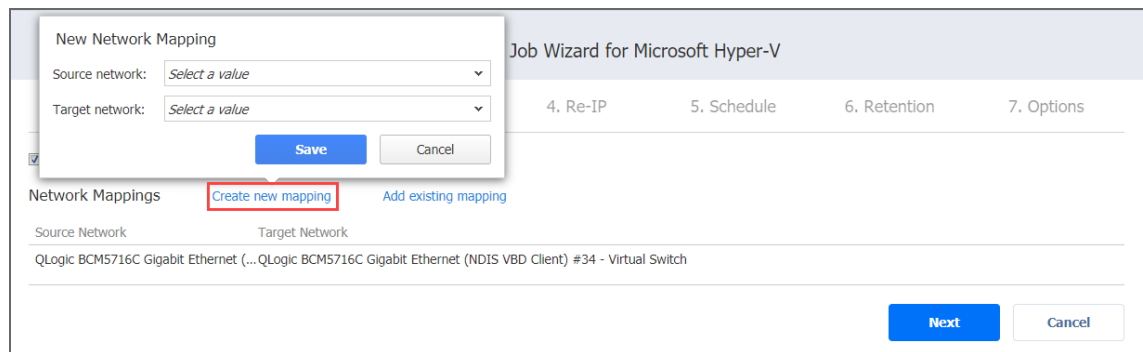
1. Select **Enable network mapping**.



The screenshot shows the 'New Replication Job Wizard for Microsoft Hyper-V' with the '3. Networks' step selected. The 'Enable network mapping' checkbox is checked and highlighted with a red box. The 'Next' button is visible.

2. The **Network Mappings** section opens. You have the following options:

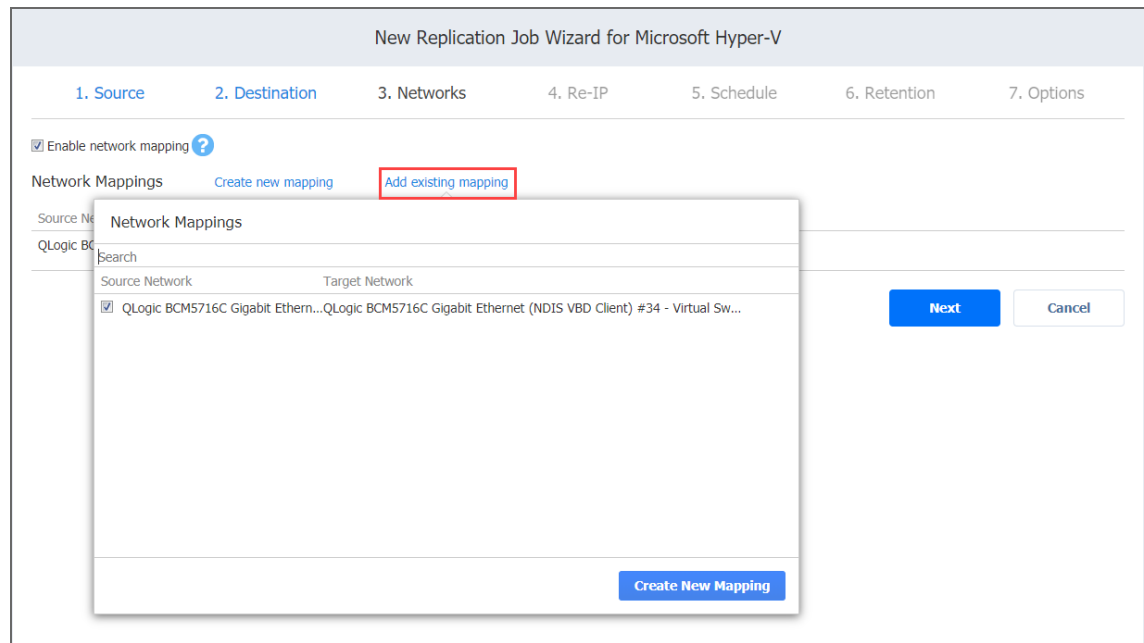
- Create a new mapping:
 - a. Click **Create new mapping**.
 - b. The **New Network Mapping** dialog box opens. Choose a source network and target network and click **Save**.



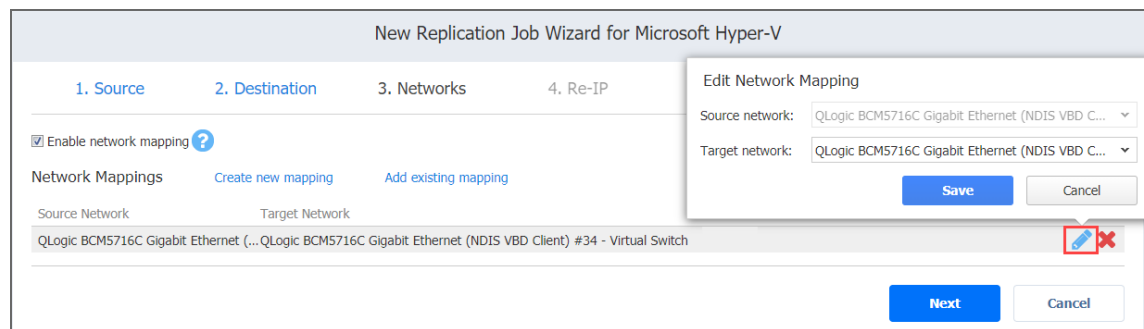
The screenshot shows the 'New Network Mapping' dialog box. The 'Source network' and 'Target network' dropdowns are both set to 'Select a value'. The 'Save' button is highlighted with a red box.

- Add an existing mapping:
 - a. Click **Add existing mapping**.
 - b. The **Network Mappings** dialog box opens. Choose one or more appropriate network

mappings and close the dialog box.



- Edit an existing mapping:
 - a. Hover the pointer over the required item in the **Network Mappings** list and click the **Edit** button to the right of the item.
 - b. The **Edit Network Mapping** dialog box opens. Choose the appropriate item from the **Target network** drop-down list and click **Save**.



- Delete an existing mapping: Hover the pointer over the required item in the **Network Mappings** list and click the delete icon to the right of the item.
3. Click **Next** to go to the next page of the wizard.

Replication Job Wizard for Hyper-V: Re-IP

Notes

- The **Re-IP** page is skipped if you have chosen an existing backup as the target for your replication job on the **Source** page.
- Re-IP Rules enabled for replication jobs are only stubs for failover jobs. They do not work at the replication stage.
- Re-IP rules that are enabled for your replication job can be used for creating the corresponding failover jobs. Refer to [“Failover Job Wizard for Microsoft Hyper-V: Re-IP” on page 858](#) for details.

To enable Re-IP rules for your replication job, do the following on the **Re-IP** page of the wizard:

1. Select **Enable Re-IP**.
2. The **Re-IP Rules** section opens. Click the **Select VMs** link.
3. The **Re-IP** dialog box opens. In the list of your source VMs, select at least one, and close the dialog box.
4. You have the following options:
 - Create a new rule:
 - a. Click **Create new rule**.
 - b. The **New Re-IP Rule** dialog box opens. Enter source and target settings for the Re-IP rule and click **Save**.

New Replication Job Wizard for Microsoft Hyper-V

1. Source 2. Destination 3. Networks 4. Re-IP 5. Schedule 6. Retention 7. Options

☒ Enable Re-IP ? Select VMs

Re-IP Rules **Create new rule** Add existing rule

New Re-IP Rule

Source Settings

IP address: 192.168.1.*

Subnet mask: 255.255.255.0

Target Settings

IP address: 192.168.2.*

Subnet mask: 255.255.255.0

Default gateway: 192.168.2.1

Primary DNS server: 192.168.2.200

Secondary DNS server: 192.168.2.201

DNS suffix: example.com

Save Cancel

The job does not use any Re-IP rules.

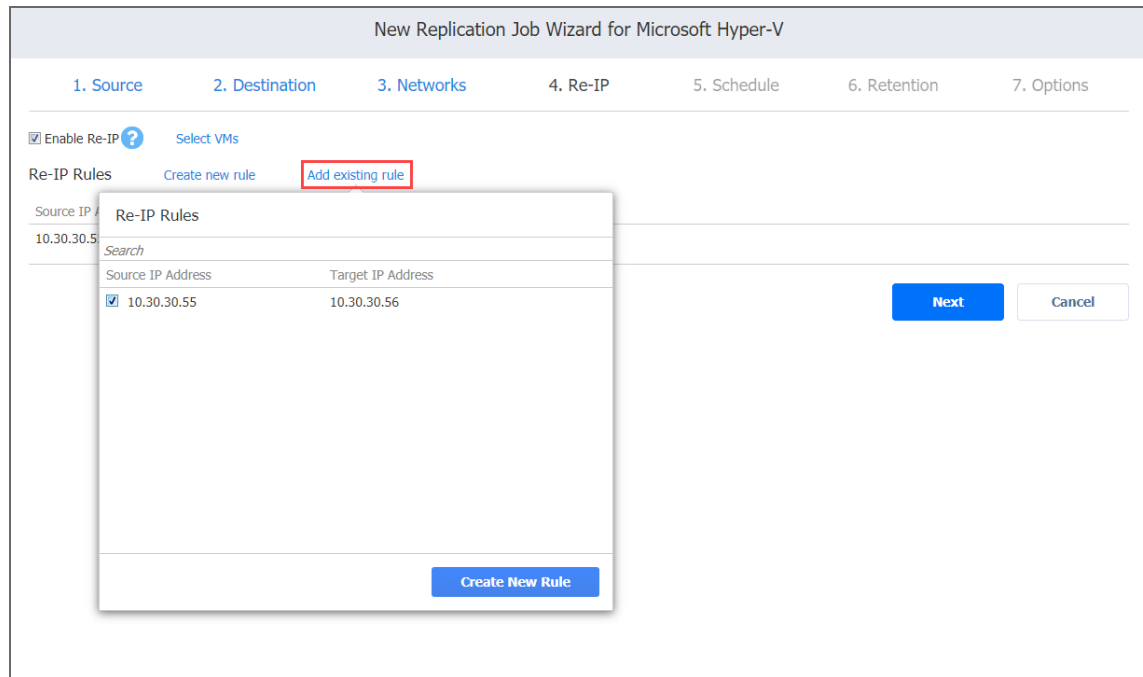
Next Cancel

Note

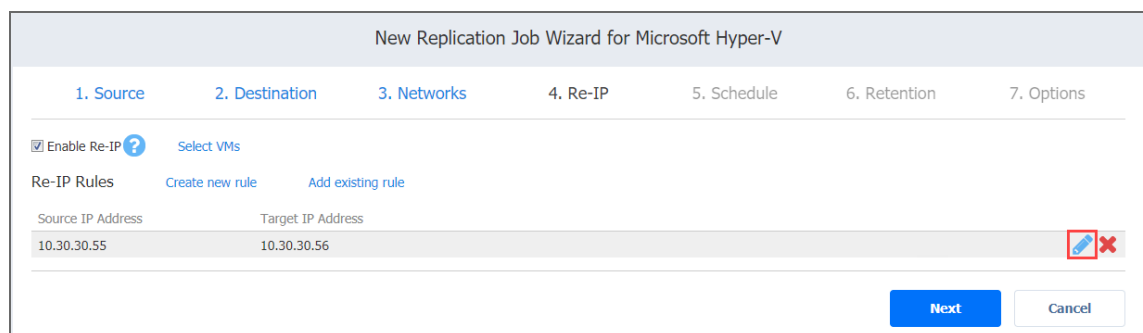
You can use wildcards for IP addresses. Refer to the [“Failover Job Wizard for Microsoft Hyper-V: Re-IP” on page 858](#) for details.

- Add an existing rule:

- a. Click **Add existing rule**.
- b. The **Re-IP Rules** dialog box opens. Select one or more appropriate Re-IP rules and close the dialog box.



- Edit an existing Re-IP rule:
 - a. Hover the pointer over the required item in the **Re-IP Rules** list and click the **Edit** button to the right of the item.
 - b. The **Edit Re-IP Rule** dialog box opens. Edit the required properties of the Re-IP rule and click **Save**.



- Delete an existing mapping: Hover the pointer over the required item in the **Re-IP Rules** list and click the delete icon to the right of the item.
5. Click **Next** to go to the next page of the wizard.

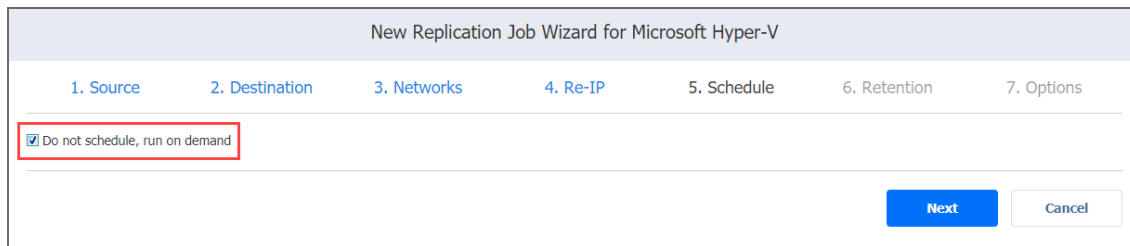
Replication Job Wizard for Hyper-V: Schedule

On the **Schedule** page of the wizard, select to run the backup job manually or schedule the job to run on a regular basis.

- [Disabling Scheduled Job Execution](#)
- [Daily or Weekly Replication](#)
- [Monthly or Yearly Replication](#)
- [Periodic VM Replication](#)
- [Chained Job](#)
- [Additional Schedule](#)

Disabling Scheduled Job Execution

If you wish to start the job manually (without any schedule), select the **Do not schedule, run on demand** checkbox.



New Replication Job Wizard for Microsoft Hyper-V

1. Source 2. Destination 3. Networks 4. Re-IP 5. Schedule 6. Retention 7. Options

☒ Do not schedule, run on demand

Next Cancel

Daily or Weekly Replication

To run the job once a day, choose **Run daily/weekly** from the schedule drop-down list and do the following:

- Choose a time zone that should be used for the job start and end times from the time zone drop-down list.
- Specify the time when the job should be started in the **Starting at** box.
- Specify the end time for the job in the **Ending** box. If the job has not completed by the time specified, the job will be stopped.
- Select the days of the week during which the job will be started.

- If necessary, select the **Effective from** checkbox and pick the date when the schedule comes into effect.

New Replication Job Wizard for Microsoft Hyper-V

1. Source 2. Destination 3. Networks 4. Re-IP 5. Schedule 6. Retention 7. Options

☐ Do not schedule, run on demand

(UTC+02:00, EET) Eastern European Time

Schedule #1

Run daily/weekly

Starting at: 0:00 Ending: 6:00

☒ Mon ☒ Tue ☒ Wed ☒ Thu ☒ Fri ☐ Sat ☐ Sun

All days Work days Weekends

every 1 weeks

☐ Effective from

[Add another schedule](#)

[Show calendar](#)

Next Cancel

Monthly or Yearly Replication

To run the job monthly or yearly, choose **Run monthly/yearly** from the schedule drop-down list and do the following:

- Specify the job start schedule in the appropriate boxes.
- Specify the day and month when the job should be started in the **Run every** boxes.
- Specify the time when the job should be started in the **Starting at** box.
- Specify the end time for the job in the **Ending** box. If the job has not completed by the time specified, the job will be stopped.
- If necessary, select the **Effective from** checkbox and pick the date when the schedule comes into effect.

New Replication Job Wizard for Microsoft Hyper-V

1. Source 2. Destination 3. Networks 4. Re-IP 5. Schedule 6. Retention 7. Options

☐ Do not schedule, run on demand

(UTC+02:00, EET) Eastern European Time

Schedule #1

Run monthly/yearly

Run every last Friday of every month

Starting at: 0:00 Ending: 6:00

☐ Effective from

[Add another schedule](#)

[Show calendar](#)

Next Cancel

Periodic VM Replication

To run the job multiple times per day, choose **Run periodically** from the schedule drop-down list and then choose a time period from the appropriate boxes:

- Specify the time when the job should be started in the **Starting** box.
- Specify the end time for the job in the **Ending** box. If the job has not completed by the time specified, the job will be stopped.
- Select the days of the week during which the job will be started.
- If necessary, select the **Effective from** checkbox and pick the date when the schedule comes into effect.

New Replication Job Wizard for Microsoft Hyper-V

1. Source 2. Destination 3. Networks 4. Re-IP 5. Schedule 6. Retention 7. Options

☐ Do not schedule, run on demand

(UTC+02:00, EET) Eastern European Time

Schedule #1

Run periodically every 30 minutes

Starting at: 0:00 Ending: 6:00

☒ Mon ☒ Tue ☒ Wed ☒ Thu ☒ Fri ☐ Sat ☐ Sun

All days Work days Weekends

☐ Effective from

[Add another schedule](#)

[Show calendar](#)

Next Cancel

Chained Job

To run the job after a previous one has completed, choose **Run after another job** from the schedule drop-down list and set the options as follows:

- **After the job:** Select a job after which the current job will be started.
- **Run this job:** Choose whether to run the current job immediately after the previous one has completed or within a delay.
- **After successful runs:** If selected, the job will run if the previous one has completed successfully.
- **After failed runs:** If selected, the job will run if the previous one has failed.
- **After stopped runs:** If selected, the job will run if the previous one has been stopped.

- **Effective from:** If selected, the schedule will come into effect on the date picked.

New Replication Job Wizard for Microsoft Hyper-V

1. Source 2. Destination 3. Networks 4. Re-IP 5. Schedule 6. Retention 7. Options

☐ Do not schedule, run on demand
(UTC+02:00, EET) Eastern European Time

Schedule #1

Run after another job

After the job: Hyper-V backup job 2

Run this job: Immediately

☒ After successful runs ☐ After failed runs ☐ After stopped runs

☐ Effective from

[Add another schedule](#)
[Show calendar](#)

Next Cancel

Additional Schedule

If you want to have more than one schedule for your job, click **Add another schedule** and set it up as has been described above.

New Replication Job Wizard for Microsoft Hyper-V

1. Source 2. Destination 3. Networks 4. Re-IP 5. Schedule 6. Retention 7. Options

☐ Do not schedule, run on demand
(UTC+02:00, EET) Eastern European Time

Schedule #1

Run after another job

After the job: Hyper-V backup job 2

Run this job: Immediately

☒ After successful runs ☐ After failed runs ☐ After stopped runs

☐ Effective from

Add another schedule
[Show calendar](#)

Next Cancel

Replication Job Wizard for Hyper-V: Retention

NAKIVO Backup & Replication can create a recovery point (snapshot) on the replica VM after each job run. You can specify the number of recovery points to be retained using the Grandfather-Father-Son (GFS) backup rotation scheme.

Up to 30 recovery points in total can be created on a replica VM.

Use the following options to specify a retention policy:

- **Keep x last recovery points:** Retains the specified number of last recovery points for each VM in the job.
- **Keep one recovery point per day for x days:** Retains one last recovery point per day for the specified number of days.
- **Keep one recovery point per week for x weeks:** Retains the last available backup of every week for the specified number of weeks.
- **Keep one recovery point per month for x months:** Retains the last available backup of every month for the specified number of months.
- **Keep one recovery point per year for x years:** Retains the last available backup of every year for the specified number of years.

New Replication Job Wizard for Microsoft Hyper-V

1. Source 2. Destination 3. Networks 4. Re-IP 5. Schedule 6. Retention 7. Options

☒ Keep 10 last recovery points

☐ Keep one recovery point per day for 10 days

☐ Keep one recovery point per week for 4 weeks

☐ Keep one recovery point per month for 12 months

☐ Keep one recovery point per year for 3 years

[Learn more](#)

Next Cancel

Replication Job Wizard for Hyper-V: Options

On the **Options** page of the wizard, set up job options as described in the following sections:

- “Job Options” below
- “Replica Options” on page 743
- “Pre and Post Actions” on page 744
- “Data Transfer” on page 747
- “Completing the New Replication Job Wizard for Microsoft Hyper-V” on page 749

Job Options

In this section, you can specify a name and a priority level for your replication job and enable/disable [app-aware mode](#), change tracking, [network acceleration](#), [encryption](#), [VM verification](#), [excluding swap files](#), partitions and [unused blocks](#).

New Replication Job Wizard for Microsoft Hyper-V						
1. Source	2. Destination	3. Networks	4. Re-IP	5. Schedule	6. Retention	7. Options
Job Options						
Job name:		<input type="text" value="Hyper-V replication job"/>				
Job priority:		<input type="text" value="5"/>				
App-aware mode:		<input type="text" value="Disabled"/>				
Use agent for OS quiescing:		<input type="text" value="Disabled"/>				
Change tracking:		<input type="text" value="Use Hyper-V RCT"/>				
Network acceleration:		<input type="text" value="Disabled"/>				
Network encryption:		<input type="text" value="Disabled"/>				
VM verification:		<input type="text" value="Disabled"/>				
Exclude swap files and partitions:		<input type="text" value="Enabled"/>				
Exclude unused blocks:		<input type="text" value="Enabled"/>				

Job Name

Specify a name for the replication job.

Job Priority

Select a job priority level between 1 and 5, with 1 being the highest priority. Jobs with higher priority levels are prioritized by Transporters during job processing.

Note

This option is only available in the Enterprise, Enterprise Essentials, Enterprise Plus, MSP Enterprise, and MSP Enterprise Plus editions.

App-aware Mode

With the **App-aware mode** option enabled, VM processing is performed using guest OS quiescing to ensure the consistency of application data.

Note

This option is not available for existing backups chosen as the target of replication on the **Source** wizard page.

We recommend reading the support articles about the requirements for App-aware mode:

- [Hyper-V Server configuration](#)
- [Linux and FreeBSD guest OS configuration.](#)

Select one of the following options from the **App-aware mode** drop-down list:

- **Enabled (proceed on error):** In the dialog box that opens, select the checkboxes next to the VMs for which you want to create application-aware replicas, and then select the credentials next to each VM. These credentials will be used to log into the VMs you have selected and trigger the VSS service. With this option selected, NAKIVO Backup & Replication proceeds with the replication even if the app-aware mode fails (for example, because of wrong credentials).
- **Enabled (fail on error):** In the dialog box that opens, select the checkboxes next to the VMs for which you want to create application-aware replicas, and then select the credentials next to each VM. These credentials will be used to log into the VMs you have selected and trigger the VSS service. With this option selected, NAKIVO Backup & Replication fails the replication if the app-aware mode fails (for example, because of wrong credentials).
- **Disabled:** VM replication is performed without application awareness.

Use Agent for OS Quiescing

If this option is enabled, NAKIVO Backup & Replication injects an agent into VMs to perform OS quiescing. This option is only available with App-aware mode enabled.

Note

Enabling this option may generate additional data transfer for the creation of shadow copies during job runs.

Change Tracking

Select one of the options from the **Change tracking** drop-down list:

- **Use Hyper-V RCT:** It is the native Microsoft Hyper-V change block tracking method. You can select this option for the fastest incremental backup.

- **Use proprietary method:** With this option selected, NAKIVO Backup & Replication reads all the contents of all VM disks to determine which data has changed since the last job run.
- **No change tracking (always full):** With this option selected, NAKIVO Backup & Replication always performs a full VM replication of all source VMs.

Note

This option is not available for existing backups chosen as the target of replication on the **Source** wizard page.

Network Acceleration

With Network acceleration enabled, NAKIVO Backup & Replication uses compression and traffic reduction techniques to speed up data transfer. Select this option if you plan to replicate over WAN or slow LAN links.

Network Encryption

With Network Encryption enabled, VM data is protected with AES 256 encryption while traveling over the network. Data encryption increases replication time and CPU load on machines running Transporters. Select this option when replicating over WAN without a VPN connection.

You need at least one Transporter at the source and target sites to enable encryption.

VM Verification

VM Verification allows you to check the integrity of the backup by starting it and interacting with it.

You can choose one of the following **VM Verification** options:

- **Disabled:** VM Verification is disabled.
- **Screenshot verification:** When enabled, the VM replica created by the job is verified: NAKIVO Backup & Replication powers on this replica with networking turned off, takes a screenshot of the OS, then powers off the VM replica. The VM screenshot will be included in email notifications (if they're configured. See [“Notifications & Reports” on page 349.](#)) and displayed on the Dashboard.
- **Boot verification:** When enabled, the VM replica created by the job is verified: After VM replication is completed, NAKIVO Backup & Replication recovers the VM using Flash VM Boot, disables networking to prevent network connections, and verifies that system start is successful.

Important

Hyper-V Integration Services must be running on the source VMs to successfully enable screenshot verification for your backup job.

After choosing **Screenshot verification** option, do the following in the dialog box that opens:

1. **Verify not more than x VMs simultaneously:** Specify the maximum number of VM replicas that can be started simultaneously.

2. **Recovery time objective:** Specify the amount of time allocated for the verification of each VM replica. If a VM OS does not start within the specified amount of time, verification will be considered failed. Specified time must be sufficient to fully start the VM OS. Try increasing this amount if the default amount is not sufficient.
3. **Screenshot delay:** Specify the amount of time that NAKIVO Backup & Replication waits before taking a screenshot after the guest OS starts.

After choosing **Boot verification**, set verification options in the dialog box that opens:

1. **Verify not more than x VMs simultaneously:** Specify the maximum number of VMs that can be started on the target container simultaneously.
2. **Recovery time objective:** Specify the amount of time allocated for the verification of each VM backup.

If a VM OS does not start within the specified amount of time, verification will be considered failed.

New Replication Job Wizard for Microsoft Hyper-V

1. Source 2. Destination 3. Network 4. Replication 5. Schedule 6. Retention 7. Options

Job Options

Job name: Hyper-V

App-aware mode: Enabled

Use agent for OS quiescing: Disabled

Change tracking: Use Hyper-V

Network acceleration: Disabled

Network encryption: Disabled

VM verification: Enabled

Exclude swap files and partitions: Enabled

Exclude unused blocks: Enabled

Replica Options

Replica VM disks: Respect original VM disk type

Replica VM names: Append "-replica" in the end

Pre and Post Actions

☐ Send job run reports to

☐ Truncate Exchange logs

☐ Truncate SQL Server logs

☐ Run local pre job script

☐ Run local post job script

Data Transfer

Cancel Finish Finish & Run

Exclude Swap Files and Partitions

With this option enabled, NAKIVO Backup & Replication automatically excludes swap files and partitions during the backup process.

Note

The feature is not available for replication from backup jobs.

Exclude Unused Blocks

With this option enabled, NAKIVO Backup & Replication automatically excludes unused disk blocks and blocks occupied by deleted files during processing of source objects running Windows OS. This feature allows for reducing backup storage space and object processing time.

Note

The feature is not available for replication from backup jobs.

Replica Options

In the *Replica Options* section, you can choose a VM disk type and VM name.

New Replication Job Wizard for Microsoft Hyper-V

1. Source 2. Destination 3. Networks 4. Re-IP 5. Schedule 6. Retention 7. Options

Job Options

Job name:

App-aware mode: [settings](#)

Use agent for OS quiescing: [i](#)

Change tracking: [settings](#)

Network acceleration: [i](#)

Network encryption: [i](#)

VM verification: [i](#)

Exclude swap files and partitions: [i](#)

Exclude unused blocks: [i](#)

Replica Options

Replica VM disks: [i](#)

Replica VM names: [i](#)

Pre and Post Actions

☐ Send job run reports to [i](#)

☐ Truncate Exchange logs [i](#)

☐ Truncate SQL Server logs [i](#)

☐ Run local pre job script [i](#)

☐ Run local post job script [i](#)

Data Transfer

Cancel **Finish** Finish & Run

Replica VM Disks

Choose one of the following options:

- **Respect original VM disk type:** With this option enabled, the created disk will be of the same type as that of the source VM.
- **Create dynamic size disks on target VMs:** With this option enabled, dynamic size disks are created on replicas, occupying only space actually required by VM files, including OS ones and database records, regardless of the disk types of the original source VM.

Replica VM Names

With NAKIVO Backup & Replication, you can change VM replica names to easily distinguish between VM replicas and the source VMs. By default, the text “-replica” is appended to the end of the VM replica name. To change VM Replica names, choose one of the following **Replica VM names** options in the **Replica Options** section:

- **Append "-replica" in the end:** Source VM names are used for replica names and “-replica” is added before or after the replica name.
- **Leave replica names as is:** Replica names will be identical to the source VM names.
- **Enter custom replica names:** Enter custom names for replicas.

Pre and Post Actions

In the *Pre and Post Actions* section, you can set up email notifications, select to [truncate Microsoft Exchange and SQL Server logs](#), and run [pre- and post- job scripts](#).

Email Notifications

NAKIVO Backup & Replication can send email notifications about the job completion status to specified recipients. This feature complements global notifications and allows you to configure notifications on a per-job level.

To enable this option, make sure your [Email settings](#) are configured.

To send email notifications, do the following:

In the *Pre and Post Actions* section:

1. Select **Send job run reports to**.
2. Specify one or more email addresses in the text field. Use semicolons to separate multiple email addresses.

Microsoft Exchange Server Logs Truncation

With NAKIVO Backup & Replication, you can delete (aka truncate) Microsoft Exchange Server logs on the source VMs after job completion.

To set up Microsoft Exchange log truncation, do the following:

1. In the *Pre and Post Actions* section, select the **Truncate Exchange logs** option.
2. In the dialog box that opens, select the checkboxes next to the VMs running Microsoft Exchange and then select the credentials next to each VM. These credentials are used to log into the VMs that you have selected.

Note

This option is not available for existing backups chosen as the target of replication on the **Source** wizard page.

Truncation of Microsoft SQL Server Transaction Logs

With NAKIVO Backup & Replication, you can delete (aka truncate) Microsoft SQL Server logs on the source VMs after job completion.

To set up Microsoft SQL log truncation, do the following:

1. In the *Pre and Post Actions* section, select the **Truncate SQL Server logs** option.
2. In the **SQL Server Log Truncation** dialog box that opens, select the checkboxes next to the VMs running Microsoft SQL Server and then select the credentials next to each VM. These credentials are used to log into the VMs that you have selected.

Note

This option is not available for existing backups chosen as the target of replication on the **Source** wizard page.

Pre Job Script

To run a script before the product begins replicating VMs, do the following:

1. Place a script file on the machine where the Director is installed.
2. In the *Pre and Post Actions* section, select **Run local pre job script**.
3. Specify the following parameters in the dialog box that opens:
 - **Script path:** Specify a local path to the script on the machine where the Director is installed. Script interpreter should be specified.
Example (Windows): `cmd.exe /c D:\script.bat`
Example (Linux): `bash /root/script.sh`
 - **Job behavior:** Choose one of the following job behaviors in relation to script completion:
 - **Wait for the script to finish:** With this option selected, VM replication is only started after the script is completed.
 - **Do not wait for the script to finish:** With this option selected, the script runs and the VMs start replicating at the same time.
 - **Error handling:** Choose one of the following job behaviors in relation to script failure:
 - **Continue the job on script failure:** With this option selected, the job performs VM replication even if the script has failed.
 - **Fail the job on script failure:** With this option selected, the job is failed and VM replication is not performed.

Post Job Script

To run a script after the product has finished backing up all VMs, do the following:

1. Place a script file on the machine where the Director is installed.
2. In the *Pre and Post Actions* section, select the **Run local post job script** option.
3. Specify the following parameters in the dialog box that opens:
 - **Script path:** Specify a local path to the script on the machine where the Director is installed. Script interpreter should be specified.
Example (Windows): `cmd.exe /c D:\script.bat`
Example (Linux): `bash /root/script.sh`
 - **Job behavior:** Choose one of the following job behaviors in relation to script completion:
 - **Wait for the script to finish:** With this option selected, the job is in the “running” state until the script is completed.
 - **Do not wait for the script to finish:** With this option selected, the job is completed even if the script execution is still in progress.
 - **Error handling:** Choose one of the following job behaviors in relation to script failure:
 - **Continue the job on script failure:** With this option selected, script failure does not influence the status of the job.

- **Fail the job on script failure:** With this option selected, if the script has failed, the job status will be set to “failed” even if VM replication has been successful.

New Replication Job Wizard for Microsoft Hyper-V

1. Source 2. Destination 3. Networks 4. Re-IP 5. Schedule 6. Retention 7. Options

Use agent for OS quiescing: Disabled

Change tracking: Use Hyper-V RCT [settings](#)

Network acceleration: Disabled

Network encryption: Disabled

VM verification: Disabled

Exclude swap files and partitions: Enabled

Exclude unused blocks: Enabled

Replica Options

Replica VM disks: Respect original VM disk type

Replica VM names: Append "-replica" in the end

Pre and Post Actions

☐ Send job run reports to

☐ Truncate Exchange logs

☐ Truncate SQL Server logs

☐ Run local pre job script

☐ Run local post job script

Data Transfer

☐ Limit transporter load to 3 concurrent tasks

Bandwidth throttling: Disabled

☐ Bottleneck detection

Cancel Finish Finish & Run

Data Transfer

In the *Data Transfer* section on the **Options** page, you can set the transporter load and configure [bandwidth throttling](#).

New Replication Job Wizard for Microsoft Hyper-V

1. Source 2. Destination 3. Networks 4. Re-IP 5. Schedule 6. Retention 7. Options

Use agent for OS quiescing: Disabled

Change tracking: Use Hyper-V RCT [settings](#)

Network acceleration: Disabled

Network encryption: Disabled

VM verification: Disabled

Exclude swap files and partitions: Enabled

Exclude unused blocks: Enabled

Replica Options

Replica VM disks: Respect original VM disk type

Replica VM names: Append "-replica" in the end

Pre and Post Actions

☐ Send job run reports to

☐ Truncate Exchange logs

☐ Truncate SQL Server logs

☐ Run local pre job script

☐ Run local post job script

Data Transfer

☐ Limit transporter load to 3 concurrent tasks

Bandwidth throttling: Disabled

☐ Bottleneck detection

Cancel Finish Finish & Run

Transporter Load

You can limit the maximum number of transporter tasks used by the job. By default, it is set to 3 concurrent tasks.

To change the default number of tasks, do the following:

1. In the **Data Transfer** section, select the checkbox next to **Limit transporter load to**.
2. Specify the number of concurrent tasks in the corresponding field.

Bandwidth Throttling

To regulate the speed of data transfer over the network for your replication job:

1. For the **Bandwidth throttling** option, choose **Enabled**.

Note

If bandwidth throttling is disabled for the current job, global bandwidth rules may still apply to your job. Refer to [“Bandwidth Throttling” on page 331](#) for details.

2. Click the **settings** link that becomes available.
3. The **Job Bandwidth Rules** dialog box opens displaying the list of available rules. You have the following options:
 - Create a new bandwidth rule for your replication job:
 1. Click the **Create New Rule** button.
 2. The **New Bandwidth Rule** dialog box opens. Refer to the [“Bandwidth Throttling” on page 331](#) topic for details about creating a bandwidth rule.
 3. Click **Save**.
 - Activate an existing bandwidth rule for your job. Select the checkbox to the left of the necessary bandwidth rule. To deactivate a bandwidth rule for your job, deselect the corresponding checkbox.
 - Edit a bandwidth rule. Click the **Edit** link for a bandwidth rule and modify it in the **Edit Bandwidth Rule** dialog box that opens.
 - Disable a bandwidth rule. Click the **Disable** link. The bandwidth rule will be disabled for all jobs.
 - Remove a bandwidth rule. Click the **Remove** link and then click **Delete** to confirm your operation.

Bottleneck detection

When the **Bottleneck detection** option is enabled, additional information is collected and recorded in NAKIVO Backup & Replication logs in the course of data transfer for the purpose of bottleneck detection. Check this option to enable the **Bottleneck detection** capability of the Transporters engaged in the job.

Completing the New Replication Job Wizard for Microsoft Hyper-V

Click **Finish** or **Finish & Run** to complete the job creation.

Note

If you click **Finish & Run**, you will have to define the scope of your job. Please refer to [“Running Jobs on Demand” on page 295](#) for details.

Staging (Seeding) VM Replication

With VMs usually being large, the initial (full) VM replication can be slow and time-consuming, and can put an undesirable load on the network. Perform staged replication to speed up the initial VM replication and save network bandwidth. Staging requires the transfer of VMs to the target site using a removable medium (such as an external USB hard drive). You can then create a new replication job that will use the transferred VMs as a target and perform only incremental replication.

To stage VM replication, follow the steps below:

1. Put VMs that you want to replicate on a removable medium (such as an external USB hard drive) using backup, replication, or any other method.
2. Transfer the medium to the target location.
3. Add (recover) the VMs to the desired server and datastore.
4. Create a new replication job and map the source VMs to the transferred VMs.

Recovery

During outage events that threaten business continuity, NAKIVO Backup & Replications offers multiple recovery options allowing you to resume normal business operations swiftly.

This section covers the following recovery topics:

- [“Full Recovery” on page 808](#)
- [“Granular Recovery” on page 752](#)
- [“Planning Disaster Recovery” on page 852](#)

Granular Recovery

The granular recovery technology allows you to instantly recover specific files and objects from image-based backups. With this technology, you can easily recover corrupted or accidentally deleted files or objects without fully restoring a VM first. With NAKIVO Backup & Replication you can recover files for physical machines, VMware, Microsoft Hyper-V, AWS, and Nutanix virtual environments. You can also recover Microsoft Exchange emails, and Microsoft Active Directory and Microsoft SQL Server objects directly from compressed and deduplicated backups. In addition, multiple recovery jobs and/or users may access the same recovery point even if it is currently in use by an existing recovery job/session.

Before you start the recovery process, verify that:

- The target VM/instance/physical machine is powered on.
- The target VM/instance/physical machine has enough space. The required minimum of free space is equal to the size of the recovered object + 1 GB.
- The target VM/instance/physical machine is accessible over the network.

For more details, refer to the corresponding articles below:

- [“File Recovery” on page 753](#)
- [“Object Recovery for Microsoft Exchange” on page 768](#)
- [“Object Recovery for Microsoft Active Directory” on page 779](#)
- [“Importing Recovered Objects to Active Directory” on page 791](#)
- [“Object Recovery for Microsoft SQL Server” on page 792](#)
- [“Performing Universal Object Recovery” on page 801](#)

File Recovery

With NAKIVO Backup & Replication, you can recover files or folders directly from compressed and deduplicated backups. Refer to [“Instant File Recovery to Source” on page 22](#) for more information.

Note

File recovery is restricted to [supported disk types and file systems](#).

Refer to the following topics to learn more:

- [“Opening File Recovery Wizard” on page 754](#)
- [“File Recovery Wizard: Backup” on page 756](#)
- [“File Recovery Wizard: Recovery Server” on page 757](#)
- [“File Recovery Wizard: Files” on page 761](#)
- [“File Recovery Wizard: Options” on page 764](#)

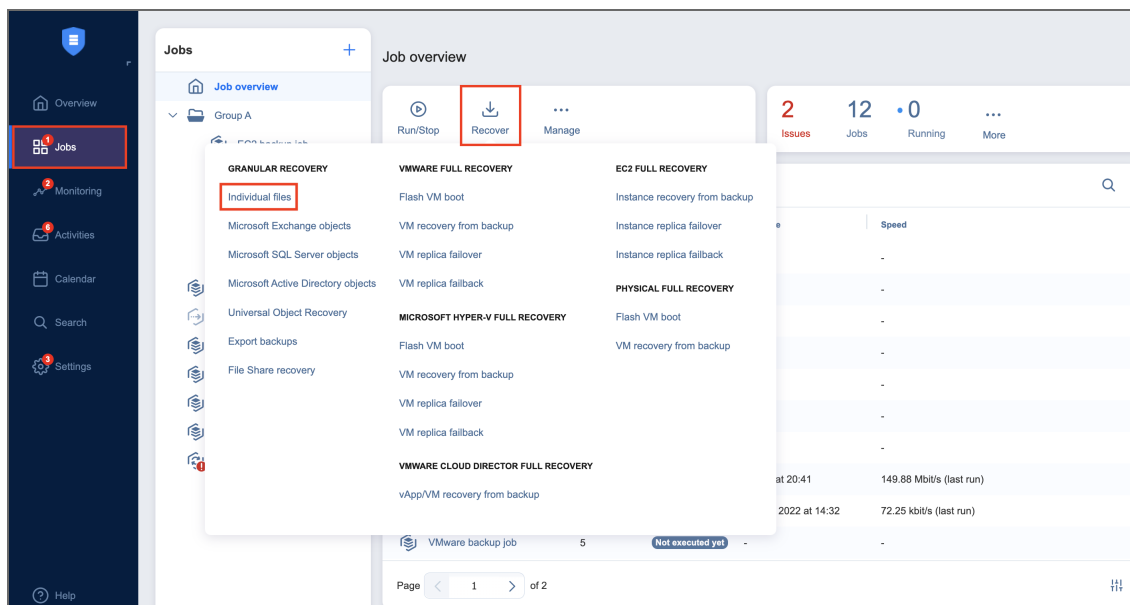
Opening File Recovery Wizard

You can start the recovery process either from the **Jobs** menu, by using the [search](#) function, or from the **Repositories** tab in **Settings** (for example, if you no longer have a backup job, but still have the backup). Refer to the following sections for more details:

- [Starting File Recovery from Jobs Menu](#)
- [Starting File Recovery from Backup Repository](#)

Starting File Recovery from Jobs Menu

To start file recovery from the **Jobs** menu, click **Recover** and then click **Individual Files**.

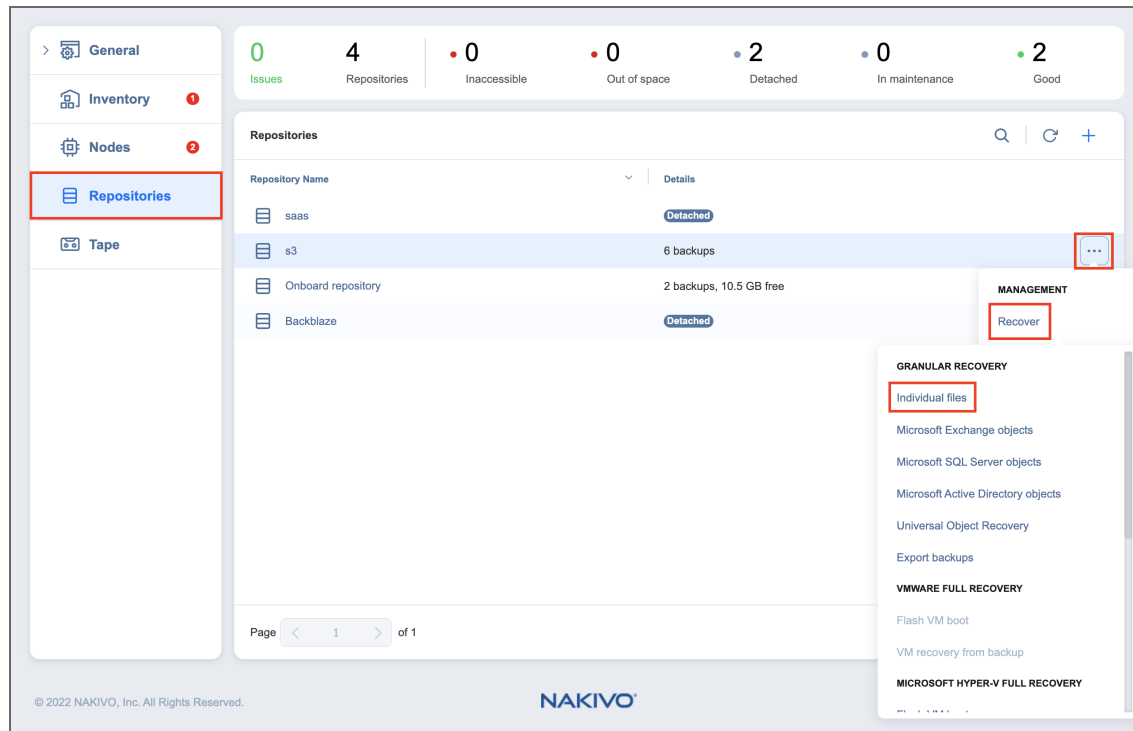


Starting File Recovery from Backup Repository

To start file recovery from a Backup Repository, do the following:

1. From the main menu of NAKIVO Backup & Replication, click **Settings**.
2. Go to the **Repositories** tab and hover over the Backup Repository containing the required backup.

3. Click the ellipsis **Manage** button, click **Recover**, and select **Individual Files**. The **File Recovery Wizard** opens.



File Recovery Wizard: Backup

On the **Backup** page of the wizard, select a backup using either a **Backup Repository** or **Jobs & Groups** view in the left pane, and then select a recovery point in the right pane.

File Recovery Wizard

1. Backup 2. Recovery Method 3. Files 4. Options 5. Finish

View: Backup Repositories

Jobs & Groups

Backup Repositories

Onboard repository

AS-NBR10-multi

S3_ Object_Lock

24

AD-Exchange2019_ping1 (inaccessible)

AD-Exchange2019_ping1 (inaccessible)

Ali2016

AndreyY-Win2016AD

AndreyY-Win2016AD-replica (inaccessible)

AS-NBR10-multi

AS-NBR10-multi

AY-NBR10.3-multi

AS-NBR10-multi

<input checked="" type="radio"/>	24 Aug at 20:00 (UTC +03:00) 2 months 8 days ago	Incremental
<input type="radio"/>	23 Aug at 20:00 (UTC +03:00) 2 months 9 days ago	Incremental
<input type="radio"/>	22 Aug at 20:00 (UTC +03:00) 2 months 10 days ago	Incremental
<input type="radio"/>	18 Aug at 20:00 (UTC +03:00) 2 months 14 days ago	Incremental
<input type="radio"/>	15 Aug at 20:00 (UTC +03:00) 2 months 17 days ago	Full

Cancel Next

Click **Next** to go to the next page of the wizard.

File Recovery Wizard: Recovery Server

In this page of the wizard, choose one of the following recovery methods:

- [Recovering Files to Server](#)
- [Downloading Files to Browser or Sending Files via Email](#)
- [Recovering Files to File Share](#)

Recovering Files to Server

Please do the following to recover files to a server:

1. In the **Recovery Method** section, choose **Recover to the following server**.
2. The **Recovery Server Settings** section opens. Set the following options:
 - a. **Recovery server:** Choose the target server from the drop-down list.

Notes

- NAKIVO Backup & Replication tries to auto-detect the IP address automatically.
 - File recovery to the original location is executed via a system account.
- b. **Server IP address:** Enter the IP address of the recovery server if it is not detected by the application based on the recovery server name.
 - c. **Use custom SSH port:** If necessary, enter an SSH port to be used for connecting to the recovery server. The default value is 22.
 - d. **Credentials type:** Choose your preferred option and enter your respective credentials:
 - a. **Password:** Enter a username with administrative privileges for the file share entered above and your password.
 - b. **Private key:** Select your private key from the drop-down list.
3. Click the **Test Connection** button to test your credentials for the specified recovery server. If your credentials are correct, a checkmark appears to the right of the button.

4. Click **Next**.

File Recovery Wizard

1. Backup 2. Recovery Method 3. Files 4. Options 5. Finish

Recovery Method

☐ Download to browser or send via email

☒ Recover to the following server

☐ Recover to file share

Recovery Server Settings

Recovery server: AS-NBR10-multi ⓘ

Server hostname or IP: 10.30.23.176 ⓘ

☒ Use custom SSH port: 22 ⓘ

Credentials type: Password

Username: admin

Password: [Manage credentials](#)

Test Connection

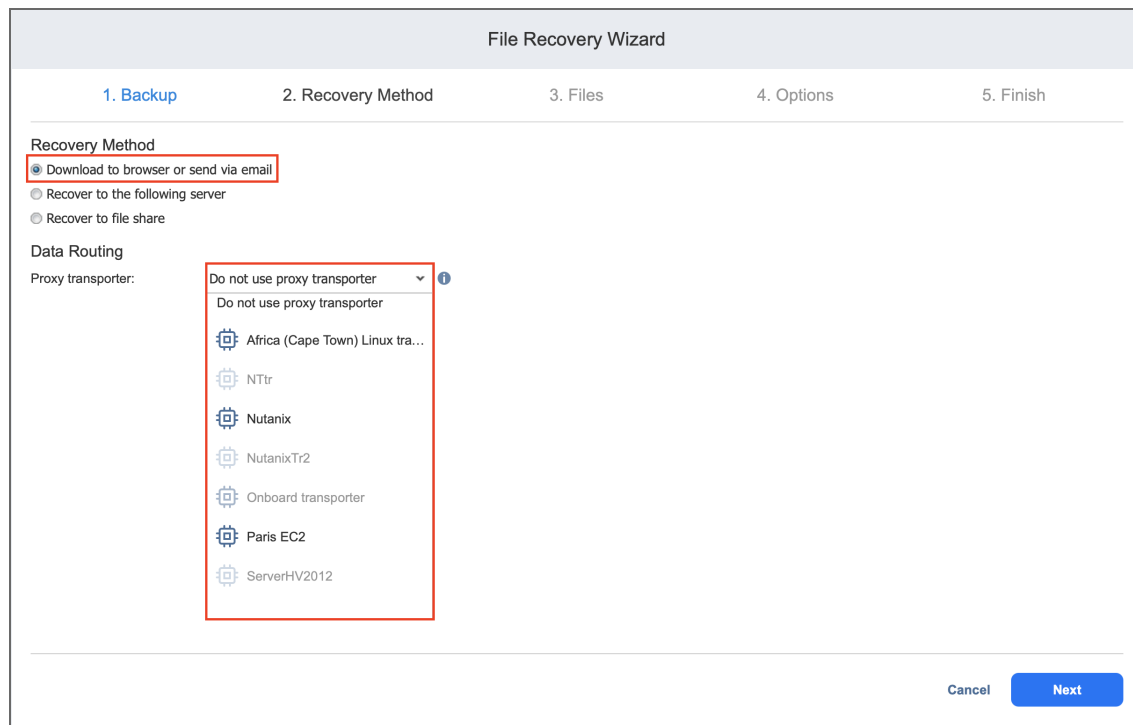
Cancel Next

After NAKIVO Backup & Replication prepares a recovery point, the next page of the wizard opens.

Downloading Files to Browser or Sending Files via Email

To download files to your browser or send them via email, follow the steps below:

1. In the **Recovery Method** section, choose **Download to browser or send via email**.
2. The **Data Routing** section opens. In the **Proxy transporter list**, the **Do not use proxy transporter option** is chosen by default. You can also choose a proxy transporter from the list of available transporters.
3. Click **Next**.



Note

NAKIVO Backup & Replication will use a proxy transporter in the following cases:

- The transporter assigned to the backup repository is missing support for some file systems.
- The transporter assigned to the backup repository is missing iSCSI packages.

NAKIVO Backup & Replication starts preparing a recovery point for the recovery. After the recovery point is prepared successfully, the next page of the wizard opens.

Recovering Files to File Share

To recovery files to a file share, do the following:

1. In the **Recovery Method** section, choose **Recover to file share**.
2. The **Data Routing** section opens. In the **Proxy transporter list**, the **Do not use proxy transporter option** is chosen by default. You can also choose a proxy transporter from the list of available transporters.
3. In the **File Share Settings** section, set the following options:
 - a. **Share type**: Choose the type of file share.
 - b. **Path to the share**: Enter the path to the file share.
 - c. **Credentials type**: Choose your preferred option and enter your respective credentials:
 - a. **Password**: Enter a username with administrative privileges for the file share entered

above and your password.

b. **Private key:** Enter your private key.

4. Click the **Test Connection** button to test your credentials for the specified file share. If your credentials are correct, a checkmark appears to the right of the button.
5. Click **Next**.

File Recovery Wizard

1. Backup 2. Recovery Method 3. Files 4. Finish

Recovery Method

- ☐ Download to browser or send via email
- ☐ Recover to the following server
- ☒ Recover to file share

Data Routing

Proxy transporter: Do not use proxy transporter ⓘ

File Share Settings

Share type: CIFS ⓘ

Path to the share: \\Backup\\Files ⓘ

Credentials type: Password ⓘ

Username: admin ⓘ

Password: ⓘ

[Manage credentials](#)

Test Connection

Cancel Next

Note

File-level recovery to CIFS share may fail if network credentials are shared across multiple open CIFS connections. If you encounter issues while testing connection, try adding localhost domain to the used credentials (i.e. localhost\Administrator).

In addition, NAKIVO Backup & Replication will use a proxy transporter in the following cases:

- The transporter assigned to the backup repository is missing support for some file systems.
- The transporter assigned to the backup repository is missing iSCSI packages.

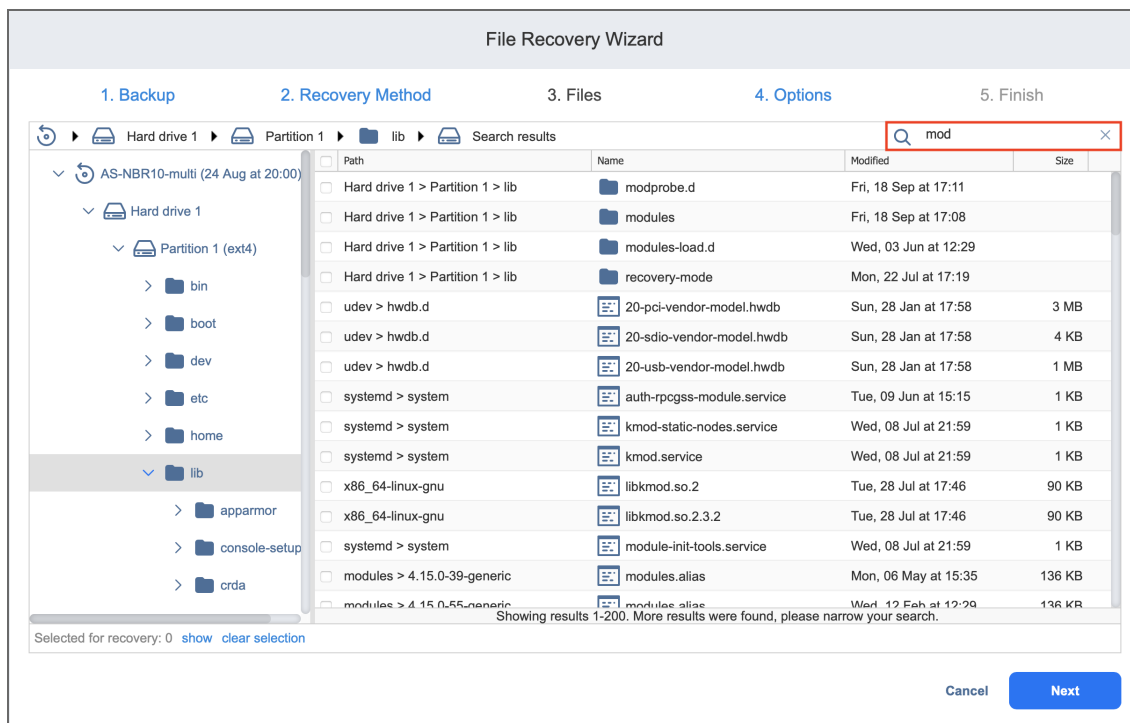
File Recovery Wizard: Files

On this page of the wizard, select files for recovery.

- [Searching for Files and Folders](#)
- [Browsing Files and Folders](#)
- [Selecting Files and Folders for Recovery](#)

Searching for Files and Folders

To search for a file or a folder, enter a part of or the entire name of the item into the **Search** box and press **Enter**.

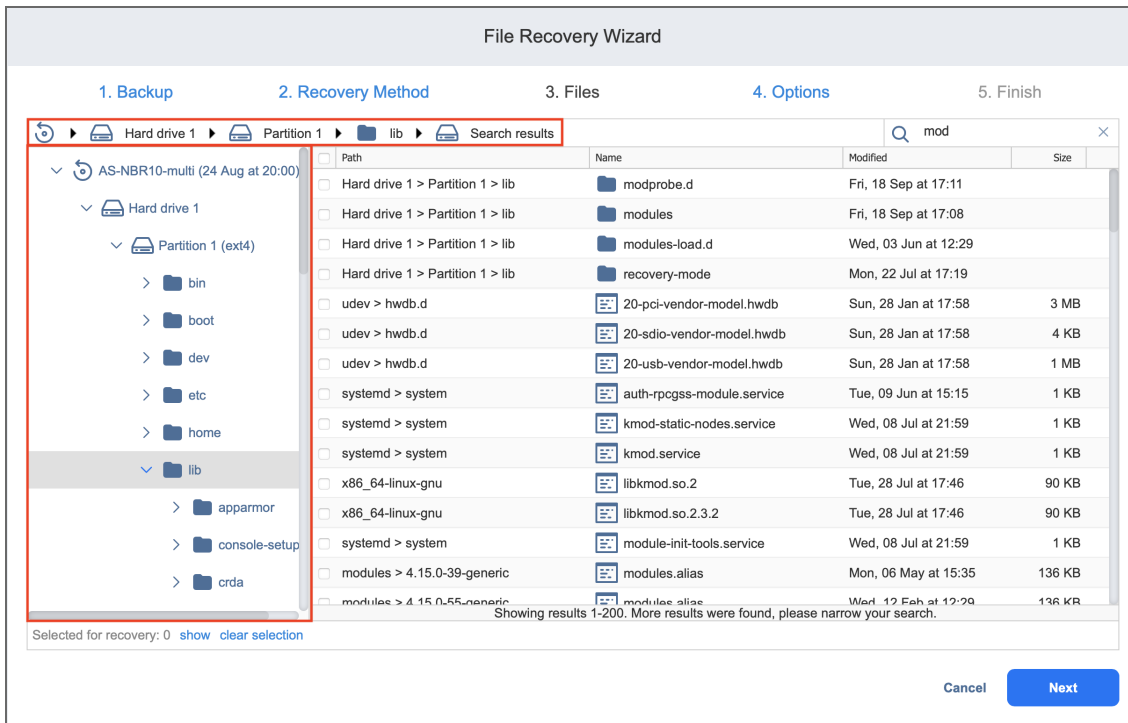


Notes

- NFS-mounted folders appear in the file tree as empty and the wizard does not recover the content of these folders.
- The search is performed starting from the point selected in the navigation pane. For example, if you select **Hard drive 1 > Disk 1 > Program Files**, the search will be performed only inside the **Program Files** folder.

Browsing Files and Folders

You can browse the files and folders of a VM backup using the navigation pane:



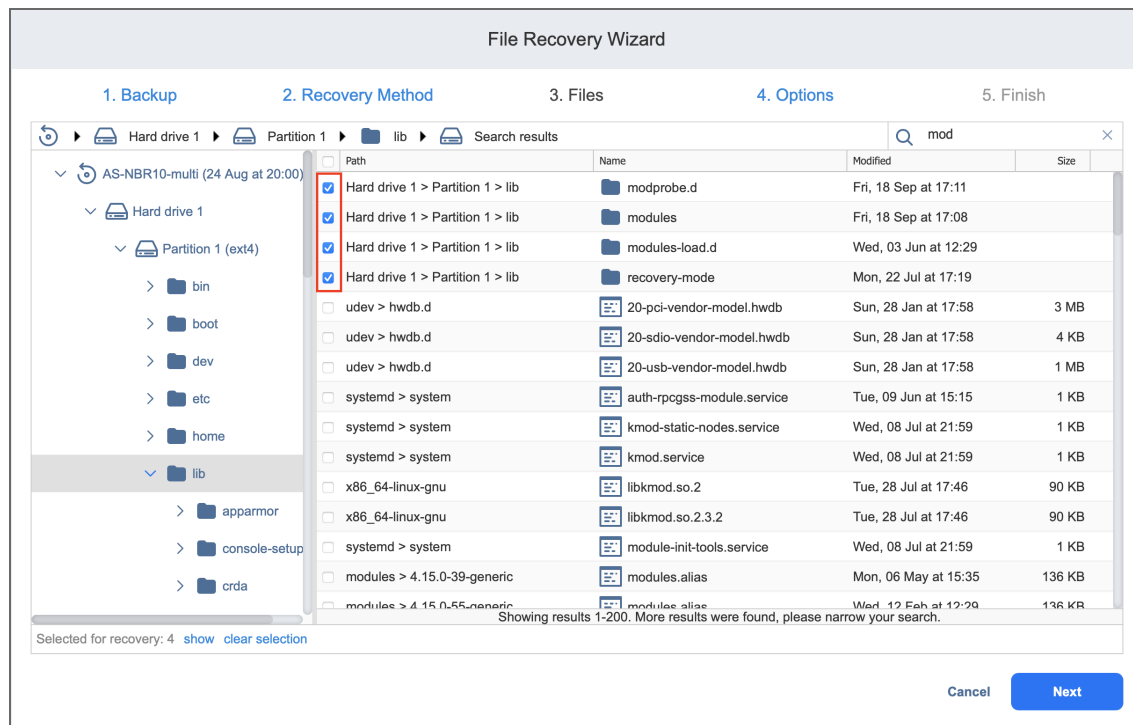
If a VM backup contains Linux LVM volumes or Windows dynamic disks, the navigation pane will display these logical groups in addition to all hard drives available in the VM backup. If a hard drive does not contain any partitions and servers as a part of a Linux LVM volume or a Windows dynamic disk, this hard drive will appear as empty.

You can also quickly move between folders by using the navigation bar above the navigation pane.

Selecting Files and Folders for Recovery

After locating the item you want to recover, select the checkbox next to it. The number of items selected for recovery is displayed at the bottom of the wizard page. You can also do the following:

- Click **show** to view the list of all items selected for recovery.
- Click **clear selection** to clear the list of items selected for recovery.



Click **Next** to go to the next page of the wizard.

File Recovery Wizard: Options

On this page of the wizard, you can choose one of the following recovery types:

- [Recovering Files via Recovery Server](#)
 - [Recovering Files to the Original Location](#)
 - [Recovering Files to a Custom Location](#)
- [Downloading Files to Browser or Sending Files via Email](#)
 - [Downloading Files](#)
 - [Forwarding Files via Email](#)

Recovering Files via Recovery Server

If you have chosen the **Recover to the following server** recovery method, on the **Recovery Server** page of the wizard, proceed as follows.

Important

- File recovery is not possible if a backup contains an incomplete set of disks that are a part of the spanned volume/dynamic disks/LVM/RAID software or any other disk structures.
- Servers added using Direct Connect are not supported.

Recovering Files to the Original Location

To recover files to original location:

1. In the **Recovery type** list, choose **Recover to original location**.
2. The **Overwrite behavior** list opens. Please choose one of the following:
 - **Rename recovered item if such item exists:** Choose the necessary server from the drop-down list.
 - **Skip recovered item if such item exists**
 - **Overwrite the original item if such item exists**
3. **Click Recover** to start recovering files to original location.

File Recovery Wizard

1. Backup 2. Recovery Server 3. Files 4. Options 5. Finish

Recovery type: Recover to original location

Overwrite behavior: Rename recovered item if such item exists

Recover Cancel

Recovering Files to a Custom Location

To recover files to a custom location:

1. In the **Recovery type** list, choose **Recover to custom location**.
2. A number of boxes open to let you set the options for a custom location. Do the following:
 - a. In the **Location type** box, choose one of the following:
 - **Local folder on Recovery Server**
 - **CIFS share**
 - **NFS share**

Note

If the selected archive is deleted from the share during the recovery process to CIFS share, the archive may still reappear in the folder and is deleted after the job is completed. Note that in such case the job is still marked as completed.

- b. In the **Location path/Path to share box**, enter the path to be used for file recovery:
 - A local path if you choose the **Local folder on Recovery Server** option.
 - A path to share on a remote server if you choose **CIFS share/NFS share**.
 - c. In the Overwrite behavior box, choose of of the following:
 - **Rename recovered item if such item exists**
 - **Skip recovered item is such item exists**
 - **Overwrite the original item if such item exists**
 - d. In the **Username** and **Password** boxes, enter the credentials required for accessing the CIFS share location you specified above.
 3. Click **Recover**.

Note

File-level recovery to CIFS share may fail if network credentials are shared across multiple open CIFS connections. If you encounter issues while performing file recovery to CIFS share, try adding localhost domain to the used credentials (i.e. localhost\Administrator).

File Recovery Wizard

1. Backup 2. Recovery Server 3. Files 4. Options 5. Finish

Recovery type: Recover to custom location

Location type: CIFS share

Path to the share: \\zenlar012\Share

Username: admin

Password: *****

[Manage credentials](#)

Overwrite behavior: Rename recovered item if such item exists

Recover
Cancel

Downloading Files to Browser or Sending Files via Email

If you have chosen the **Download to browser or send via email** recovery method, on the **Recovery Server** page of the wizard, proceed as follows.

Downloading Files

Please do the following to download files for recovery:

1. In the **Recovery Type** drop-down list, select **Download**.
2. Click **Recover**.

File Recovery Wizard

1. Backup 2. Recovery Server 3. Files 4. Options 5. Finish

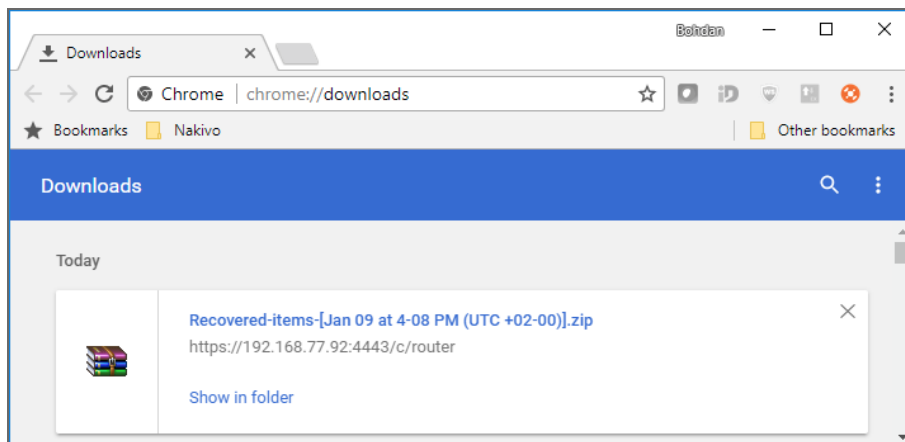
Recovery type: Download

Download

Forward via email

Recover
Cancel

When the download has finished successfully, the archive with the recovered items appears in the browser downloads folder.



Forwarding Files via Email

Note

To use this recovery type, your Email settings must be properly configured in the NAKIVO Backup & Replication Configuration. Refer to [“Notifications & Reports” on page 349](#) for details.

Please do the following to forward recovered files via Email:

1. In the **Recovery type** list, choose **Forward via email**.
2. A number of boxes open to set the options required for forwarding recovery files via email. Do the following:
 - a. In the **To** box, enter one or more email addresses to be primary recipients of the recovery files. Use semicolons to separate multiple email addresses. The recipient's email address is mandatory.
 - b. Optionally, in the **CC** box, you can enter one or more email addresses of secondary recipients.
3. Optionally, you can enter a subject in the **Subject** box.
4. Click **Recover**.

File Recovery Wizard

1. Backup 2. Recovery Server 3. Files 4. Options 5. Finish

Recovery type: **Forward via email**

To: administrator@nakivo.com

CC: administrator@example.com

Subject: Recovered Items - 17 Jun at 12:05 (UTC +03:00)

Attachments: Administrator

Recovered by NAKIVO Backup & Replication

Recover Cancel

Object Recovery for Microsoft Exchange

The [object recovery](#) feature in NAKIVO Backup & Replication allows you to browse, search, and recover Microsoft Exchange emails directly from compressed and deduplicated backups. Recovery can also be performed back to the source or any other location including CIFS share. The Object Recovery for Microsoft Exchange feature is agentless, works right out of the box, and does not require creating a special lab or running a special backup type.

Refer to the following topics for more information:

- [“Starting Object Recovery for Microsoft Exchange” on page 769](#)
- [“Object Recovery Wizard for Microsoft Exchange: Backup” on page 771](#)
- [“Object Recovery Wizard for Microsoft Exchange: Recovery Method” on page 772](#)
- [“Object Recovery Wizard for Microsoft Exchange: Objects” on page 774](#)
- [“Object Recovery Wizard for Microsoft Exchange: Options” on page 776](#)

Starting Object Recovery for Microsoft Exchange

You can start the recovery process either from the **Jobs** menu, by using the [search](#) function, or from the **Repositories** tab in **Settings** (for example, if you no longer have a backup job but still have the backup).

Important

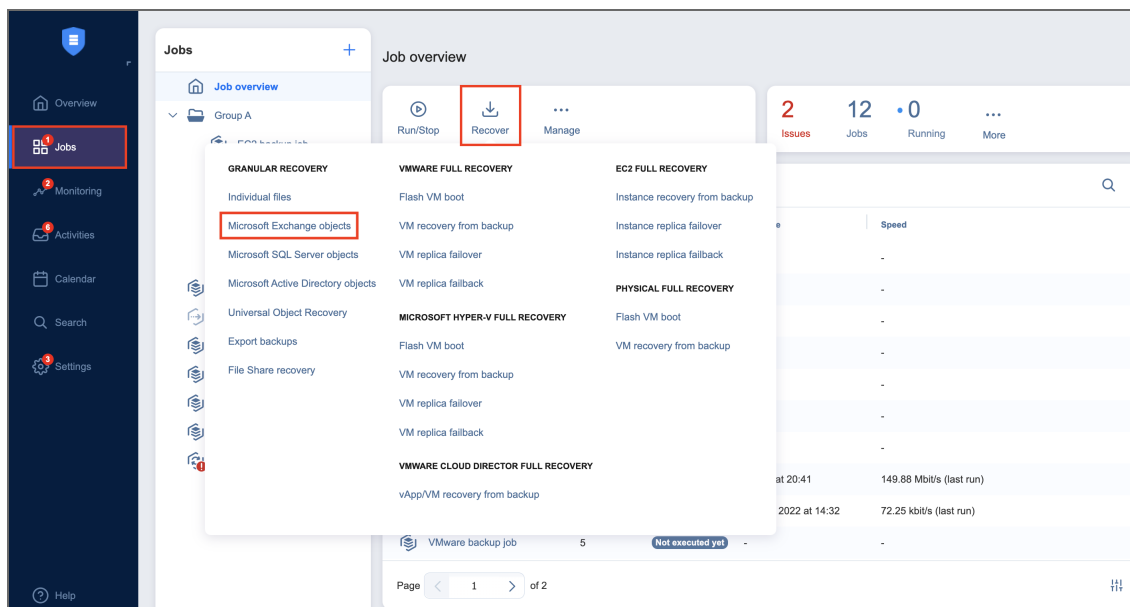
The recovery process may result in additional load and memory usage on the target server. Therefore, make sure that the server has enough memory.

Refer to the following sections to learn how to start the object recovery process for Microsoft Exchange:

- [Starting Object Recovery for Microsoft Exchange from Jobs Menu](#)
- [Starting Object Recovery for Microsoft Exchange from Backup Repository](#)

Starting Object Recovery for Microsoft Exchange from Jobs Menu

To start object recovery for Microsoft Exchange from the **Jobs** menu , click **Recover** and then click **Microsoft Exchange Objects**.

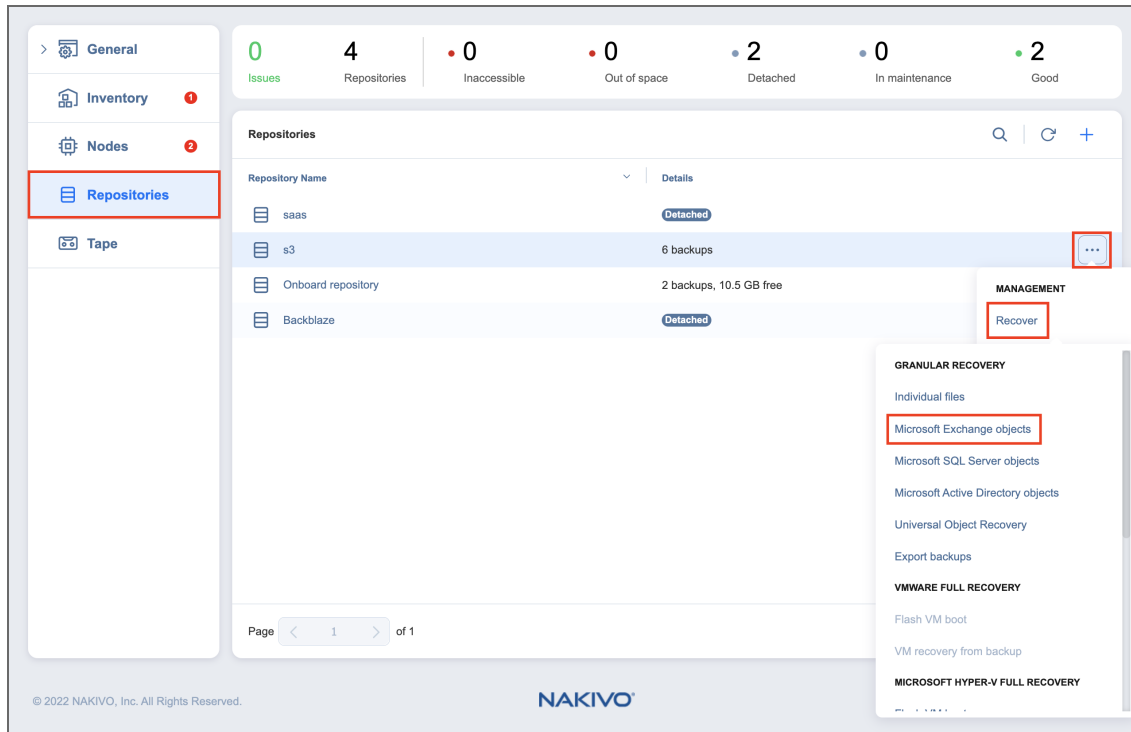


Starting Object Recovery for Microsoft Exchange from Backup Repository

To start object recovery for Microsoft Exchange from a Backup Repository, do the following:

1. Click **Settings** in the main menu of the product.
2. Go to the **Repositories** tab and hover over the Backup Repository containing the required backup.

3. Click the ellipsis **Manage** button, click **Recover**, and select **Microsoft Exchange Objects**.



The **Object Recovery Wizard for Microsoft Exchange** opens.

Object Recovery Wizard for Microsoft Exchange: Backup

On the **Backups** page of the wizard, select a backup using either a **Backup Repository** or **Jobs & Groups** view in the left pane, and then select a recovery point in the right pane.

Object Recovery Wizard for Microsoft Exchange

1. Backup 2. Recovery Server 3. Objects 4. Options 5. Finish

View: Backup Repositories

Jobs & Groups

Backup Repositories

Onboard repository

AS-NBR10-multi

S3_Object_Lock

AS-NBR10-multi

<input checked="" type="radio"/> 24 Aug at 20:00 (UTC +03:00) 2 months 8 days ago	Incremental
<input type="radio"/> 23 Aug at 20:00 (UTC +03:00) 2 months 9 days ago	Incremental
<input type="radio"/> 22 Aug at 20:00 (UTC +03:00) 2 months 10 days ago	Incremental
<input type="radio"/> 18 Aug at 20:00 (UTC +03:00) 2 months 14 days ago	Incremental
<input type="radio"/> 15 Aug at 20:00 (UTC +03:00) 2 months 17 days ago	Full

☒ Automatically locate application databases ⓘ

Cancel Next

By default, NAKIVO Backup & Replication automatically searches the selected recovery point for Microsoft Exchange databases (files with .edb extension) from which application objects can be recovered. This process can take a few minutes. If you want to manually specify the location of the database file, deselect the **Automatically locate application databases** option.

Click **Next** to go to the next page of the wizard.

Object Recovery Wizard for Microsoft Exchange: Recovery Method

On the **Recovery Method** page, select the Exchange Server you want to recover to and provide authentication information:

- **Recovery server:** From the drop-down list, select the Exchange Server instance to which the objects must be recovered. The original VM is selected by default. The selection functionality lets you switch views to display the platform where the required VM resides: VMware vSphere, Microsoft Hyper-V, Amazon EC2, Nutanix AHV, or a physical machine. You can also search for the VM by its name. You can skip this parameter altogether and enter the VM's IP address manually in the next field.

Note

- Selecting a different recovery server or entering the IP address of a different server may be blocked in case the [user](#) has insufficient permissions.
- Servers added using Direct Connect are not supported.
- **Server IP address:** Displays the automatically detected IP address of the server to which the objects must be recovered. You'll need to enter the IP address of the recovery server manually if autodetection fails or if you did not select anything in the previous parameter.
- **Use custom SSH port** (for Linux objects only): Put a checkmark and enter the port number to be used for SSH connection. When the **Use custom SSH port** checkbox is not checked, the default value is used for SSH connections.
- **Credentials type:** Choose your preferred option and enter your respective credentials:
 - a. **Password:** Enter a username with administrative privileges for the file share entered above and your password.
 - b. **Private key:** Select your private key from the drop-down list.
- **Test Connection:** Click this button to verify the credentials. You won't be able to proceed until after the connection has been successfully established.
- Click **Next** to proceed to the next step.

Object Recovery Wizard for Microsoft Exchange

1. Backup

2. Recovery Server

3. Objects

4. Options

5. Finish

Recovery Server Settings

Recovery server:

AS-NBR10-multi

Server hostname or IP:

10.30.23.176

☐ Use custom SSH port:

22

Credentials type:

Password

Username:

admin

Password:

Test Connection

Manage credentials

Cancel

Next

Info

To download items to a browser or forward them via email, enable the **system.exchange.enable.direct.recovery** setting in the [Expert tab](#). Note that contacts and calendar items will not be recoverable with this enabled setting.

Object Recovery Wizard for Microsoft Exchange: Objects

On the **Objects** page of the wizard, select Microsoft Exchange objects for recovery. Proceed as described in the following sections:

- [Searching for Microsoft Exchange Objects](#)
- [Browsing Microsoft Exchange Objects](#)
- [Viewing Microsoft Exchange Objects](#)
- [Selecting Microsoft Exchange Objects to Recover](#)

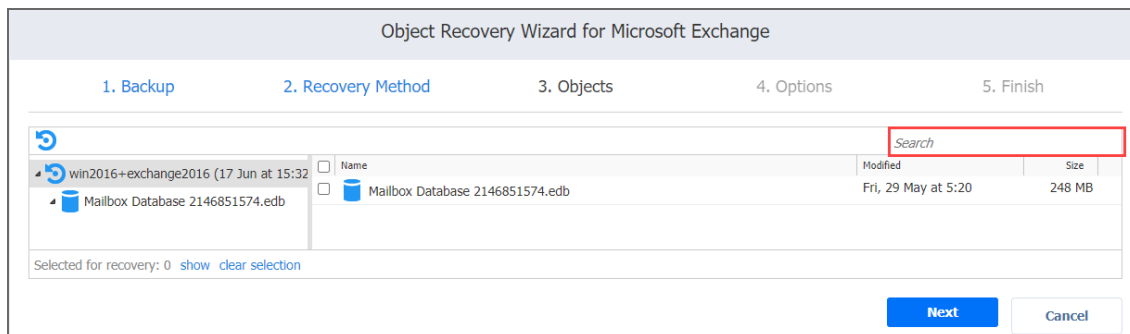
Searching for Microsoft Exchange Objects

NAKIVO Backup & Replication allows you to search for emails. The search functionality, however, has the following limitations:

- The product can search for emails only by email subject or email body
- If text formatting (such as “bold text”) is applied to a keyword that is searched for, the search may not find the keyword due to formatting conversion issues.
- The product does not create or maintain an index of the Exchange database contents. The search is performed on the fly and can take a long time to complete.

To speed up the search, perform the search within a particular folder, rather than in a mailbox.

To search for an email by its subject or body, type a word in the **Search** field and press **Enter**.



The search is performed starting from the point selected in the left (Navigation) pane. For example, if you have selected Mailbox Database > John Smith, the search will be performed only inside the John Smith mailbox.

Browsing Microsoft Exchange Objects

NAKIVO Backup & Replication scans the selected recovery point for Microsoft Exchange databases (files with “.edb” extension) and displays the list of found databases in the left pane.

Not all of the found database files contain Microsoft Exchange objects that can be recovered by the product. To browse Microsoft Exchange objects, expand the appropriate database in the left pane.

Viewing Microsoft Exchange Objects

To view a Microsoft Exchange object such as an email, click the object. Object contents will be displayed.

Note

Emails may be blocked from reading in case the [user](#) has insufficient permissions.

Selecting Microsoft Exchange Objects to Recover

In the right pane, select checkboxes next to files and folders you want to recover. The number of items selected for recovery is displayed at the bottom of the wizard page. You can also:

- Click **show** to view the list of all items selected for recovery.
- Click **clear selection** to clear the list of items selected for recovery.
- Click **hide** to hide the list of items selected for recovery.

Important

For successful recovery of databases, make sure that the Exchange Server license supports the number of databases you plan to recover.

After selecting objects for recovery, click **Next** to go to the next page of the wizard.

Object Recovery Wizard for Microsoft Exchange: Options

On the **Options** page, specify the location for recovered objects and define overwriting options and naming conventions.

Info

To download items to a browser or forward them via email, enable the **system.exchange.enable.direct.recovery** setting in the [Expert tab](#). Note that contacts and calendar items will not be recoverable with this enabled setting.

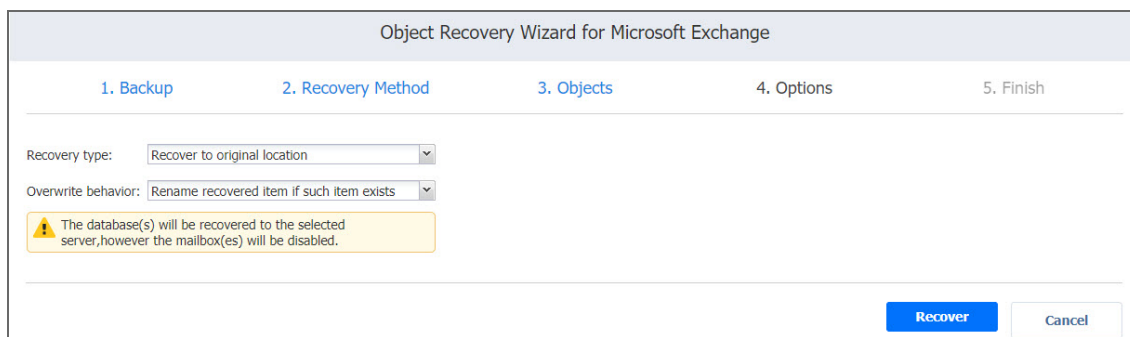
- [Recovering to the Original Location](#)
- [Recovering to a Custom Location](#)
- [Exporting to a Custom Location](#)
- [Overwriting Behavior](#)

Recovering to the Original Location

In the **Recovery type** drop-down list, select **Recover to original location** to recover objects to their original location on the recovery VM.

Note

Recovering to the original location is not supported when a whole mailbox is selected for recovery



The screenshot shows the 'Object Recovery Wizard for Microsoft Exchange' window, specifically the '4. Options' step. The wizard has five steps: 1. Backup, 2. Recovery Method, 3. Objects, 4. Options, and 5. Finish. In the 'Recovery type' dropdown, 'Recover to original location' is selected. In the 'Overwrite behavior' dropdown, 'Rename recovered item if such item exists' is selected. A yellow warning box contains the text: 'The database(s) will be recovered to the selected server, however the mailbox(es) will be disabled.' At the bottom right, there are 'Recover' and 'Cancel' buttons.

Recovering to a Custom Location

In the **Recovery type** drop-down list, select **Recover to custom location** to recover objects to a custom location on the recovery VM. Specify the recovery location in the **Local path field** or browse to find it.

Notes

- Recovering to a custom location may be blocked in case the [user](#) has insufficient permissions.
- Recovering to a custom location is not supported when a whole mailbox is selected for recovery.


Object Recovery Wizard for Microsoft Exchange

1. Backup 2. Recovery Method 3. Objects 4. Options 5. Finish

Recovery type: Recover to custom location

Local path: C:\Folder\Subfolder

Overwrite behavior: Rename recovered item if such item exists

 The database(s) will be recovered to the selected server, however the mailbox(es) will be disabled.

Exporting to a Custom Location

In the **Recovery type** drop-down list, you can choose **Export** to export Microsoft Exchange. You can choose the following locations for the export:

- **Local folder:** After selecting this option, enter the local path to the folder where the recovered objects should be stored.
- **CIFS share:** After selecting this option, provide the path to the file share and enter the necessary credentials.

Notes

- This option is not supported for databases.
- When this option is selected, some object types are not exported to .pst files:
 - Contacts are exported to .vcf files.
 - Calendar objects are exported to .vcs files.
 - Emails are exported to .eml files.

Overwriting Behavior

Specify the naming convention for the recovered folders by choosing one of the following options from the **Overwrite behavior** drop-down list:

- **Rename recovered item if such an item exists**
- **Skip recovered item if such an item exists**

- **Overwrite the original item if such an item exists**

Object Recovery Wizard for Microsoft Exchange

1. Backup 2. Recovery Method 3. Objects 4. Options 5. Finish

Recovery type:

Location type:

Path to the share:

Username:

Password:

[Manage credentials](#)

Overwrite behavior:

Rename recovered item if such item exists
Rename recovered item if such item exists
Skip recovered item if such item exists
Overwrite the original item if such item exists

Recover Cancel

Click **Recover** to proceed with the recovery process. The **Finish** page is displayed. You cannot return to the previous pages of the wizard at this point, however, you can check the progress of the job execution by clicking the **Activities** link.

Object Recovery for Microsoft Active Directory

The [instant object recovery](#) feature allows you to browse, search and recover Microsoft Active Directory objects directly from compressed and deduplicated backups. This feature is agentless, works right out of the box, and does not require you to create a special lab or run a special type of backup. Microsoft Active Directory objects can be recovered in .ldif format and then be imported back to the Active Directory Server.

Refer to the following topics for more information:

- [“Starting Object Recovery for Microsoft Active Directory” on page 780](#)
- [“Object Recovery Wizard for Microsoft AD Server: Backup” on page 782](#)
- [“Object Recovery Wizard for Microsoft AD Server: Recovery Server” on page 783](#)
- [“Object Recovery Wizard for Microsoft AD Server: Objects” on page 785](#)
- [“Object Recovery Wizard for Microsoft AD Server: Options” on page 788](#)

Starting Object Recovery for Microsoft Active Directory

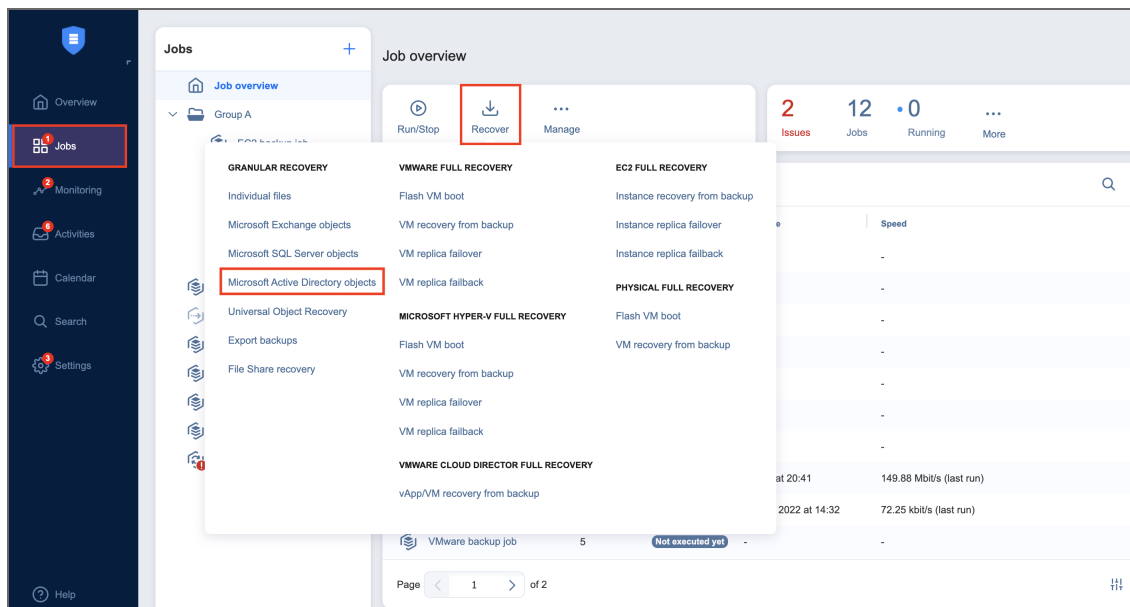
You can start the recovery process either from the **Jobs** menu, by using the [search](#) function, or from the **Repositories** tab in the **Settings** (for example, if you no longer have a backup job, but still have the backup).

Refer to the following sections for more details:

- [Starting Active Directory Object Recovery from Jobs Menu](#)
- [Starting Active Directory Object Recovery from a Backup Repository](#)

Starting Active Directory Object Recovery from Jobs Menu

To start Active Directory Object Recovery from the **Jobs** menu, click **Recover** and then choose **Microsoft Active Directory objects**.

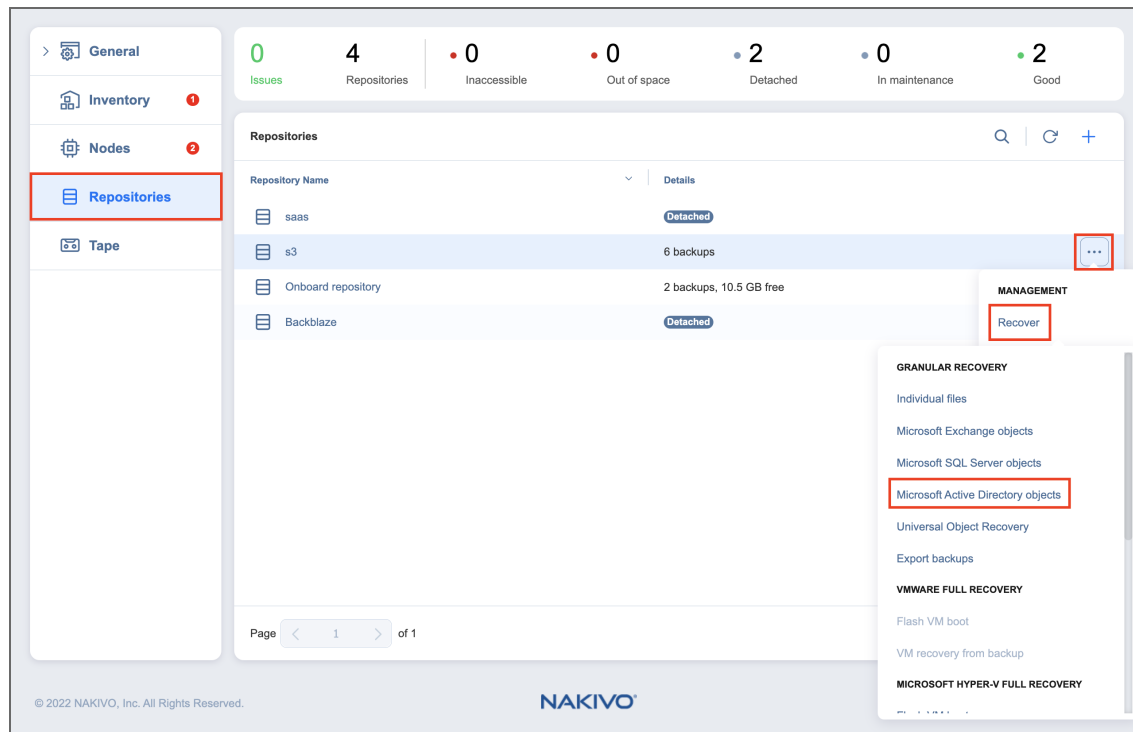


Starting Active Directory Object Recovery from a Backup Repository

To start Active Directory Object Recovery from a Backup Repository, do the following:

1. Go to the main menu of the product and click **Settings**.
2. Go to the **Repositories** tab and hover over the Backup Repository containing the required backup.

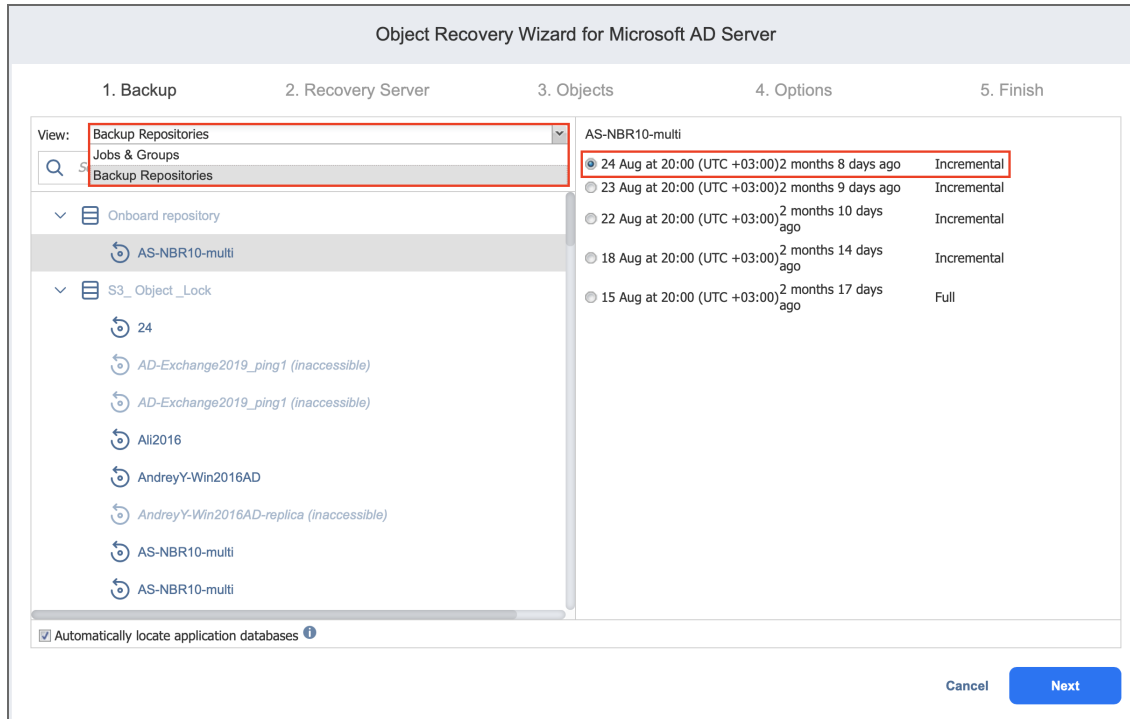
3. Click the ellipsis **Manage** button, click **Recover**, and select **Microsoft Active Directory objects**.



The **Object Recovery Job Wizard for Microsoft AD Server** opens.

Object Recovery Wizard for Microsoft AD Server: Backup

On the **Backup** page of the wizard, select a backup of a VM with the Microsoft Active Directory server in the left pane and then select a recovery point in the right pane. You can choose a backup from either a Backup Repository or jobs and groups you've created.



By default, NAKIVO Backup & Replication automatically searches the selected recovery point for the Microsoft Active Directory database from which application objects can be recovered. This process can take a few minutes. If you want to manually specify the location of the database file, deselect the **Automatically locate application databases** checkbox.

Click **Next** to go to the next page of the wizard.

Object Recovery Wizard for Microsoft AD Server: Recovery Server

On the **Recovery Server** page of the wizard, set up a Microsoft Active Directory server to which objects will be recovered.

Important

- The iSCSI Initiator service must be running on the recovery server.
- The `vc_redist.x86.exe` (v.2015) file must be installed on the recovery server. Refer to the [Microsoft article](#) for installation details
- Servers added using Direct Connect are not supported.

Set up a Microsoft Active Directory server the following way:

- In the **Recovery Server** drop-down list, select a recovery server name.
- In the **Server IP address** box, enter the IP address of the recovery server. This is necessary if the application has not detected the IP address based on the recovery server name.
- **Credentials type:** Choose your preferred option and enter your respective credentials:
 - a. **Password:** Enter a username with administrative privileges for the file share entered above and your password.
 - b. **Private key:** Select your private key from the drop-down list.
- Click the **Test Connection** button to test your credentials for the specified recovery server. If your credentials are correct, a checkmark appears to the right of the button.
- **Create snapshot before recovery:** When selected, a snapshot of the VM will be taken if recovery fails, and the VM will be reverted to this snapshot.

- Click **Next** to go to the next page of the wizard.

Object Recovery Wizard for Microsoft AD Server

1. Backup

2. Recovery Server

3. Objects

4. Options

5. Finish

Recovery Server Settings

Recovery server:

AS-NBR10-multi

Server hostname or IP:

10.30.23.176

Credentials type:

Password

Username:

admin

Password:

Test Connection

Manage credentials

☒ Create snapshot before recovery

Cancel

Next

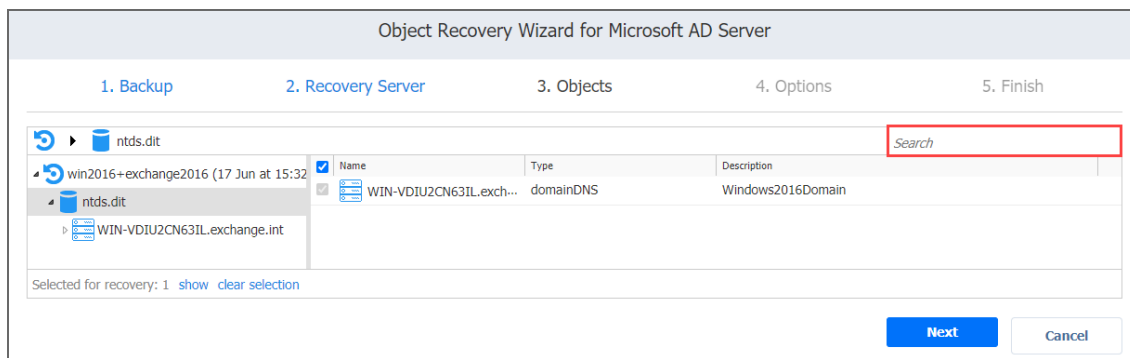
Object Recovery Wizard for Microsoft AD Server: Objects

On the **Objects** page of the wizard, select Active Directory objects you want to recover.

- [Searching for Active Directory Objects](#)
- [Browsing Active Directory Objects](#)
- [Viewing Active Directory Objects](#)
- [Selecting Active Directory Objects to Recover](#)

Searching for Active Directory Objects

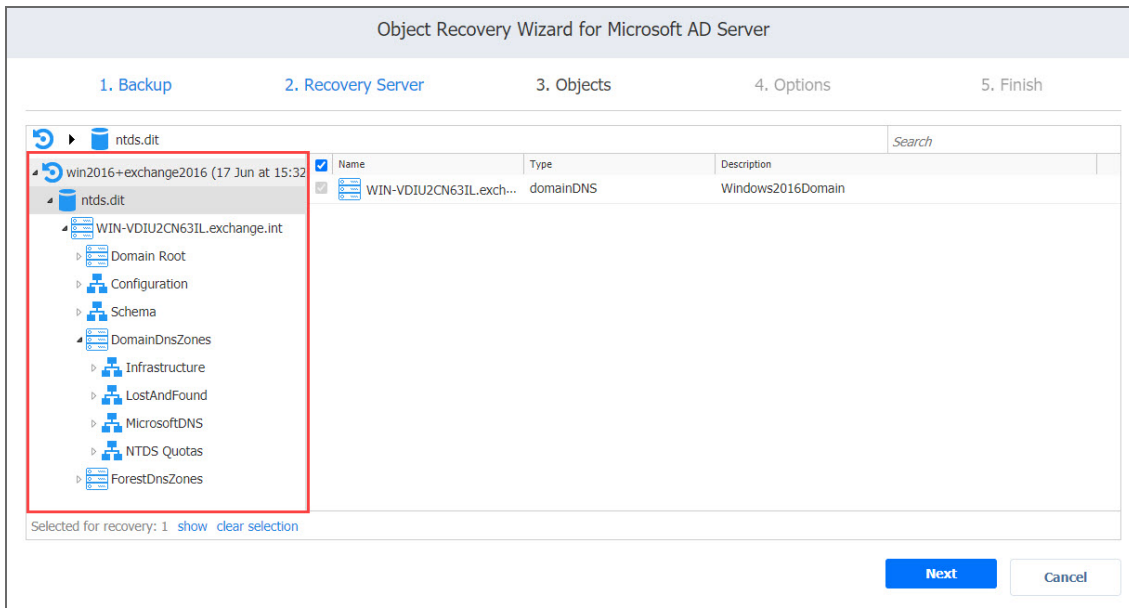
NAKIVO Backup & Replication allows you to search Active Directory objects by name. To find an object by its name, enter a word in the **Search** box and press **Enter**



The search is performed starting from the point selected in the left (navigation) pane. For example, if you have selected the **Users** group, the search will only be performed inside the **Users** group.

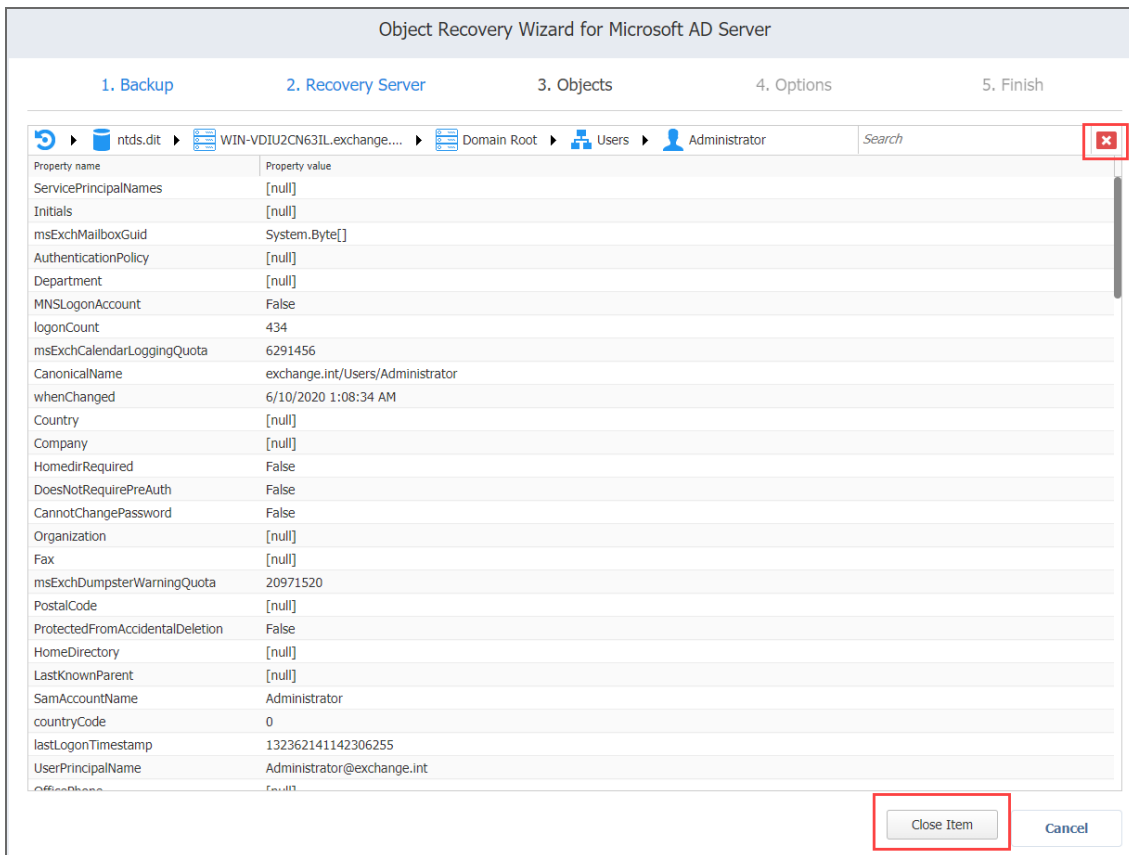
Browsing Active Directory Objects

NAKIVO Backup & Replication scans the selected recovery point for Active Directory databases (files with “.edb” extension) and displays the list of identified databases in the left (Navigation) pane. To browse Microsoft Active Directory objects, simply expand the appropriate database in the left pane. You can also browse the tree by using the scroll bar.



Viewing Active Directory Objects

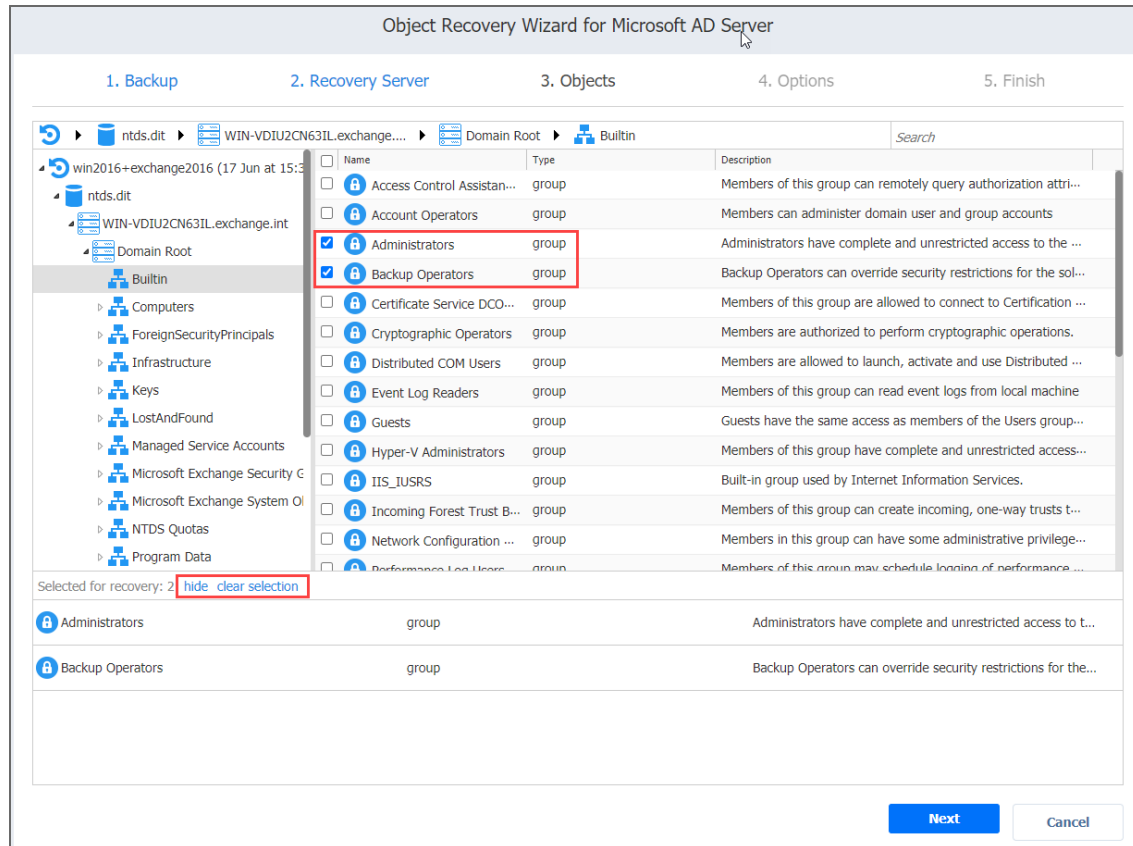
To view a Microsoft Active Directory object, click the object. The object contents will be displayed. Use the close buttons to close the item.



Selecting Active Directory Objects to Recover

In the **Contents** pane to the right, select a checkbox next to the items you want to recover. The number of items selected for recovery is displayed at the bottom of the wizard page. You can also:

- Click **show** to view the list of all items selected for recovery.
- Click **clear selection** to clear the list of items selected for recovery.
- Click **hide** to hide the list of items selected for recovery.



When ready with selecting Microsoft Active Directory objects for recovery, click **Next** to go to the next page of the wizard

Object Recovery Wizard for Microsoft AD Server: Options

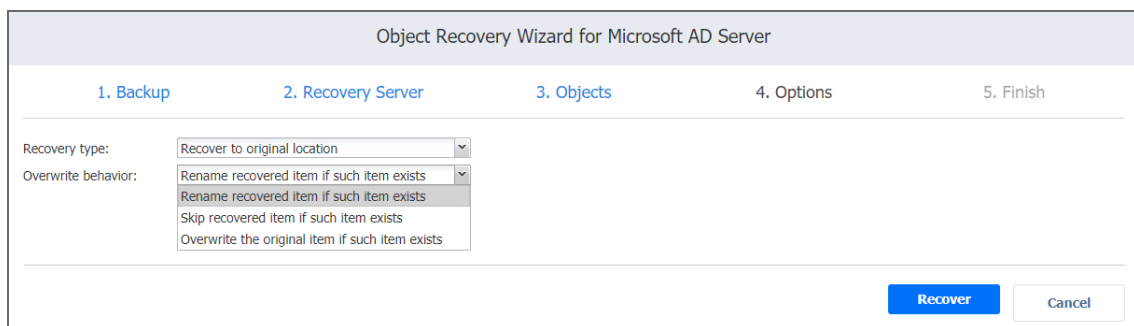
On the **Options** page of the wizard, you can set up the following options for your object recovery job:

- [Recovering Objects to the Original Location](#)
- [Exporting Active Directory Objects](#)

Recovering Objects to the Original Location

Follow the steps below to recover objects of your Microsoft Active Directory server to the original location:

1. In the **Recovery type** list, select **Recover to original location**.
2. If you have selected multiple objects or container(s) that include one or more “user” objects, the **Recover of user object** list becomes available. Select either of the following options:
 - **User will be disabled:** If this option is selected, NAKIVO Backup & Replication disables all recovered “user” objects and the corresponding user accounts are disabled after importing these objects to Active Directory.
 - **User must change password at next log on:** If this option is selected, NAKIVO Backup & Replication generates a new password for each recovered “user” object. The passwords.txt file is added to the ZIP archive with recovered objects, and it contains the new passwords. After importing the “user” objects to Active Directory, corresponding users are forced to change the password on the next log on.



The screenshot shows the 'Object Recovery Wizard for Microsoft AD Server' with the 'Options' step selected. The wizard has five steps: 1. Backup, 2. Recovery Server, 3. Objects, 4. Options, and 5. Finish. In the 'Options' step, there are two dropdown menus. The first is 'Recovery type:' with 'Recover to original location' selected. The second is 'Overwrite behavior:' with 'Rename recovered item if such item exists' selected. Below these are three buttons: 'Recover' (blue) and 'Cancel' (grey).

3. In the **Overwrite behavior** list, select what you wish to do if the recovered item conflicts with an existing one:
 - **Rename recovered item if such item exists**
 - **Skip recovered item if such item exists**
 - **Overwrite the original item if such item exists**
4. If you have chosen to recover a full database (`ntds.dit` file) on the **Recovery Server** page put a checkmark in the **Stop Microsoft Active Directory instance before recovery** checkbox to stop the instance before the recovery process begins. This option is recommended for the safe recovery of Active Dir-

ectory objects.

Object Recovery Wizard for Microsoft AD Server

1. Backup 2. Recovery Server 3. Objects 4. Options 5. Finish

Recovery type: Recover to original location

Overwrite behavior: Rename recovered item if such item exists

☒ Stop Microsoft Active Directory instance before recovery. ?

Recover Cancel

5. Click **Recover**.

Notes

- Some attributes may be skipped for the selected object(s) depending on the Active Directory system settings.
- In case the recovery process fails, the VM will be reverted to the snapshot taken on the **Recovery Server** page of the wizard

Exporting Active Directory Objects

Follow the steps below to export recovered objects of your Microsoft Active Directory server to a custom location:

1. In the **Recovery type** list, select **Export**. A number of options become available for setting up a custom location.
2. In the **Export location** list, select the appropriate location type:
 - **Local folder on Recovery Server:** If this option is selected, you will have to enter the path to a local folder on the recovery server in the **Local path** field.

Object Recovery Wizard for Microsoft AD Server

1. Backup 2. Recovery Server 3. Objects 4. Options 5. Finish

Recovery type: Export

Export location: Local folder on Recovery Server

Local path: C:\Folder\Subfolder

Overwrite behavior: Rename recovered item if such item exists

☒ Stop Microsoft Active Directory instance before recovery. ?

Recover Cancel

- **CIFS share:** If this option is selected, enter the following values:
 1. **Path to the share**
 2. **Username**

3. Password

Object Recovery Wizard for Microsoft AD Server

1. Backup 2. Recovery Server 3. Objects 4. Options 5. Finish

Recovery type: Export

Export location: CIFS share

Path to the share: \\ServerName\FolderName

Username: Type or select username

Password:

Overwrite behavior: Rename recovered item if such item exists

☒ Stop Microsoft Active Directory instance before recovery. ?

Recover Cancel

3. In the **Overwrite behavior** list, select what needs to be done if the recovered item conflicts with an existing item. Refer to the section above for an explanation.
4. Click **Recover**.

The **Finish** page of the wizard opens informing you that Microsoft Active Directory object recovery has started. To view the object recovery progress, go to the Activities page.

To close the wizard, click **Close**.

Importing Recovered Objects to Active Directory

Refer to the sections below for information on how to import recovered objects in Active Directory.

- [Importing Non-User Objects](#)
- [Importing User Objects](#)

Importing Non-User Objects

If Active Directory objects or containers that you have recovered do not contain “User” objects, follow the steps below to import the objects in Active Directory:

1. On the Active Directory machine, run command line as an administrator.
2. Run the following command: `ldifde -i -k -f filename -j logfolder`, where “filename.ldif” is the path to the recovered ldif file, and “logfolder” is the path to the folder where import logs will be saved.

Importing User Objects

If you have recovered one or more “User” objects or if you have recovered containers that include one or more “User” objects, follow the steps below to import the objects in Active Directory:

1. On the Active Directory machine, run command line as an administrator.
2. Enable a secure LDAP connection on the Active Directory machine:
 - a. Log on to the server and open the Server Manager tool.
 - b. Add the Active Directory Certificate Services role. On the **Role services** page of the **Add Roles and Features** wizard, select a Certification Authority.
 - c. When configuring the Active Directory Certificate service on the destination server, use proper credentials to configure the service, choose the **Enterprise CA** setup type, and choose a **Root CA for CA Type**.
 - d. Follow the rest of wizard instructions to complete adding the Active Directory Certificate Services role.
3. Run the following command: `ldifde -i -t 636 -f filename.ldif -k -j logfolder`, where “filename.ldif” is the path to the recovered ldif file, and “logfolder” is the path to the folder where import logs will be saved.
4. Edit the group policy by adding imported users. After importing one or more users, you may need to verify password options via user logon.

Object Recovery for Microsoft SQL Server

The [instant object recovery](#) feature in NAKIVO Backup & Replication allows you to browse, search, and recover Microsoft SQL Server objects directly from compressed and deduplicated backups. This out-of-the-box feature is agentless, and it does not require creating a special lab or running a special backup type. Microsoft SQL Server objects can be recovered to a source or another VM.

Refer to the following topics for more information:

- [“Starting Object Recovery for Microsoft SQL Server” on page 793](#)
- [“Object Recovery Wizard for Microsoft SQL Server: Backup” on page 795](#)
- [“Object Recovery Wizard for Microsoft SQL Server: Recovery Server” on page 796](#)
- [“Object Recovery Wizard for Microsoft SQL Server: Objects” on page 798](#)
- [“Object Recovery Wizard for Microsoft SQL Server: Options” on page 799](#)

Starting Object Recovery for Microsoft SQL Server

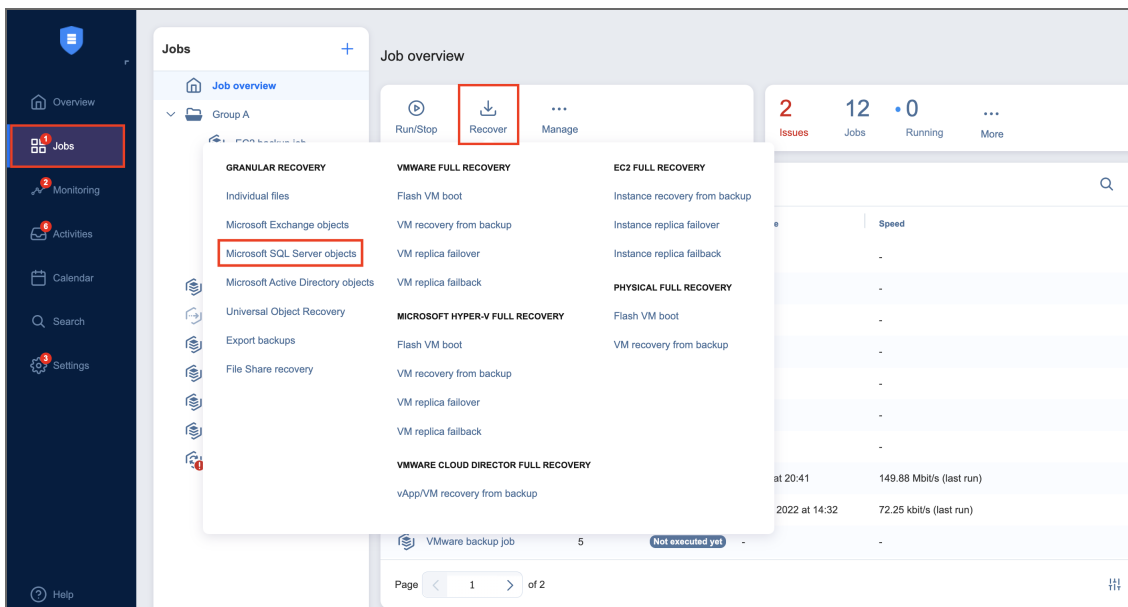
You can start the recovery process either from the **Jobs** menu, by using the [search](#) function, or from the **Repositories** tab in the **Settings** (for example, if you no longer have a backup job but still have the backup).

Refer to the following sections for more details:

- [Starting SQL Server Object Recovery from Jobs Menu](#)
- [Starting SQL Server Object Recovery from a Backup Repository](#)

Starting SQL Server Object Recovery from Jobs Menu

To start Microsoft SQL Server object recovery from the **Jobs** menu, click **Recover** and choose **Microsoft SQL Server objects**.

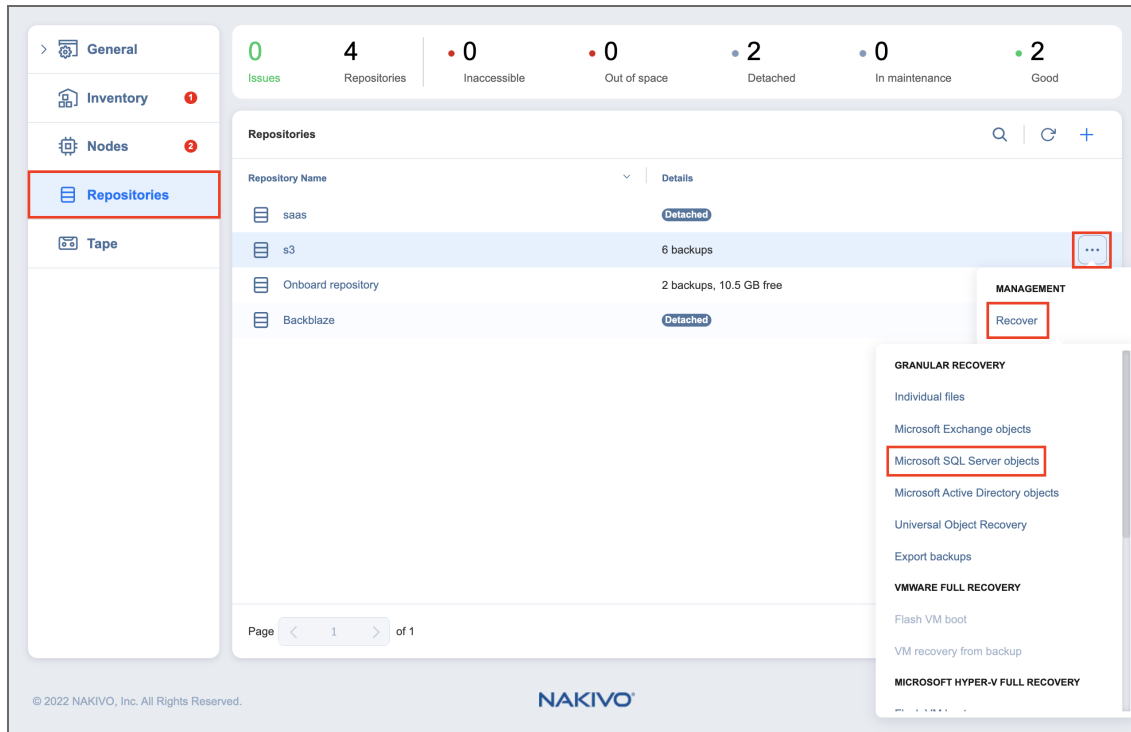


Starting SQL Server Object Recovery from Backup Repository

To start SQL Server object recovery from a Backup Repository:

1. Click **Settings** in the main menu of the product.
2. Go to the **Repositories** tab and hover the cursor over the backup repository containing the required backup.

3. Click the ellipsis **Manage** button, click **Recover**, and select **Microsoft SQL Server objects**.

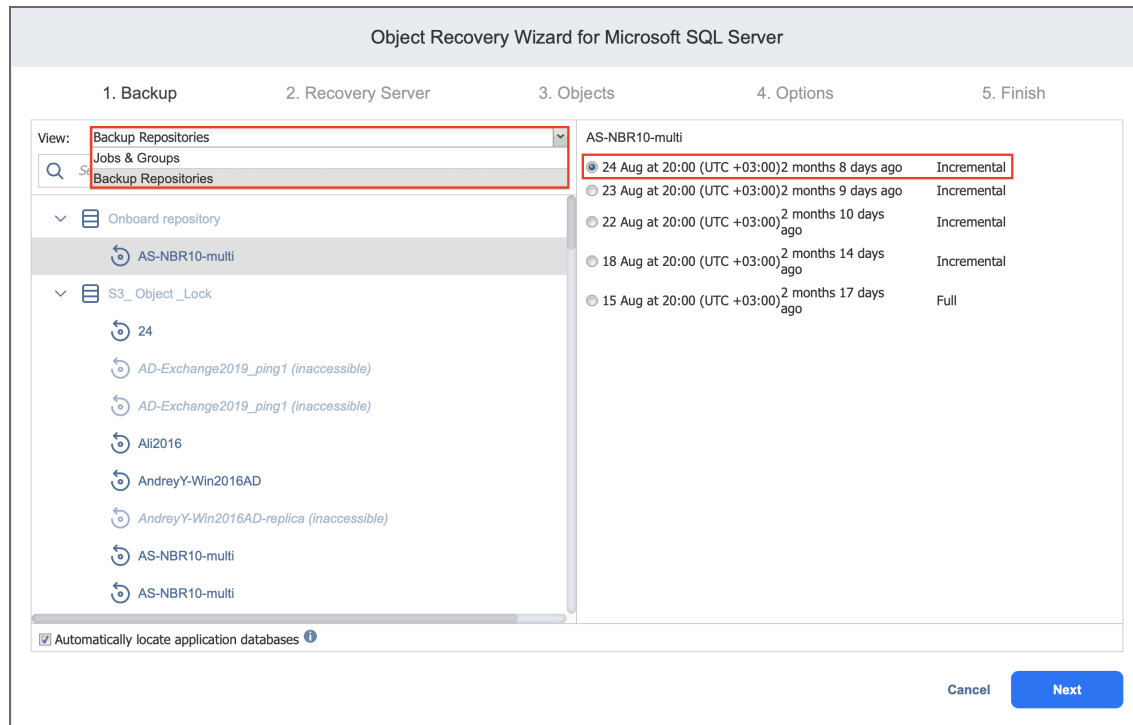


The **New Object Recovery Wizard for Microsoft SQL Server** opens.

Object Recovery Wizard for Microsoft SQL Server: Backup

On the **Backup** page of the wizard:

1. Select a backup of a VM with Microsoft SQL in the left pane using either the **Backup Repositories** or **Jobs & Groups** view.
2. Select a recovery point in the right pane.



3. Click **Next**.

By default, NAKIVO Backup & Replication automatically searches the selected recovery point for Microsoft SQL database from which objects can be recovered. This process can take a few minutes. If you want to manually specify the location of the database file, deselect the **Automatically locate application databases** option.

Object Recovery Wizard for Microsoft SQL Server: Recovery Server

To set up a recovery server for Microsoft SQL Server objects:

1. The **Recovery Server Settings** section opens. Please enter the following values:

- **Recovery server:** Choose the target server from the drop-down list.

Note

- NAKIVO Backup & Replication will try to auto-detect the IP address automatically.
- Servers added using Direct Connect are not supported.

- **Server IP address:** Enter the IP address of the recovery server if it is not detected by the application based on the recovery server name.
- **Use custom SSH port:** If necessary, enter an SSH port to be used for connecting to the recovery server. The default value is 22.
- **Credentials type:** Choose your preferred option and enter your respective credentials. Refer to [“Requirements for Microsoft SQL Server Object Recovery” on page 160](#) for a full list of requirements for recovering files to server.
 - a. **Password:** Enter a username with administrative privileges for the file share entered above and your password.
 - b. **Private key:** Select your private key from the drop-down list.
- **SQL instance:** Select a target SQL instance.

2. Click the **Test Connection** button to test your credentials for the specified recovery server. If your credentials are correct, a checkmark appears to the right of the button.

3. Click **Next**.

Object Recovery Wizard for Microsoft SQL Server

1. Backup

2. Recovery Server

3. Objects

4. Options

5. Finish

Specify a Microsoft SQL Server instance which will be used to recover application items.
Databases from the backup will be temporarily mounted to this server.

Recovery Server Settings

Recovery server:

AS-NBR10-multi

Server hostname or IP:

10.30.23.176

☐ Use custom SSH port:

22

Credentials type:

Password

Username:

admin

Password:

Test Connection

Manage credentials

SQL instance:

Select SQL Instance

Cancel

Next

Object Recovery Wizard for Microsoft SQL Server: Objects

On the **Objects** page of the wizard, select objects for recovery. You can select either entire databases or individual objects for recovery.

1. Select the database in the left pane.
2. Select the objects in the right pane. If you want to restore an entire database, select all objects in this pane.
3. Alternatively, you can look for objects using the **Search** bar.
4. When you are done, click **Next**.

Object Recovery Wizard for Microsoft SQL Server

1. Backup 2. Recovery Server 3. Objects 4. Options 5. Finish

Search

<input type="checkbox"/> Name	Modified	Size
<input checked="" type="checkbox"/> AdventureWorks2017.mdf	Wed, 13 May at 19:29	264 MB
<input checked="" type="checkbox"/> model_msdbdata.mdf	Tue, 24 Sep at 16:09	13 MB
<input type="checkbox"/> model_msdbdata.mdf	Tue, 24 Sep at 16:09	13 MB
<input type="checkbox"/> model_replicatedmaster.mdf	Tue, 24 Sep at 16:09	4 MB
<input type="checkbox"/> model_replicatedmaster.mdf	Tue, 24 Sep at 16:09	4 MB

Selected for recovery: 2 [hide](#) [clear selection](#)

AdventureWorks2017.mdf	...QL15.MSSQLSERVER > MSSQL > DATA	Wed, 13 May 2020...	264 MB
model_msdbdata.mdf	...QL15.MSSQLSERVER > MSSQL > DATA	Tue, 24 Sep 2019 ...	13 MB

Next Cancel

Object Recovery Wizard for Microsoft SQL Server: Options

On the **Options** page of the wizard, set the options for the recovery job.

- [Recovery Scope](#)
- [Recovery Settings](#)
- [Overwrite Behavior](#)

Recovery Scope

Set the recovery scope by selecting either **Recover schema and data** or Recover only schema.

Object Recovery Wizard for Microsoft SQL Server

1. Backup 2. Recovery Server 3. Objects 4. Options 5. Finish

Recovery Scope

☒ Recover schema and data

☐ Recover only schema

Recovery Settings

Recovery type: Recover to original location ▼

Overwrite behavior: Rename recovered item if such item exists ▼

Recover Cancel

Recovery Settings

Set up the recovery type and overwrite behavior.

Recovery Type

- **Recover to original location:** Recover objects to the same server and SQL instance where they were originally located.
- **Recover to custom location:** Recover objects to a different instance.
- **Export :** Export objects as files to a specified location.
 - **SQL instance:** Select the target SQL instance.
 - **Target database:** Select the target database of the selected instance.
 - **Local folder on Recovery Server:** Specify a path to save objects.
 - **CIFS share:** Specify a remote CIFS (Windows) file share and your credentials for it (or select them

from the Manage credentials list).

Object Recovery Wizard for Microsoft SQL Server

1. Backup 2. Recovery Server 3. Objects 4. Options 5. Finish

Recovery Scope

☒ Recover schema and data
☐ Recover only schema

Recovery Settings

Recovery type: Export

Export location: CIFS share

Path to the share: \\ServerName\FolderName

Username: Type or select username

Password: [Manage credentials](#)

Overwrite behavior: Rename recovered item if such item exists

Recover Cancel

If you are using a domain name, enter it in the following format: domain\username

Overwrite Behavior

Select what to do if the recovered item conflicts with an existing one:

- **Rename recovered item if such item exists**
- **Skip recovered item if such item exists**
- **Overwrite the original item if such item exists**

Object Recovery Wizard for Microsoft SQL Server

1. Backup 2. Recovery Server 3. Objects 4. Options 5. Finish

Recovery Scope

☒ Recover schema and data
☐ Recover only schema

Recovery Settings

Recovery type: Recover to custom location

SQL instance: MSSQLSERVER

Path to the local folder: C:\Folder\Subfolder

Overwrite behavior: Rename recovered item if such item exists
Skip recovered item if such item exists
Overwrite the original item if such item exists

Recover Cancel

Click **Recover** to start the object recovery process. The **Finish** page opens.

Performing Universal Object Recovery

With [Universal Object Recovery](#) you can choose a disk from a VM recovery point and mount it to a target machine. This will allow you to recover backup data located on the mounted disk. Before creating a Universal Object Recovery job, make sure the [System Requirements](#) for recovering files to a server are met.

Please refer to the following topics for creating a Universal Object Recovery job:

- [“Opening Universal Object Recovery Wizard” on page 802](#)
- [“Universal Object Recovery Wizard: Backup” on page 804](#)
- [“Universal Object Recovery Wizard: Disks” on page 805](#)
- [“Universal Object Recovery Wizard: Options” on page 806](#)

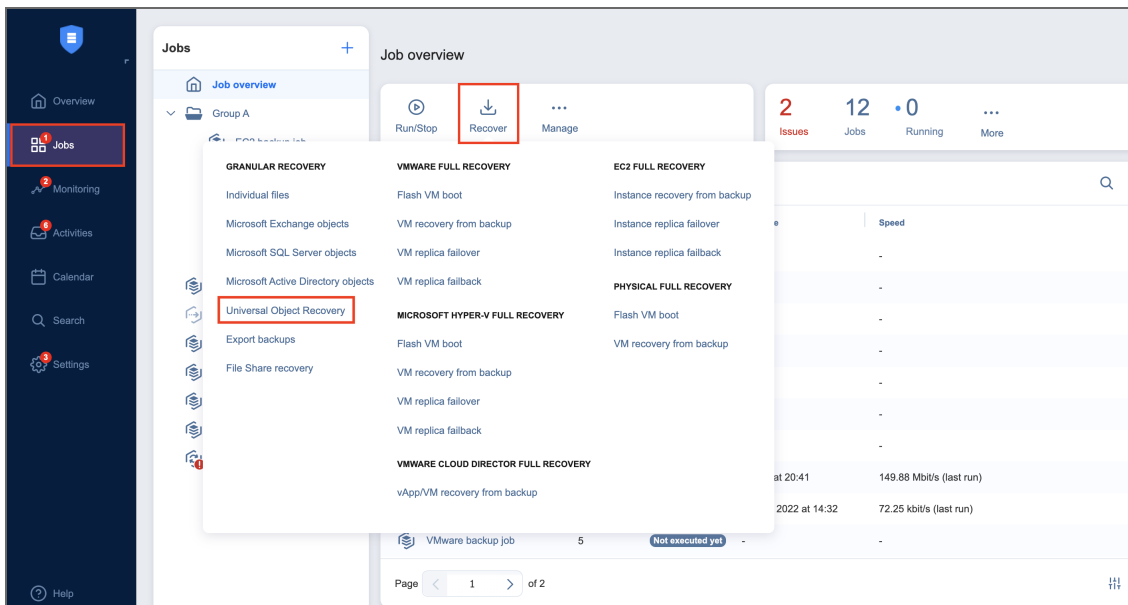
Opening Universal Object Recovery Wizard

You can start the recovery process either from the **Jobs** menu, by using the [search](#) function, or from the **Repositories** page in **Settings** (for example, if you no longer have a backup job but still have the backup). Refer to the following sections for more details:

- [Starting Universal Object Recovery from Jobs Menu](#)
- [Starting Universal Object Recovery from a Backup Repository](#)

Starting Universal Object Recovery from Jobs Menu

To start Universal object recovery from the **Jobs** menu, click **Recover** and choose **Universal Object Recovery**.

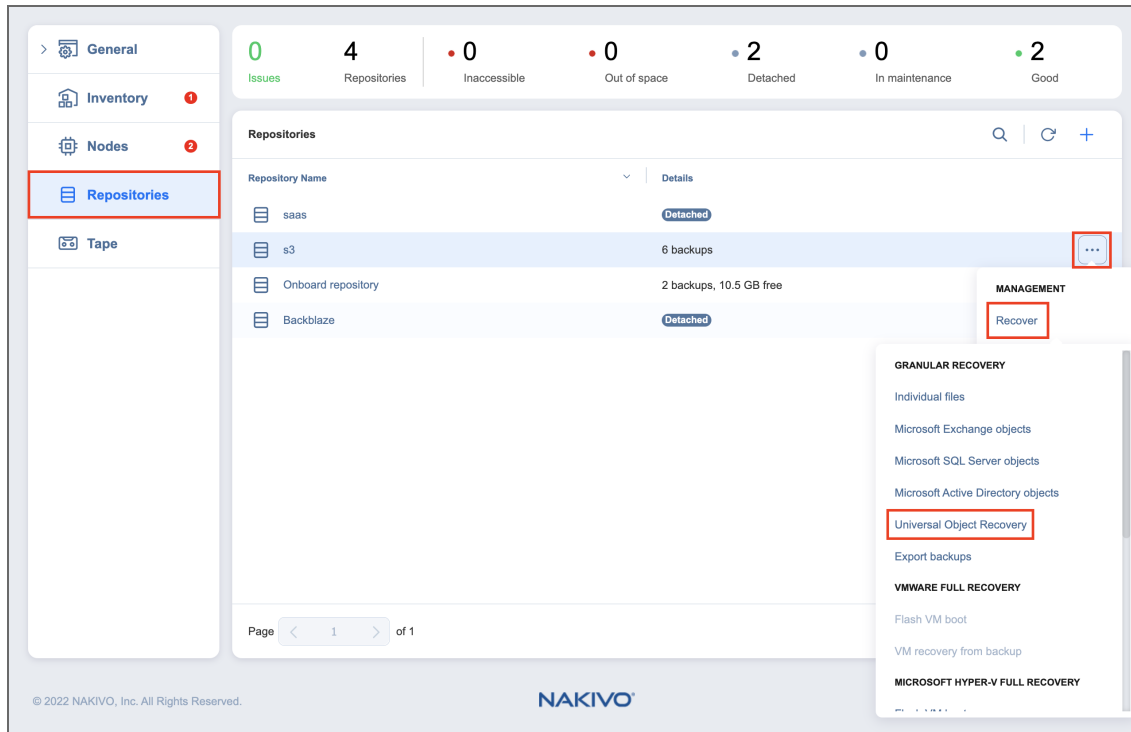


Starting Universal Object Recovery from a Backup Repository

To start Universal object recovery from a Backup Repository:

1. Click **Settings** in the main menu of NAKIVO Backup & Replication.
2. Go to the **Repositories** tab and hover the cursor over the Backup Repository containing the required backup.

3. Click the ellipsis **Manage** button, click **Recover**, and select **Universal Object Recovery**.

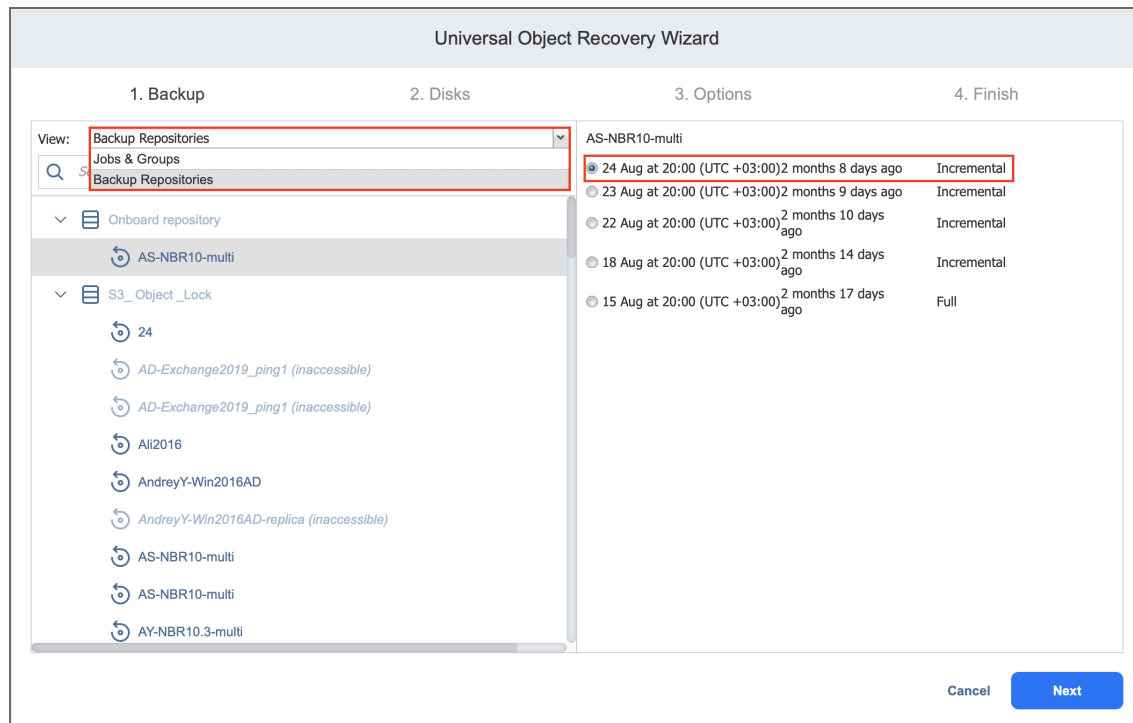


The new **Universal Recovery Job Wizard** opens.

Universal Object Recovery Wizard: Backup

On the **Backup** page of the wizard, do the following:

1. Optionally, you can filter the items tree by entering a string into the **Search** box. You can enter a part of or the entire name of the item.
2. Choose either of the following item views:
 - **Backup Repositories:** When chosen, the Backup Repositories tree opens in the left pane. Proceed as follows:
 - a. Expand a repository by clicking the icon to the left of the repository.
 - b. Choose a backup in the left pane and then choose a recovery point in the right pane.
 - **Jobs & Groups:** When chosen, the jobs' tree opens in the left pane. Proceed as follows:
 - a. Expand a job by clicking the icon to the left of the job.
 - b. Choose a backup in the left pane and then choose a recovery point in the right pane.
3. Click **Next** to go to the next page of the wizard.



Universal Object Recovery Wizard: Disks

On the **Disks** page of the wizard, choose one or more disks from the list of disks. Click Next to go to the next page of the wizard.

Universal Object Recovery Wizard			
1. Backup	2. Disks	3. Options	4. Finish
<div><input checked="" type="checkbox"/> Hard drive 1 (80.0 GB)</div>			
		<div>NextCancel</div>	

Universal Object Recovery Wizard: Options

In the **Options** page of the wizard:

1. Specify mount location options:

- **Mount location:** Choose the mount location from the drop-down list.

Note

Servers added using Direct Connect are not supported.

- **Location IP address:** Enter the IP address of the server to which the disks will be mounted if it is not detected by the application based on the Mount location value. Here you can enter an IP address of any virtual or physical machine.
 - **Use custom SSH port:** To recover to a Linux server, select this option to enter a custom SSH port to be used for connecting to the recovery server. The default value is 22
 - **Credentials type:** Choose your preferred option and enter your respective credentials:
 - **Password:** Enter a username with administrative privileges for the file share entered above and your password.
 - **Private key:** Select your private key from the drop-down list.
2. Click the **Test Connection** button to test your credentials for the specified recovery server. If your credentials are correct, a checkmark appears to the right of the button.
3. **Malware detection:** With [this option](#) enabled, the backups are scanned for malware using the configured antivirus software on the scan server.
4. Optionally, if you have selected **Enabled** for the **Malware detection** option, click the **settings** link to configure the following options:
- **Scan server:** Select a specific [scan server](#) for the job or leave the **Default** setting. If **Default** is selected, the Transporter is used as the scan server and can support a maximum of 2 concurrent scan tasks.

Note

- For the **Default** option, if the Repository Transporter is the installed Transporter, it requires the master password to function as the scan server.
 - For more details on the requirements for Scan Server, refer to the [Feature Requirements](#).
- **Scan type:** Choose between the **Deep scan** and the **Quick scan**:
 - **Deep scan:** When this option is selected, the antivirus software scans the entire backup and may take longer to complete.

- **Quick scan:** When this option is selected, the antivirus software scans only OS disks in the backup.
- **If malware is detected:** Choose the behavior if malware is detected:
 - **Fail recovery:** With this option, the recovery process fails in case the job has only one disks. If the job has several disks, the infected disks are skipped and the job continues to run.
 - **Continue recovery:** When this option is selected, the recovery job completes the scanning process and recovers the infected disks.
- **Scan timeout:** Specify the timeout for the malware detection process. If the specified amount of time is exceeded, the recovery job fails.
- Click **Apply** when you're done.

5. Click **Mount** to confirm mounting your disks to the selected recovery server.

The screenshot shows the 'Universal Object Recovery Wizard' at step 3, 'Options'. The wizard has four steps: 1. Backup, 2. Disks, 3. Options, and 4. Finish. The 'Options' step is active. The form contains the following fields and controls:

- Mount location:** A dropdown menu showing 'MS SQL 2016 (dev edition) of latest SP on wi...' with an information icon.
- Location IP address:** A text field containing '10.30.24.48' with an information icon.
- Use custom SSH port:** A checkbox that is checked, followed by a text field containing '22' with an information icon.
- Credentials type:** A dropdown menu showing 'Password'.
- Username:** A text field containing 'administrator'.
- Password:** A text field containing masked characters '*****'.
- Test Connection:** A button with a checkmark icon, indicating a successful connection test.
- Malware detection:** A dropdown menu showing 'Disabled' with a 'settings' link.
- Buttons:** 'Cancel' and 'Mount' buttons at the bottom right.

The Universal Object Recovery is started and the **Finish** page of the wizard opens.

6. Click the **Activities** link to go to the **Activities** page if you want to view the progress of the Universal Object Recovery.
7. Click **Close** to close the Universal Object Recovery Wizard. Upon successful Universal Object Recovery, the disks are mounted to the recovery server.

Full Recovery

With NAKIVO Backup & Replication, you can recover an entire VM in case of hardware or VM failure. The VM is recovered in the same state as it was during the backup and it will appear on the host selected for recovery. You can also perform cross-platform recovery that allows you to export virtual disks from VM backups to different formats for further manual recovery of the VMs in different virtual environments. The Flash VM Boot feature allows you to recover an entire VM from the backup in seconds. This feature makes it possible to boot a VM directly from a compressed and deduplicated backup without recovering the entire VM. The VM can be started in a few seconds, and it can run directly from the backup. In addition, multiple recovery jobs and/or users may access the same recovery point even if it is currently in use by an existing recovery job/session.

For more details, refer to the corresponding articles below:

- [“Performing Flash VM Boot Recovery” on page 834](#)
- [“Hyper-V VM Recovery” on page 809](#)
- [“Starting Recovery from Tape” on page 831](#)
- [“Performing Cross-Platform Recovery” on page 824](#)

Hyper-V VM Recovery

With NAKIVO Backup & Replication, you can recover full VMs from backups. When you run VM recovery, a new VM is created; the source VM is not reverted to a previous state or replaced with the new VM.

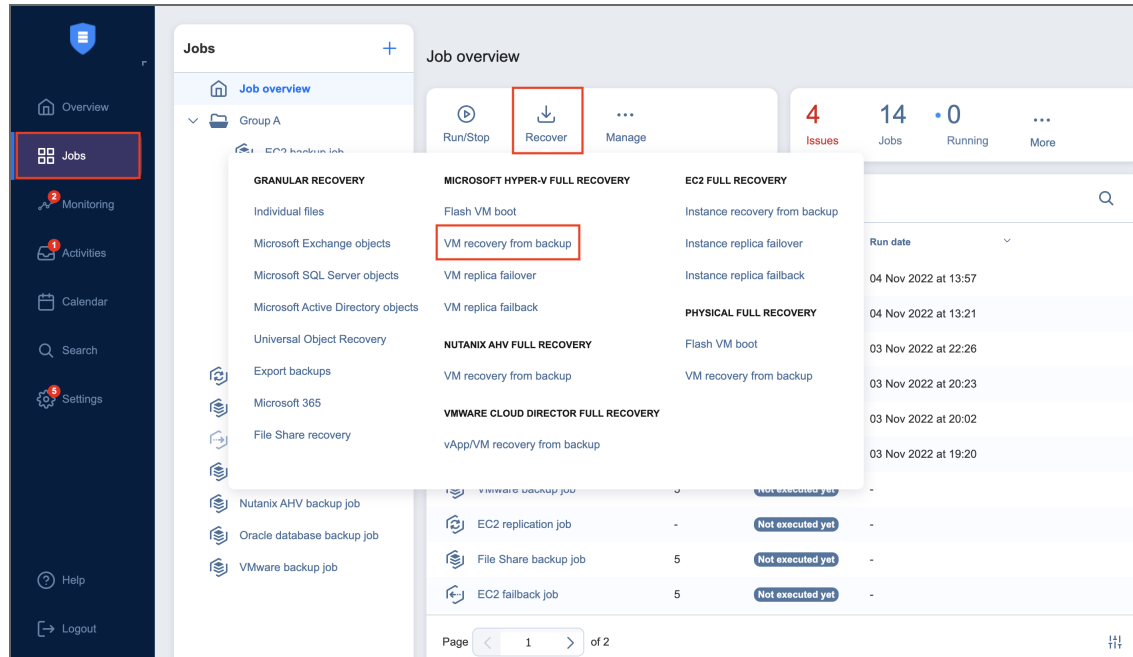
Refer to the following topics for more information:

- [“Starting Hyper-V VM Recovery” on page 810](#)
- [“Recovery Job Wizard for Hyper-V: Backups” on page 812](#)
- [“Recovery Job Wizard for Hyper-V: Destination” on page 813](#)
- [“Recovery Job Wizard for Hyper-V: Options” on page 816](#)

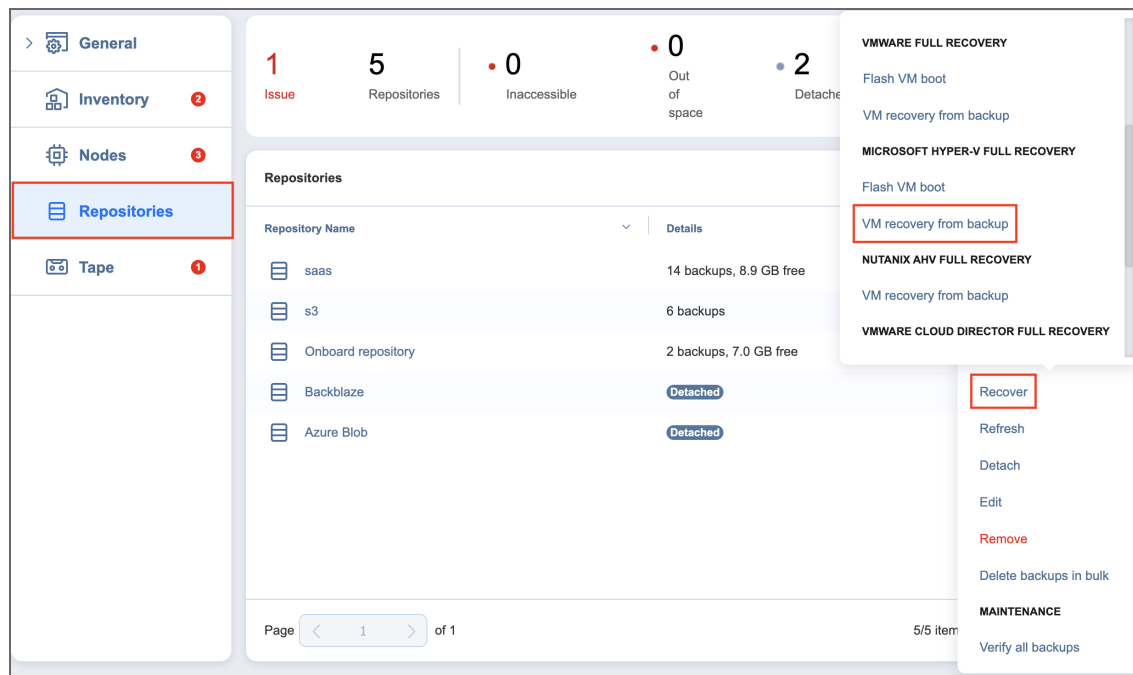
Starting Hyper-V VM Recovery

To recover entire Hyper-V VMs from backups, do one of the following:

- Start the recovery process from the **Jobs** menu by clicking **Recover** and then clicking **VM recovery from backup**.



- Open the **New Recovery Job Wizard** from the **Repositories** tab following the steps below:
 - From the main menu of NAKIVO Backup & Replication, click **Settings**.
 - Go to the **Repositories** tab.
 - Hover over the Backup Repository containing the necessary backup, click the ellipsis **Manage** button, and click **Recover**
 - Click **VM recovery from backup** under **Microsoft Hyper-V Full Recovery**.



- Open the **New Recovery Job Wizard** from the **Tape** tab by following the steps below:
 1. From the main menu of NAKIVO Backup & Replication, click **Settings**.
 2. Go to the **Tape** tab and click **Backups**.
 3. Select the necessary Hyper-V VM backups.
 4. Click the **Recover** button.
- Alternatively, the recovery can be performed by using the [search](#) function.

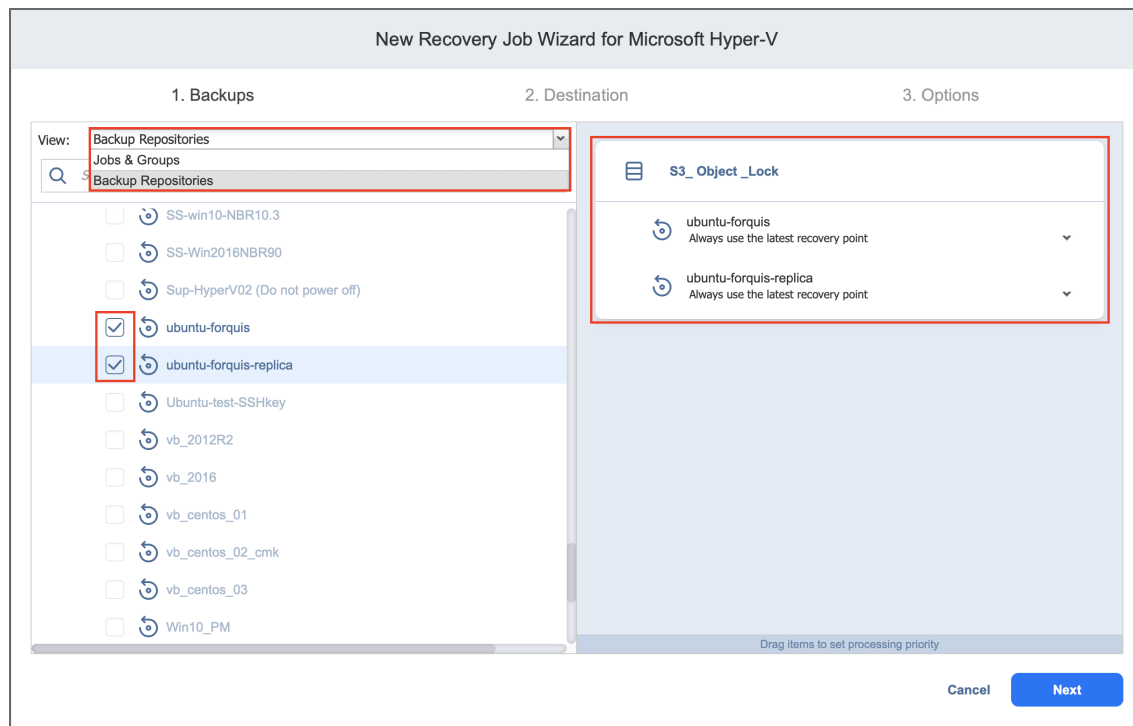
The **New Recovery Job Wizard for Hyper-V** opens.

Recovery Job Wizard for Hyper-V: Backups

On the **Backups** page of the wizard, proceed as follows:

1. Select one of the following views:
 - **Jobs & Groups:** In this view, do the following:
 - a. Select one or more VM or VM template backups in the left pane.
 - b. Select a recovery point for each backup in the right pane.
 - **Backup Repositories:** In this view, do the following:
 - a. Select one or more Backup Repositories in the left pane.
 - b. Select a recovery point for each backup in the right pane.
 - **Tape:** In this view, do the following:
 - a. Select one or more tape backups in the left pane.
 - b. Select a recovery point for each backup in the right pane.

You can search for a specific backup, job, group, or repository (depending on the selected View) by entering its name into the Search field.



2. Click **Next** to go to the next step.

Recovery Job Wizard for Hyper-V: Destination

On the **Destination** page, select a location for the recovered VMs.

- [Setting the Same Host, Datastore, and Network for All Recovered VMs](#)
- [Setting Backup Repository as Destination](#)
- [Setting the Default Destination for Recovered VMs](#)
- [Setting Different Options for Recovered VMs](#)

Setting the Same Host, Datastore, and Network for All Recovered VMs

To recover all VMs to the same server and location and to connect all recovered VMs to the same networks, follow the steps below:

1. If you selected a tape backup on the **Backups** page, select **New VM(s)** in the **Recover to** drop-down list. Otherwise, proceed to the next step.
2. Choose a server from the **Container** drop-down list.
3. Type a location in the **Path** field or click **Browse** to navigate to the path. It can be a local or a shared path.
4. Choose a network from the **Network** drop-down list.

New Recovery Job Wizard for Microsoft Hyper-V

1. Backups 2. Destination 3. Options

Container: Hyper-V test

Path: C:\NakivoRecovered Browse...

Network: Select target network

Advanced setup...

Cancel Next

Note

To connect to a shared path successfully, the following conditions must be met:

1. The shared path is created with the same credentials as the corresponding Hyper-V container that was added. See Adding Hyper-V Servers for details on adding Hyper-V containers to NAKIVO Backup &

Replication.

2. The login session in which you created the shared path has not been ended.

As a workaround, create a symbolic link to the shared path from the Hyper-V container. Refer to Step 7 of [High Availability of NAKIVO Backup and Replication](#) for details.

Setting Backup Repository as Destination

If you selected a tape backup on the **Backups** page, you have the additional option of recovering to an existing Backup Repository. To do so, select **Backup Repository** from the **Recover to** drop-down menu and choose the appropriate repository from the **Repository** drop-down menu below.

Setting the Default Destination for Recovered VMs

If you have chosen a host, cluster, folder, or a Backup Repository as a source for your recovery job on the **Backups** page, you can set the default container, datastore, and VM folder for the recovered VMs. To do this, follow the steps below:

1. Click **Advanced setup** and then click on the name of the chosen host, cluster, or folder.
2. If you selected a tape backup on the **Backups** page, select **New VM(s)** in the **Recover to** drop-down list. Otherwise, proceed to the next step.
3. Choose a **Default container**.
4. If you have chosen the backup job on the **Source** page, you can choose a **Default Network**.
5. Optionally, you can also choose a **Default VM folder**.

New Recovery Job Wizard for Microsoft Hyper-V

1. Backups 2. Destination 3. Options

Container: Hyper-V test

Path: C:\NakivoRecovered

Network: EXTERNAL

Hyper-V backup job

Default container: Hyper-V test

Default path: C:\NakivoRecovered

Default network: EXTERNAL

SUB_Win2016_Win2008R2

SUB_WinSrv2019

Cancel


Setting Different Options for Recovered VMs

To specify different options for recovered VMs, follow the steps below:


1. Click **Advanced setup**.
2. If you selected a tape backup on the **Backups** page, select **New VM(s)** or **Backup Repository** in the **Recover to** drop-down list. Otherwise, proceed to the next step.
3. Choose a target container, disk, and network adapter for each VM.
4. Click **Next** to go to the next step.


New Recovery Job Wizard for Microsoft Hyper-V


1. Backups 2. Destination 3. Options

Container:  Hyper-V test


Path: C:\NakivoRecovered [Browse...](#)


Network:  EXTERNAL



 Hyper-V backup job Click to collapse


Default container:  Hyper-V test ?

Default path: C:\NakivoRecovered [Browse...](#) ?

Default network:  EXTERNAL ?

 SUB_Win2016_Win2008R2 Click to collapse

Source	Target
VM location: Repo7Tb	Container:  Hyper-V test
VM resources: 1 CPU, 1.0 GB RAM	Virtual Machine: <i>A new VM will be created</i>
Disks	Disks
<input checked="" type="checkbox"/> Hard disk 2: 1.0 GB	Hard disk 2: C:\NakivoRecovered Browse...
VM configuration	VM configuration: C:\NakivoRecovered Browse...
Network adapters	Network adapters
Network adapter 1	Network adapter 1:  EXTERNAL

 SUB_WinSrv2019

Recovery Job Wizard for Hyper-V: Options

On the **Options** page, you can set up recovery options for the job.

- [“Job Options” below](#)
- [“Recovered VM Options” on page 818](#)
- [“Pre and Post Job Actions” on page 819](#)
 - [“Setting Up a Pre Job Script” on page 819](#)
 - [“Setting Up a Post Job Script” on page 820](#)
 - [“Email Notifications” on page 821](#)
- [“Data Transfer” on page 821](#)
 - [“Transporter Load” on page 821](#)
 - [“Bandwidth Throttling” on page 821](#)
 - [“Bottleneck Detection” on page 822](#)
- [“Completing the New Recovery Job Wizard for Microsoft Hyper-V” on page 823](#)

Job Options

In the *Job Options* section, specify the following:

1. **Job name:** Specify a name for the recovery job.
2. **Job priority:** Select a job priority level between 1 and 5, with 1 being the highest priority. Jobs with higher priority levels are prioritized by Transporters during job processing.

Note

This option is only available in the Enterprise, Enterprise Essentials, Enterprise Plus, MSP Enterprise, and MSP Enterprise Plus editions.

3. **Network acceleration:** When [network acceleration](#) is enabled, NAKIVO Backup & Replication uses compression and traffic reduction techniques to speed up data transfer. Enable this option if you plan to recover VMs over WAN or slow LAN links.
4. **Encryption** When [encryption](#) is enabled, VM data is protected with AES 256 encryption while traveling over the network. Data encryption increases the backup time and CPU load on machines running Transporters. Select this option if recovering over WAN without a VPN connection.
5. **Malware detection:** With [this option](#) enabled, the backups are scanned for malware using the configured antivirus software on the scan server.
6. Optionally, if you have selected **Enabled** for the **Malware detection** option, click the **settings** link to configure the following options:

- **Scan server:** Select a specific [scan server](#) for the job or leave the **Default** setting. If **Default** is selected, the Transporter is used as the scan server and can support a maximum of 2 concurrent scan tasks.

Note

- For the **Default** option, if the Repository Transporter is the installed Transporter, it requires the master password to function as the scan server.
 - For more details on the requirements for Scan Server, refer to the [Feature Requirements](#).
-
- **Scan type:** Choose between the **Deep scan** and the **Quick scan**:
 - **Deep scan:** When this option is selected, the antivirus software scans the entire backup and may take longer to complete.
 - **Quick scan:** When this option is selected, the antivirus software scans only OS disks in the backup.
 - **If malware is detected:** Choose the behavior if malware is detected:
 - **Fail the recovery job:** With this option, the recovery process fails in case the job has only one VM. If the job has several VMs, the infected VMs are skipped and the job continues to run.
 - **Continue and recover to isolated network:** When this option is selected, the recovery job completes the scanning process and recovers the infected VMs to a temporary isolated network.
 - **Scan timeout:** Specify the timeout for the malware detection process. If the specified amount of time is exceeded, the recovery job fails.
 - Click **Apply** when you're done.

1. Backups
2. Destination
3. Options

Job Options
Job name: Hyper-V recovery job
Job priority: 5
Network acceleration: Disabled
Network encryption: Disabled
Malware detection: Disabled

Recovered VM Options
Recovery mode: Synthetic
Recovered VM names: Append "-recovered" in the end
VM disks: Respect original VM disk type
VM power on: Power on recovered VMs
VM MAC addresses: Do not generate new MAC address

Pre and Post Actions
☒ Send job run reports to admin@nakivo.com
☐ Run local pre job script
☐ Run local post job script

Data Transfer
☐ Limit transporter load to 3 concurrent tasks
Bandwidth throttling: Disabled
☐ Bottleneck detection

Cancel
Finish
Finish & Run

Recovered VM Options

In the *Recovered VM Options* section, specify the following:

- **Recovery mode:** Choose one of the following:
 - **Synthetic:** With this recovery mode, the VMs are recovered with the environmental dependencies (such as CPU affinity) removed. Select this option when recovering VMs to a new location.
 - **Production:** With this recovery mode, environment dependencies will be preserved on the recovered VM(s). Make sure the location to which the VM(s) will be recovered does not contain the original VM(s), otherwise UUID and MAC address conflicts may occur.
- **Recovered VM names:** Choose one of the following:
 - **Append "-recovered" in the end:** Source VM names are used for recovered VM names and "-recovered" are added after the recovered VM name.
 - **Leave recovered VM names as is:** Recovered VM names are identical to the source VM names.
 - **Enter custom recovered VM names:** You can enter custom names for recovered VM.
- **VM disks:** Choose one of the following:
 - **Respect original VM disk type:** When specified, disks that respect original VM disk type will be created on target VMs. Select this option to recover VMs to their original location.
 - **Create only thin disks on target VMs:** When specified, only thin disks will be created on target VMs. Use this option to save space on target datastore.
- **VM MAC addresses:** Choose one of the following:
 - **Do not generate new MAC addresses:** When this option is chosen, the recovered VM will have the same MAC address as the source VM.

- **Generate new MAC addresses:** When this option is chosen, a new MAC address will be generated for the recovered VM.
- **VM power on:** When the **Power on recovered VMs** option is chosen, the recovered VMs will be powered on.

The screenshot shows the 'Options' tab of a recovery job configuration. The 'Recovered VM Options' section is highlighted with a red box. It contains the following settings:

- Recovery mode:** Synthetic
- Recovered VM names:** Append "-recovered" in the end
- VM disks:** Respect original VM disk type
- VM power on:** Power on recovered VMs
- VM MAC addresses:** Do not generate new MAC addresses

Other visible settings include:

- Job Options:** Job name: Hyper-V recovery job, Job priority: 5, Network acceleration: Disabled, Network encryption: Disabled, Malware detection: Disabled.
- Pre and Post Actions:** Send job run reports to: admin@nakivo.com, Run local pre job script: [checked], Run local post job script: [checked].
- Data Transfer:** Limit transporter load to: 3 concurrent tasks, Bandwidth throttling: Disabled, Bottleneck detection: [checked].

Buttons at the bottom: Cancel, Finish, Finish & Run.

Pre and Post Job Actions

NAKIVO Backup & Replication allows you to run a [script](#) before VM recovery begins (a pre-job script) and after the recovery of all VMs in the job has completed (a post-job script). The scripts can only be executed on the machine where the Director is installed. Also, you can set up email notifications to be sent to the specified recipients on job completion.

Setting Up a Pre Job Script

To run a script before the product begins recovering VMs, do the following:

1. Place a script file on the machine where the Director is installed.
2. Select the **Run local pre job script** option and click the **settings** link.
3. Specify the following parameters in the dialog box that opens:
 - **Script path:** Specify a local path to the script on the machine where the Director is installed. A script interpreter should be specified.
Example (Windows): `cmd.exe /c D:\script.bat`
Example (Linux): `bash /root/script.sh`
 - **Job behavior:** Choose one of the following job behaviors in relation to script completion:
 - **Wait for the script to finish:** With this option selected, VM backup will only be started after the script is completed.

- **Do not wait for the script to finish:** With this option selected, the product will run the script and will start backing up VMs at the same time.
- **Error handling:** Choose one of the following job behaviors in relation to script failure:
 - **Continue the job on script failure:** With this option selected, the job will perform VM backup even if the script has failed.
 - **Fail the job on script failure:** With this option selected, if the script fails, the job will be failed and VM backup will not be performed.

Setting Up a Post Job Script

To run a script after the product has finished backing up all VMs, do the following:

1. Place a script file on the machine where the Director is installed.
2. Select the **Run local post job script** option and click the **settings** link.
3. Specify the following parameters in the dialog box that opens:
 - **Script path:** Specify a local path to the script on the machine where the Director is installed. A script interpreter should be specified.
Example (Windows): `cmd.exe /c D:\script.bat`
Example (Linux): `bash /root/script.sh`
 - **Job behavior:** Choose one of the following job behaviors in relation to script completion:
 - **Wait for the script to finish:** With this option selected, the job will be in the “running” state until the script is completed.
 - **Do not wait for the script to finish:** With this option selected, the job will be completed even if the script execution is still in progress.
 - **Error handling:** Choose one of the following job behaviors in relation to script failure:
 - **Continue the job on script failure:** With this option selected, script failure will not influence the status of the job.
 - **Fail the job on script failure:** With this option selected, if the script fails, the job status will

be set to “failed” even if VM backup has been successful.

The screenshot shows the 'Options' tab of the NAKIVO Backup & Replication interface. It is divided into three sections: 1. Backups, 2. Destination, and 3. Options. The 'Options' section contains several configuration areas:

- Job Options:** Job name (Hyper-V recovery job), Job priority (5), Network acceleration (Disabled), Network encryption (Disabled), and Malware detection (Disabled).
- Recovered VM Options:** Recovery mode (Synthetic), Recovered VM names (Append "-recovered" in the end), VM disks (Respect original VM disk type), VM power on (Power on recovered VMs), and VM MAC addresses (Do not generate new MAC address).
- Pre and Post Actions:** This section is highlighted with a red box. It includes the 'Send job run reports to' checkbox (checked) with the email address 'admin@nakivo.com' entered, and two unchecked checkboxes: 'Run local pre job script' and 'Run local post job script'.
- Data Transfer:** Includes 'Limit transporter load to' (3 concurrent tasks), 'Bandwidth throttling' (Disabled), and 'Bottleneck detection' (unchecked).

At the bottom right, there are three buttons: 'Cancel', 'Finish', and 'Finish & Run'.

Email Notifications

NAKIVO Backup & Replication can send email notifications about job completion status to specified recipients. This feature complements global notifications and allows you to configure notifications on a per-job level. To enable this option, make sure that [Email settings](#) are configured.

To send email notifications, do the following:

- In the *Pre and Post Actions* section, select the **Send job run reports to** option
- Specify one or more email addresses in the text box. Use semicolons to separate multiple email addresses.

Data Transfer

In the *Data Transfer* section, specify the Transporter load for the recovery job and set up [bandwidth throttling](#).

Transporter Load

You can limit the maximum number of transporter tasks used by the job. By default, it is set to 3 concurrent tasks.

To change the default number of tasks, do the following:

1. Select the **Limit transporter load to** checkbox.
2. Specify the number of concurrent tasks in the corresponding box.

Bandwidth Throttling

Please follow the steps below to regulate the speed of data transfer over the network for your recovery job:

1. For the **Bandwidth throttling** option, choose **Enabled**.

Note

If bandwidth throttling is disabled for the current job, global bandwidth rules may still apply to your job. Refer to [“Bandwidth Throttling” on page 331](#) for details.

2. Click the **settings** link that becomes available.
3. The **Job Bandwidth Rules** dialog box opens displaying you the list of available rules. You have the following options:
 - Create a new bandwidth rule for your recovery job:
 - a. Click the **Create New Rule** button.
 - b. The **New Bandwidth Rule** dialog box opens. Refer to [“Bandwidth Throttling” on page 331](#) for details on creating a bandwidth rule.
 - c. Click **Save**.
 - Activate an existing bandwidth rule for your job. Select the checkbox to the left of the necessary bandwidth rule. To deactivate a bandwidth rule for your job, deselect the corresponding checkbox.
 - Edit a bandwidth rule. Click the **Edit** link for a bandwidth rule and modify it in the **Edit Bandwidth Rule** dialog box that opens.
 - Disable a bandwidth rule. Click the **Disable** link. The bandwidth rule will be disabled for all jobs.
 - Remove a bandwidth rule. Click the **Remove** link and then click **Delete** to confirm your operation.

Bottleneck Detection

When the **Bottleneck detection** option is enabled, additional information is collected and recorded in NAKIVO Backup & Replication logs in the course of data transfer for the purpose of bottleneck detection. Check this option to enable the **Bottleneck detection** capability of the Transporters engaged in the job.

1. Backups
2. Destination
3. Options

Job Options

Job name:
Hyper-V recovery job

Job priority:
5

Network acceleration:
Disabled

Network encryption:
Disabled

Malware detection:
Disabled

Recovered VM Options

Recovery mode:
Synthetic

Recovered VM names:
Append "-recovered" in the end

VM disks:
Respect original VM disk type

VM power on:
Power on recovered VMs

VM MAC addresses:
Do not generate new MAC address

Pre and Post Actions

☒ Send job run reports to
admin@nakivo.com

☐ Run local pre job script

☐ Run local post job script

Data Transfer

☐ Limit transporter load to
3 concurrent tasks

Bandwidth throttling:
Disabled

☐ Bottleneck detection

Cancel
Finish
Finish & Run

Completing the New Recovery Job Wizard for Microsoft Hyper-V

Click **Finish** or **Finish & Run** to complete the job creation.

Note

If you click **Finish & Run**, you will have to define the scope of your job. Please refer to [“Running Jobs on Demand” on page 295](#) for details.

Performing Cross-Platform Recovery

With the [Cross-Platform Recovery](#) feature of NAKIVO Backup & Replication, you can export backups to standard formats that are compatible with various platforms. The following formats are supported:

- VMDK for disk(s) of VMware virtual machine(s)
- VHD for disk(s) of Hyper-V virtual machine(s)
- VHDX for disk(s) of Hyper-V virtual machine(s)

To export your backup for subsequent recovery on the same platform or a different one, use the Backup Export Wizard in NAKIVO Backup & Replication. Refer to [“Feature Requirements” on page 151](#) for the supported scenarios for cross-platform recovery.

NAKIVO Backup & Replication does not run VM preparation when exporting the backups into a specific format. If you plan to import the VM into a different platform and VM preparation is required, prepare your VM in advance.

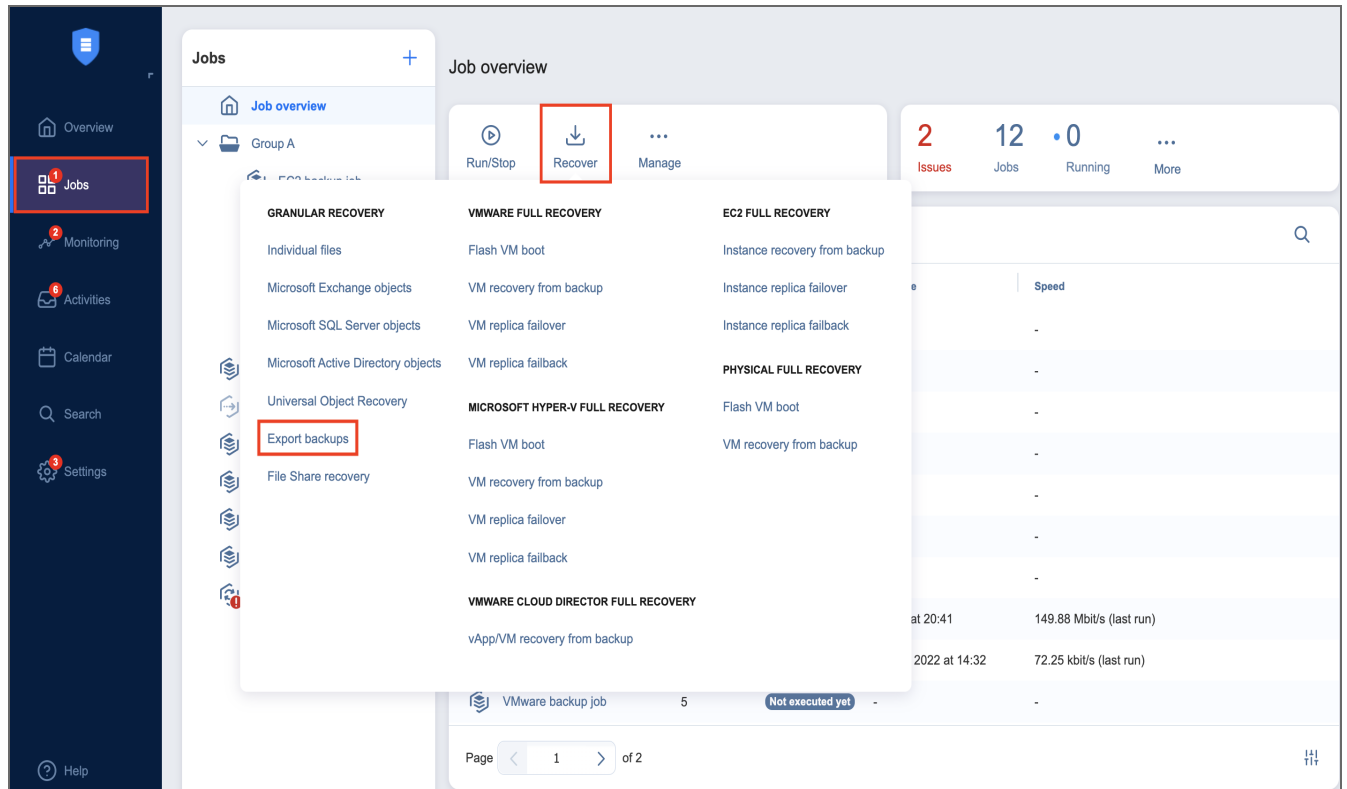
This section includes the following topics:

- [“Opening Backup Export Wizard” on page 825](#)
- [“Backup Export Wizard: Backups” on page 827](#)
- [“Backup Export Wizard: Disks” on page 828](#)
- [“Backup Export Wizard: Options” on page 829](#)
- [“Backup Export Wizard: Finish” on page 831](#)

Opening Backup Export Wizard

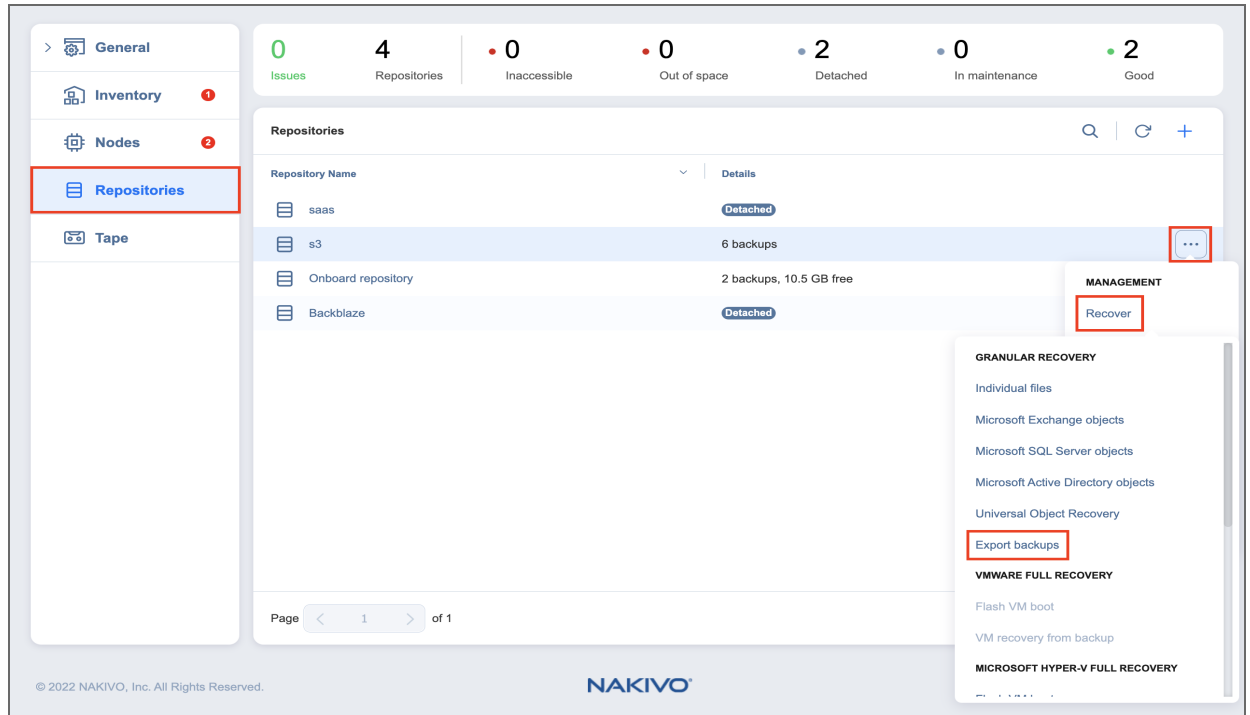
Open **Backup Export Wizard** using one of the following ways:

- Navigate to the **Jobs** menu, click **Recover** and then click **Export Backups**.



- On the *Settings* page:
 1. Click the **Repositories** tab.
 2. In the list of repositories, hover over a repository and click the ellipsis **Manage** button.

3. Click **Recover** and select **Export Backups**.

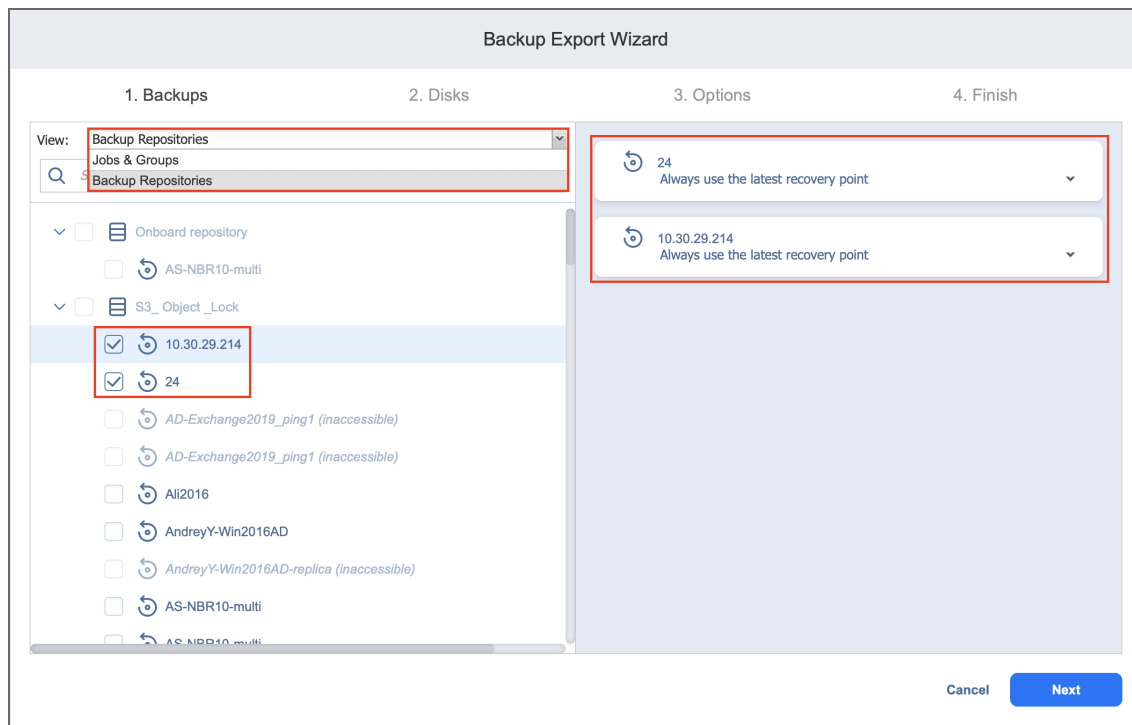


- Alternatively, the Backup Export can be performed by using the [search](#) function.

Backup Export Wizard: Backups

On the **Backups** page of the wizard:

1. In the left pane, select one or more backups using one of these views:
 - **Jobs & Groups**
 - **Backup Repositories**
2. Select a recovery point for each backup in the right pane.
3. Click **Next** to go to the next page of the wizard.



Backup Export Wizard: Disks

On the **Disks** page of the wizard:

1. Select one or more disks under each backup.
2. Click **Next** to go to the next page of the wizard.

Backup Export Wizard

1. Backups

2. Disks

3. Options

4. Finish

24

☒ scsi.0 (20.0 GB)

10.30.29.214

☒ \\.\PHYSICALDRIVE2 (200.0 GB)

AS-NBR10-multi

☒ Hard disk 1 (50.0 GB)

AY-NBR10.3-multi

☒ Hard disk 1 (50.0 GB)

Total estimated size: 320.0 GB

Cancel

Next

Backup Export Wizard: Options

On the **Options** page of the wizard, specify options for exporting your backups:

1. **Export format:** Choose one of the following:

- VMDK
- VHD
- VHDX

Note

VMDK disks are always pre-allocated with the thick provisioning type of storage.

2. **Export location:** Choose one of the following:

- **Local folder on assigned Transporter:** With this option selected, you have to specify a path to the local folder to which the backups will be exported.
- **CIFS share:** With this option selected, proceed as follows:
 - a. Enter the following:
 - Path to the share
 - Username and Password or Private Key
 - b. Click **Test Connection** to check your credentials for the specified share.
- **NFS share:** With this option selected, proceed as follows:
 - a. Enter Path to the share.
 - b. Click **Test Connection** to check the connection to the specified share.

3. Click **Export** to go to the next page of the wizard.

Backup Export Wizard

1. Backups

2. Disks

3. Options

4. Finish

Export format:

VMDK

Export location:

CIFS share

Path to the share:

\\Path\Folder

Credentials type:

Password

Username:

admin

Password:

Manage credentials

Test Connection

Cancel

Export

Backup Export Wizard: Finish

The **Finish** page of the wizard informs you that your backup export has started. To view the status of your backup export, go to **Activities**.

To view the backup export progress, go to **Settings > General > Events**.

To close the **Backup Export Wizard**, click **Close**.

Starting Recovery from Tape

To initiate recovery from a tape backup, do the following:

Starting Recovery from the Tape Tab

1. Go to **Settings**, click the **Tape** tab, and open the **Backups** view.
2. In the **Backups** table, select the checkbox next to one or several backups that you want to recover and click the **Recover** button. This opens the Recovery wizard with specified backups and their latest recovery point selected.

Note

Only backups of the same type can be selected. That is, you cannot select VMware and Hyper-V type backups and launch the Recovery wizard.

> General

Inventory

Transporters

Repositories

Tapes

334
Issues

0
Devices

0
Tapes

102
Backups

DevicesTapesBackups

<input type="checkbox"/>	Backup Name	Type	Tapes	Point	Last point
<input checked="" type="checkbox"/>	0002373	Hyper-V VM	34	43	Wed, Jul 13 at 7:45 PM
<input type="checkbox"/>	0002373	Hyper-V VM	65	234	Wed, Jul 13 at 7:45 PM
<input type="checkbox"/>	0002373	Hyper-V VM	14	5	Wed, Jul 13 at 7:45 PM
<input type="checkbox"/>	0002373	Hyper-V VM	5	24	Wed, Jul 13 at 7:45 PM
<input type="checkbox"/>	0002373	Hyper-V VM	3	432	Wed, Jul 13 at 7:45 PM
<input type="checkbox"/>	0002373	Hyper-V VM	4	56	Wed, Jul 13 at 7:45 PM

Page

< 1 >

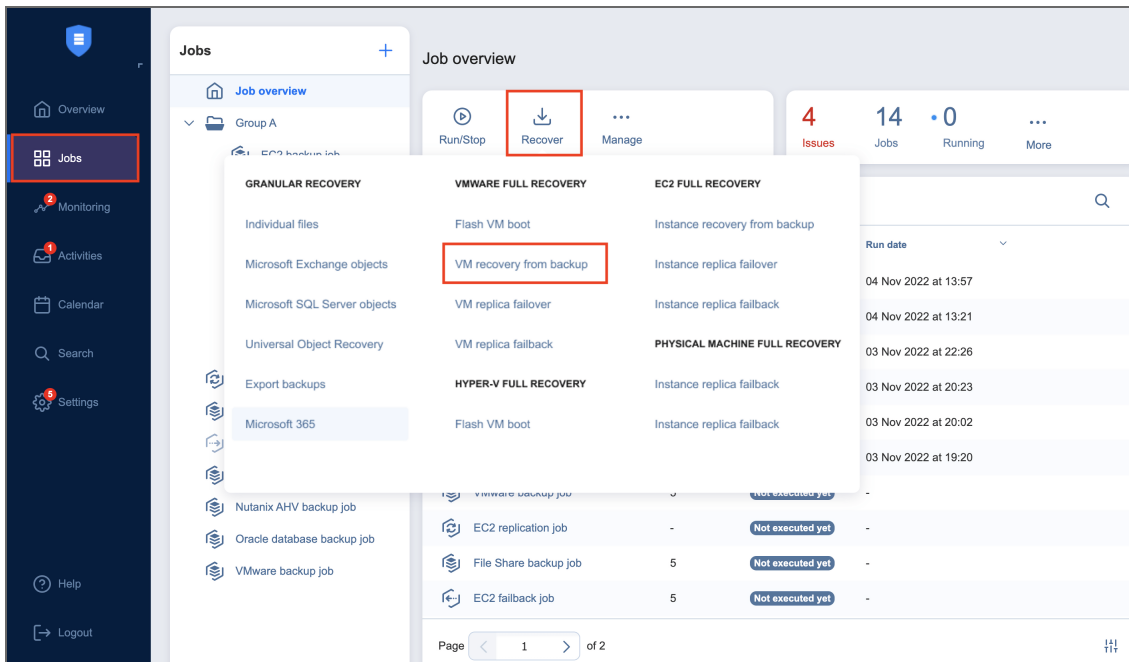
of 1

20/23 items displayed per page

- Alternatively, go to the [“Managing Tape Cartridges” on page 567](#) page, select a backup in the **Tape contents** pane and then click the recovery point you want to restore from.

Starting Recovery from the Jobs Dashboard

You may also initiate recovery from a tape backup via the Jobs dashboard. To do so, click **Recover** and select the appropriate recovery object and type. For example, to launch the VMware recovery wizard, click **VM recovery from backup** under **VMware Full Recovery**.

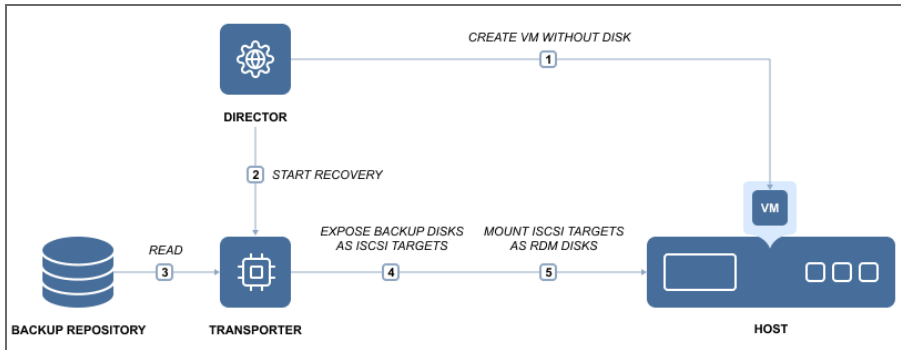


Then, proceed as described in the following topics:

- [“Recovery Job Wizard for Hyper-V: Backups” on page 812](#)

Performing Flash VM Boot Recovery

The [Flash VM Boot](#) feature allows you to run (boot) VMware and Hyper-V VMs directly from compressed and deduplicated VM backups, without recovering entire VMs first. When you boot a VM from a backup, NAKIVO Backup & Replication creates a new VM on the target server.



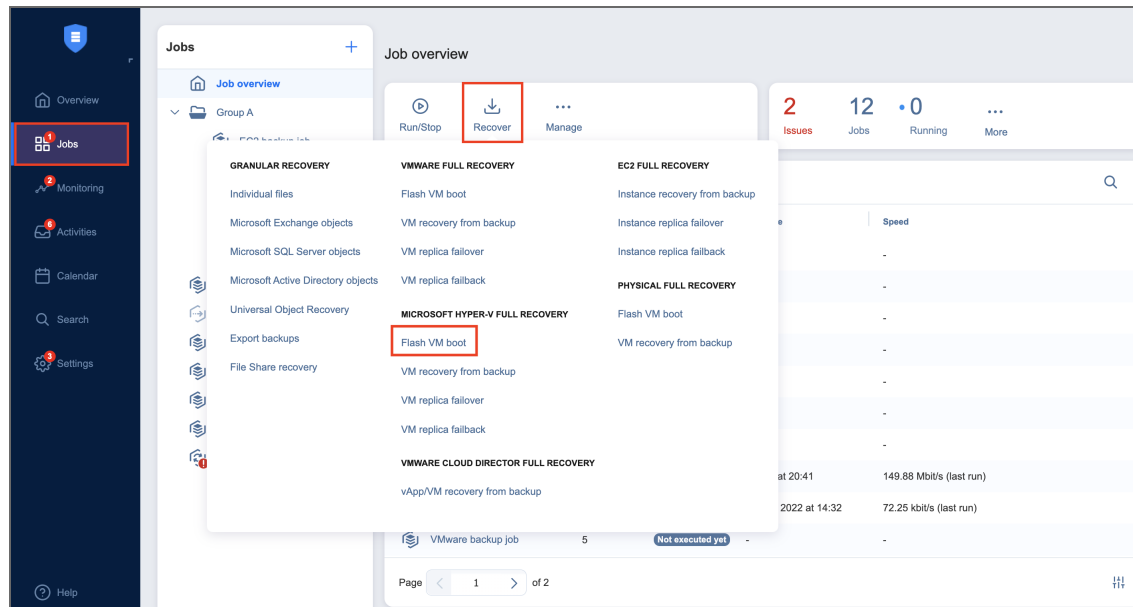
When a VMware VM is created, NAKIVO Backup & Replication takes a snapshot of the VM: this way all changes that occur to the VM are temporarily stored in the snapshot and discarded when you stop the job. When a Hyper-V VM is created, the application temporarily stores the changes to the VM in a disk-based write cache in the Backup Repository; changes are discarded when the job is stopped. For more information, refer to the following topics:

- [“Creating Hyper-V Flash VM Boot Jobs” on page 835](#)
- [“Migrating Recovered VMs Using Flash Boot” on page 850](#)

Creating Hyper-V Flash VM Boot Jobs

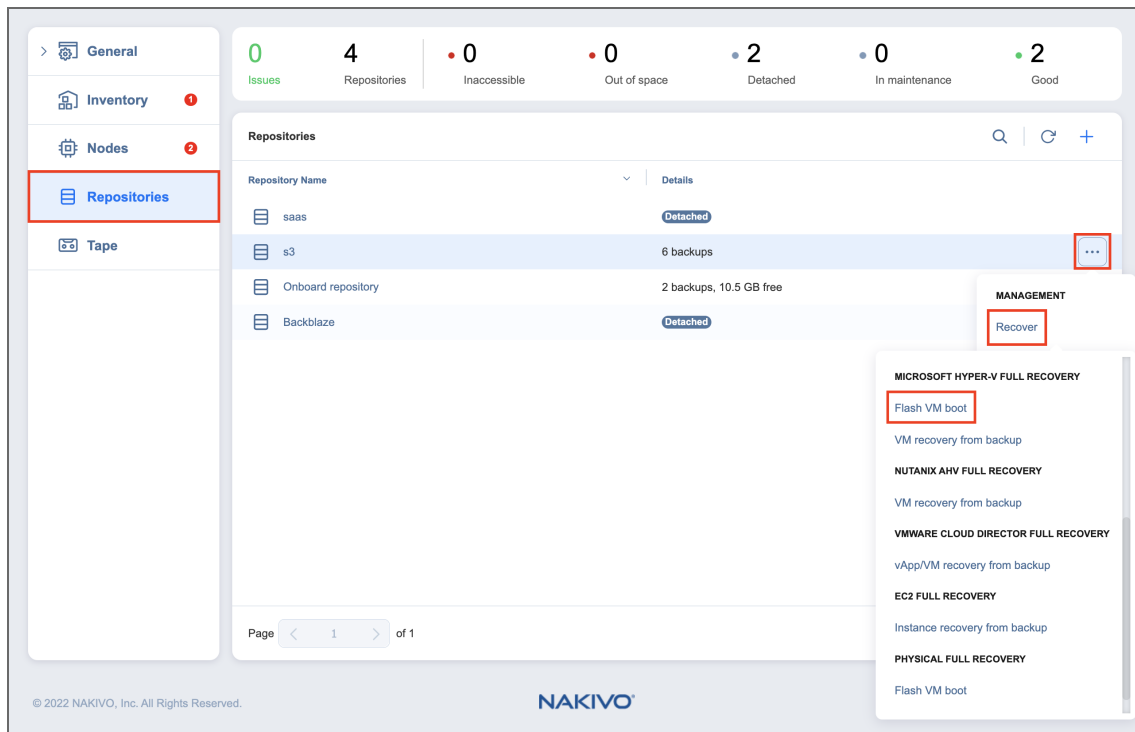
To create a Hyper-V Flash VM Boot job, do one of the following:

- Open the **New Flash Boot Job Wizard** from the **Jobs** menu by clicking **Recover** and then clicking **Flash VM Boot**.



- Open the Flash VM Boot wizard from the **Repositories** tab by following the steps below:
 1. Click **Settings** in the main menu of the product.
 2. Go to the **Repositories** tab.
 3. Hover over the name of the Backup Repository, and click the ellipsis **Manage** button. Click

Recover and then select **Flash VM Boot** under **Microsoft Hyper-V Full Recovery**.



- Alternatively, the recovery can be performed by using the [search](#) function.

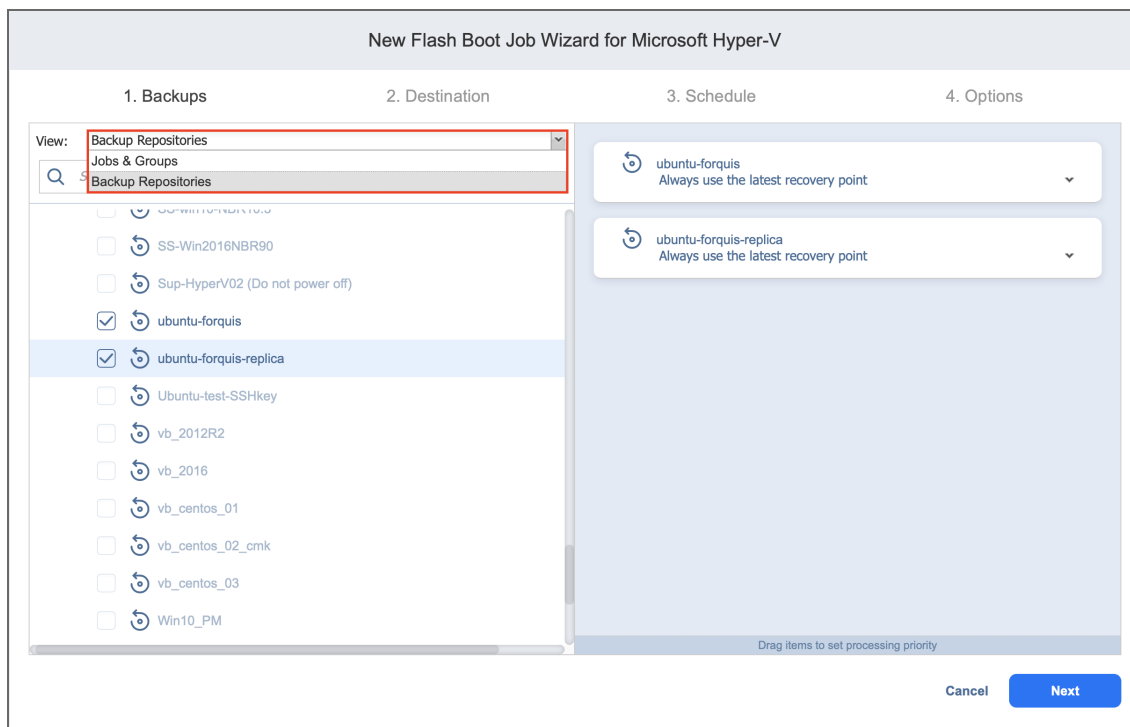
The **New Flash Boot Job Wizard** opens.

- “Hyper-V Flash Boot Job Wizard: Backups” on page 837
- “Hyper-V Flash Boot Job Wizard: Destination” on page 838
- “Hyper-V Flash Boot Job Wizard: Schedule” on page 840
- “Hyper-V Flash Boot Job Wizard: Options” on page 844

Hyper-V Flash Boot Job Wizard: Backups

On the **Backups** page of the wizard, proceed as follows:

1. Select one of the views:
 - **Jobs & Groups:** When selected, perform the following:
 - a. Select one or more VM backups in the left pane.
 - b. Select a recovery point for each backup in the right pane.
 - **Backup Repositories:** When selected, perform the following:
 - a. Select one or more Backup Repositories in the left pane.
 - b. Select a recovery point for each backup in the right pane



2. Select a recovery point for each backup in the right pane.
3. Click **Next** to go to the next page.

Hyper-V Flash Boot Job Wizard: Destination

On the **Destination** page, select a destination for the recovered VMs.

Notes

- Due to Microsoft iSCSI Target Server limits on Windows Server, only 256 iSCSI target instances (VM disks) can be flash-booted per iSCSI Target Server.

Proceed as described in the sections below.

- [Setting the Same Container, Path, and Network for All VMs](#)
- [Setting Different Options for Recovered VMs](#)

Setting the Same Container, Path, and Network for All VMs

To run all VMs on the same container and path, and to connect all recovered VMs to the same network, choose a target container, path, and network from the appropriate drop-down lists.

New Flash Boot Job Wizard for Microsoft Hyper-V

1. Backups 2. Destination 3. Schedule 4. Options

Container: Hyper-V test ▼

Path: C:\NakivoRecovered [Browse...](#)

Network: EXTERNAL ▼

[Advanced setup...](#)

[Cancel](#) [Next](#)

Note

If you choose the **Connect to temporary isolated network** option from the **Network** drop-down list, NAKIVO Backup & Replication will create a new Hyper-V virtual switch and a new network on all hosts where VMs will be recovered. Recovered VMs will be connected to the newly created network.

Setting Different Options for Recovered VMs

To specify different options for VMs, follow the steps below:

1. Click **Advanced setup**.
2. Choose a target container and network adapter for each individual VM.
3. Click **Next**.

Container: Hyper-V test

Path: C:\NakivoRecovered **Browse...**

Network: EXTERNAL

Hyper-V backup job Click to collapse

Default container: Hyper-V test ?

Default path: C:\NakivoRecovered **Browse...** ?

Default network: EXTERNAL ?

SUB_Win2016_Win2008R2 Click to collapse

Source

VM location: Repo7Tb

VM resources: 1 CPU, 1.0 GB RAM

Disks

Hard disk 2: 1.0 GB

VM configuration

Network adapters

Network adapter 1

Target

Container: Hyper-V test

Virtual Machine: A new VM will be created

Disks

Hard disk 2: C:\NakivoRecovered **Browse...**

VM configuration: C:\NakivoRecovered **Browse...**

Network adapters

Network adapter 1: EXTERNAL

SUB_WinSrv2019 Click to collapse

Source

VM location: Repo7Tb

VM resources: 2 CPU, 4.0 GB RAM

Disks

Hard disk 2: 1.0 GB

VM configuration

Network adapters

Network adapter 1

Target

Container: Hyper-V test

Virtual Machine: A new VM will be created

Disks

Hard disk 2: C:\NakivoRecovered **Browse...**

VM configuration: C:\NakivoRecovered **Browse...**

Network adapters

Network adapter 1: EXTERNAL

Cancel **Next**

Note

If you choose the **Connect to temporary isolated network** option for a NIC, NAKIVO Backup & Replication will create a new Hyper-V virtual switch and a new network on the host where the VM will be recovered. The recovered VM will be connected to the network.

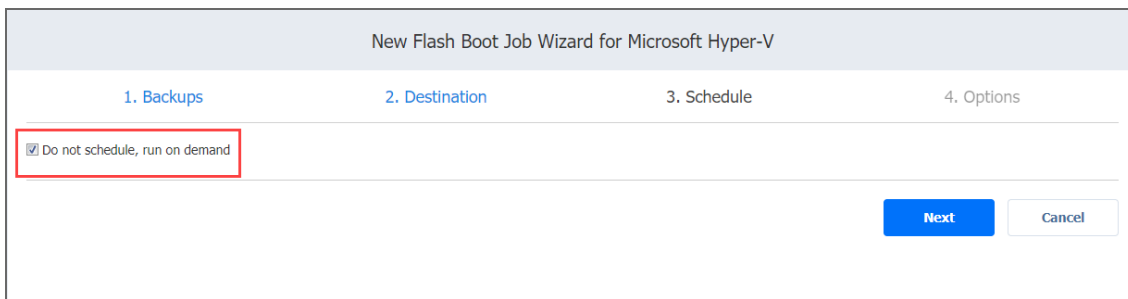
Hyper-V Flash Boot Job Wizard: Schedule

On the **Schedule** page of the wizard, select to run the recovery job manually or schedule the job to run on a regular basis. Proceed as described in the sections below:

- [Disabling Scheduled Job Execution](#)
- [Daily Job Execution](#)
- [Monthly or Yearly Job Execution](#)
- [Periodic Job Execution](#)
- [Chained Job](#)
- [Additional Schedule](#)

Disabling Scheduled Job Execution

If you want to start the job manually only (without any schedule), select the **Do not schedule, run on demand** checkbox and click **Next**.



New Flash Boot Job Wizard for Microsoft Hyper-V

1. Backups 2. Destination 3. Schedule 4. Options

☒ Do not schedule, run on demand

Next Cancel

Daily Job Execution

To run a job once a day, do the following:

- Choose a time zone to be used for the job start and end times from the time zone drop-down list.
- Choose **Run daily/weekly** from the schedule drop-down list.
- Specify the time when the job should be started in the **Starting at:** box.
- Specify the end time for the job in the **Ending:** box. If the job has not completed by the time specified, the job will be stopped.
- Select the days of the week on which the job will be started.
- If necessary, select the **Effective from** checkbox and pick the date when the schedule should come into effect.

- Click **Next**.

New Flash Boot Job Wizard for Microsoft Hyper-V

1. Backups 2. Destination 3. Schedule 4. Options

☐ Do not schedule, run on demand

(UTC+02:00, EET) Eastern European Time

Schedule #1

Run daily/weekly

Starting at: 0:00 Ending: 6:00

☒ Mon ☒ Tue ☒ Wed ☒ Thu ☒ Fri ☐ Sat ☐ Sun

All days Work days Weekends

every 1 weeks

☐ Effective from

[Add another schedule](#)

[Show calendar](#)

Next Cancel

Monthly or Yearly Job Execution

To run a job monthly or yearly, do the following:

- Choose a time zone to be used for the job start and end times from the time zone drop-down list.
- Choose **Run monthly/yearly** from the schedule drop-down list.
- Specify a job start schedule in the appropriate boxes.
- Specify the time when the job should be started in the **Starting at:** box.
- Specify the end time for the job in the **Ending:** field. If the job has not completed by the time specified, the job will be stopped.
- If necessary, select the **Effective from** checkbox and pick the date when the schedule should come into effect.
- Click **Next**.

New Flash Boot Job Wizard for Microsoft Hyper-V

1. Backups 2. Destination 3. Schedule 4. Options

☐ Do not schedule, run on demand

(UTC+02:00, EET) Eastern European Time

Schedule #1

Run monthly/yearly

Run every last Friday of every month

Starting at: 0:00 Ending: 6:00

☐ Effective from

[Add another schedule](#)

[Show calendar](#)

Next Cancel

Periodic Job Execution

To run a job multiple times per day, do the following:

- Choose a time zone to be used for the job start and end times from the time zone drop-down list.
- Choose **Run periodically** from the schedule drop-down list and then choose a time period from the appropriate boxes.
- Specify the time when the job should be started in the **Starting at:** box.
- Specify the end time for the job in the **Ending** box. If the job has not completed by the time specified, the job will be stopped.
- Select the days of the week on which the job will be started.
- If necessary, select the **Effective from** checkbox and pick the date when the schedule should come into effect.
- Click **Next**.

New Flash Boot Job Wizard for Microsoft Hyper-V

1. Backups 2. Destination 3. Schedule 4. Options

☐ Do not schedule, run on demand

(UTC+02:00, EET) Eastern European Time

Schedule #1

Run periodically every 30 minutes

Starting at: 0:00 Ending: 6:00

☒ Mon ☒ Tue ☒ Wed ☒ Thu ☒ Fri ☐ Sat ☐ Sun

All days Work days Weekends

☐ Effective from

[Add another schedule](#)

[Show calendar](#)

Next Cancel

Chained Job

To run the job after a previous one has completed, choose **Run after another job** from the schedule drop-down list and set the options as follows:

- **After the job:** Select a job after which the current job will be started.
- **Run this job:** Choose whether to run the current job immediately after the previous one has completed or specify a delay.
- **After successful runs:** When selected, the job will run if the previous one has completed successfully.
- **After failed runs:** When selected, the job will run if the previous one has failed.
- **After stopped runs:** When selected, the job will run if the previous one has been stopped.
- If necessary, select the **Effective from** checkbox and pick the date when the schedule should come into effect.

- Click **Next**.

The screenshot shows the 'New Flash Boot Job Wizard for Microsoft Hyper-V' window, specifically the '3. Schedule' step. The wizard has four steps: 1. Backups, 2. Destination, 3. Schedule, and 4. Options. In the 'Schedule' step, there are several options for scheduling the job. The 'Do not schedule, run on demand' option is selected. Below this, there is a time zone dropdown set to '(UTC+02:00, EET) Eastern European Time'. Under 'Schedule #1', the 'Run after another job' dropdown is highlighted with a red box. Below this, the 'After the job:' dropdown is set to 'Physical machine backup job-2(D)'. The 'Run this job:' dropdown is set to 'Immediately'. There are also checkboxes for 'After successful runs' (checked), 'After failed runs', and 'After stopped runs'. At the bottom, there are links for 'Add another schedule' and 'Show calendar'. The 'Next' button is highlighted in blue.

Additional Schedule

If you need to add an additional schedule, click **Add another schedule** and configure it as described above.

Hyper-V Flash Boot Job Wizard: Options

On the **Options** page, set up job options as described in these sections:

- [Job Options](#)
 - [Job Name](#)
 - [Job Priority](#)
 - [VM Verification](#)
 - [Malware Detection](#)
- [Recovered VM Options](#)
- [Pre and Post Actions](#)
 - [Setting Up Email Notifications for the Job](#)
 - [Setting Up a Pre Job Script](#)
 - [Setting Up a Post Job Script](#)
- [Data Routing](#)
- [Completing the New Flash VM Boot Job Wizard](#)

Job Options

In this section, specify a job name and a priority level, select a VM verification type, and enable malware detection. Proceed as described below:

Job Name

In the *Job Options* section, enter the name for the job.

Job Priority

Select a job priority level between 1 and 5, with 1 being the highest priority. Jobs with higher priority levels are prioritized by Transporters during job processing.

Note

This option is only available in the Enterprise, Enterprise Essentials, Enterprise Plus, MSP Enterprise, and MSP Enterprise Plus editions.

VM Verification

VM Verification allows you to check the integrity of the backup by starting it and interacting with it. For more details, refer to [“VM Verification” on page 52](#).

You can choose one of the following VM verification options:

- **Screenshot verification:** When enabled, all VM backups created by the job will be verified as follows: After a backup of a VM is completed, the VM is recovered from the backup using Flash VM Boot (and is disconnected from networks), a screenshot of the recovered VM is taken once the VM OS has booted, after which the VM is discarded. VM screenshots will be included in email notifications (see [“Notifications & Reports” on page 349](#)) and displayed on the **Dashboard**.

- **Boot verification:** When enabled, all VM backups created by the job will be verified as follows: After a VM backup is completed, NAKIVO Backup & Replication recovers the VM using Flash VM Boot, disables networking to prevent network connections, and verifies successful system start.

If you select the **Screenshot verification** option, provide verification options in the **VM Boot Location** dialog box that opens:

- **Verify not more than x VMs simultaneously:** Specify the maximum number of VMs that can be started on the target container simultaneously.
- **Recovery time objective:** Specify an amount of time allocated for verification of each VM backup. If the VM OS does not start within the specified amount of time, verification will be considered failed.
- **Screenshot delay:** Specify an amount of time that the product should wait after a Guest OS start before taking a screenshot.

Note

The specified time must be sufficient to fully start the VM OS. Try increasing this amount if the default amount is not sufficient.

After selecting **Boot verification**, specify the verification options in the dialog box that opens:

1. **Verify not more than x VMs simultaneously:** Specify the maximum number of VMs that can be started on the target container simultaneously.
2. **Recovery time objective:** Specify the amount of time allocated for verification of each VM backup. If a VM OS does not start within the specified amount of time, verification will be considered failed.

Malware Detection

With [this option](#) enabled, the backups are scanned for malware using the configured antivirus software on the scan server. Optionally, if you have selected **Enabled** for the **Malware detection** option, click the **settings** link to configure the following options:

- **Scan server:** Select a specific [scan server](#) for the job or leave the **Default** setting. If **Default** is selected, the Transporter is used as the scan server and can support a maximum of 2 concurrent scan tasks.

Note

- For the **Default** option, if the Repository Transporter is the installed Transporter, it requires the master password to function as the scan server.
- For more details on the requirements for Scan Server, refer to the [Feature Requirements](#).
- **Scan type:** Choose between the **Deep scan** and the **Quick scan**:
 - **Deep scan:** When this option is selected, the antivirus software scans the entire backup and may take longer to complete.
 - **Quick scan:** When this option is selected, the antivirus software scans only OS disks in the backup.

- **If malware is detected:** Choose the behavior if malware is detected:
 - **Fail the recovery job:** With this option, the recovery process fails in case the job has only one VM. If the job has several VMs, the infected VMs are skipped and the job continues to run.
 - **Continue and recover to isolated network:** When this option is selected, the recovery job completes the scanning process and recovers the infected VMs to a temporary isolated network.
- **Scan timeout:** Specify the timeout for the malware detection process. If the specified amount of time is exceeded, the recovery job fails.
- Click **Apply** when you're done.

New Flash Boot Job Wizard for Microsoft Hyper-V

1. Backups 2. Destination 3. Schedule 4. Options

Job Options

Job name:

Job priority:

VM verification:

Malware detection:

Recovered VM Options

Recovered VM names:

VM MAC addresses:

VM power on:

Pre and Post Actions

☒ Send job run reports to

☐ Run local pre job script

☐ Run local post job script

Proxy transporter:

Cancel Finish Finish & Run

Recovered VM Options

In the *Recovered VM Options* section, you can specify names for recovered VMs so that you can distinguish between the recovered VMs and the source VMs. Also, you can set up the VM MAC addresses option and choose to either power on or not the VM after recovery. Proceed the following way:

1. In the **Recovered VM names** list, choose one of the following:
 - **Append “-recovered” in the end:** This is the default option. VM names are used for recovered VMs and “-recovered” is appended to the end of the name.
 - **Leave recovered VM names as is:** Recovered VM names are identical to the source VM names.
 - **Enter custom recovered VM names:** When selected, the **Custom Recovered VM Names** box can be opened and you can enter a name for each VM to be recovered.
2. Choose whether a new MAC address will be generated for the recovered VM. When you select **Generate new MAC address in the VM MAC addresses**, a new MAC address is generated for each recovered VM. If you choose the **Do not generate new MAC addresses** option, the recovered VMs will have the same MAC address as the source VMs.

3. In addition, you can choose whether the recovered VMs will be powered on. In the **VM power on** list, choose one of the following:

- **Power on recovered VMs**
- **Do not power on recovered VMs**

Pre and Post Actions

NAKIVO Backup & Replication allows you to run a script before Flash VM boot begins (a pre-job script) and after the boot of all VMs in the job has completed (a post-job script). The scripts can be executed only on the machine where the Director is installed. Refer to [“Pre and Post Job Scripts” on page 75](#) for details.

Setting up Email Notifications for the Job

1. Select the **Send job run reports to** checkbox.
2. The text box opens for editing next to the checkbox. Specify one or more email addresses in the text box. Use semicolons to separate multiple email addresses.

Note

By default, the text box contains email recipients that are specified in the **Email notifications** section of the NAKIVO Backup & Replication.

Setting Up a Pre Job Script

To run a script before the product begins recovering VMs, do the following:

1. Place a script file on the machine where the Director is installed.
2. Select the **Run local pre job script** option. In the *Settings* dialog box that opens, specify the following parameters:
 - **Script path:** Specify a local path to the script on the machine where the Director is installed. A script interpreter should be specified.
Example (Windows): `cmd.exe /c D:\script.bat`
Example (Linux): `bash /root/script.sh`

- **Job behavior:** Choose one of the following job behaviors in relation to script completion:
 - **Wait for the script to finish:** With this option selected, VM backup is started only after the script is completed.
 - **Do not wait for the script to finish:** With this option selected, the product runs the script and starts backing up VMs at the same time.
- **Error handling:** Choose one of the following job behaviors in relation to script failure:
 - **Continue the job on script failure:** With this option selected, the job performs VM backup even if the script has failed.
 - **Fail the job on script failure:** With this option selected, if the script fails, the job is failed and VM backup will not be performed.

Setting Up a Post Job Script

To run a script after the product has finished recovering all VMs, do the following:

1. Place a script file on the machine where the Director is installed.
2. Select the **Run local post job script** option and in the **settings** dialog box that opens, specify the parameters as described for pre-job scripts.

The screenshot shows the 'New Flash Boot Job Wizard for Microsoft Hyper-V' dialog box, specifically the '4. Options' tab. The 'Pre and Post Actions' section is highlighted with a red box. The options in this section are:

- ☒ Send job run reports to: admin@nakivo.com
- ☐ Run local pre job script
- ☐ Run local post job script

Other options visible in the dialog include:

- Job name: Hyper-V flash VM boot job
- Job priority: 5
- VM verification: Disabled
- Malware detection: Disabled
- Recovered VM Options:
 - Recovered VM names: Append "-recovered" in the end
 - VM MAC addresses: Do not generate new MAC address
 - VM power on: Power on recovered VMs
- Proxy transporter: Do not use proxy transporter

Buttons at the bottom: Cancel, Finish, Finish & Run.

Data Routing

If the Transporter assigned to the Backup Repository cannot use iSCSI port 3260 because it is occupied by other services, you can set data routing: A proxy Transporter can be used to forward the iSCSI target exposed from the Backup Repository to the target host. To set data routing, go to the *Data routing* section and choose a proxy Transporter from the list of available Transporters.

New Flash Boot Job Wizard for Microsoft Hyper-V

1. Backups

2. Destination

3. Schedule

4. Options

Job Options

Job name:

Hyper-V flash VM boot job

Job priority:

5

VM verification:

Disabled

Malware detection:

Disabled

Recovered VM Options

Recovered VM names:

Append "-recovered" in the end

VM MAC addresses:

Do not generate new MAC addresses

VM power on:

Power on recovered VMs

Pre and Post Actions

☒ Send job run reports to

admin@nakivo.com

☐ Run local pre job script

☐ Run local post job script

Proxy transporter:

Do not use proxy transporter

Cancel

Finish

Finish & Run

Completing the New Flash VM Boot Job Wizard

Click **Finish** or **Finish & Run** to complete the job creation.

Note

If you click **Finish & Run**, you will have to define the scope of your job. Please refer to [“Running Jobs on Demand” on page 295](#) for details.

Migrating Recovered VMs Using Flash Boot

Using Flash VM Boot, you can migrate the recovered VMs to another location. To do this, follow the instructions below:

Migrating Recovered Hyper-V VMs Using Flash VM Boot to Production

Follow the steps below to migrate a Hyper-V VM recovered using Flash Boot to production:

1. Open the Hyper-V Manager and shut down the recovered VM.
2. Go to the VM settings and open the Hard Drive properties.
3. Make a note of the name of the physical disk from which the VM was booted. This is typically Disk N where N is the index number of your physical disk.
4. In the *Media section* of the Hard Drive properties, click **Virtual hard disk** and then click **New**.
5. The **New Virtual Hard Disk** wizard opens. Proceed as follows:
 - a. On the **Choose Disk Format** step of the wizard, choose VHDX as the format of your virtual hard disk. This format supports virtual disks up to 64 TB. Click **Next**.

Important

On Hyper-V 2019, adding a new virtual hard disk may fail with an error message “Failed to convert the virtual disk”.

- b. On the **Choose Disk Type** step of the wizard, choose **Dynamically expanding**. This initially creates a virtual hard disk of a small size that changes as data is added. Click **Next**.
- c. On the **Specify Name and Location** step of the wizard, specify a name and a location for the virtual hard disk file and click **Next**.
- d. On the **Configure Disk** step of the wizard, click **Copy the contents** of the specified physical disk and choose the disk you previously noted from the list of physical hard disks. Click **Next**.
- e. On the **Summary** step of the wizard, review the information and click **Finish**.
- f. Wait till the wizard creates the new virtual hard disk and closes. Click **Finish**.

Now the VM is ready for use in production.

Note

If you apply the Discard VMs command to the VM recovered via flash boot, the corresponding job will be stopped and the VM will NOT be deleted.

Alternatively, you can move your VM to another computer. Please follow the steps below:

1. In the Hyper-V Manager, right-click on your VM and choose **Move** in the context menu.
2. The **Move VM Wizard** opens. Proceed as follows:
 - a. On the **Choose Move Type** step, choose **Move virtual machine** and click **Next**.
 - b. On the **Specify Destinations** page, choose the name of the computer to which to move the VM and click **Next**.

- c. On the **Choose Move Option** step, choose **Move the virtual machine's data to a single location** and click **Next**.
- d. On the **Virtual Machine** step, specify the location of the VM on the destination computer. Then click **Next**.
- e. On the **Summary** step, check the configuration of your moving operation and click **Finish**.

When the VM has moved to the destination computer successfully, you can discard the VM with NAKIVO Backup & Replication.

Planning Disaster Recovery

NAKIVO Backup & Replication allows you to address all major [disaster recovery](#) (DR) planning points by creating automated DR workflows for VMware, Microsoft Hyper-V, and Amazon EC2 environments. The application allows you to protect VMs running within a cluster, replicate VMs, failover to replicas, and replica failback.

When using [Site Recovery](#), you can include up to 200 actions in a single job, including failover, failback, start/stop VMs and instances, run/stop jobs, run script, attach or detach repository, send an email, wait, and check condition. By arranging actions and conditions into one automated algorithm, you can create disaster recovery jobs of any complexity.

For more details, refer to the corresponding articles below:

- [“Failover to Replica for Microsoft Hyper-V” on page 853](#)
- [“Replica Failback for Microsoft Hyper-V” on page 863](#)
- [“Site Recovery Job” on page 876](#)

Failover to Replica for Microsoft Hyper-V

With NAKIVO Backup & Replication, you can switch your Hyper-V VM to the VM's latest replica in case of failure.

Refer to the following topics for more information:

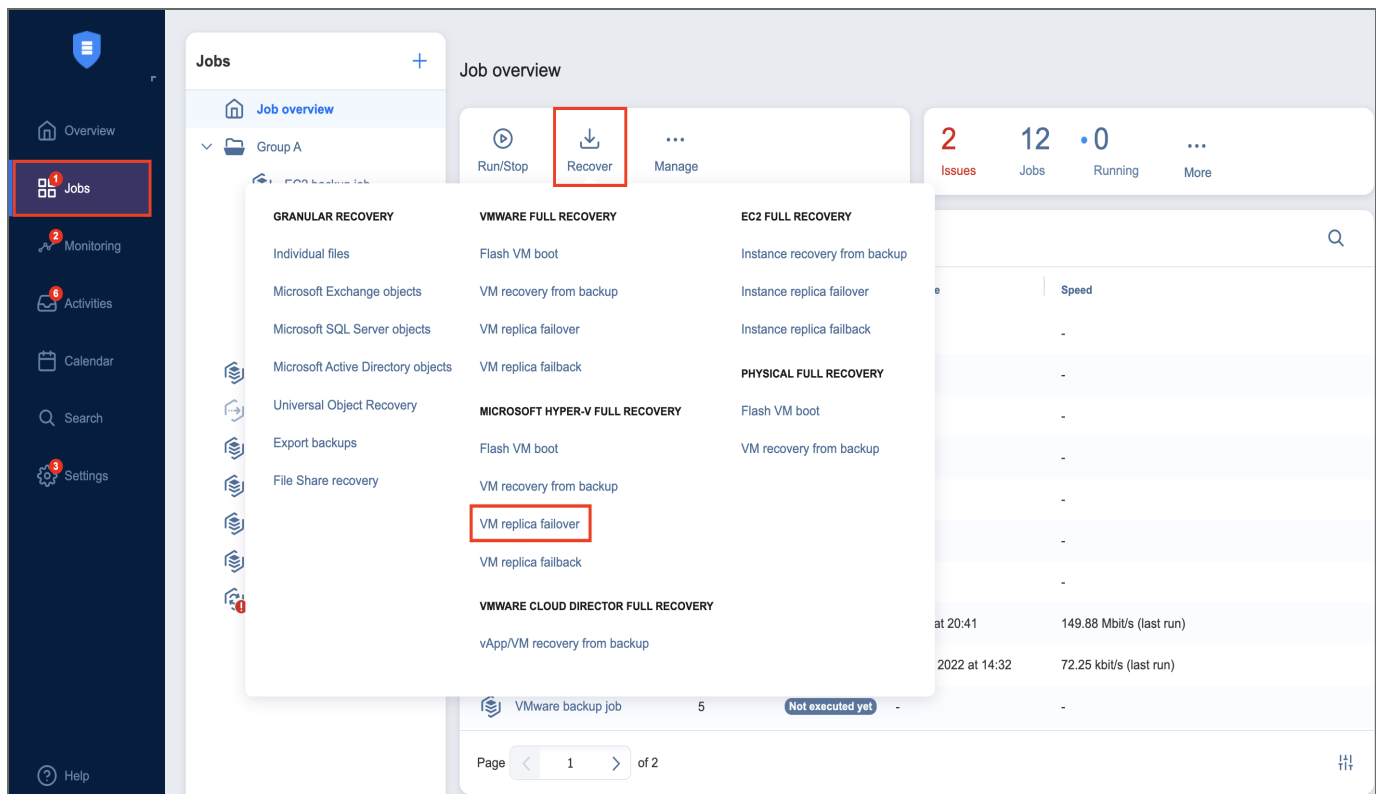
- [“Starting Microsoft Hyper-V Failover to Replica” on page 854](#)
- [“Failover Job Wizard for Microsoft Hyper-V: Source” on page 855](#)
- [“Failover Job Wizard for Microsoft Hyper-V: Networks” on page 856](#)
- [“Failover Job Wizard for Microsoft Hyper-V: Re-IP” on page 858](#)
- [“Failover Job Wizard for Microsoft Hyper-V: Options” on page 861](#)

Starting Microsoft Hyper-V Failover to Replica

Before starting a replica failover job for Hyper-V, make sure that you have a Hyper-V replication job with at least one backup available. Refer to [“Creating Hyper-V Replication Jobs” on page 719](#) for details.

To start the procedure of switching a Hyper-V system workload to a backup VM, do the following:

1. Click **Recover** in the **Jobs** menu.
2. Click **VM replica failover** in the **Microsoft Hyper-V Full Recovery** section. Note that the Hyper-V replication job must have been completed successfully for this option to be available.
3. Alternatively, select the relevant replication job and click **Recover > VM replica failover**.
4. Additionally, the failover can be performed by using the [search](#) function.



The **New Failover Job Wizard for Microsoft Hyper-V** opens.

Failover Job Wizard for Microsoft Hyper-V: Source

On **Source** page of the wizard, do the following:

1. In the left pane of the page, choose either of the following inventory views:
 - **Jobs & Groups:** When selected, the inventory tree displays groups, jobs, and backups of the appropriate hypervisor. You can select the required Hyper-V VM from the list of replication jobs.
 - **Policy:** When selected, job policies can be used. Refer to [“Managing Job Policies” on page 309](#) for details. If the items were selected in alternate views, a dialog box opens warning you that switching to the Policy view will reset your current selection. Click **Switch View** to confirm switching to the Policy view. Make sure that at least one item matches the available set of policy rules. Refer to [“Managing Policy Rules” on page 312](#) for details.
2. Select one or more source Hyper-V VMs in the left pane and then select a recovery point for each source VM in the right pane.
3. Click **Next** to go to the next page.

The screenshot displays the 'Edit: Hyper-V failover job' wizard, specifically the '1. Source' step. The interface is divided into four tabs: '1. Source', '2. Networks', '3. Re-IP', and '4. Options'. The '1. Source' tab is active.

On the left side, there is a 'View:' dropdown menu with 'Jobs & Groups' selected. Below it is a search bar and a list of jobs. The 'Hyper-V replication job' is expanded, showing a list of items. The 'ubuntu-forquis-replica' item is selected, indicated by a checkmark and a red box.

On the right side, there is a recovery point selection area. The 'ubuntu-forquis-replica' recovery point is selected, with the text 'Always use the latest recovery point' displayed below it. A red box highlights this selection.

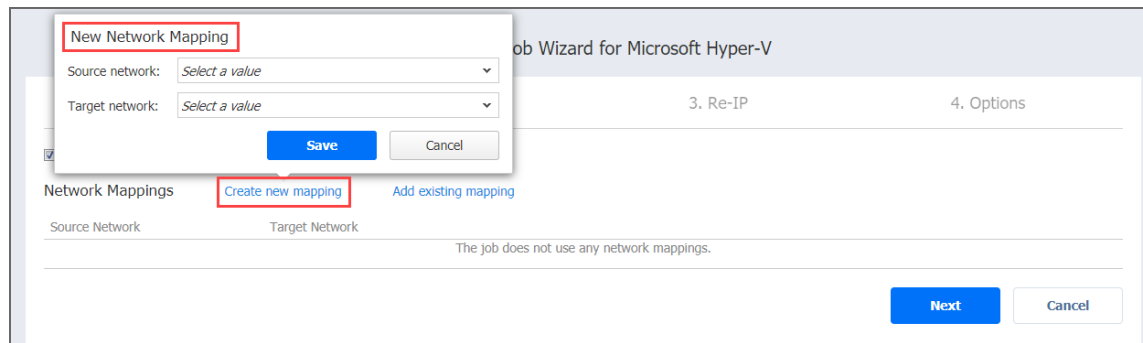
At the bottom of the wizard, there are three buttons: 'Cancel', 'Save', and 'Save & Run'. The 'Save' button is highlighted in blue.

Failover Job Wizard for Microsoft Hyper-V: Networks

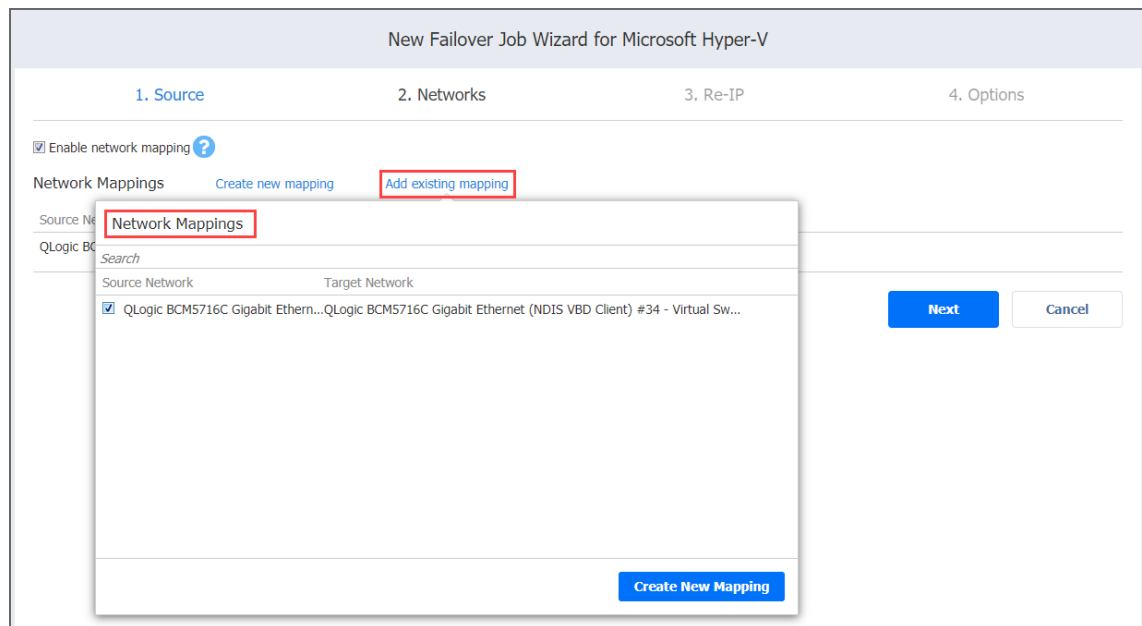
When the replica network – or target Hyper-V virtual network – differs from the network address where the source VMs are deployed – or source Hyper-V virtual network – your failover job needs a relation between these networks to be performed successfully. This relation is called a network mapping.

To map source VM virtual networks to appropriate target virtual networks, do the following on the **Networks** page of the wizard:

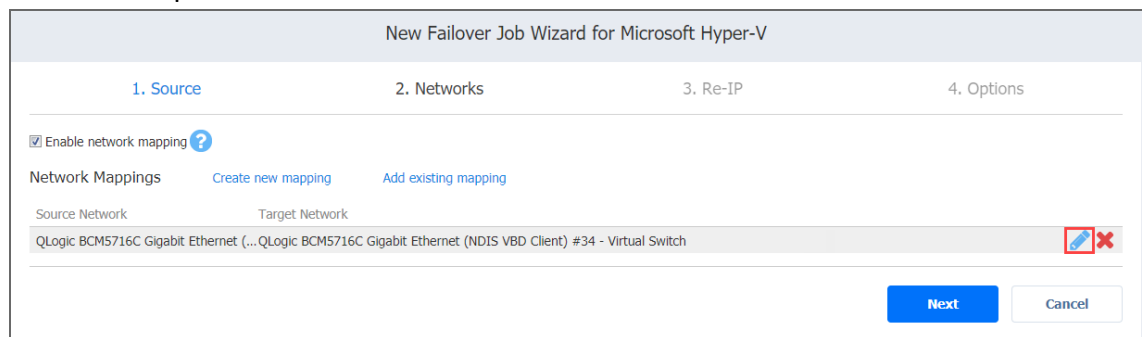
1. Select **Enable network mapping**.
2. The **Network Mapping section** opens. The following options are available:
 - Create a new network mapping:
 - a. Click **Create new mapping**.
 - b. The New Network Mapping dialog box opens. Choose a source network and a target network and click **Save**.



- Add an existing network mapping:
 - a. Click **Add existing mapping**.
 - b. The **Network Mappings** dialog box opens. Choose an appropriate network mapping and close the dialog box.



- Edit an existing network mapping:
 - a. Hover over the required item in the **Network Mappings** list and click **Edit** to the right of the item.
 - b. The **Edit Network Mapping** dialog box opens. Choose the required item from the **Target network** drop-down list and click **Save**.



- Delete an existing mapping: Hover over the required item in the **Network Mappings** list and click the "X" icon to the right of the item.
 - To leave the list of existing network mappings intact, go to the next page of the wizard.
3. Click **Next** to go to the next page of the wizard.

Failover Job Wizard for Microsoft Hyper-V: Re-IP

When the IP addressing scheme for the target replica differs from the IP addressing scheme for the Hyper-V source VMs, your failover job needs to have relations between your source VMs addresses and target replica VMs addresses so that the job is performed successfully. Such relations are called Re-IP rules.

Warning

Hyper-V Integration Services must be running on source VMs to enable successful re-IP for your failover job.

To map a source VM IP address to a specific target IP address, do the following on the **Re-IP** page of the wizard:

1. Select **Enable Re-IP**.
2. The **Re-IP Rules** section opens. Click the **Select VMs** link.
3. The **Re-IP** dialog box opens. In the list of your source VMs, select at least one and close the dialog box.
4. The following options are available:
 - Create a new rule:
 - a. Click **Create new rule**.
 - b. The **New Re-IP Rule** dialog box opens. Enter source and target settings for the re-IP rule and click **Save**.

The screenshot shows the 'New Failover Job Wizard for Microsoft Hyper-V' with four steps: 1. Source, 2. Networks, 3. Re-IP, and 4. Options. In the '3. Re-IP' step, the 'Enable Re-IP' checkbox is checked. Below it, there are three buttons: 'Re-IP Rules', 'Create new rule' (highlighted with a red box), and 'Add existing rule'. A modal dialog titled 'New Re-IP Rule' is open, containing the following fields:

Source Settings	
IP address:	192.168.1.*
Subnet mask:	255.255.255.0
Target Settings	
IP address:	192.168.2.*
Subnet mask:	255.255.255.0
Default gateway:	192.168.2.1
Primary DNS server:	192.168.2.200
Secondary DNS server:	192.168.2.201
DNS suffix:	example.com

At the bottom of the dialog are 'Save' and 'Cancel' buttons. In the background, a 'Next' button is visible.

Note

You can use wildcard characters for IP addresses. For example, if you enter `192.168.1.*` → `10.30.30.*` for the re-IP rule, a source VM IP address such as `192.168.1.50` will be changed to the `10.30.30.50` IP address for your failover job. If several re-IP rules are applicable to your source VM, the product will define the most suitable rule and apply it to the source VM IP address.

- Add an existing rule:
 - a. Click **Add existing rule**.
 - b. The **Re-IP Rules** dialog box opens. Choose an appropriate re-IP rule and close the dialog

box.

New Failover Job Wizard for Microsoft Hyper-V

1. Source 2. Networks 3. Re-IP 4. Options

☒ Enable Re-IP ? Select VMs

Re-IP Rules Create new rule Add existing rule

Source IP Address 10.30.30.55

Search

Source IP Address	Target IP Address
<input checked="" type="checkbox"/> 10.30.30.55	10.30.30.56

Create New Rule

Next Cancel

- Edit an existing re-IP rule:
 - a. Hover over the required item in the **Re-IP Rules** list and click the **Edit** button to the right of the item.
 - b. The **Edit Re-IP Rule** dialog box opens. Edit the required properties of the re-IP rule and click **Save**.
- Delete an existing rule: Hover over the required item in the **Re-IP Rules** list and click the **X** icon to the right of the item.

New Failover Job Wizard for Microsoft Hyper-V

1. Source 2. Networks 3. Re-IP 4. Options

☒ Enable Re-IP ? Select VMs

Re-IP Rules Create new rule Add existing rule

Source IP Address	Target IP Address
10.30.30.55	10.30.30.56

Next Cancel

To leave the list of existing re-IP rules intact, go to the next page of the wizard.

5. Click **Next** to go to the next page of the wizard.

Failover Job Wizard for Microsoft Hyper-V: Options

On the **Options** page of the wizard, specify the options for the Microsoft Hyper-V failover job.

- [Job Options](#)
- [Pre and Post Actions](#)
- [Completing the New Failover Job Wizard for Microsoft Hyper-V](#)

Job Options

In this section, you can specify the following failover job options:

1. **Job name:** A string of 50 or fewer characters specifying the name of the failover job.
2. **Power off source VMs:** Select this checkbox to power off source VMs when the failover job has completed.

Pre and Post Actions

You can enable the following pre- and post-actions:

1. **Send job run reports to:** When selected, a job report is sent to the specified recipients each time the failover job has completed. This option overrides the default setting in the NAKIVO Backup & Replication [Settings](#).
2. **Run local pre-job script:** When selected, a dialog box opens. You can specify the following options of the [pre-job script](#) to be executed in this dialog box:
 - **Script path:** A local path to the script on the machine where the Director is installed. A script interpreter should also be specified.
 - **Job behavior:** The following options are available:
 - **Wait for the script to finish:** This is the default option.
 - **Do not wait for the script to finish.**
 - **Error handling:** The following options are available:
 - **Continue the job on script failure: This is the default option.**
 - **Fail the job on script failure.**
3. **Run local post job script:** When selected, a dialog box opens in which you can specify the options of the post-job script to be executed on the machine where the product is installed. Proceed as for the pre-job script.

New Failover Job Wizard for Microsoft Hyper-V

1. Source

2. Networks

3. Re-IP

4. Options

Job Options

Job name:

Hyper-V failover job

☒ Power off source VMs

Pre and Post Actions

☒ Send job run reports to

administrator@nakivo.com?

☐ Run local pre job script?

☐ Run local post job script?

Finish

Finish & Run

Cancel

Completing the New Failover Job Wizard for Microsoft Hyper-V

Click **Finish** or **Finish & Run** to complete the job creation.

Note

If you click **Finish & Run**, you will have to define the scope of your job. Please refer to [Running Jobs on Demand](#) for details.

Replica Failback for Microsoft Hyper-V

With NAKIVO Backup & Replication, you can switch your Hyper-V VM replicas to source or to a new location.

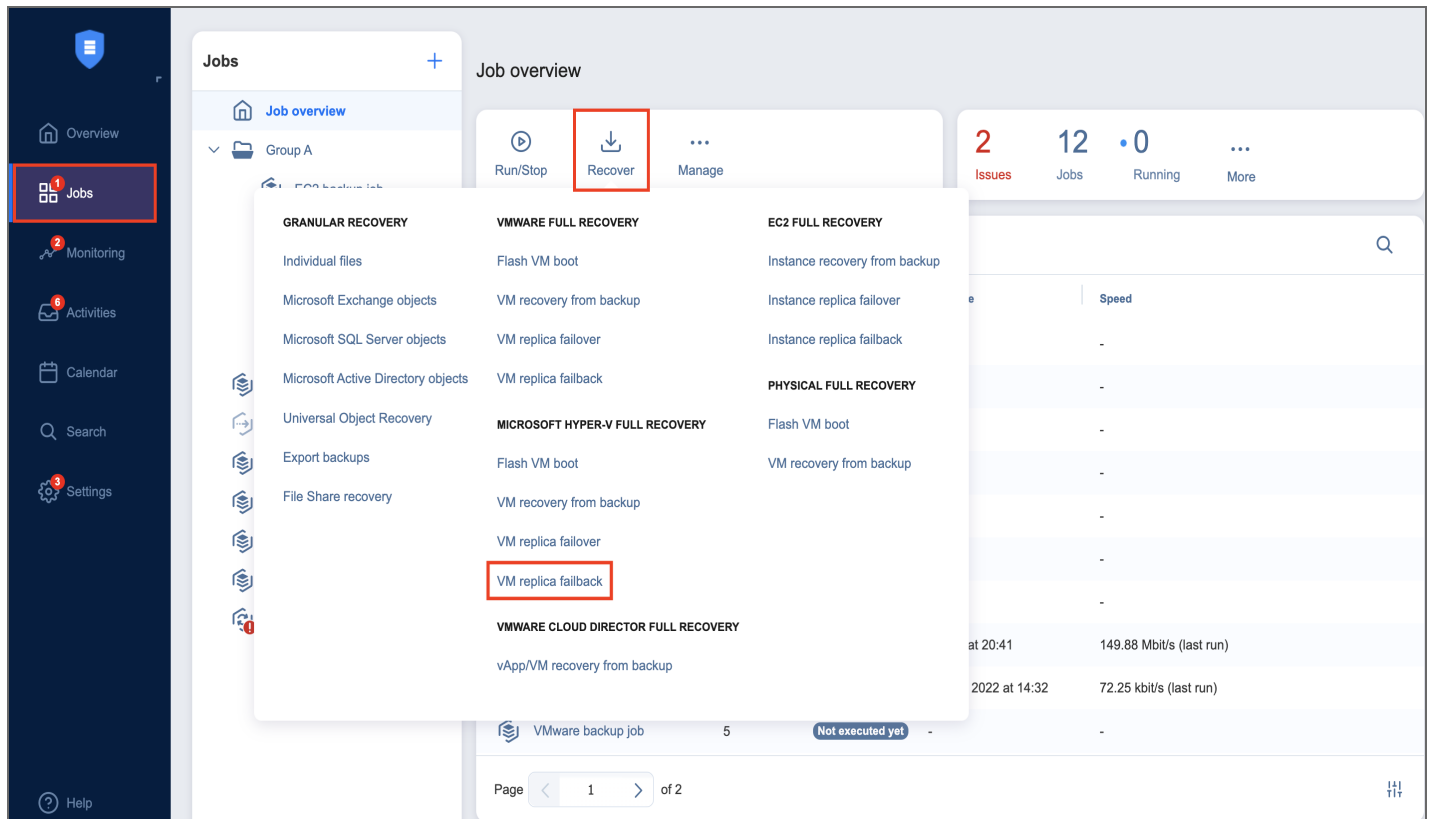
Refer to the following topics for more information:

- [“Starting Replica Failback for Microsoft Hyper-V” on page 864](#)
- [“Failback Job Wizard for Microsoft Hyper-V: Source” on page 865](#)
- [“Failback Job Wizard for Microsoft Hyper-V: Destination” on page 866](#)
- [“Failback Job Wizard for Microsoft Hyper-V: Networks” on page 868](#)
- [“Failback Job Wizard for Microsoft Hyper-V: Re-IP” on page 869](#)
- [“Failback Job Wizard for Microsoft Hyper-V: Options” on page 871](#)

Starting Replica Failback for Microsoft Hyper-V

Before starting replica failback for Microsoft Hyper-V, make sure that you have switched the replicas to the "Failover" state with a Hyper-V Failover Job. Refer to [“Failover to Replica for Microsoft Hyper-V” on page 853](#) for details.

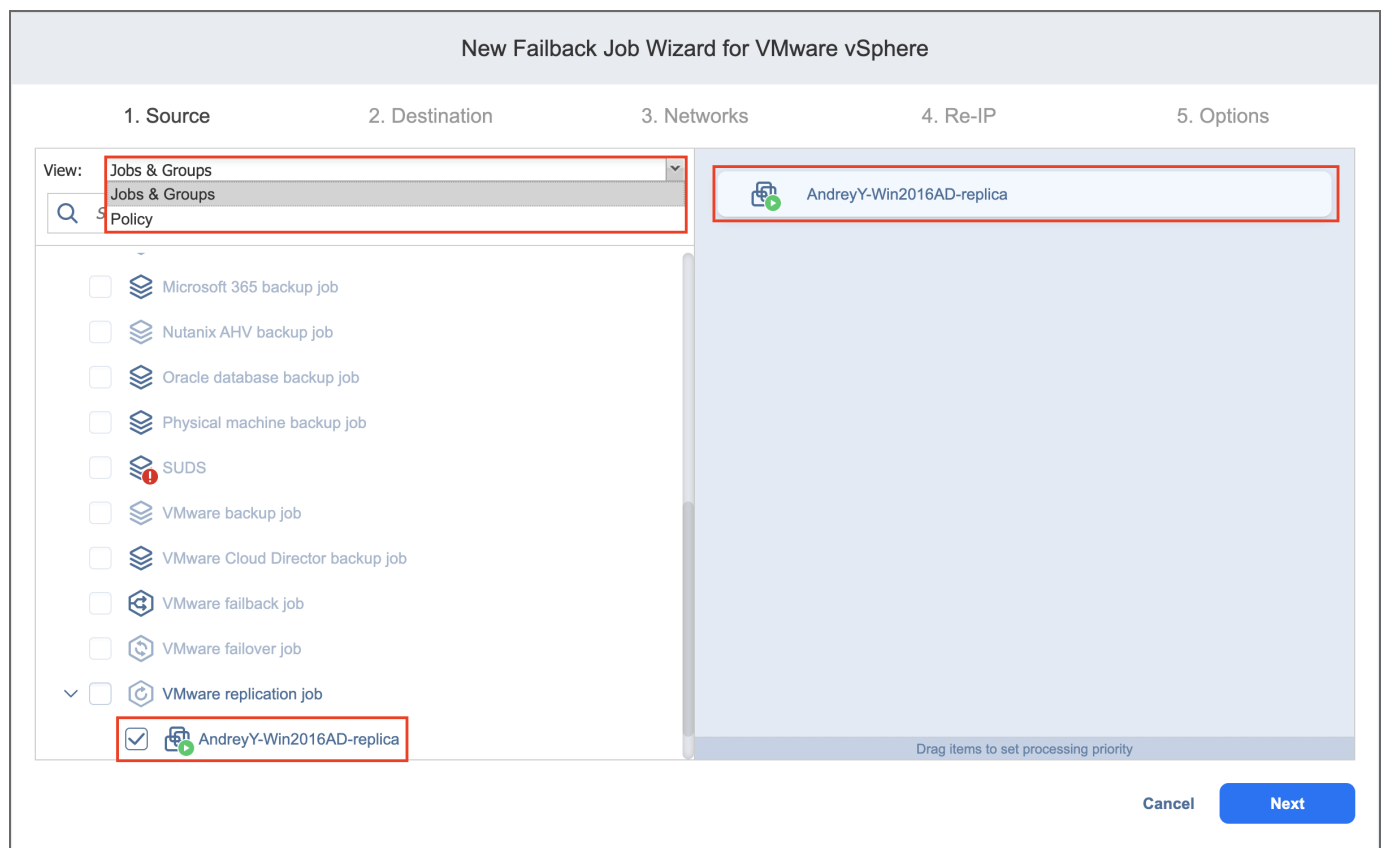
To start the failback procedure, click **Recover** in the **Jobs** menu and then click **VM replica failback** in the **Microsoft Hyper-V Full Recovery** section. Alternatively, the failback can be performed by using the [search](#) function.



Failback Job Wizard for Microsoft Hyper-V: Source

On the **Source** page of the wizard:

1. In the left pane of the page, choose either of the following inventory views:
 - **Jobs & Groups:** When selected, the inventory tree displays groups, jobs, and backups of the appropriate hypervisor. You can select the required replica from the list of replication jobs.
 - **Policy:** When selected, job policies can be used. For details, refer to [“Managing Job Policies” on page 309](#). If the items were selected in alternate views, a dialog box opens warning you that switching to the **Policy** view will reset your current selection. Click **Switch View** to confirm switching to the **Policy** view. Make sure that at least one item matches the available set of policy rules. For details, refer to [“Managing Policy Rules” on page 312](#).
2. Select one or more replica Hyper-V VMs in the left pane of the page.
3. Click **Next** to confirm adding the selected replicas to the failback job.



Failback Job Wizard for Microsoft Hyper-V: Destination

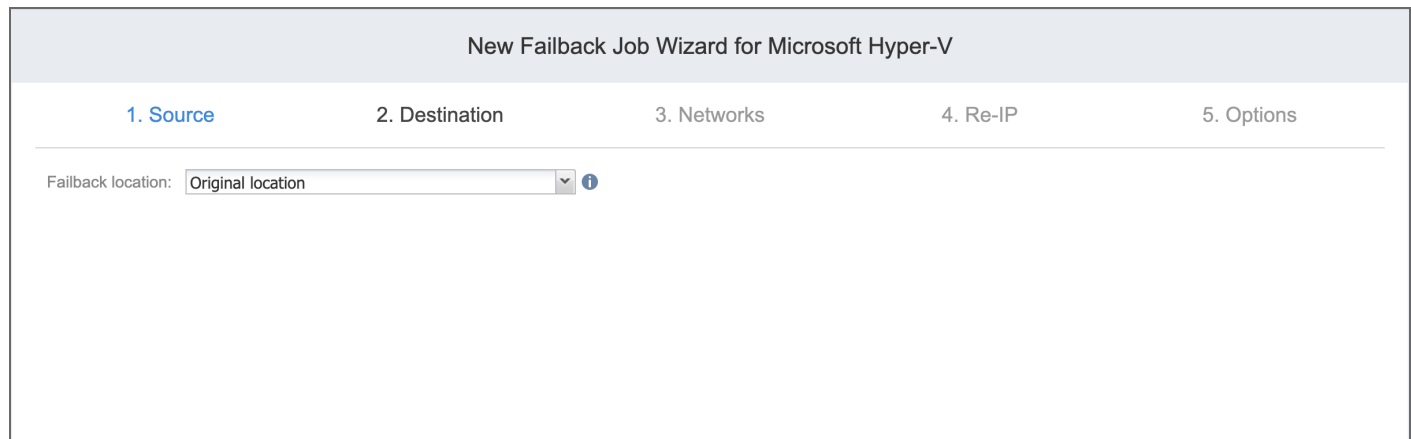
On the **Destination** page of the wizard, you can specify a failback destination for your Hyper-V replicas. Failback to the original location will update or replace the existing source VM in the original location. Failback to a new location will create a new VM. Refer to the following subsections on providing a destination for your Microsoft Hyper-V Replica Failback job:

- [Using Original Hyper-V Failback Location](#)
- [Creating New Hyper-V Failback Location](#)
- [Creating a Different Hyper-V Failback Location for All Replicas](#)

Using Original Hyper-V Failback Location

To use the original location for your Hyper-V failback job, follow the steps below:

1. In the **Failback location** list, choose **Original Location**.
2. Click **Next** to go to the **Networks** page.



New Failback Job Wizard for Microsoft Hyper-V

1. Source 2. Destination 3. Networks 4. Re-IP 5. Options

Failback location: ⓘ

Creating New Hyper-V Failback Location

To create a new location for your Hyper-V failback job, follow the steps below:

1. In the **Failback location** list, choose **New Location**.
2. In the **Container** list, choose a container for your failback location.
3. In the **Path** box, enter a path to the location of the Hyper-V VM replica.

4. Click **Next** to go to the next page of the wizard.

New Failback Job Wizard for Microsoft Hyper-V

1. Source 2. Destination 3. Networks 4. Re-IP 5. Options

Failback location: New location

Container: ServerHV2012

Path: C:\NakivoReplicas

[Advanced setup...](#)

Creating a Different Hyper-V Failback Location for All Replicas

To create a new failover location for every replica you've added to the job:

1. Click **Advanced setup**.
2. Select a target container and target disks.
3. Click **Next** to go to the next page.

New Failback Job Wizard for Microsoft Hyper-V

1. Source 2. Destination 3. Networks 4. Re-IP 5. Options

Failback location: New location

Container: ServerHV2012

Path: C:\NakivoReplicas

ubuntu-forquis-replica Click to collapse

Source	Target
VM location: ServerHV2012 > ServerHV2012	Container: ServerHV2012
VM resources: 2 CPU, 1.0 GB RAM	Virtual Machine: New VM will be created
Disks	Disks
<input checked="" type="checkbox"/> e71abb5d-b86b-4... 5.8 GB	e71abb5d-b86b-4c48-a... C:\NakivoReplicas
VM configuration	VM configuration: C:\NakivoReplicas

Cancel Next

Failback Job Wizard for Microsoft Hyper-V: Networks

When the replica network address differs from the network address where the source VMs are deployed, your failback job needs a relation between these networks to be performed successfully. This relation is called a network mapping.

To map source VM virtual networks to the appropriate target virtual networks, please do the following on the **Networks** page of the wizard:

1. Select **Enable network mapping**.
2. The *Network Mappings* section opens. You have the following options:
 - Create a new network mapping:
 - a. Click **Create new mapping**.
 - b. The **New Network Mapping** dialog box opens. Choose a source network and a target network and click **Save**.
 - Add an existing network mapping:
 - a. Click **Add existing mapping**.
 - b. The **Network Mappings** dialog opens. Choose an appropriate network mapping and close the dialog box.
 - Edit an existing network mapping:
 - a. Hover over the required item in the **Network Mappings** list.
 - b. A toolbar with icons opens to the right of the item. Click the **Edit** icon.
 - c. The **Edit Network Mapping** dialog opens. Choose an appropriate item from the **Target network** drop-down list and click **Save**.
 - Delete an existing mapping:
 - a. Hover over the required item in the **Network Mappings** list.
 - b. A toolbar with icons opens to the right of the item. Click the **Delete** icon.
 - To leave the list of existing network mappings intact, go to the next page of the wizard.
3. Click **Next** to go to the next page of the wizard.

New Failback Job Wizard for Microsoft Hyper-V

1. Source 2. Destination 3. Networks 4. Re-IP 5. Options

☒ Enable network mapping ?

Network Mappings [Create new mapping](#) [Add existing mapping](#)

Source Network	Target Network
QLogic BCM5716C Gigabit Ethernet (...QLogic BCM5716C Gigabit Ethernet (NDIS VBD Client) #34 - Virtual Switch	

[Next](#) [Cancel](#)

Failback Job Wizard for Microsoft Hyper-V: Re-IP

When the IP addressing scheme for the replica differs from the IP addressing scheme for the Hyper-V source VMs, your failback job needs relations between source VMs addresses and the replica VMs addresses to be performed successfully. These relations are called Re-IP rules.

Warning

Hyper-V Integration Services must be running on source VMs to enable successful re-IP for your failback job. To map a source VM IP address to a specific target IP address, do the following on the **Re-IP** page of the wizard:

1. Select **Enable Re-IP**.
2. The *Re-IP Rules* section opens. Click the **Select VMs** link.
3. The **Re-IP** dialog opens. In the list of your source VMs, select at least one and close the dialog.
4. You have the following options:
 - Create a new rule:
 - a. Click **Create new rule**.
 - b. The **New Re-IP Rule** dialog opens. Enter source and target settings for the Re-IP rule and click **Save**.

Note

You can use wildcards for IP addresses.

Example

When the 192.168.1.* -> 10.30.30.* Re-IP rule, a source VM IP address such as 192.168.1.50 will be changed to the 10.30.30.50 IP address for your replica failback job. When there are several Re-IP rules applicable to your source VM, the application will define the most suitable one and apply it to the source VM IP address.

- Add an existing rule:
 - a. Click **Add existing rule**.
 - b. The **Re-IP Rules** dialog opens. Choose an appropriate Re-IP rule and close the dialog box.
- Edit an existing Re-IP rule:
 - a. Hover over the required item in the **Re-IP Rules** list.
 - b. A toolbar with icons opens to the right of the item. Click the **Edit** icon.
 - c. The **Edit Re-IP Rule** dialog box opens. Edit the required properties of the Re-IP rule and click **Save**.
- Delete an existing mapping:
 - a. Hover the pointer over the necessary item in the **Re-IP Rules**
 - b. A toolbar with icons opens to the right of the item. Click the **Delete** icon.
- To leave the list of existing Re-IP rules intact, go to the next page of the wizard.

5. Click **Next** to go to the next page of the wizard.

New Failback Job Wizard for Microsoft Hyper-V


1. Source

2. Destination

3. Networks

4. Re-IP

5. Options

☒ Enable Re-IP 

Select VMs

Re-IP Rules

Create new rule



Add existing rule

Source IP Address

Target IP Address

10.30.30.55

10.30.30.56



Next

Cancel

Failback Job Wizard for Microsoft Hyper-V: Options

On the **Options** page of the wizard, specify the options for the Microsoft Hyper-V failback job as described in the following sections:

- “Job Options” below
- “Pre and Post Actions” on the next page

Job Options

1. In the **Job name** box, enter a string of 50 or fewer characters specifying the name of your failback job.
2. Select a **Job Priority** level between 1 and 5, with 1 being the highest priority. Jobs with higher priority levels are prioritized by Transporters during job processing.

Note

This option is only available in the Enterprise, Enterprise Essentials, Enterprise Plus, MSP Enterprise, and MSP Enterprise Plus editions.

3. Select **Power off replica VMs** to power off the replica workloads during the failback.

New Failback Job Wizard for Microsoft Hyper-V

1. Source

2. Destination

3. Networks

4. Re-IP

5. Options

Job Options

Job name:

Hyper-V failback job

Job priority:

5

settings

App-aware mode:

Disabled

☒ Power off replica VMs

Pre and Post Actions

☐ Send job run reports to

☐ Run local pre job script

☐ Run local post job script

Data Transfer

☐ Limit transporter load to

3

concurrent tasks

Bandwidth throttling:

Disabled

☐ Bottleneck detection

Cancel

Finish

Finish & Run

Pre and Post Actions

If needed, enable pre and post actions for the failback job:

1. **Send job run reports to:** When selected, a job report is sent to the specified recipients each time the failback job is completed. This overrides the default setting specified in the NAKIVO Backup & Replication **Settings**.
2. **Run local pre job script:** When selected, a dialog box opens in which you can specify the following options of the [pre-job script](#) to be run:
 - **Script path:** A local path to the script on the machine where the Director is installed. A script interpreter should be specified as well.
 - **Job behavior:** The following options are available:
 - **Wait for the script to finish:** This is the default option.
 - **Do not wait for the script to finish.**
 - **Error handling:** The following options are available:
 - **Continue the job on script failure:** This is the default option.
 - **Fail the job on script failure.**
3. **Run local post job script:** When selected, a dialog box opens in which you can specify options of the [post-job script](#) to be run on the machine where the product is installed. Proceed to set the options

as described for pre-job scripts.

New Failback Job Wizard for Microsoft Hyper-V

1. Source 2. Destination 3. Networks 4. Re-IP 5. Options

Job Options

Job name:

Job priority: [i](#) [settings](#)

App-aware mode: [i](#)

☒ Power off replica VMs

Pre and Post Actions

☐ Send job run reports to [i](#)

☐ Run local pre job script [i](#)

☐ Run local post job script [i](#)

Data Transfer

☐ Limit transporter load to concurrent tasks [i](#)

Bandwidth throttling: [i](#)

☐ Bottleneck detection [i](#)

Cancel **Finish** Finish & Run

Data Transfer

In the *Data Transfer* section of the **Options** page, you can configure Transporter load, bandwidth load, and other options. Proceed as described in the sections below.

Transporter Load

You can limit the maximum number of Transporter tasks used by the job. By default, this number is set to 3 concurrent tasks.

To change the default number of tasks, do the following:

1. In the *Data Transfer* section, select the **Limit transporter load to** checkbox.
2. Specify the number of concurrent tasks in the corresponding box.

Bandwidth Throttling

Follow the steps below to regulate the speed of data transfer over the network for your backup job:

1. For the **Bandwidth throttling** option, choose **Enabled**.

Note

If bandwidth throttling is disabled for the current job, global bandwidth rules may still apply to your job. Refer to [“Bandwidth Throttling” on page 331](#) for details.

2. Click the **settings** link that becomes available.
3. The **Job Bandwidth Rules** dialog box opens, displaying the list of available rules. You have the following options:
 - Create a new bandwidth rule for your backup job:
 - a. Click the **Create New Rule** button.
 - b. The **New Bandwidth Rule** dialog box opens. Refer to the [“Bandwidth Throttling” on page 331](#) topic for details on creating a bandwidth rule.
 - c. Click **Save**.
 - Activate an existing bandwidth rule for your job. Select the checkbox to the left of the required bandwidth rule. To deactivate a bandwidth rule for your job, deselect the corresponding checkbox.
 - Edit a bandwidth rule. Click the **Edit** link for a bandwidth rule and modify it in the **Edit Bandwidth Rule** dialog box that opens.
 - Disable a bandwidth rule. Click the **Disable** link. The bandwidth rule is disabled for all jobs.
 - Remove a bandwidth rule. Click the **Remove** link and then click **Delete** to confirm your operation.

Bottleneck detection

When the **Bottleneck detection** option is enabled, additional information is collected and recorded in NAKIVO Backup & Replication logs in the course of data transfer for the purpose of bottleneck detection. Check this option to enable the **Bottleneck detection** capability of the Transporters engaged in the job. Click **Finish** or **Finish & Run** to complete the job creation.

New Failback Job Wizard for Microsoft Hyper-V

1. Source

2. Destination

3. Networks

4. Re-IP

5. Options

Job Options

Job name:

Job priority: [settings](#)

App-aware mode:

☒ Power off replica VMs

Pre and Post Actions

☐ Send job run reports to [i](#)

☐ Run local pre job script [i](#)

☐ Run local post job script [i](#)

Data Transfer

☐ Limit transporter load to concurrent tasks [i](#)

Bandwidth throttling: [i](#)

☐ Bottleneck detection [i](#)

Cancel

Finish

Finish & Run

Site Recovery Job

Site Recovery Job is a special job that automates execution of one or multiple [Site Recovery](#) actions. You can execute your Site Recovery Job on demand or on schedule.

Creating a Site Recovery Job is done with a wizard and includes the following steps:

- [“Creating Site Recovery Job” on page 877](#)
- [“Running Site Recovery Job” on page 907](#)

Creating Site Recovery Job

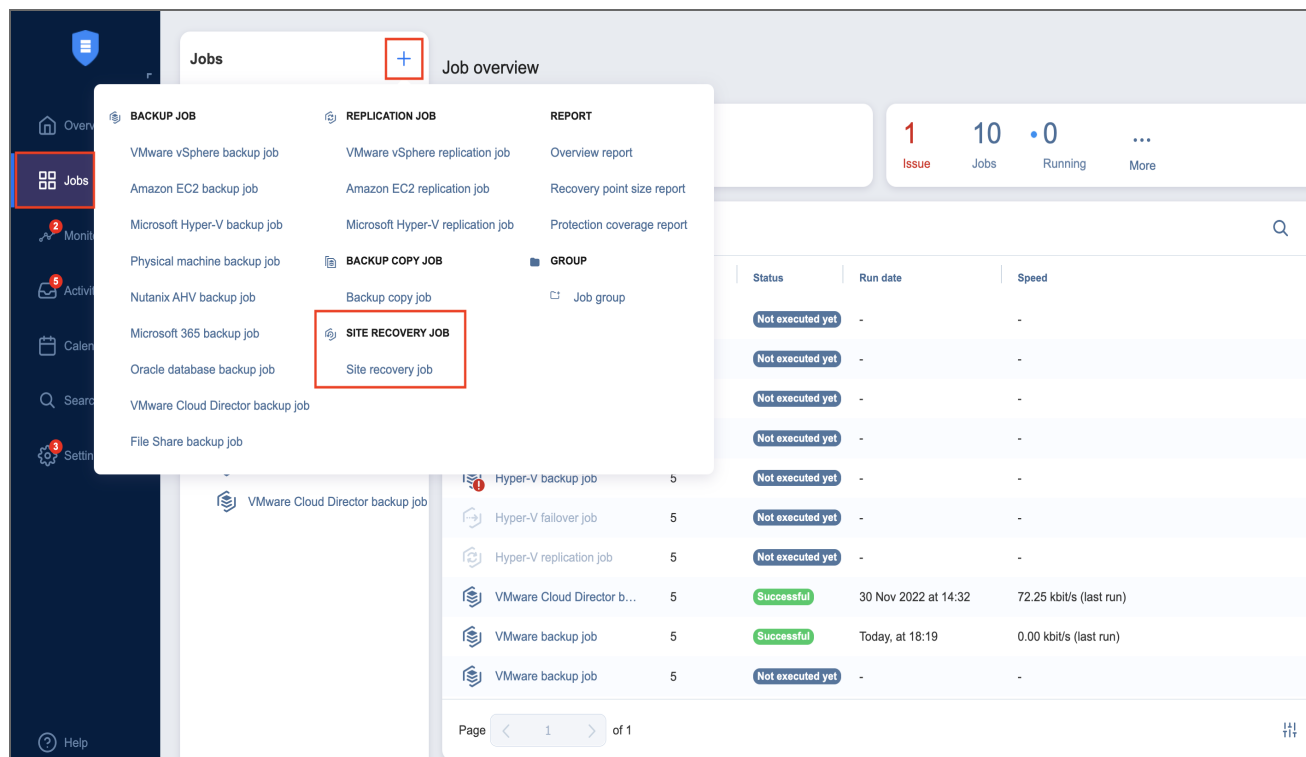
Creating a Site Recovery Job is done with a wizard and includes the following steps:

- [“Starting Site Recovery Job Wizard” on page 878](#)
- [“Site Recovery Job Wizard: Actions” on page 879](#)
- [“Site Recovery Job Wizard: Networks” on page 897](#)
- [“Site Recovery Job Wizard: Re-IP” on page 899](#)
- [“Site Recovery Job Wizard: Test Schedule” on page 902](#)
- [“Site Recovery Job Wizard: Options” on page 906](#)

Starting Site Recovery Job Wizard

Follow the steps below to start creating a Site Recovery Job:

1. Go to the **Jobs** menu and click the plus **Create** button.
2. In the menu that opens, click **Site recovery job**.



The **New Site Recovery Job Wizard** opens.

Site Recovery Job Wizard: Actions

On the **Actions** page of the **Site Recovery Job wizard**, you can add one or more actions to a Site Recovery job. Refer to the subsections below for details:

- [Actions Available for Site Recovery Job](#)
- [Managing Actions of Site Recovery Job](#)
- [Options Common to Most Actions](#)

When finished with adding actions to a Site Recovery job, click **Next** to go to the **Networks** page of the **Site Recovery Job Wizard**.

Actions Available for Site Recovery Job

The list of actions available for a Site Recovery job is available in the left pane. It includes the following:

- [“Failover Hyper-V VMs Action” on page 881](#)
- [“Failback Hyper-V VMs Action” on page 883](#)
- [“Start VMs / Instances Action” on page 887](#)
- [“Stop VMs / Instances Action” on page 888](#)
- [“Run / Stop Jobs Action” on page 890](#)
- [“Run Script Action” on page 891](#)
- [“Attach / Detach Repository Action” on page 892](#)
- [“Send Email Action” on page 893](#)
- [“Wait Action” on page 894](#)
- [“Check Condition Action” on page 895](#)

To add an action to a Site Recovery job, click the corresponding item in the actions list and follow the instructions of the wizard that opens.

Managing Actions of Site Recovery Job

The actions list of a Site Recovery job is located in the right pane and contains the actions you add.

For a selected action, a toolbar with buttons is available allowing you to perform the following commands:

- **Move up / Move down:** Moves your action up/down in the list of Site Recovery job actions.
- **Edit:** A page opens allowing you to make changes to your Site Recovery job action. When finished with editing the Site Recovery job action, click **Save**.

- **Remove:** A dialog box opens asking you to confirm removing the Site Recovery job action. Click the **Remove** button to confirm your operation.

Options Common to Most Actions

Most of the actions you add to your Site Recovery job will have the following common options:

- **Run this action in:** This option allows you to choose how to run the action:
 - **Run this action in both testing and production mode.**
 - **Run this action in production mode only.**
 - **Run this action in testing mode only.**
- **Waiting behavior:** This option allows you to choose one of the following:
 - **Wait for this action to complete:** The Site Recovery job will wait for the action to be completed before continuing to run the job.
 - **Start next action immediately:** The Site Recovery job will continue running while the action is in progress.
- **Error handling:** This option allows you to choose one of the following:
 - **Stop and fail the site recovery job if this action fails:** The Site Recovery job will stop and fail if the action fails.
 - **Continue the site recovery job if the action fails:** The Site Recovery job will continue if the action fails.

Failover Hyper-V VMs Action

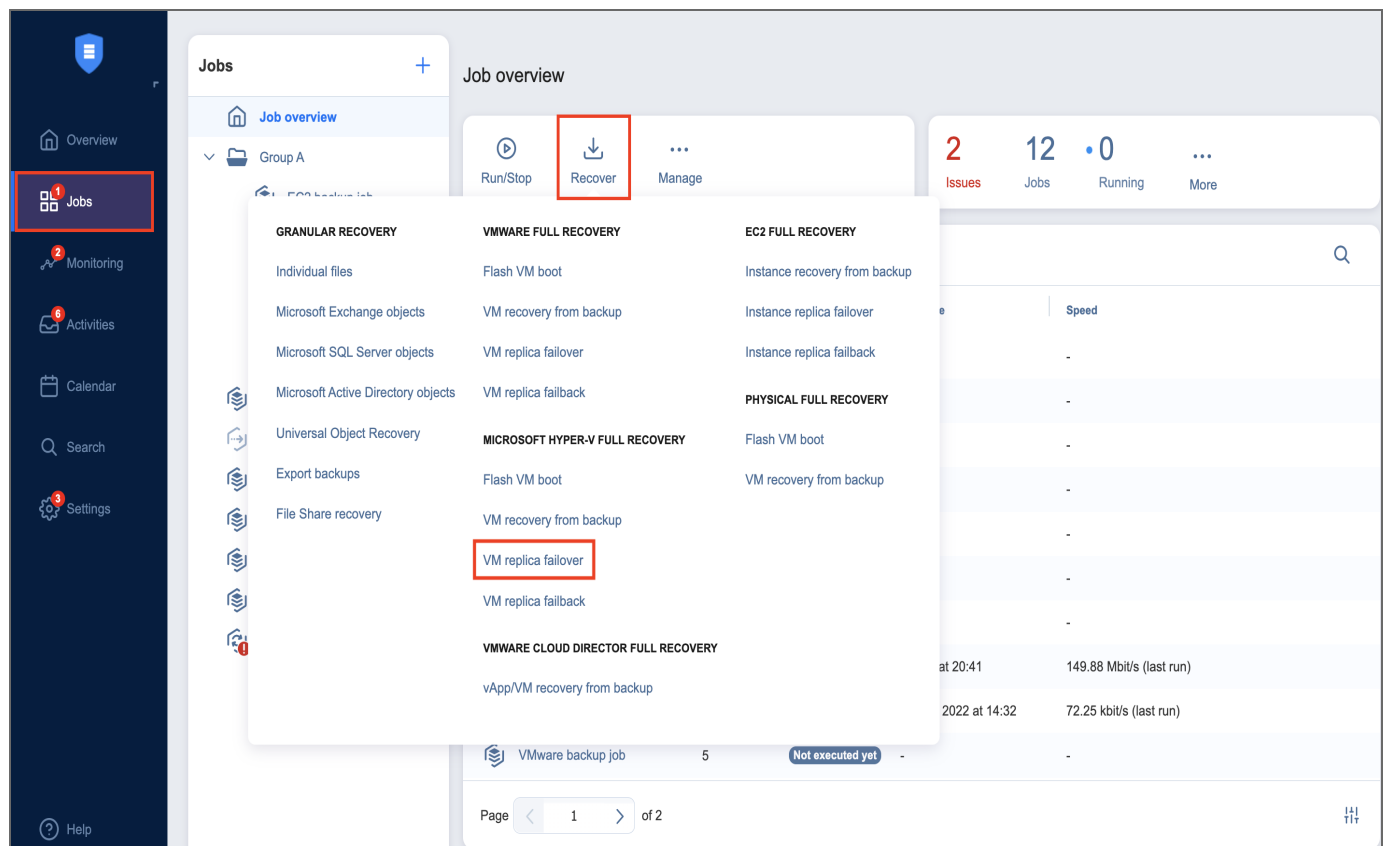
Refer to the following sections on adding a **Failover Hyper-V VMs** action to your Site Recovery job:

- [Failover Hyper-V VMs: VMs](#)
- [Failover Hyper-V VMs: Options](#)

Failover Hyper-V VMs: VMs

On this page of the wizard, do the following:

1. In the left pane of the page, choose either of the following inventory views:
 - **Jobs & Groups:** When selected, the inventory tree displays groups, jobs, and backups of the appropriate hypervisor. You can select the required Hyper-V VM from the list of replication jobs.
 - **Policy:** When selected, job policies can be used. Refer to [“Managing Job Policies” on page 309](#) for details. If the items were selected in alternate views, a dialog box opens warning you that switching to the **Policy** view will reset your current selection. Click **Switch View** to confirm switching to the **Policy** view. Make sure that at least one item matches the available set of policy rules. Refer to [“Managing Policy Rules” on page 312](#) for details.
2. Select one or more source Hyper-V VMs in the left pane and then select a recovery point for each source VM in the right pane.
3. Click **Next** to go to the **Options** page.



Failover Hyper-V VMs: Options

On this page of the wizard, do the following:

1. Select **Power off source VMs** to power off the production workloads during the failover. Note that this will take place only in production mode; no workloads will be powered on in test mode.
2. In the *Action options* section, set the options for your action. Refer to [“Site Recovery Job Wizard: Actions” on page 879](#) for details.
3. Click **Save**.

New Site Recovery Job Wizard > 1. Failover Hyper-V VMs

1. VMs 2. Options

☒ Power off source VMs (production mode only) ?

Action options

Run this action in: Run this action in both testing and production mode ?

Waiting behavior: Wait for this action to complete ?

Error handling: Stop and fail the job if this action fails ?

The **Options** page closes and your **Failover Hyper-V VMs** action is added to the Site Recovery Job.

Failback Hyper-V VMs Action

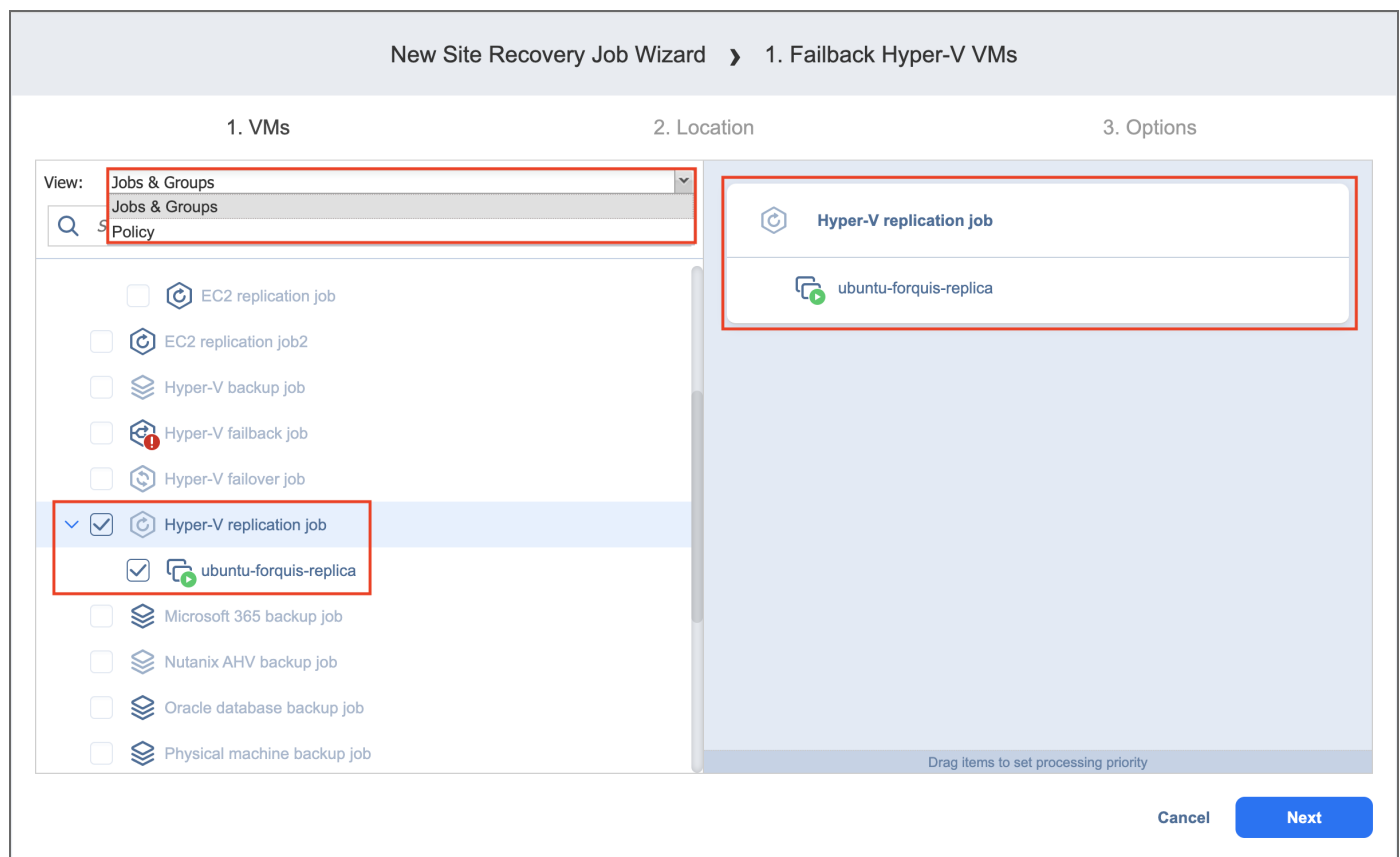
Refer to the following sections on adding a *Failback Hyper-V VMs* action to your Site Recovery job:

- [Failback Hyper-V VMs: VMs](#)
- [Failback Hyper-V VMs: Location](#)
- [Failback Hyper-V VMs: Options](#)

Failback Hyper-V VMs: VMs

On the **VMs** page of the wizard, do the following:

1. In the left pane of the page, choose either of the following inventory views:
 - **Jobs & Groups:** When selected, the inventory tree displays groups, jobs, and backups of the appropriate hypervisor. You can select the required replica from the list of replication jobs.
 - **Policy:** When selected, job policies can be used. Refer to [“Managing Job Policies” on page 309](#) for details. If the items were selected in alternate views, a dialog box opens warning you that switching to the **Policy** view will reset your current selection. Click **Switch View** to confirm switching to the **Policy** view. Make sure that at least one item matches the available set of policy rules. Refer to [“Managing Policy Rules” on page 312](#) for details.
2. Select one or more replica Hyper-V VMs in the left pane of the page.
3. Click **Next** to go to the **Location** page.



Failback Hyper-V VMs: Location

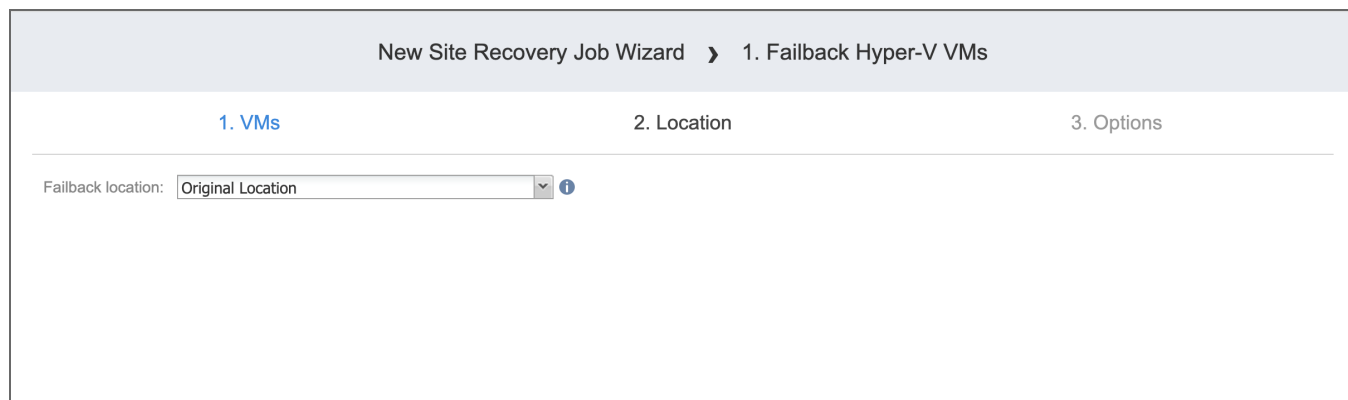
Refer to the following subsections on providing a location for your **Failback Hyper-V VMs** action:

- [“Using Original Hyper-V Failback Location” below](#)
- [“Creating New Hyper-V Failback Location” below](#)
- [“Reusing Existing Hyper-V Failback Location” on the next page](#)

Using Original Hyper-V Failback Location

To use the original location for your **Failback Hyper-V VMs** action, follow the steps below:

1. In the **Failback location** list, choose **Original Location**.
2. Click **Next** to go to the **Options** page.



New Site Recovery Job Wizard > 1. Failback Hyper-V VMs

1. VMs 2. Location 3. Options

Failback location: Original Location ⓘ

Creating New Hyper-V Failback Location

To create a new location for your **Failback Hyper-V VMs** action, follow the steps below:

1. In the **Failback location** list, choose **New Location**.
2. In the **Container** list, choose a container for your failback location.
3. In the **Path** box, enter a path to the location of the Hyper-V VM replica.

- Click **Next** to go to the **Options** page.

New Site Recovery Job Wizard > 1. Failback Hyper-V VMs

1. VMs 2. Location 3. Options

Failback location: New Location

Container: ServerHV2012

Path: C:\NakivoReplicas

To use existing VMs as targets, expand the Advanced setup and specify target VM for each source VM.

Hyper-V replication job Click to collapse

Default container: ServerHV2012

Default path: C:\NakivoReplicas

ubuntu-forquis-replica Click to collapse

Source	Target
VM location: ServerHV2012 > ServerHV2012	Container: ServerHV2012
VM resources: 2 CPU, 1.0 GB RAM	Virtual Machine: New VM will be created
Disks	Disks
<input checked="" type="checkbox"/> e71abb5d-b86b-4... 5.8 GB	e71abb5d-b86b-4c48-a... C:\NakivoReplicas
VM configuration	VM configuration: C:\NakivoReplicas

Cancel Save

Reusing Existing Hyper-V Failback Location

To reuse existing locations for your **Failback Hyper-V VMs** action, follow the steps below:

- In the **Failback location** list, choose **New Location**.
- Click **Advanced options**.
- Click the necessary source VMs to expand them.
- For the required VM, click **Use existing target VM** to select it.
- The **Virtual Machine** list updates to include VMs. Select the VM to be used as a target.
- After setting the location advanced options, click **Next** to go to the **Options** page.

Failback Hyper-V VMs: Options

On the **Options** page of the wizard, do the following:

- Select **Power off replica VMs** to power off the production workloads during the failover. Note that this will take place only in production mode; no workloads will be powered on in test mode.
- In the *Action options* section, set up options for your action. Refer to [“Site Recovery Job Wizard: Actions” on page 879](#) for details.

3. Click **Save**.

New Site Recovery Job Wizard > 1. Failback Hyper-V VMs

1. VMs

2. Location

3. Options

☒ Power off replica VMs (production mode only) ⓘ

Action options

Run this action in:

Run this action in both testing and production mode ⓘ

Waiting behavior:

Wait for this action to complete ⓘ

Error handling:

Stop and fail the job if this action fails ⓘ

App-aware mode:

Enabled (proceed on error) ⓘ [settings](#)

Cancel

Save

The **Options** page closes, and your Failback Hyper-V VMs action is added to the Site Recovery job.

Start VMs / Instances Action

The topic covers the following actions of a Site Recovery Job:

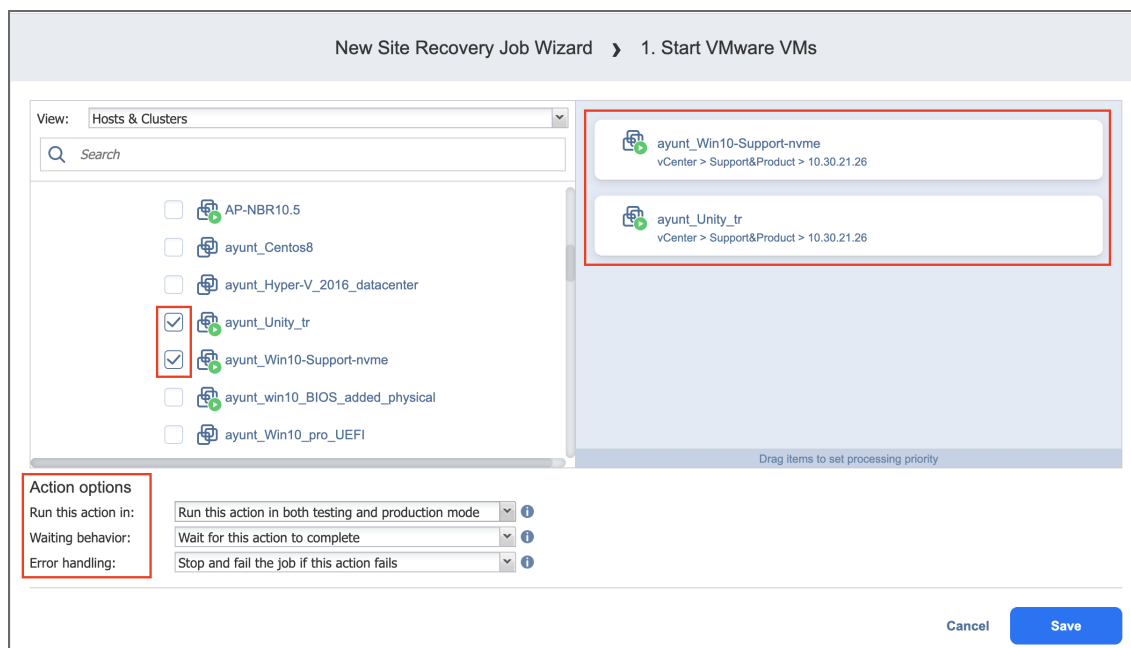
- Start VMware VMs
- Start Hyper-V VMs
- Start EC2 Instances

On the wizard's page that opens, do the following:

1. In the left pane of the page, choose either of the following inventory views:
 - **Hosts & Clusters:** Not available for AWS EC2. When chosen, the inventory tree displays all containers and VMs.
 - **VMs & Templates.** Available for VMware only. When chosen, the inventory tree displays VMware hosts, VMs, and VM templates.
 - **AWS Accounts:** Available for AWS EC2 only. When chosen, the inventory tree displays all AWS EC2 accounts along with their regions and available instances.
 - **Policy:** When selected, job policies can be used. Refer to [Managing Job Policies](#) for details.

Note

Switching to an alternative view resets your selection in the current view.



2. Optionally, you can filter the inventory tree by entering a string into the **Search** box. You can enter a part of or the entire name of the item.
3. Select at least one VMware/Hyper-V VM or EC2 instance in the inventory tree.
4. Set the action options. Refer to [“Site Recovery Job Wizard: Actions” on page 879](#) for details.
5. Click **Save**.

The page of the wizard closes and your **Start VMs / Instances** action is added to the Site Recovery Job.

Stop VMs / Instances Action

The topic covers the following actions of your site recovery job:

- Stop VMware VMs
- Stop Hyper-V VMs
- Stop EC2 Instances

On the **Stop VMs / Instances** page that opens from the **Actions** page of the Site Recovery Job Wizard, do the following:

1. In the left pane of the page, choose one of the following inventory views:
 - **Hosts & Clusters:** Not available for AWS EC2. When chosen, the inventory tree displays all containers and VMs.
 - **VMs & Templates view:** Available for VMware only. When chosen, the inventory tree displays VMware hosts, VMs, and VM templates.
 - **AWS Accounts:** Available for AWS EC2 only. When chosen, the inventory tree displays all AWS EC2 accounts along with their regions and available instances.
 - **Policy:** When selected, job policies can be used. Refer to [“Managing Job Policies” on page 309](#) for details.

Note

Switching to an alternative view resets your selection in the current view.

New Site Recovery Job Wizard > 1. Stop VMware VMs

View: Hosts & Clusters

Hosts & Clusters

VMs & Templates

Policy

AP-NBR10.5

ayunt_Centos8

☒ ayunt_Hyper-V_2016_datacenter

☒ ayunt_Unity_tr

☒ ayunt_Win10-Support-nvme

ayunt_win10_BIOS_added_physical

ayunt_Win10_pro_UEFI

ayunt_Hyper-V_2016_datacenter
vCenter > Support&Product > 10.30.21.26

ayunt_Unity_tr
vCenter > Support&Product > 10.30.21.26

ayunt_Win10-Support-nvme
vCenter > Support&Product > 10.30.21.26

Drag items to set processing priority

Action options

Run this action in: Run this action in both testing and production mode

Waiting behavior: Wait for this action to complete

Error handling: Stop and fail the job if this action fails

Cancel Save

2. Optionally, you can filter the inventory tree by entering a string into the **Search** box. You can enter a part of the entire name of the item.
3. Select at least one VMware/Hyper-V VM or EC2 instance in the inventory tree.

4. Set action options. Refer to [“Site Recovery Job Wizard: Actions” on page 879](#) for details.
5. Click **Save**.

The page of the wizard closes, and your **Stop VMs / Instances** action is added to the site recovery job.

Run / Stop Jobs Action

The topic covers the following actions of a Site Recovery Job:

- Run Jobs
- Stop Jobs

On the **Run / Stop Jobs** page that opens from the **Actions** page of the Site Recovery Job Wizard, do the following:

1. Select at least one item in the list of jobs.
2. Configure action options. Refer to [“Site Recovery Job Wizard: Actions” on page 879](#) for details.
3. Click **Save**.

New Site Recovery Job Wizard > 1. Run jobs

▼ ☐ All jobs

▼ ☐ GROUP

- ☐ Backup copy job
- ☒ Backup to Tape
- ☒ EC2 backup job
- ☐ EC2 fallback job
- ☐ EC2 failover job

Action options

Run this action in: Run this action in both testing and production mode ⓘ

Waiting behavior: Wait for this action to complete ⓘ

Error handling: Stop and fail the job if this action fails ⓘ

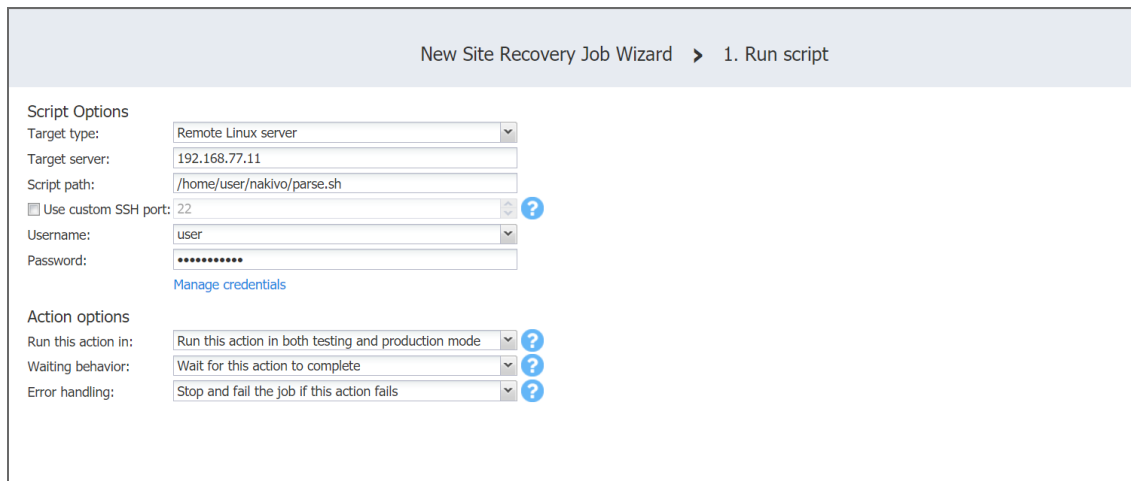
Cancel Save

The page of the wizard closes and your **Run / Stop Jobs** action is added to the Site Recovery Job.

Run Script Action

To add the action to a Site Recovery Job, on the **Run Script** page of the wizard, do the following:

1. **Target type:** Choose one of the following target types for your script:
 - **This server (Director):** The script will run on the machine where the Director is deployed. Provide the following options:
 1. **Script path:** A path to the script.
 2. **Username / Password:** Credentials for running your script on the machine.
 - **Remote Windows / Linux server:** The script will run on a remote Windows / Linux server. Provide the following options:
 1. **Target server:** The hostname or the IP address of the remote server.
 2. **Script path:** A path to the script on the remote server.
 3. **Username / Password:** Credentials for running your script on the remote server.
 - **VMware / Hyper-V VM / EC2 instance:** The script will run on a VMware or Hyper-V VM or an EC2 instance. Provide the following options:
 1. **Target VM / Instance:** Choose the required item from the inventory tree.
 2. **Script path:** A path to the script on the VMware or Hyper-V VM or EC2 instance.
 3. **Username / Password:** Credentials for running your script on the VMware or Hyper-V VM or EC2 instance.
2. Set the **Action options**. Refer to [“Site Recovery Job Wizard: Actions” on page 879](#) for details.
3. Click **Save**.



New Site Recovery Job Wizard > 1. Run script

Script Options

Target type: Remote Linux server

Target server: 192.168.77.11

Script path: /home/user/nakivo/parse.sh

☒ Use custom SSH port: 22

Username: user

Password:

[Manage credentials](#)

Action options

Run this action in: Run this action in both testing and production mode

Waiting behavior: Wait for this action to complete

Error handling: Stop and fail the job if this action fails

The page of the wizard closes and your **Run Script** action is added to the Site Recovery Job.

Attach / Detach Repository Action

The topic covers the following actions of a Site Recovery Job:

- Attach Repository
- Detach Repository

On the **Attach / Detach Repository** page that opens from the **Actions** page of the Site Recovery Job Wizard, do the following:

1. Select a repository in the list of repositories.
2. Specify action options. Refer to [Options Common to Most Actions](#) for details.
3. Click **Save**.

The page of the wizard closes and your **Attach / Detach Repository** action is added to the site recovery job.

Send Email Action

On the **Send Email** page of the wizard, do the following to add the action to your site recovery job:

1. In the **To** box, enter a valid email address for the recipient.
2. In the **Cc** box, optionally you can enter an email address of the carbon copy recipient.
3. In the **Subject** box, optionally you can enter a subject of the mail.
4. Optionally, you can add attachments to your mail with the **Browse** button.
5. Enter your message text in the email body box.
6. Set up action options. Refer to [“Site Recovery Job Wizard: Actions” on page 879](#) for details.
7. Click **Save**.

New Site Recovery Job Wizard > 1. Send email

To:

Cc:

Subject:

Attachments: [Browse...](#)

Action options

Run this action in:

Waiting behavior:

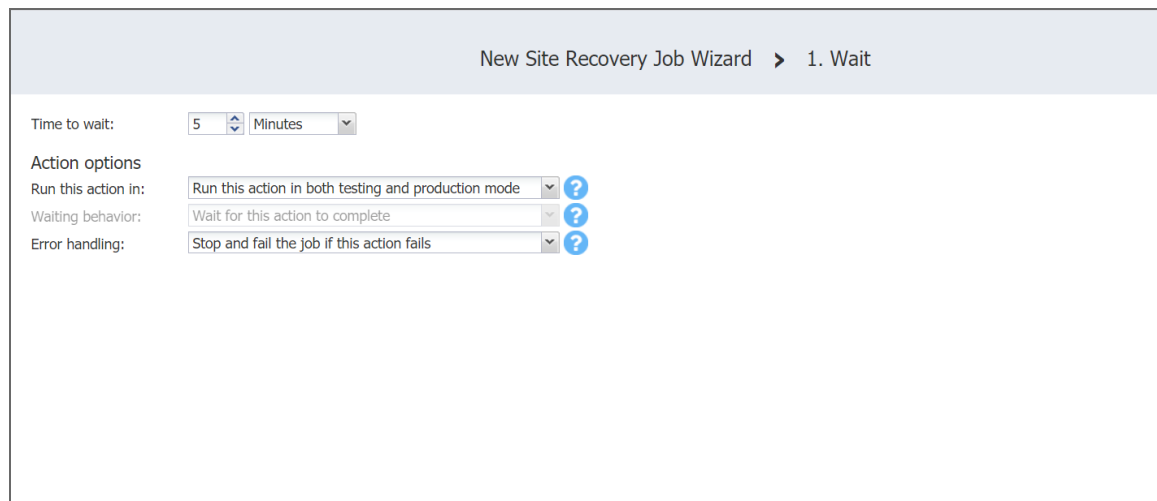
Error handling:

The page of the wizard closes, and your **Send Email** action will be added to the site recovery job.

Wait Action

To add a wait action to your Site Recovery job, on the **Wait** page of the wizard, do the following:

1. Enter the time to wait in minutes or hours.
2. Set the action options. Refer to [“Site Recovery Job Wizard: Actions” on page 879](#) for details.
3. Click **Save**.



New Site Recovery Job Wizard > 1. Wait

Time to wait: 5 Minutes

Action options

Run this action in: Run this action in both testing and production mode ?

Waiting behavior: Wait for this action to complete ?

Error handling: Stop and fail the job if this action fails ?

The page of the wizard closes and your **Wait** action is added to the Site Recovery job.

Check Condition Action

On the *Check Condition* page of the wizard, do the following to add the action to your site recovery job:

1. Choose a condition type from the list:
 - **Resource exists:** This condition checks whether the specified resource exists. With this option, you have to set the following:
 - a. Choose a resource type from the list:
 - **VMware VM**
 - **Hyper-V VM**
 - **EC2 Instance**
 - b. Define your identification method using two lists:
 - i. In the first list, choose either **Name** or **ID**.
 - ii. In the second list, choose one of the following:
 - **Equals**
 - **Contains**
 - **Starts with**
 - **Ends with**
 - c. Enter your condition criterion in the **Search string** box.
 - **Resource is running:** This condition checks whether the specified resource is running. With this option, you have to set the options as described for the **Resource exists** option above.
 - **IP/hostname is reachable:** This condition checks whether the specified IP/hostname is reachable. With this option, you have to enter the following:
 - a. Choose the source endpoint among the following:
 - **This server (Director):** With this option, the condition checks whether the Director can reach the **IP/hostname** specified in the box below.
 - **Remote transporter:** With this option, the condition checks whether one of your remote Transporters can reach the **IP/hostname** specified in the box below.
 - b. In the **IP/hostname** box, enter an IP address or a host name of the resource to be checked for reachability.
2. In the **Action if True** section of the page, choose an action to be taken if the condition criterion is satisfied:
 - **Continue site recovery job:** Your Site Recovery job will be continued.
 - **Stop and fail site recovery job:** Your Site Recovery job will be stopped as failed.
 - **End site recovery job successfully:** Your Site Recovery job will be ended as successful.

- **Go to another site recovery Job action:** Another action of your Site Recovery job will be initiated. If you choose this action type, a new box will open to allow you to choose the necessary action.
3. In the **Action if False** section of the page, choose an action to be taken if the condition criterion is not satisfied. Available options are similar to those described in the **Action if True** section above.
 4. Click **Save**.

New Site Recovery Job Wizard > 1. Check condition

Condition

Condition type:Resource exists

Resource type:VMware VM

Identification method:NameEquals

Search string:Vmware

Action if True

Action type:Continue site recovery job

Action if False

Action type:Stop and fail site recovery job

The page of the wizard closes and your **Check Condition** action is added to the Site Recovery job.

Site Recovery Job Wizard: Networks

On the **Networks** page of the **Site Recovery Job Wizard** you can map source VM virtual networks to appropriate target virtual networks and test networks.

Please proceed as follows:

1. Select **Enable network mapping**.

Note

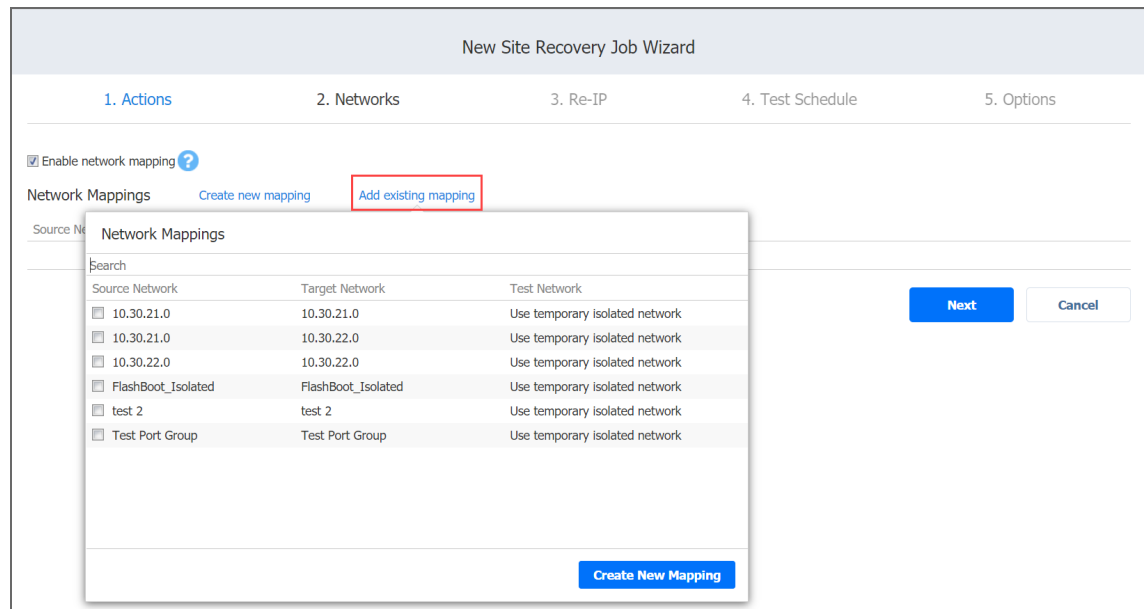
A failover or a failback action needs to be on the actions list to allow enabling network mapping for your site recovery job.

2. The *Network Mapping* section opens. You have the following options:
 - Create a new network mapping:
 - a. Click **Create new mapping**.
 - b. The **New Network Mapping** dialog opens. Choose a source network, a target network and a test network, and click **Save**.

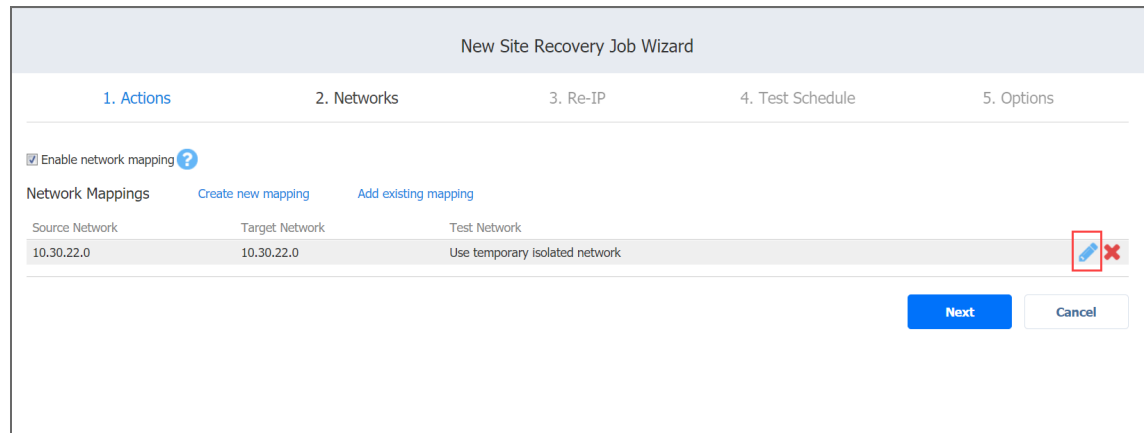
The screenshot shows the 'New Site Recovery Job Wizard' interface, specifically the '2. Networks' step. At the top, there are five tabs: '1. Actions', '2. Networks', '3. Re-IP', '4. Test Schedule', and '5. Options'. Below the tabs, there is a section for 'Network Mappings'. A checkbox labeled 'Enable network mapping' with a question mark icon is checked. Below this, there are two buttons: 'Create new mapping' (highlighted with a red box) and 'Add existing mapping'. A modal dialog titled 'New Network Mapping' is open in the foreground. It contains three dropdown menus: 'Source network' with the value '10.30.21.0', 'Target network' with the value '10.30.22.0', and 'Test network' with the value 'Use temporary isolated network'. At the bottom of the dialog are 'Save' and 'Cancel' buttons. In the background, under the 'Network Mappings' section, there is a list area that says 'No items available.' and a 'Next' button.

- Add an existing network mapping:
 - a. Click **Add existing mapping**.
 - b. The **Network Mappings** dialog opens. Choose an appropriate network mapping and close

the dialog box.



- Edit an existing network mapping:
 - a. Hover the pointer over the necessary item in the **Network Mappings** list and then click the **Edit** button to the right of the item.
 - b. The **Edit Network Mapping** dialog box opens. Choose appropriate items from the **Target network** and the **Test network** lists and then click **Save**.



- Delete an existing mapping: hover the pointer over the necessary item in the **Network Mappings** list and then click the **Delete** icon to the right of the item.
 - To leave the list of existing network mappings intact, go to the next page of the wizard.
3. Click **Next** to go to the next page of the wizard.

Site Recovery Job Wizard: Re-IP

In the **Re-IP** page of the **Site Recovery Job Wizard** you can map a source VM IP address to a specific target IP address.

Please proceed as follows:

1. Select **Enable Re-IP**.

Note

A failover or a failback action needs to be in the actions list to allow enabling Re-IP for your site recovery job.

2. The *Re-IP Rules* section opens. Click the **Select VMs** link.
3. The **Re-IP** dialog opens. In the list of your source VMs, select at least one, select the credentials to be used for each VM, and close the dialog.

Note

Re-IP rules will be applied only to VMs that have a static IPv4 address configured.

4. You have the following options:
 - Create a new rule:
 - a. Click **Create new rule**.
 - b. The **New Re-IP Rule** dialog opens. Enter source and target settings for the Re-IP rule and click **Save**.

The screenshot shows the 'New Site Recovery Job Wizard' interface. The '3. Re-IP' step is active, with options to 'Enable Re-IP' (checked) and 'Select VMs'. Below this, there are links for 'Re-IP Rules', 'Create new rule', and 'Add existing rule'. A modal dialog titled 'New Re-IP Rule' is open, containing the following fields:

Source Settings	
IP address:	192.168.0.1
Subnet mask:	255.255.255.0
Target Settings	
IP address:	192.168.2.2
Subnet mask:	255.255.255.0
Default gateway:	192.168.2.2
Primary DNS server:	192.168.2.200
Secondary DNS server:	192.168.2.200
DNS suffix:	suffix.com

At the bottom of the dialog are 'Save' and 'Cancel' buttons. In the background, the wizard shows a message: 'The job does not use any Re-IP rules.' with 'Next' and 'Cancel' buttons.

Note

You can use wildcards for IP addresses. For example, when the 192.168.1.* -> 10.30.30.* Re-IP rule is available, it will change the source VM IP address like 192.168.1.50 to the 10.30.30.50 IP address, for your site recovery job.

When there are several Re-IP rules applicable to your source VM, the application will define the most suitable one and apply it to the source VM IP address.

- Add an existing rule:

- a. Click **Add existing rule**.
- b. The **Re-IP Rules** dialog box opens. Choose an appropriate Re-IP rule and close the dialog.

- Edit an existing Re-IP rule:
 - a. Hover the pointer over the necessary item in the **Re-IP Rules** list and then click the **Edit** button to the right of the item.
 - b. The **Edit Re-IP Rule** dialog opens. Edit the necessary properties of the Re-IP rule and then click **Save**.

- Delete an existing mapping: hover the pointer over the necessary item in the **Re-IP Rules** list and then click the **Delete** icon to the right of the item.

- To leave the list of existing Re-IP rules intact, go to the next page of the wizard.
5. Click **Next** to go to the next page of the wizard.

Site Recovery Job Wizard: Test Schedule

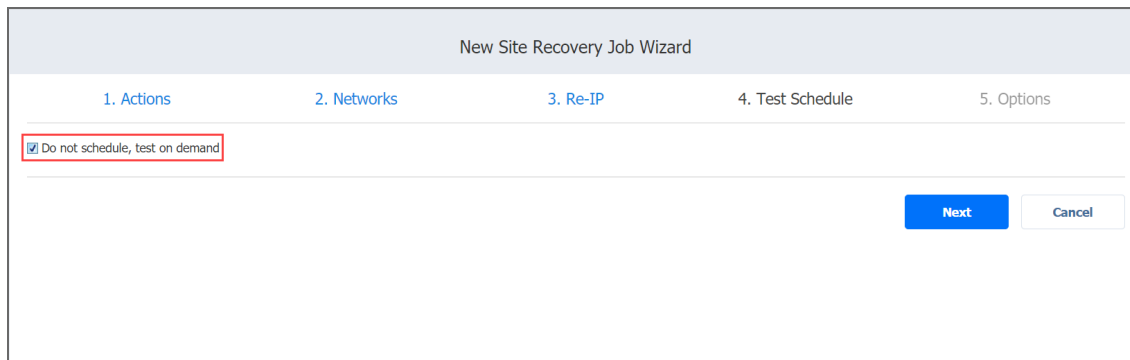
On the **Test Schedule** page of the **Site Recovery Job Wizard** you can schedule testing your site recovery job.

Please refer to the following sections for details:

- [“Disabling Site Recovery Job Test Schedule” below](#)
- [“Daily Site Recovery Job Testing” below](#)
- [“Monthly or Yearly Site Recovery Job Testing” on the next page](#)
- [“Periodic Site Recovery Job Testing” on page 904](#)
- [“Chained Site Recovery Job” on page 904](#)
- [“Additional Schedule” on page 905](#)

Disabling Site Recovery Job Test Schedule

If you only want to start the site recovery job manually (without any test schedule), select the **Do not schedule, test on demand** check box.



New Site Recovery Job Wizard

1. Actions 2. Networks 3. Re-IP 4. Test Schedule 5. Options

☒ Do not schedule, test on demand

Next Cancel

Then click **Next** to go to the *Options* page of the *Site Recovery Job Wizard*.

Daily Site Recovery Job Testing

To test your site recovery job once a day, do the following:

- Choose a time zone that should be used for the site recovery job start and end times from the time zone list.
- Choose **Run daily/weekly** from the **Schedule #1** list.
- Specify the time when the site recovery job should be started in the **Starting at** box.
- Specify the end time for the site recovery job in the **Ending** box. If the site recovery job has not completed by the time specified, the site recovery job will be stopped.
- Select the days of the week during which the site recovery job will be started.
- To specify a date when the job test schedule comes into effect, click **Effective from**, click **date** and then pick a date in the calendar that opens.

- Click **Next** to go to the **Options** page of the **Site Recovery Job Wizard**.

New Site Recovery Job Wizard

2. Networks 3. Re-IP 4. Test Schedule 5. Options

Job schedule will come into effect on the selected date. Pick a date in the calendar below.

June 2020

M	T	W	T	F	S	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	1	2	3	4	5
6	7	8	9	10	11	12

Apply

☒ Effective from [date](#)
[Add another schedule](#)
[Show calendar](#)

Next Cancel

Monthly or Yearly Site Recovery Job Testing

To test your site recovery job monthly or yearly, do the following:

- Choose **Monthly/yearly** from the schedule list.
- Choose a time zone that should be used for the job start and end times, in the list of available time zones.
- Specify a site recovery job start schedule in the appropriate boxes.
- Specify the time when the site recovery job should be started, in the **Starting at** box.
- Specify the end time for the site recovery job, in the **Ending** box. If the site recovery job has not completed by the time specified, the site recovery job will be stopped.
- Select the days of the week during which the job will be started.
- To specify a date when the job test schedule comes into effect, click **Effective from**, click **Date** and then pick a date in the calendar that opens.
- Click **Next** to go to the **Options** page of the **Site Recovery Job Wizard**.

New Site Recovery Job Wizard

1. Actions 2. Networks 3. Re-IP 4. Test Schedule 5. Options

☐ Do not schedule, test on demand

(UTC+02:00, EET) Eastern European Time

Schedule #1

Run monthly/yearly

Run every last Friday of every month

Starting at: 0:00 Ending: 6:00

☒ Effective from

[Add another schedule](#)
[Show calendar](#)

Next Cancel

Periodic Site Recovery Job Testing

To test your site recovery job multiple times per day, do the following:

- Choose a time zone that should be used for the site recovery job start and end times from the list of time zones.
- Choose **Run periodically** from the **Schedule #1** list and then choose a time period from the appropriate boxes.
- Specify the time when the site recovery job should be started in the **Starting at** box.
- Specify the end time for the job in the **Ending** box. If the site recovery job has not completed by the time specified, the site recovery job will be stopped.
- To specify a date when the job test schedule comes into effect, click **Effective from**, click **Date** and then pick a date in the calendar that opens.
- Click **Next** to go to the **Options** page of the **Site Recovery Job Wizard**.

The screenshot shows the 'New Site Recovery Job Wizard' with five tabs: 1. Actions, 2. Networks, 3. Re-IP, 4. Test Schedule (active), and 5. Options. Under the 'Test Schedule' tab, there is a checkbox for 'Do not schedule, test on demand'. Below it is a time zone dropdown menu set to '(UTC+02:00, EET) Eastern European Time'. The 'Schedule #1' section includes a dropdown for 'Run periodically', followed by 'every 50 minutes'. There are input fields for 'Starting at: 0:00' and 'Ending: 6:00'. Below these are checkboxes for days of the week: Mon, Tue, Wed, Thu, Fri, Sat, and Sun. Underneath the day checkboxes are links for 'All days', 'Work days', and 'Weekends'. There is also an 'Effective from' checkbox. At the bottom left of the form are links for 'Add another schedule' and 'Show calendar'. At the bottom right are 'Next' and 'Cancel' buttons.

Chained Site Recovery Job

To run the site recovery job after a previous job has completed, do the following:

1. Choose **Run after another job** from the **Schedule #1** list.
2. Set the options as follows:
 - **After the job:** select a job after which the current site recovery job will be started.
 - **Run this job:** Choose whether to run the current site recovery job immediately after the previous job has completed, or specify a delay.
 - **After successful runs:** If selected, the site recovery job will run if the previous job has completed successfully.
 - **After failed runs:** If selected, the site recovery job will run if the previous job has failed.
 - **After stopped runs:** If selected, the site recovery job will run if the previous job has been stopped.

3. To specify a date when the job test schedule comes into effect, click **Effective from**, click **date** and then pick a date in the calendar that opens.
4. Click **Next** to go to the *Options* page of the **Site Recovery Job Wizard**.

Additional Schedule

To add more than one schedule to your site recovery job, do the following:

1. Click **Add another schedule**.
2. The *Schedule #2* section opens. Proceed with instructions provided in the sections above.
3. When ready with adding an additional schedule to your site recovery job, click **Next**.

Site Recovery Job Wizard: Options

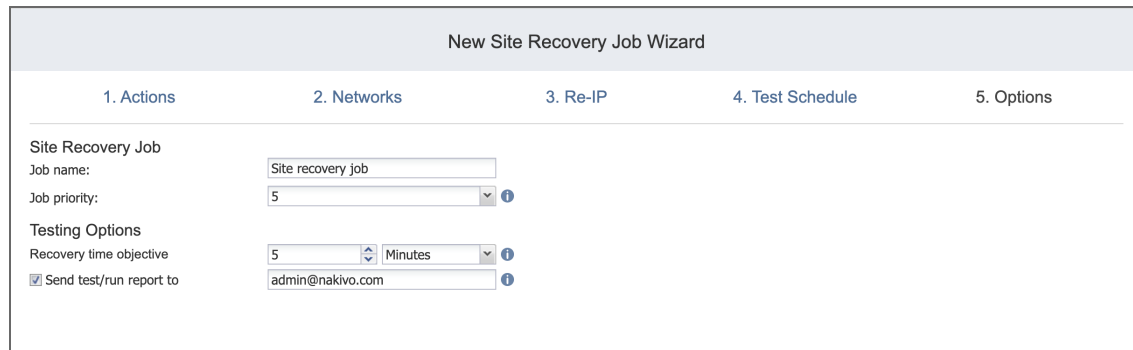
On the **Options** page of the **Site Recovery Job Wizard** you can specify the options of the Site Recovery Job. Proceed as follows:

1. In the *Site Recovery Job* section, specify a name for the Site Recovery Job. If the Site Recovery Job contains failback actions that require a Transporter, you may also specify a job priority level from 1 to 5, with 1 being the highest priority. Jobs with higher priority levels are prioritized by Transporters during job processing.

Note

The **Job Priority** option is only available in the Enterprise, Enterprise Essentials, Enterprise Plus, MSP Enterprise, and MSP Enterprise Plus editions.

2. In the *Testing Options* section:
 - **Recovery time objective:** Enter the amount of time allowed for the Site Recovery Job test to complete. The report will inform you of whether this objective has been met.
 - **Send test/run report to:** When selected, this option enables sending email notifications to the specified recipients. Use the semi-colon character to separate multiple email addresses.
3. Click **Finish** to complete creating the Site Recovery Job.



The screenshot shows the 'New Site Recovery Job Wizard' with five tabs: 1. Actions, 2. Networks, 3. Re-IP, 4. Test Schedule, and 5. Options. The 'Options' tab is active. It contains the following fields:

- Site Recovery Job**
 - Job name:
 - Job priority: (dropdown menu with an info icon)
- Testing Options**
 - Recovery time objective: (dropdown menu with an info icon)
 - ☒ Send test/run report to: (info icon)

The **Site Recovery Job Wizard** closes and the Site Recovery Job appears in the list of NAKIVO Backup & Replication jobs.

Running Site Recovery Job

The section includes the following topics:

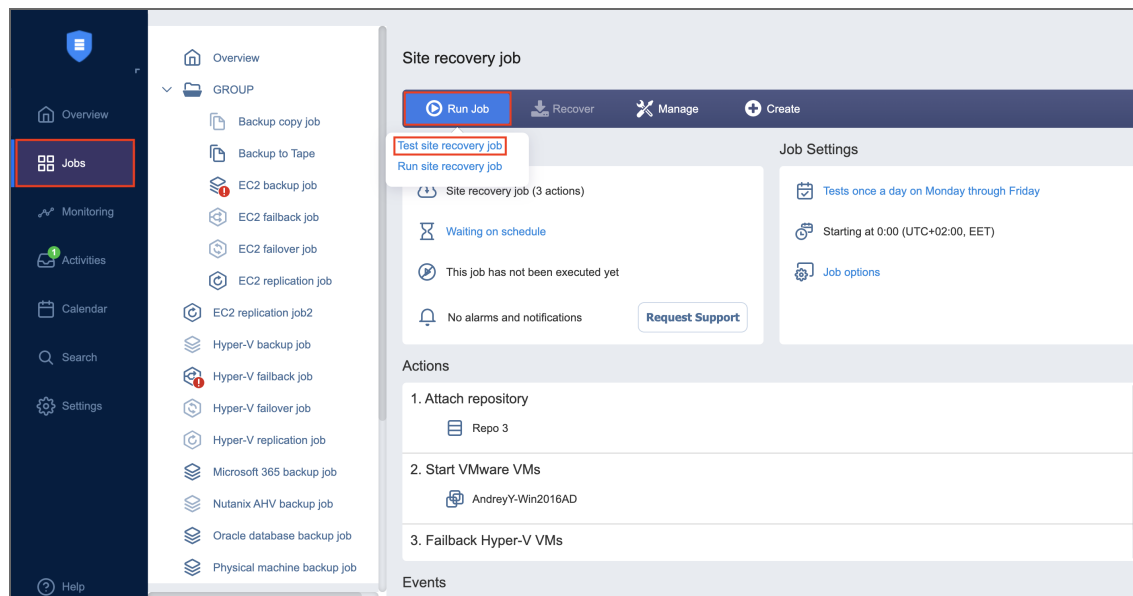
- [Running Site Recovery Job in Test Mode](#)
- [Running Site Recovery Job in Production Mode](#)

Running Site Recovery Job in Test Mode

Running your Site Recovery Job in the test mode allows you to verify the site recovery workflow and results.

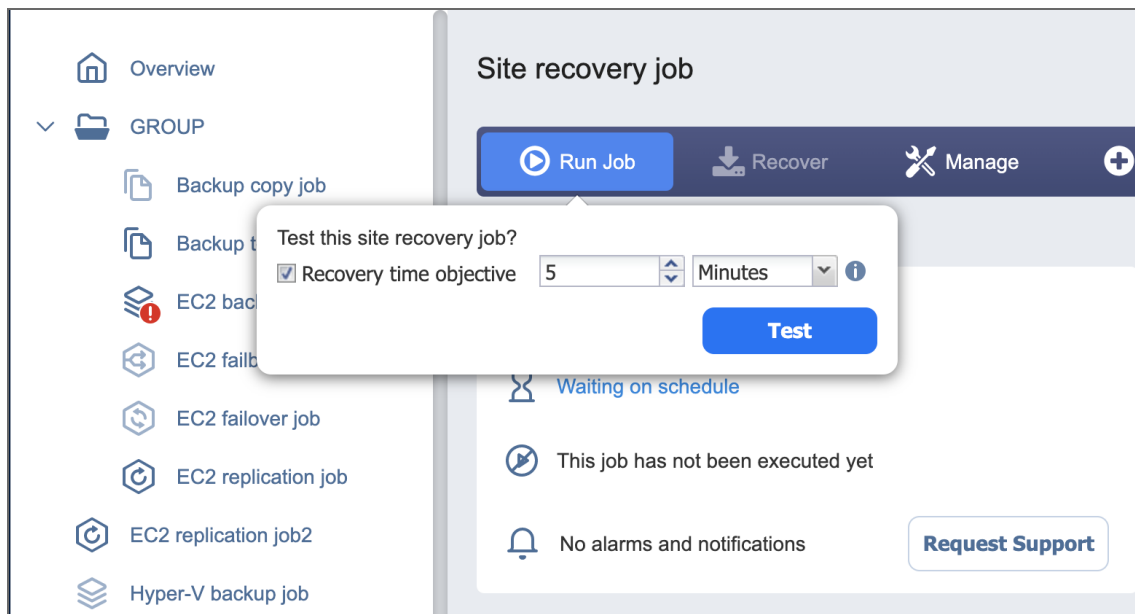
Please follow the steps below to run your Site Recovery Job in the test mode:

1. In the **Jobs** menu, select your Site Recovery Job and then click the **Run Job** button.
2. In the dialog that opens, click **Test site recovery job**.



3. The **Recovery time objective** dialog opens. Here you can:

- Disable/enable the **Recovery time objective** option.
- If the **Recovery time objective** is enabled, modify the amount of time allowed for the job to be completed.



4. Click **Test** when ready. The Site Recovery Job starts running in the test mode.

Note

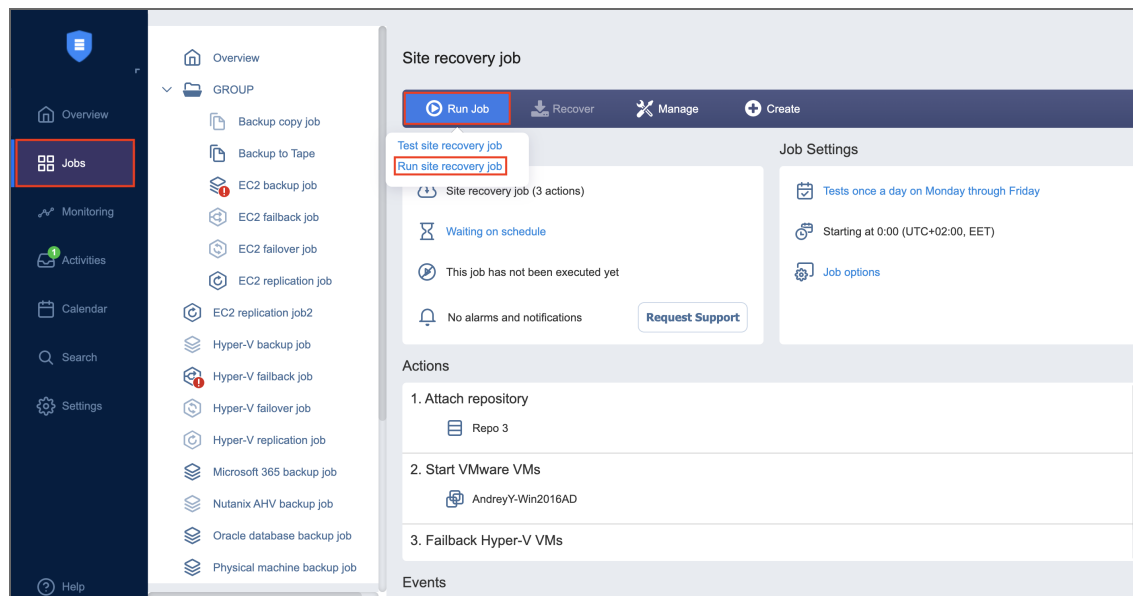
In addition to testing the site recovery job on demand, testing can also be scheduled. Refer to [Site Recovery Job Wizard: Test Schedule](#) for details.

Running Site Recovery Job in Production Mode

Running your Site Recovery Job in the production mode allows you to recover your environment from disaster.

Please follow the steps below to run your Site Recovery Job in the production mode:

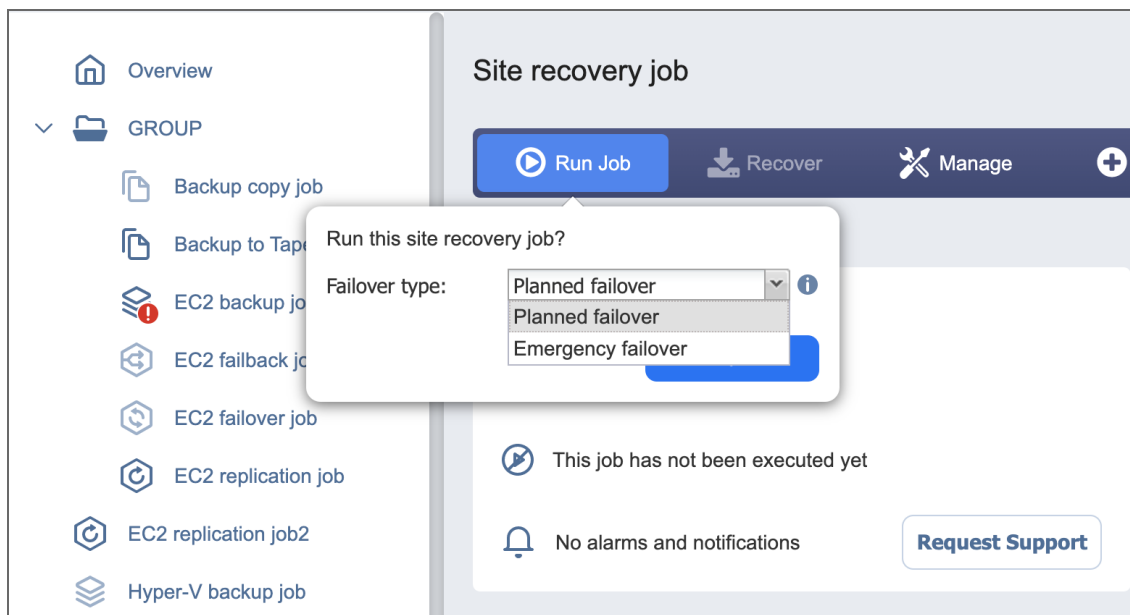
1. In the **Jobs** menu, select your Site Recovery Job and then click the **Run Job** button.
2. In the dialog that opens, click **Run site recovery job**.



3. The **Failover type** dialog opens. Choose either of the following failover types:
 - **Planned failover**: The application will sync replica data with the source VM before switching workloads to the replica.
 - **Emergency failover**: The application will switch workloads from the source VM to the replica immediately.

Note

The **Failover type** option is only available for Site Recovery Jobs containing a Failover action.



4. Click **Run**. The Site Recovery Job starts running in the production mode.

Integration and Automation

This section contains the following topics:

- [“Command Line Interface” on page 911](#)
- [“Automation with HTTP API” on page 924](#)
- [“Aptare IT Analytics Integration” on page 925](#)

Command Line Interface

This section covers the following topics:

- [“Using Command Line Interface” on page 912](#)
- [“Available Commands” on page 914](#)
- [“Exit Codes” on page 923](#)

Using Command Line Interface

- [“Operation Modes of Command Line Interface” below](#)
- [“Using Command Line Interface Locally” below](#)
- [“Using Command Line Interface Remotely” below](#)
- [“Using Command Line Interface in Multi-Tenant Mode” on the next page](#)

NAKIVO Backup & Replication allows you running actions from the product’s command line interface (CLI). In case credentials are configured for the product, running an action via CLI requires providing administrator credentials as arguments, namely, `--username [login] --password [password]`, where `[login]` is the administrator user name and `[password]` is the administrator password.

Operation Modes of Command Line Interface

You can run CLI in either of the following modes:

- *Interactive mode.* This allows you to use a single login for a session. When opened in the interactive mode, CLI allows you executing commands without dashes.
To open CLI in the interactive mode, enter `cli.bat --interactive --username [login] --password [password]` and press **Enter**. To exit the CLI interactive mode, enter **Ctrl-C**.
- *Non-interactive mode.* This requires entering your credentials for each command. You will have to enter dashes before commands. For example: `cli.bat --username [login] --password [password] --inventory-list`

Using Command Line Interface Locally

To use CLI on the machine where NAKIVO Backup & Replication Director is installed, follow the steps below:

1. Run the CLI executable:
 - If NAKIVO Backup & Replication is installed on a Windows OS, run the `cli.bat` file located in the `bin` folder inside the product installation folder ("C:\Program Files\NAKIVO Backup & Replication" by default).
 - If NAKIVO Backup & Replication is installed on a Linux OS, run the `cli.sh` file located in the `director/bin` folder inside the product installation folder (`/opt/nakivo/` by default).
2. Run available [commands](#).

Using Command Line Interface Remotely

To use CLI from a remote machine, follow the steps below:

1. Copy the CLI executable and `.jar` files to the machine from where you plan to use the CLI:
 - If NAKIVO Backup & Replication is installed on a Windows OS, copy the `cli.bat` and `cli.jar` files located in the `bin` folder inside the product installation folder ("C:\Program Files\NAKIVO Backup & Replication" by default).
 - If NAKIVO Backup & Replication is installed on a Linux OS, copy the `cli.sh` and `cli.jar` files located in the `director/bin` folder inside the product installation folder (`/opt/nakivo/` by default).
2. On the machine from where you plan to use the CLI, configure the `PATH` system variable as described at <http://java.com/en/download/help/path.xml>
3. Run commands using the following format: `<command> <host> <port> <username> <password>`

Example

To get a list of jobs of the product which is installed on the machine with the `192.168.10.10` IP address, uses the `4443` port number for the **Director Web HTTPS port**, and has "admin" as login and password for the product's web UI, run the following command: `--job-list --host 192.168.10.10 --port 4443 --username admin --password admin`

Using Command Line Interface in Multi-Tenant Mode

Triggering an action inside a tenant in the multi-tenant mode via command line interface requires providing a tenant ID as an argument:

```
cli.bat --repository-detach [repo_id] --username [login] --password [password] --tenant [tenant-id]
```

Available Commands

You can run CLI commands either in interactive or non-interactive mode. Refer to the *Operation Modes of Command Line Interface* subsection of the [“Using Command Line Interface” on page 912](#) topic.

Use either long or short form of the commands*.

Command	Long form	Short form	Output
Help			
General help	cli.bat --help	cli.bat -h	<ul style="list-style-type: none">• Command name• Description
Job Management			
List all jobs	cli.bat --job-list	cli.bat -jl	<ul style="list-style-type: none">• Job ID• Job name• Current job status• Job last run result
Start a job	cli.bat --job-start [job_id]	cli.bat -jr [job_id]	
Stop a job	cli.bat --job-stop [job_id]	cli.bat -js [job_id]	
Disable a job	cli.bat --job-disable [job_id]	cli.bat -jd [job_id]	
Disable multiple jobs	cli.bat --job-disable [job_id1] [job_id2] [job_id3] ... [job_idX]	cli.bat -jd [job_id1] [job_id2] [job_id3] ... [job_idX]	
Enable a job	cli.bat --job-enable [job_id]	cli.bat -je [job_id]	
Enable multiple jobs	cli.bat --job-enable [job_id1] [job_id2] [job_id3] ... [job_idX]	cli.bat -je [job_id1] [job_id2] [job_id3] ... [job_idX]	

Command	Long form	Short form	Output
Generate a report for a job in PDF format	<pre>cli.bat --job-report [job_id]</pre> <ul style="list-style-type: none"> • The command with no arguments creates the job report and saves it to the current directory. • To save the report to other directory: cli.bat --job-report [job_id] --save-to [dir_path] • To send the report to default email(s): cli.bat --job-report [job_id] --send-by-email • To send the report to other email: cli.bat --job-report [job_id] --send-by-email [email_address] 	<pre>cli.bat -jp [job_id]</pre> <ul style="list-style-type: none"> • The command with no arguments creates the job report and saves it to the current directory. • To save the report to other directory: cli.bat -jp [job_id] -f [dir_path] • To send the report to default email (s): cli.bat -jp [job_id] -eml • To send the report to other email: cli.bat -jp [job_id] -eml [email_address] 	

Command	Long form	Short form	Output
Generate a report for a job in CSV format	<pre>cli.bat --job-report [job_id] -csv</pre> <ul style="list-style-type: none"> The command with no arguments creates the job report and saves it to the current directory. To save the report to other directory: cli.bat --job-report [job_id] --save-to [dir_path] --csv To send the report to default email(s): cli.bat --job-report [job_id] --send-by-email --csv To send the report to other email: cli.bat --job-report [job_id] --send-by-email [email_address] --csv 	<pre>cli.bat -jp [job_id] --csv</pre> <ul style="list-style-type: none"> The command with no arguments creates the job report and saves it to the current directory. To save the report to other directory: cli.bat -jp [job_id] -f [dir_path] --csv To send the report to default email (s): cli.bat -jp [job_id] -eml --csv To send the report to other email: cli.bat -jp [job_id] -eml [email_address] --csv 	
Return information about a job	<pre>cli.bat --job-info [job_id]</pre>	<pre>cli.bat -ji [job_id]</pre>	<ul style="list-style-type: none"> Job ID Job name Current job status Job last run result
Inventory			

Command	Long form	Short form	Output
List all inventory items	cli.bat --inventory-list	cli.bat -il	<ul style="list-style-type: none"> • Item ID • Item IP/host name • Item type (host/vCenter) • Item children count (X hosts, E VMs) • Item current state • Item current status
Update all inventory items	cli.bat --inventory-update	cli.bat -iu	
Update an inventory item	cli.bat --inventory-update [item_id]	cli.bat -iu [item_id]	
Return information about an inventory item	cli.bat --inventory-info [item_id]	cli.bat -ii [item_id]	<ul style="list-style-type: none"> • Item ID • Item IP/host name • Item type (host/vCenter) • Item children count (X hosts, E VMs) • Item current state • Item current status
Transporters			
List all transporters	cli.bat --transporter-list	cli.bat -trl	<ul style="list-style-type: none"> • Transporter ID • Transporter IP/host name • Transporter current load • Transporter maximum load • Transporter current state • Transporter current status

Command	Long form	Short form	Output
Update all transporters	cli.bat --transporter-update	cli.bat -tru	
Update a transporter	cli.bat --transporter-update [transporter_id]	cli.bat -tru [transporter_id]	
Return information about a transporter	cli.bat --transporter-info [transporter_id]	cli.bat -tri [transporter_id]	<ul style="list-style-type: none"> • Transporter ID • Transporter IP/host name • Transporter current load • Transporter maximum load • Transporter current state • Transporter current status
Repositories			
List all repositories	cli.bat --repository-list	cli.bat -rl	<ul style="list-style-type: none"> • Repository ID • Repository name • Assigned transporter • Backup count • Free space • Attached or detached • Consistent or inconsistent • Repository current state • Repository current status
Update all repositories	cli.bat --repository-update	cli.bat -ru	

Command	Long form	Short form	Output
Update a repository	cli.bat --repository-update [repo_id]	cli.bat -ru [repo_id]	
Detach a repository	cli.bat --repository-detach [repo_id]	cli.bat -rd [repo_id]	
Attach a repository	cli.bat --repository-attach [repo_id]	cli.bat -ra [repo_id]	
Start repository maintenance	cli.bat --repository-maintenance [repo_id] [parameter] Parameters: <ul style="list-style-type: none"> • --selfheal • --verify • --spacereclaim 	cli.bat -rm [repo_id] [parameter] Parameters: <ul style="list-style-type: none"> • --selfheal • --verify • --spacereclaim 	
Stop repository maintenance	cli.bat --repository-maintenance-stop [repo_id]	cli.bat -rms [repo_id]	
Return information about a repository	cli.bat --repository-info [repo_id]	cli.bat -ri [repo_id]	<ul style="list-style-type: none"> • Repository ID • Repository name • Assigned transporter • Backup count and free space • Attached or detached • Consistent or inconsistent • Repository current state • Repository current status
Support			

Command	Long form	Short form	Output
Generate a support bundle	cli.bat --bundle-create <ul style="list-style-type: none"> • The command with no parameters will create a support bundle and save it in the current directory. • To save the bundle to other directory: cli.bat --bundle-create --save-to [dir_path] • To send the bundle to support over email: cli.bat --bundle-create --send-to-support • To send the bundle to other email: cli.bat --bundle-create --send-by-email [email_address] 	cli.bat -bc <ul style="list-style-type: none"> • The command with no parameters will create a support bundle and save it in the current directory. • To save the bundle to other directory: cli.bat -bc -f [dir_path] • To send the bundle to support over email: cli.bat -bc -sup • To send the bundle to other email: cli.bat -bc -eml [email_address] 	
Licensing			
Get the current license information	cli.bat --license-info	cli.bat -li	
Replace the current license with a new license file	cli.bat --license-replace [file_path]	cli.bat -lin [file_path]	
Multi-Tenancy			

Command	Long form	Short form	Output
List all tenants	cli.bat --tenant-list	cli.bat -tl	<ul style="list-style-type: none"> • Tenant ID • Tenant name • Allocated items type and count • Tenant status • Enabled or disabled
Disable a tenant	cli.bat --tenant-disable [tenant_id]	cli.bat -td [tenant_id]	
Enable a tenant	cli.bat --tenant-enable [tenant_id]	cli.bat -te [tenant_id]	
Return information about a tenant	cli.bat --tenant-info [tenant_id]	cli.bat -ti [tenant_id]	<ul style="list-style-type: none"> • Tenant ID • Tenant Account ID • Tenant name • Allocated items type and count • Tenant status • Enabled or disabled
Create a support bundle for master admin level	<ul style="list-style-type: none"> • Generate the support bundle for master level only: cli.bat --bundle-create • Generate the support bundle with all tenants logs: cli.bat --bundle-create --include-tenants 	<ul style="list-style-type: none"> • Generate the support bundle for master level only: cli.bat -bc • Generate the support bundle with all tenants logs: cli.bat -bc -ite 	
Miscellaneous			

Command	Long form	Short form	Output
Get the CLI version	cli.bat --version The command returns the CLI version which is equal to the full version of NAKIVO Backup & Replication.	-	
Run a command in the debug mode	cli.bat --repository-info [repo_id] --debug This is an option that can be added to any other CLI command. With the debug mode turned on, the commands will return the full error text.	cli.bat -ri [repo_id] --debug	

*Examples are given for Windows OS.

Exit Codes

NAKIVO Backup & Replication CLI provides the following exit codes:

- **0:** Normal
- **1:** Unknown command
- **2:** Cannot login
- **3:** Command failed
- **4:** Local failure
- **5:** No arguments

Automation with HTTP API

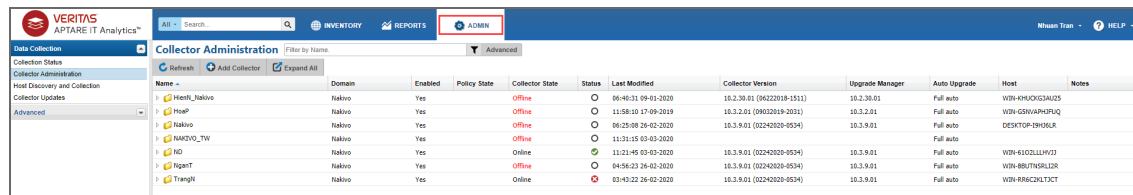
HTTP API allows you to run common NAKIVO Backup & Replication commands outside of the product web interface.

The API is JSON-RPC based. For detailed request and response syntax, refer to [API Reference](#).

Aptare IT Analytics Integration

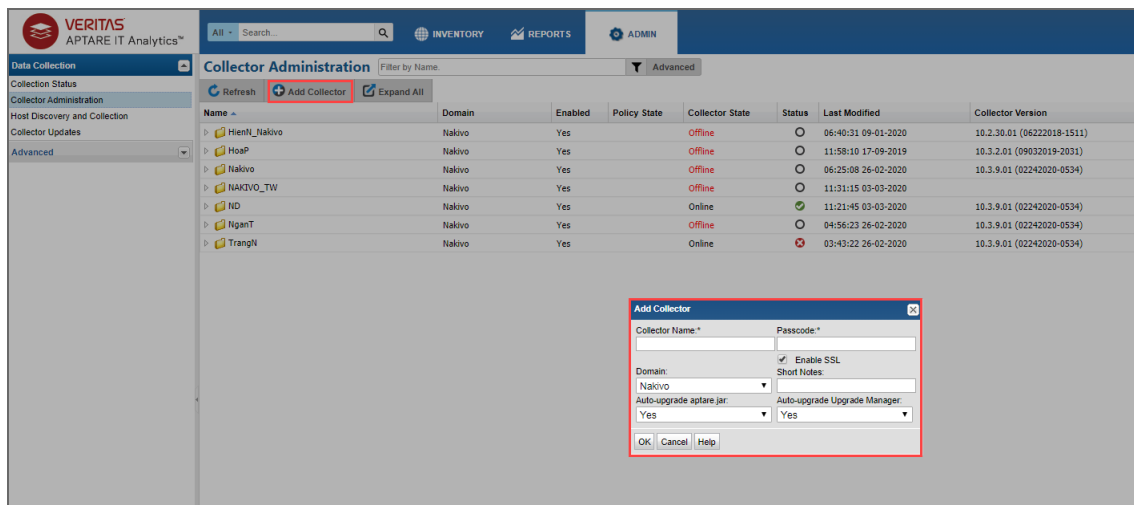
APTARE IT Analytics is a storage resource management platform for integrating storage and backup solutions. The integration with NAKIVO Backup & Replication is based on an APTARE data collector that sends storage component information to the system's platform. The steps for integrating NAKIVO Backup & Replication with APTARE IT Analytics are as follows:

1. On the machine where NAKIVO Backup & Replication is deployed, do the following:
 - a. **Install** APTARE StorageConsole Data Collector with NAKIVO connector.
 - b. When the installation has been successfully completed, make sure that the APTARE Agent service is running.
2. Open your NAKIVO Backup & Replication instance and run your backup jobs.
3. Log in to the APTARE portal.
4. Go to the **ADMIN** tab and take the following steps:



Name	Domain	Enabled	Policy State	Collector State	Status	Last Modified	Collector Version	Upgrade Manager	Auto Upgrade	Host	Notes
HienTi_Nakivo	Nakivo	Yes		Offline	O	06:40:31 09-01-2020	10.2.30.01 (06222018-1511)	10.2.30.01	Full auto	WIN-KHUCKG3A025	
Hoap	Nakivo	Yes		Offline	O	11:58:10 17-09-2019	10.3.2.01 (09032019-2031)	10.3.2.01	Full auto	WIN-GSHWAP0F0UQ	
Nakivo	Nakivo	Yes		Offline	O	06:25:08 26-02-2020	10.3.9.01 (02242020-0534)	10.3.9.01	Full auto	DESKTOP-1HUGLR	
NAKIVO_TW	Nakivo	Yes		Offline	O	11:31:15 03-03-2020			Full auto		
ND	Nakivo	Yes		Online	O	11:21:45 03-03-2020	10.3.9.01 (02242020-0534)	10.3.9.01	Full auto	WIN-6102LLUR013	
NganT	Nakivo	Yes		Offline	O	04:56:23 26-02-2020	10.3.9.01 (02242020-0534)	10.3.9.01	Full auto	WIN-48U7TMSL128	
Trangli	Nakivo	Yes		Online	O	03:43:22 26-02-2020	10.3.9.01 (02242020-0534)	10.3.9.01	Full auto	WIN-RRACHN13XT	

- a. Add a Collector. For details, refer to the [Managing and Monitoring Data Collection](#) subsection of the APTARE IT Analytics User Guide.



Add Collector

Collector Name: *

Password: *

Domain:

Auto-upgrade aptare.jar:

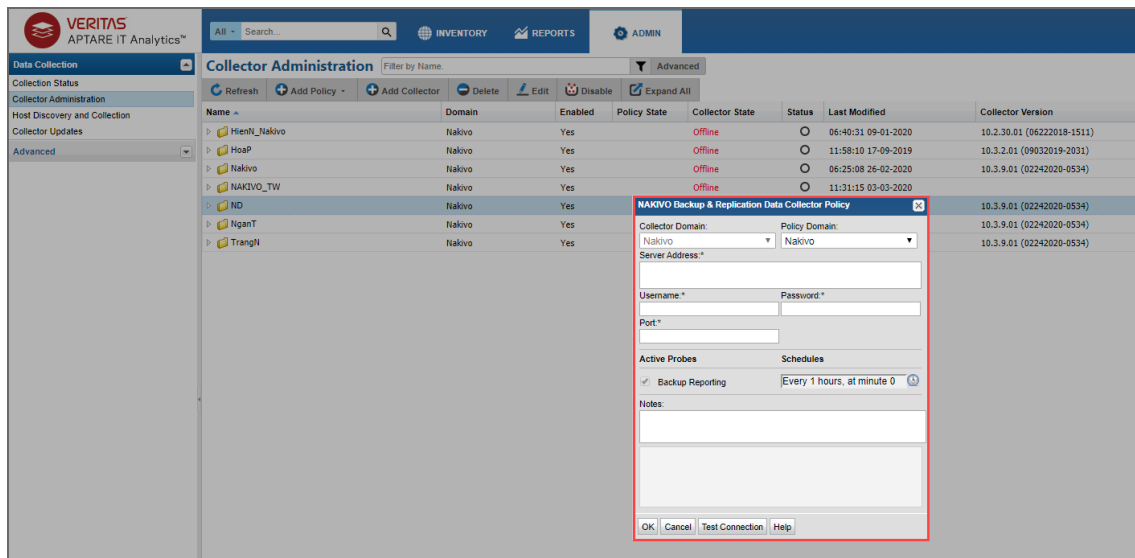
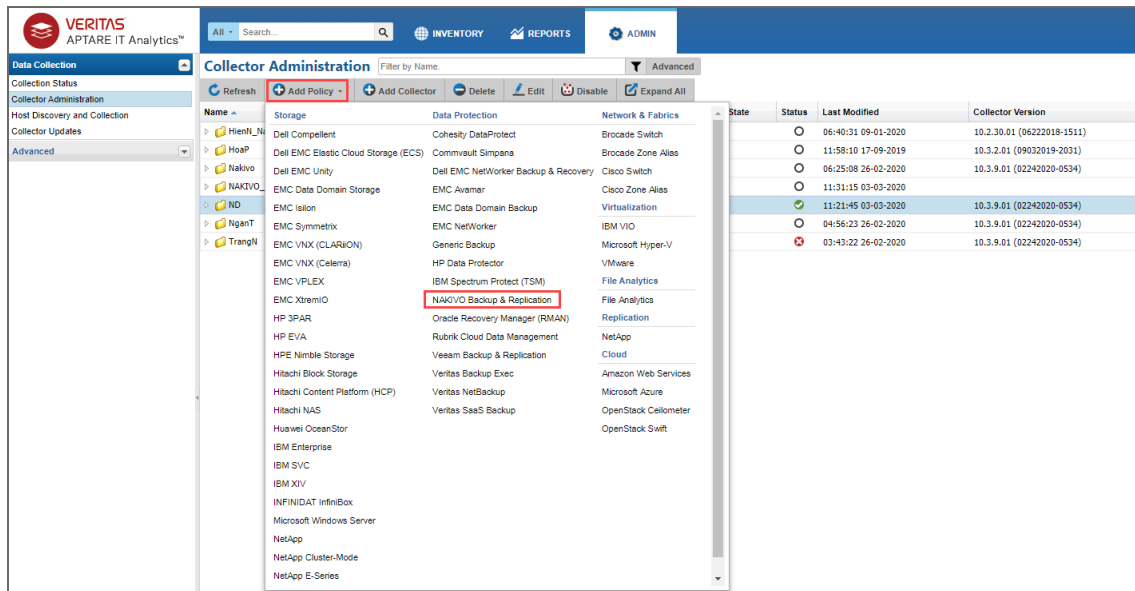
Auto-upgrade Upgrade Manager:

☒ Enable SSL

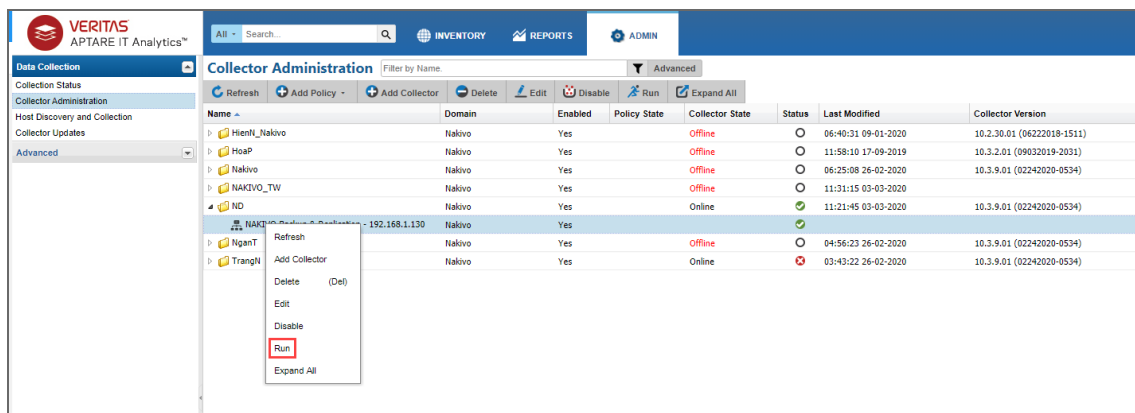
☐ Short Notes

OK Cancel Help

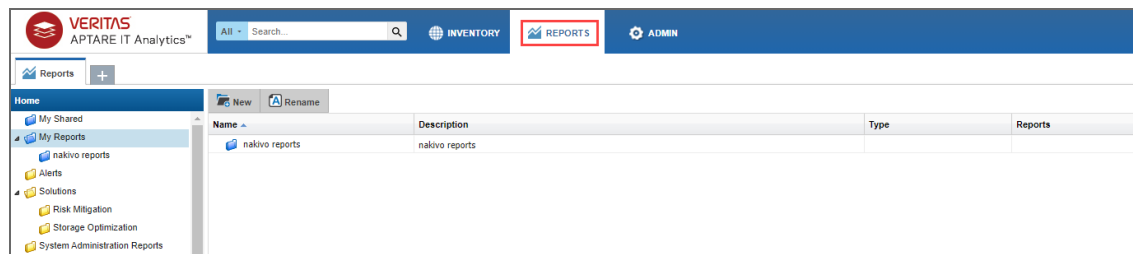
- b. Add a NAKIVO Backup & Replication data protection policy with a connection to your NAKIVO Backup & Replication instance. For details, refer to the [Pre-Installation Setup for Generic Backup](#) subsection of the APTARE IT Analytics User Guide.



c. Run your policy.

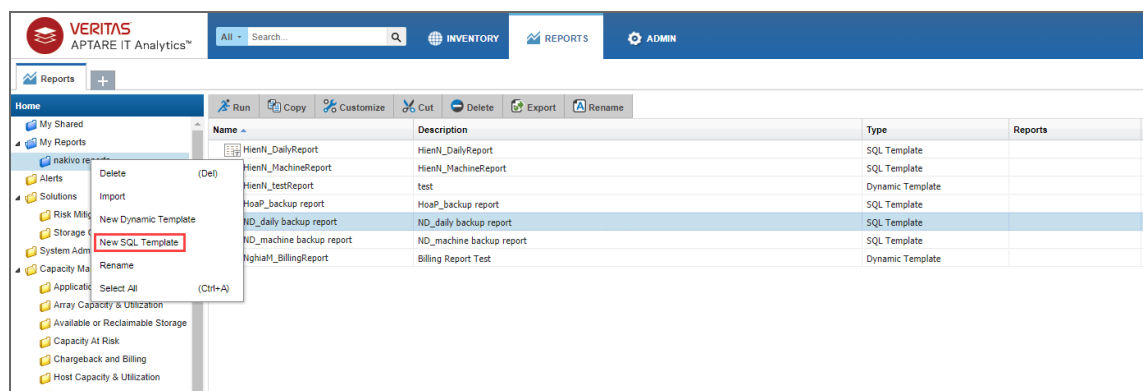


5. Go to the **REPORTS** tab in the APTARE portal and take the following actions:

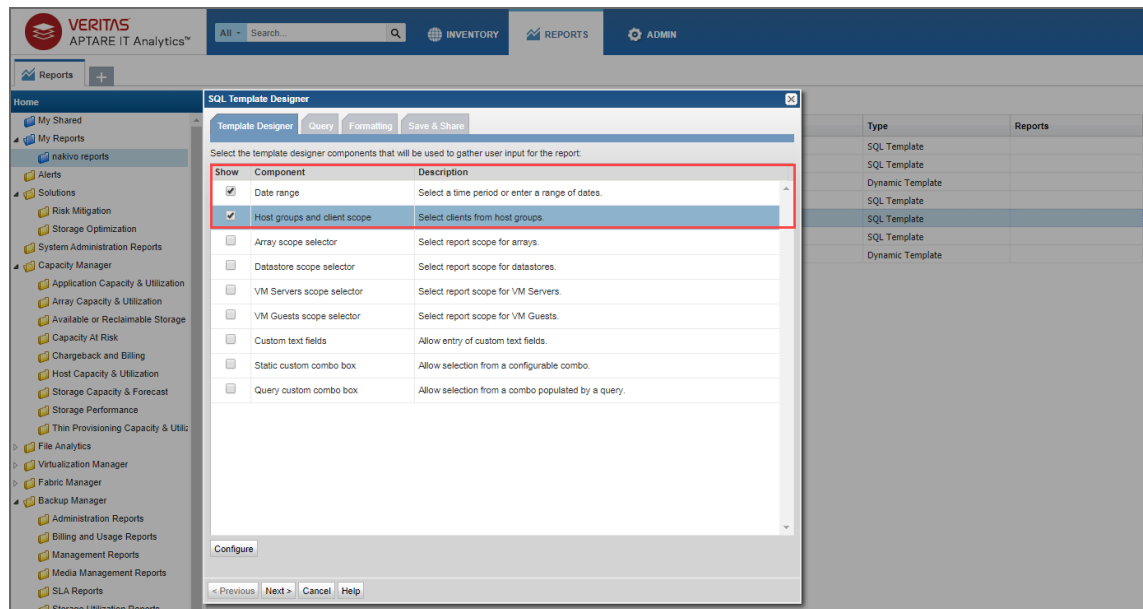


a. Create and configure the report for your backup job the following way:

i. Right-click on your report folder and select **New SQL Template**.



- ii. Select the template designer that will be used to gather user input for the report.



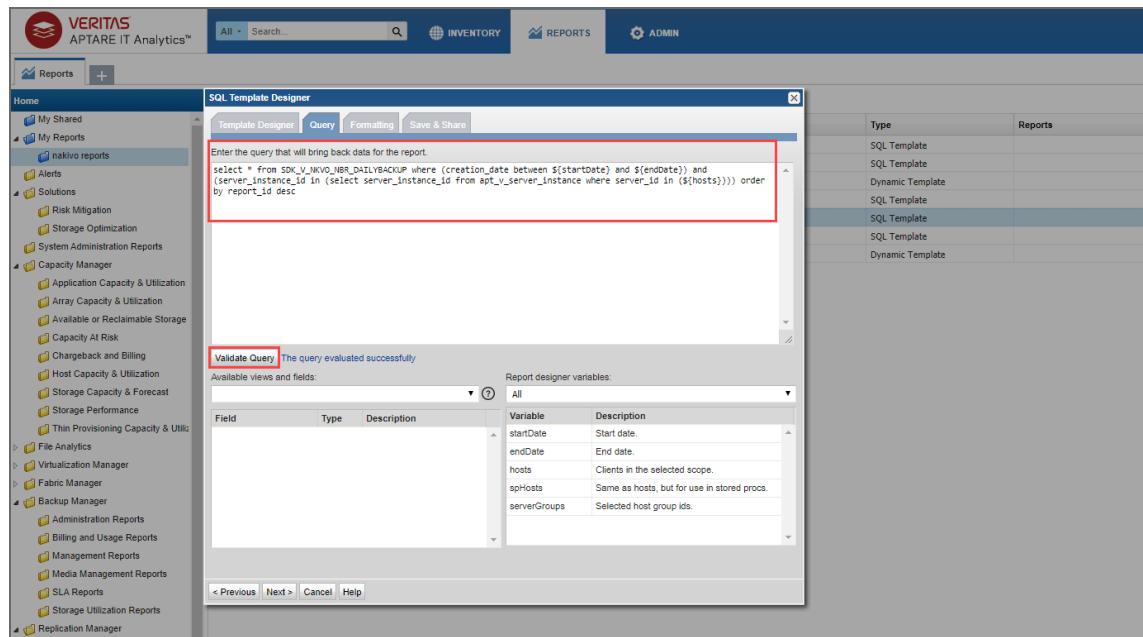
- iii. Build an SQL query for your machine backup report or daily backup report, use either:

Daily Backup Report

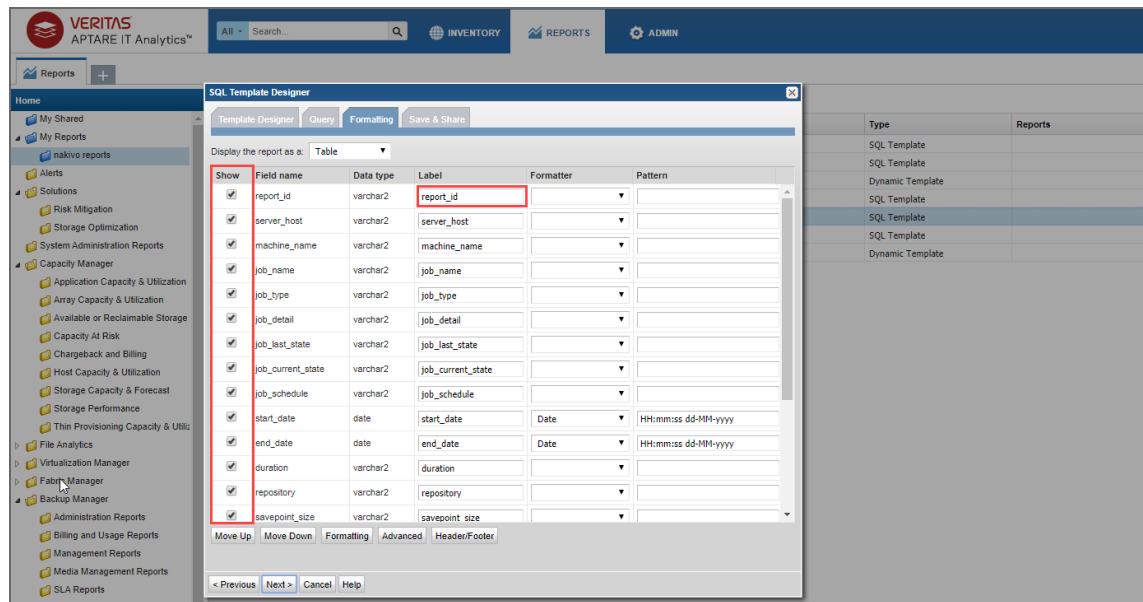
```
select * from SDK_V_NKVO_NBR_DAILYBACKUP where (creation_date
between ${startDate} and ${endDate}) and (server_instance_id
in (select server_instance_id from apt_v_server_instance
where server_id in (${hosts}))) order by report_id desc
```

Machine Backup Report

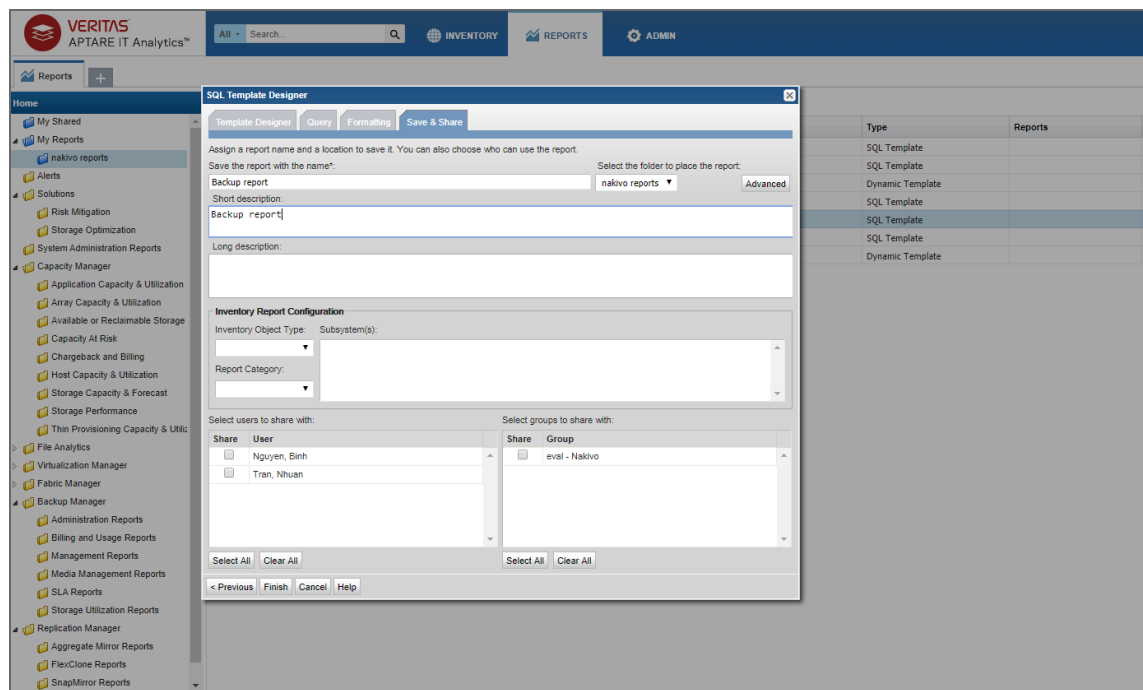
```
select * from SDK_V_NKVO_NBR_MACHINEBACKUP where (creation_
date between ${startDate} and ${endDate}) and (server_
instance_id in (select server_instance_id from apt_v_server_
instance where server_id in (${hosts}))) order by report_id
desc
```



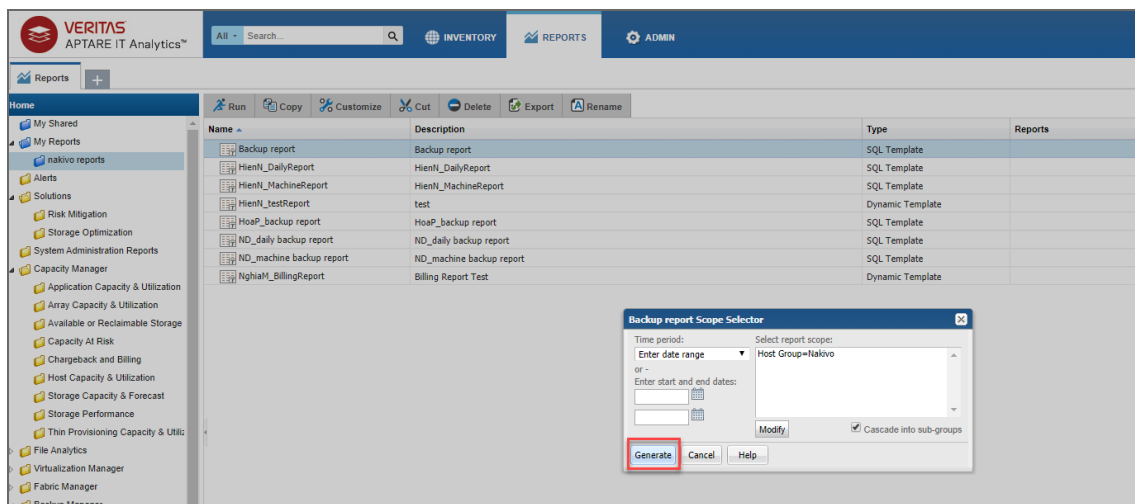
iv. Change formatting options if necessary.



- v. Provide a name and description of the report and select users to share it with. Click **Finish**.



- b. Double-click on the report. In the dialog box that opens, enter the necessary time and report scope. Click **Generate** to generate your report. For details, refer to the [Generating and Maintaining Reports](#) subsection of the APTARE IT Analytics User Guide.



To know more about APTARE IT Analytics, refer to the [APTARE IT Analytics User Guide](#).

Multi-Tenant Mode

This section covers the following topics:

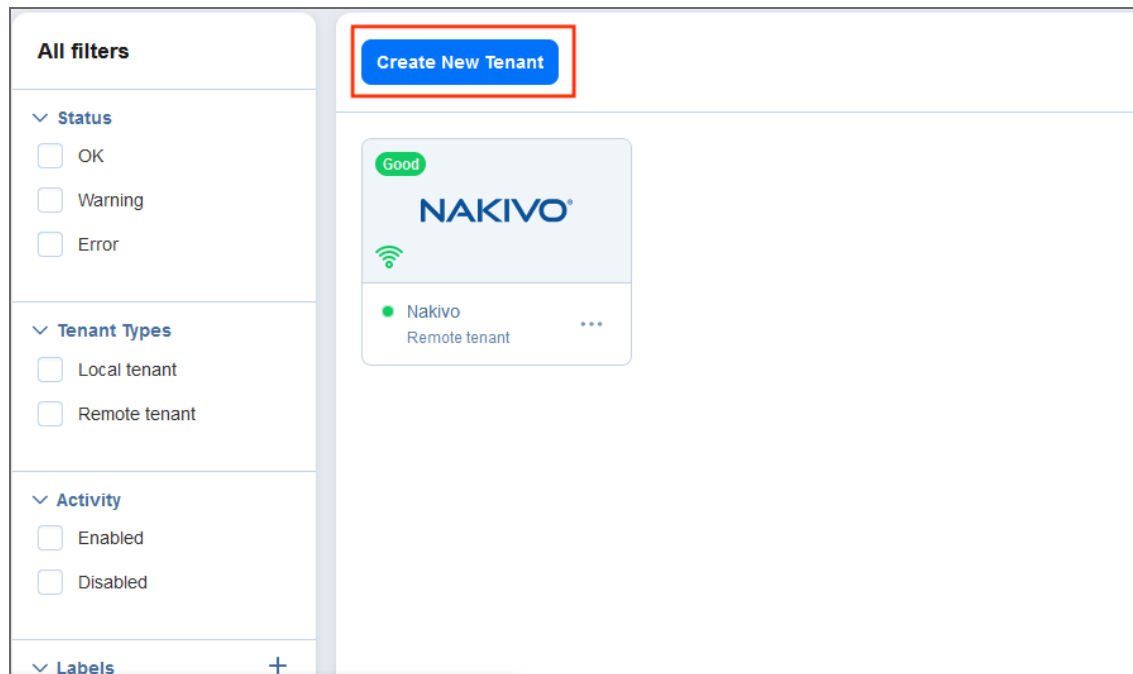
- [“Creating a Local Tenant” below](#)
- [“Creating a Remote Tenant” on page 938](#)
- [“Tenant Management” on page 942](#)
- [“Granting Self-Service Access” on page 956](#)

Creating a Local Tenant

This section covers the topics describing the local tenant creation process in NAKIVO Backup & Replication. The data protection resources (Inventory items, Backup Repositories, and Nodes) of a local tenant account can only be added and edited by the master tenant.

To create a new local tenant, follow the steps below:

1. Log in to NAKIVO Backup & Replication as a Master Admin.
2. Click **Create New Tenant**.



3. In the popup, select **New local tenant**.
4. Complete the wizard as described in the topics below to finish the tenant creation process.
 - [“Local Tenant Creation Wizard: Tenant” on the next page](#)
 - [“Local Tenant Creation Wizard: Inventory” on page 933](#)
 - [“Local Tenant Creation Wizard: Transporters” on page 934](#)

- [“Local Tenant Creation Wizard: Repositories” on page 935](#)
- [“Local Tenant Creation Wizard: Users” on page 936](#)
- [“Local Tenant Configuration” on page 937](#)

Local Tenant Creation Wizard: Tenant

On this page of the wizard, you can provide a name for the local tenant, assign licenses to the local tenant, and enter contact information for the local tenant. Additionally, the master tenant can enable VM Limitation for the new local tenant. When this option is enabled, the tenant cannot exceed the number of allocated VMs for the purpose of backup and replication. Tenants can see the number of allocated and used VMs in the licensing tab and in the job creation wizard.

Proceed as follows:

1. To add a tenant logo, click **Change tenant logo**, navigate to a new image, select it, and click **Open**. The uploaded image is resized and displayed on the right side of the page.
2. In the **Tenant name** field, enter a name for the local tenant. By default, the tenant name is displayed under the tenant logo. If you do not want the tenant name to be displayed, deselect the **Display tenant name** checkbox.
3. Optionally, in the **Labels** field, select the tags you want to assign to the tenant. Additionally, you can enter the name of the new label in the field and click **Create new label** to create and add it to the **Labels** field automatically.
4. In case the Trial or Subscription license is installed, do the following:
 - a. In the **Workloads allocated** field, enter the number of workloads you want to assign to the local tenant.
 - b. In the **Microsoft 365 users allocated** field, enter the number of Microsoft 365 users you want to assign to the local tenant.
5. In case a Perpetual license is installed, do the following:
 - a. In the **Sockets allocated** field, enter the number of sockets you want to assign to the local tenant.
 - i. Optionally, enable the **Limit number of protected VMs** option.

Note

In case the option is not available, make sure that the [feature requirements](#) are met.

- ii. Enter the number of protected VMs for the tenant.

Note

Even with VM limitation enabled, licenses are counted on a per-socket basis.

- b. In the **Physical servers allocated** field, enter the number of physical server licenses you want to assign to the local tenant.
 - c. In the **Physical workstations allocated** field, enter the number of physical workstation licenses you want to assign to the local tenant.
 - d. In the **Microsoft 365 users** allocated field, enter the number of Microsoft 365 users you want to assign to the local tenant.
 - e. In the **Oracle databases** allocated field, enter the number of Oracle Database licenses you want to assign to the local tenant.
6. Optionally, in the **Contact email** field, enter the email address of the local tenant.
 7. Optionally, in the **Contact phone** field, enter the phone number of the local tenant.
 8. Optionally, in the **Website field**, enter the website URL of the local tenant.
 9. Optionally, in the **Address** field, enter the address of the local tenant.
 10. Click **Next** to proceed to the **Inventory** page.

Local Tenant Creation Wizard: Inventory

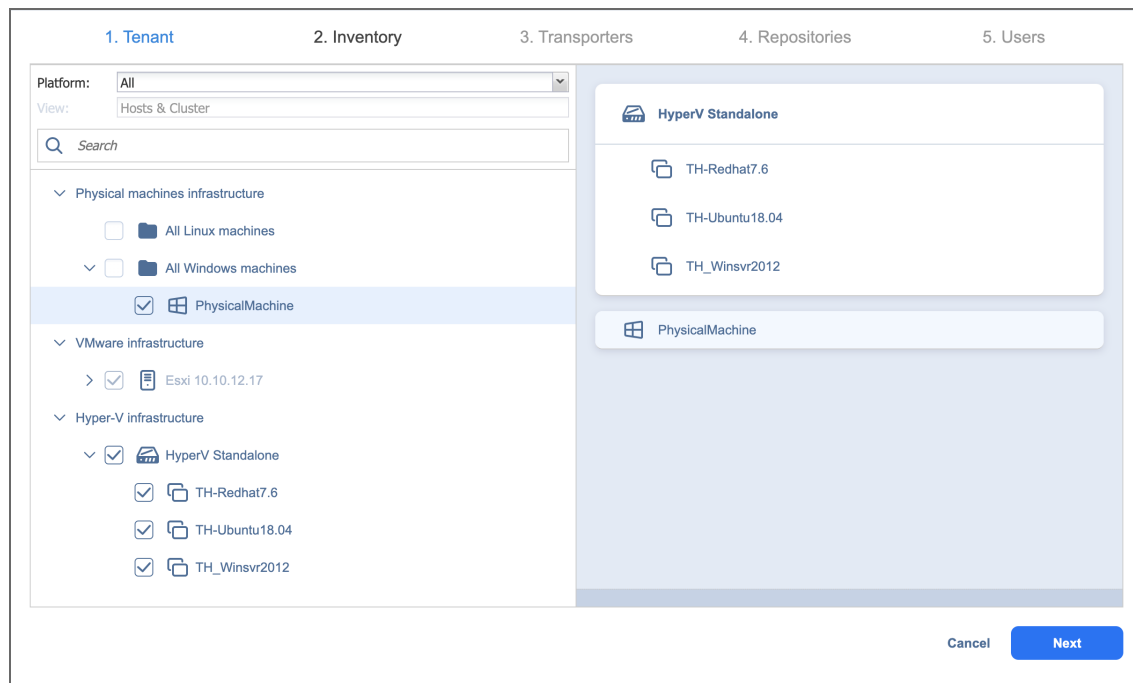
On this page, you can assign inventory items to the local tenant. Proceed as follows:

1. Choose the platform to display the items added to the inventory. **All** is selected by default.

Note

Items that are assigned to other tenants are visible, but cannot be selected.

2. Optionally, you can filter the Inventory tree by entering a string into the **Search** box. You can enter either a part or the entire name of the item.
3. Select the items you want to assign to the local tenant. The selected items appear in the right pane.



4. Click **Next** to proceed to the **Transporters** page.

Local Tenant Creation Wizard: Transporters

On this page of the wizard, you can assign the Transporters that the local tenant will be able to use for backup, recovery, and replication jobs. Proceed as follows:

1. In the **Search** field, you can enter the name or part of the name of the Transporter to find the specific ones you need.

Notes

- When you assign an Inventory item with a dependent Transporter to the local tenant on the Inventory page of the wizard, that Transporter is selected automatically and cannot be deselected. If an Inventory item with a dependent Transporter was not assigned to the local tenant, that Transporter cannot be selected on this page.
 - The transporter deployed in the virtual appliance cannot be assigned to multiple tenants.
2. On the left pane of the screen, you can select the Transporters to be assigned to the tenant. The following information is available:
 - **Name:** Name of the Transporter.
 - **Assigned tenants:** The number of tenants assigned to the Transporter. Multiple tenants can use the same Transporter without accessing each other's data.
 - **Maximum load per tenant:** The maximum number of tasks that the Transporter is able to perform at the same time per each assigned tenant.

3. The selected Transporters appear in the right pane. Click **Next** to proceed.

1. Tenant




2. Inventory


3. Transporters


4. Repositories

5. Users

Q Search

Name	Assigned tenants	Maximum load per tenant
<input checked="" type="checkbox"/>  HyperV Standalone	0	6
<input type="checkbox"/>  Onboard transporter	1	6
<input checked="" type="checkbox"/>  PhysicalMachine	0	6

 HyperV Standalone

 PhysicalMachine

Cancel

Next

Local Tenant Creation Wizard: Repositories

On this page of the wizard, you can assign Backup Repositories that the local tenant will be able to use for backup, recovery, and replication jobs. Note that a single repository cannot be used by multiple tenants.

Proceed as follows:

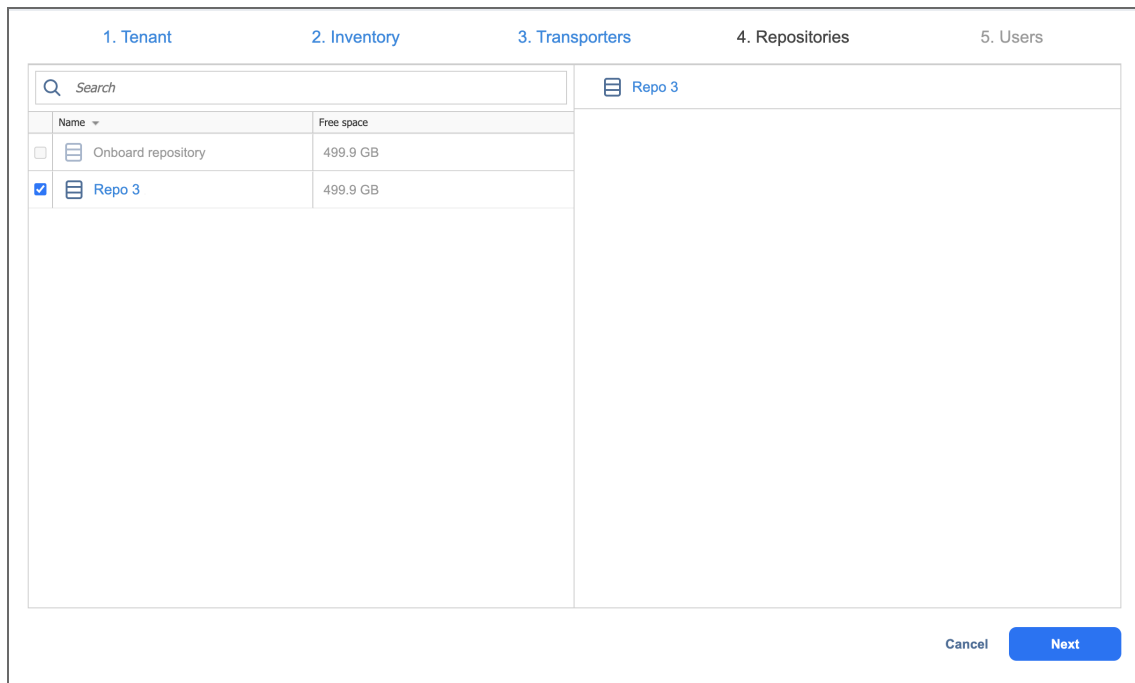
1. In the **Search** field, you can enter either a part or the entire name of the Backup Repository to find the specific ones you need.

Note

If the dependent Transporter was not chosen on the Transporters page of the wizard, the Backup Repositories assigned to this Transporter would not be available for selection.

2. On the left pane of the screen, you can select the Backup Repositories to be assigned to the local tenant. The following information is available
 - **Name:** Name of the Backup Repository.
 - **Free Space:** The amount of free space available on the Backup Repository.

The selected Backup Repositories appear in the right pane.



3. Click **Next** to proceed to the next page of the wizard.

Local Tenant Creation Wizard: Users

On this page of the wizard, you can create local users or import Active Directory users for the tenant. The added users can use the product and have access to the allocated resources. Do the following:

1. In the lower-left pane of the screen, click **Create local user** to create a [new local user for the tenant](#).
2. If you have successfully [configured AD integration](#), you can click **Add AD user** to import [AD user for the tenant](#).

3. Once you're done, click **Finish** to complete the Local Tenant Creation Wizard.

1. Tenant

2. Inventory

3. Transporters

4. Repositories

5. Users

Search

User name	Role	Group	Two-factor authentication	
Local	Self-service user	Local users	disabled	<div>EditDelete</div>

Create local user

Cancel

Finish

Local Tenant Configuration

After creating a new tenant, click the tenant to open the initial Tenant Configuration Wizard which will guide you through the tenant setup process. Refer to [“First Steps with NAKIVO Backup & Replication”](#) on page 275 for a description of the initial configuration wizard.

Tenants

User1

1. Inventory

2. Transporters

3. Repositories

Add New...

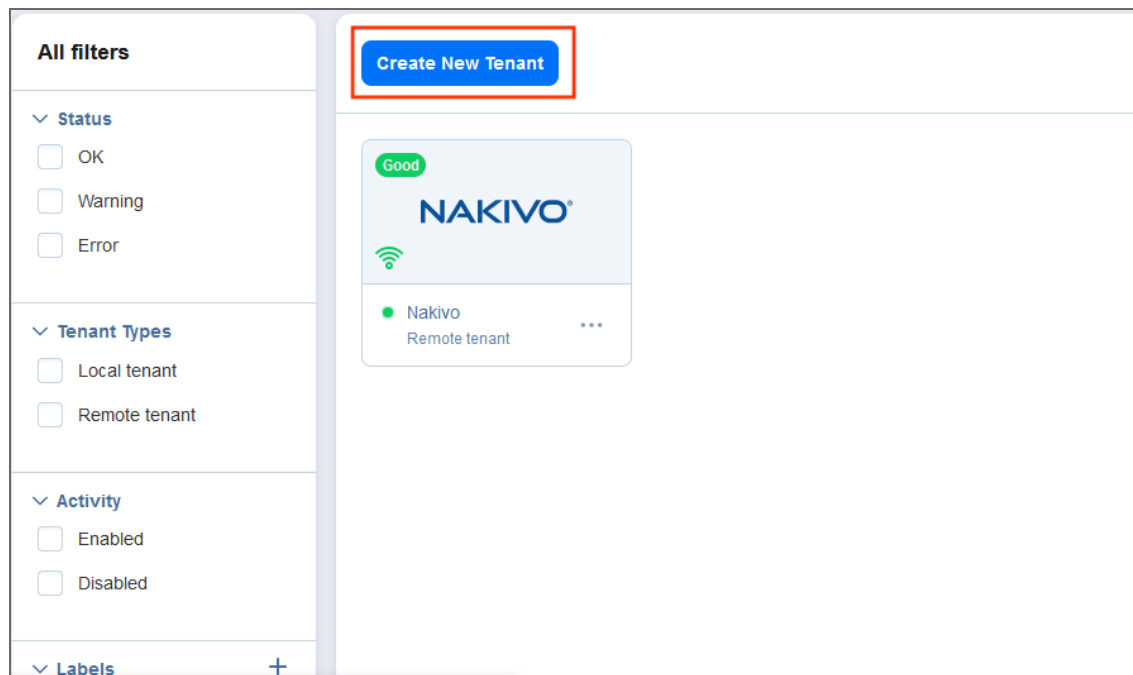
Next

Creating a Remote Tenant

This section covers the topics describing the remote tenant creation process. Creating and configuring a remote tenant allows a master tenant to monitor a standalone instance of NAKIVO Backup & Replication via the **MSP Console**. The remote tenant account retains the ability to manage the resources in their data protection infrastructure.

To create a new remote tenant, follow the steps below:

1. Log in to NAKIVO Backup & Replication as a Master Admin.
2. Click **Create New Tenant**.



3. In the popup, select **New remote tenant**.
4. Complete the remote tenant creation process as described in the topics below:
 - [“Remote Tenant Creation Wizard: Tenant”](#) below
 - [“Remote Tenant Creation Wizard: User”](#) on the next page
 - [“Remote Tenant Configuration”](#) on page 940

Remote Tenant Creation Wizard: Tenant

Complete the **Tenant** section of the **Remote Tenant Creation** wizard by configuring the following fields:

1. **Tenant name:** Specify the name of the remote tenant.
2. **Labels:** Optionally, you can create a new tag or assign existing tags to the remote tenant using the drop-down menu.
3. **Tenant logo:** Upload a logo to be displayed for the remote tenant in the multi-tenancy Dashboard. The photo is automatically resized and a preview is generated.

4. **Display tenant name:** Enable this option if you want the tenant name to be displayed in the **Master Tenant Dashboard**.

Optionally, add contact information for the remote tenant by filling in the following fields:

- **Contact email**
- **Contact phone**
- **Website**
- **Address**

Create remote tenant

1 Tenant

2 Users

General

Tenant name:

Labels:

Tenant logo: 12Mb | 128 x 128px

☐ Display tenant name

Contact information

Contact email:

Contact phone:

Website:

Address:

When you're done, click **Next** to move to the next page of the wizard.

Remote Tenant Creation Wizard: User

Complete the **User** section of the **Remote Tenant Creation** wizard by configuring the following fields:

1. **Username:** Specify a username for the remote tenant **User**.
2. **Name:** Specify the remote tenant display name.

3. **Password:** Create a password for this user and repeat it in the **Repeat Password** field below.
4. **Email:** Enter the user's email address.
5. **Description:** Optionally, you can add a description for this **User**.

Create remote tenant

✓ Tenant

2 User

General information

Username:

Remote tenant 1

Name:

Alex

Password:

••••••••

👁

Repeat password:

••••••••

👁

Email:

admin@admin.com

Description:

Role

Access level:

Level 1

Role:

Remote tenant

Permission

Show

The **Remote tenant** role and its permissions are added to the **User** automatically. Click **Finish** to confirm the creation of the remote tenant.

Remote Tenant Configuration

When a remote tenant is created, it is automatically added to the list of tenants in the **Master Tenant Dashboard**. To connect a remote tenant to your multi-tenant installation of NAKIVO Backup & Replication, follow the steps below:

1. Provide the remote tenant with the credentials created for the remote tenant user, as well as your hostname/IP address and Director port number (4443 by default). In addition, you will need to open a separate listening port for communication with the remote tenant's instance (port 6702 is used by default). For more information on the required TCP ports, see the **MSP Console** section in [“Feature Requirements” on page 151](#).
 2. The remote tenant must go to **Settings > MSP** in their own instance of NAKIVO Backup & Replication and add the MSP using the above information, and then click **Add**.
 3. A popup with certificate details appears. The remote tenant should click **Apply** to add the MSP to the **MSP** tab.
 4. In your **Master Tenant Dashboard**, the remote tenant should now have a green Connected icon on the tenant card. Clicking on the remote tenant’s name allows you to drill down and monitor their instance.
- For more information on tenant-side **MSP Console** configuration, refer to [“Adding an MSP” on page 342](#).

Tenant Management

This section covers the following topics:

- [“Using Filters” on page 943](#)
- [“Using Labels” on page 945](#)
- [“Viewing Tenant Information” on page 948](#)
- [“Opening Tenant Dashboard” on page 951](#)
- [“Disabling Tenants” on page 953](#)
- [“Editing Tenants” on page 954](#)
- [“Deleting Tenants” on page 955](#)

Using Filters

- [About Filters](#)
- [Applying Filters](#)

About Filters

The **Master Tenant Dashboard** has 5 filter categories, which allow you to quickly display tenants based on their characteristics. The following filters are available:

- **Status:**
 - **OK:** Displays tenants that have no errors and notifications
 - **Warning:** Displays only tenants that have notifications
 - **Error:** Displays only tenants that have errors
- **Type:**
 - **Local:** Displays only local tenants
 - **Remote:** Displays only remote tenants
- **Activity:**
 - **Enabled:** Displays only enabled tenants
 - **Disabled:** Displays only disabled tenants
- **Labels:** Filters tenants by labels assigned to them
- **VMs Allocated:** Filters tenants by the number of VMs allocated to them

Applying Filters

To apply a filter, check the box to the left of a filter name.

All filters

▼ Status

☐ OK

☐ Warning

☐ Error

▼ Tenant Types

☐ Local tenant

☐ Remote tenant

▼ Activity

☐ Enabled

☐ Disabled

▼ Labels

There are no labels yet.

Create New Tenant

Good

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Remote tenant

To dismiss a filter, simply uncheck the box to the left of the name of an active filter.

Using Labels

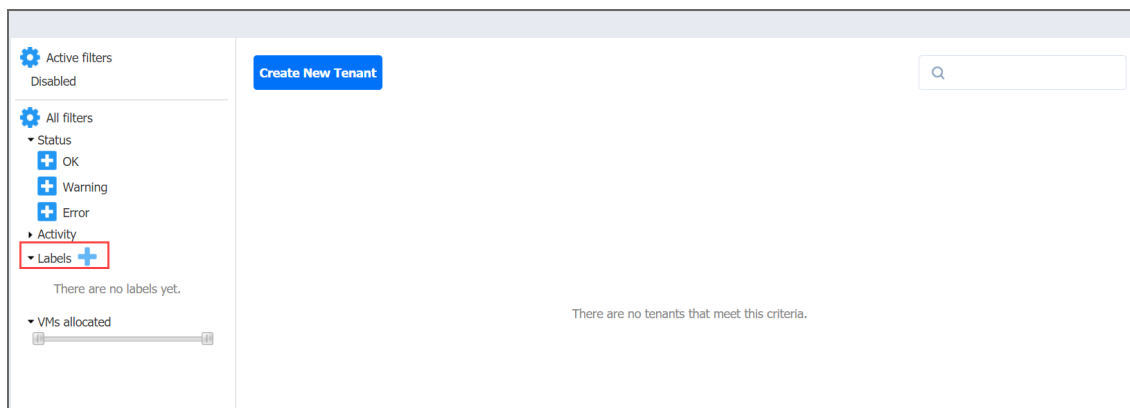
- [About Labels](#)
- [Creating Labels](#)
- [Assigning Labels to Tenants](#)
- [Editing Label Names](#)
- [Deleting Label](#)

About Labels

With NAKIVO Backup & Replication, you can create custom labels and assign them to tenants. Assigning a label to a tenant allows you to quickly sort existing tenants into different categories, such as location, SLA level, etc.

Creating Labels

To create a new label, click the **Plus** icon next to **Labels** and enter a name for the new label, and press the **Enter** key.



You can also create a new label when creating a new tenant.

Assigning Labels to Tenants

You can assign a label to a tenant either during the tenant creation or by [editing the tenant](#).

Create a new tenant

Tenant name:

Workloads allocated:

Office365 Exchange mailboxes allocated:

Labels: New

Contact email:

Contact phone:

Website:

Address:

Admin Account

Username:

Email:

New password:

Repeat password:

Role:

Guest Account

Guest access:

[Change tenant logo](#)

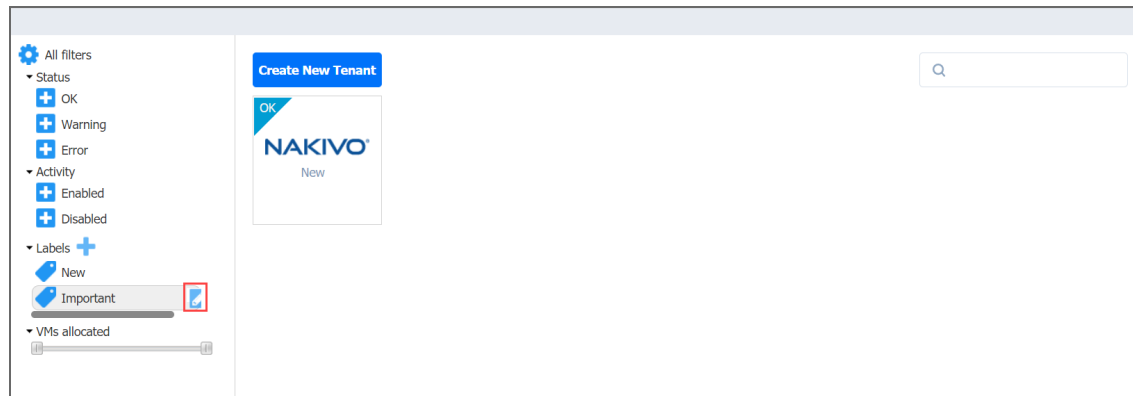
☒ Display tenant name

Create **Cancel**

Editing Label Names

To change a label name, do the following:

1. Hover over the label.
2. Click the **Edit** icon.



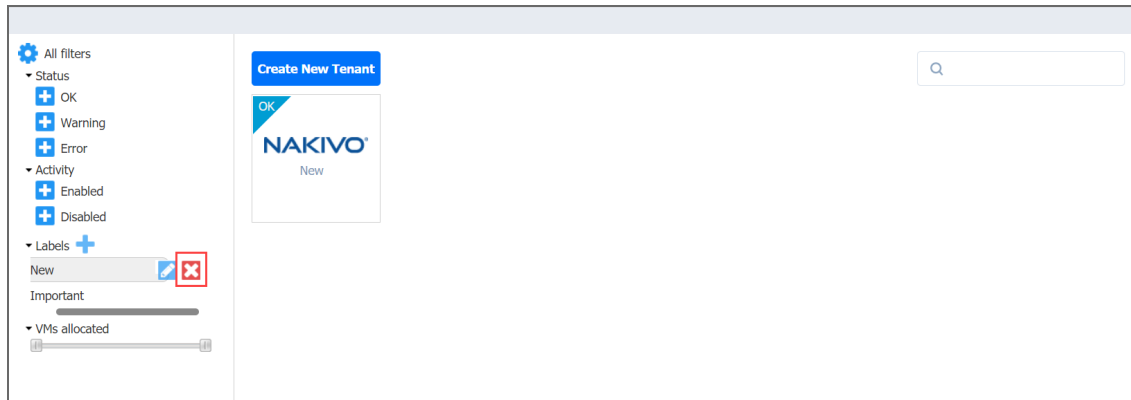
3. Enter the new label name and press the **Enter** key.

Deleting Labels

To permanently delete a label, do the following:

1. Hover the mouse pointer over a label.
2. Click the **Delete** icon.

3. In the dialog box that opens, click **Delete** to confirm that you wish to permanently delete the label

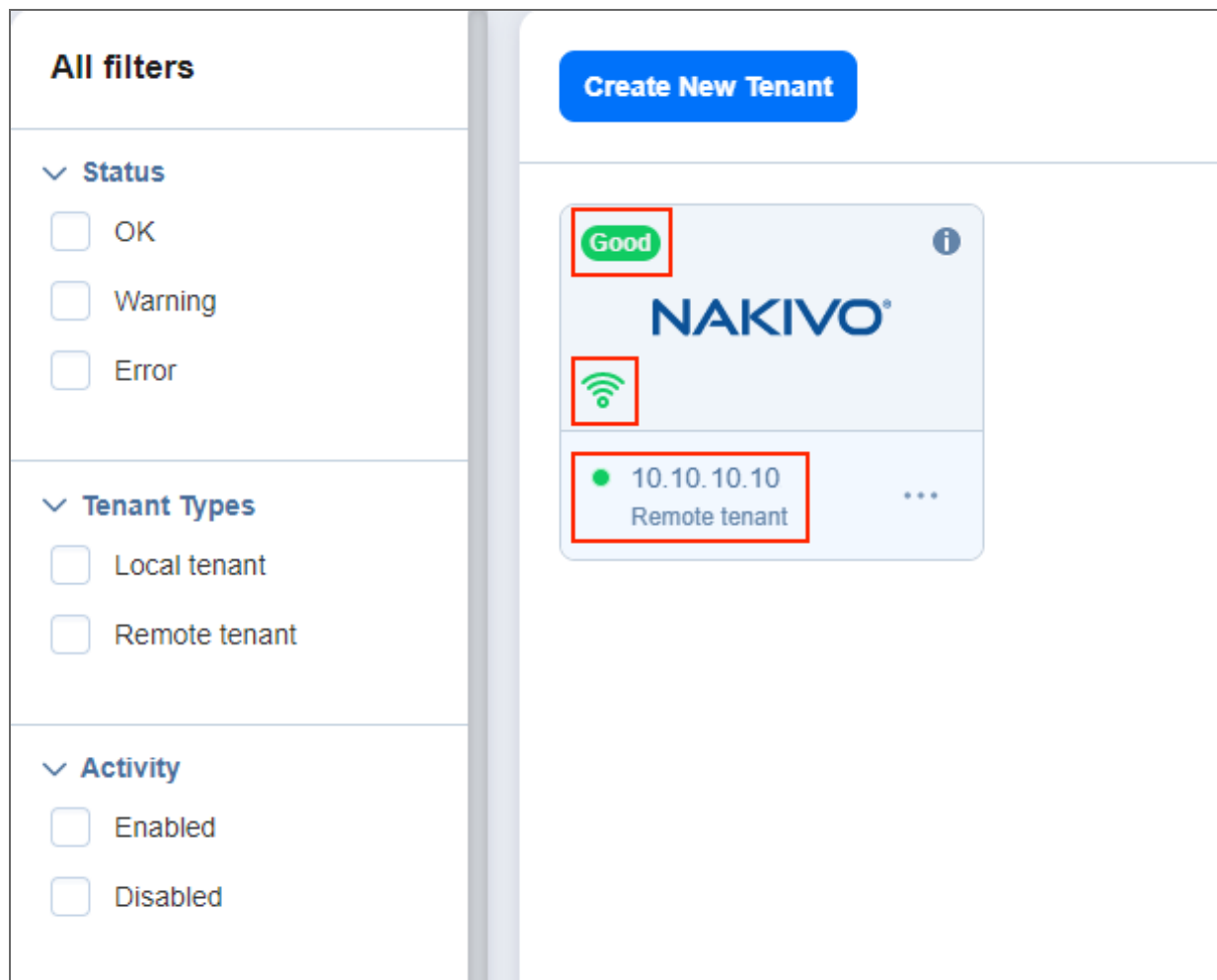


Viewing Tenant Information

On the **Master Tenant Dashboard**, you can view information about each tenant's instance of NAKIVO Backup & Replication. The information readily displayed on a tenant's card is as follows:

- **Tenant status:** The color and content of this indicator gives an overview of the tenant instance's alarms and notifications status. The given number reflects the number of alarms and/or notifications present at the remote tenant. A green **Good** indicator means there are no outstanding alarms and notifications. Other colors represent the following:
 - **Yellow:** There are outstanding notifications.
 - **Red:** There are outstanding alarms.
 - **Grey:** The tenant is disabled.
- **Connection** (remote tenants only): A green signal icon on a remote tenant's card indicates that a connection has been established between the remote tenant and Master Tenant instances; that is to say, a green signal icon will appear on the remote tenant's card once they have successfully [added the MSP](#). A red signal icon means the connection could not be established or has been interrupted.
- **Accessibility:** A green circle icon next to the tenant's name indicates that the tenant is currently accessible by the Master Tenant.

- **Tenant name and type:** Lastly, the tenant card indicates the name and type of a given tenant.



For more tenant information, hover over the tenant card and click on the **Info** button. A pop-up window opens with general tenant details and usage statistics.

All filters

▼ Status

☐ OK

☐ Warning

☐ Error

▼ Tenant Types

☐ Local tenant

☐ Remote tenant

▼ Activity


☐ Enabled

☐ Disabled

Create New Tenant

Good


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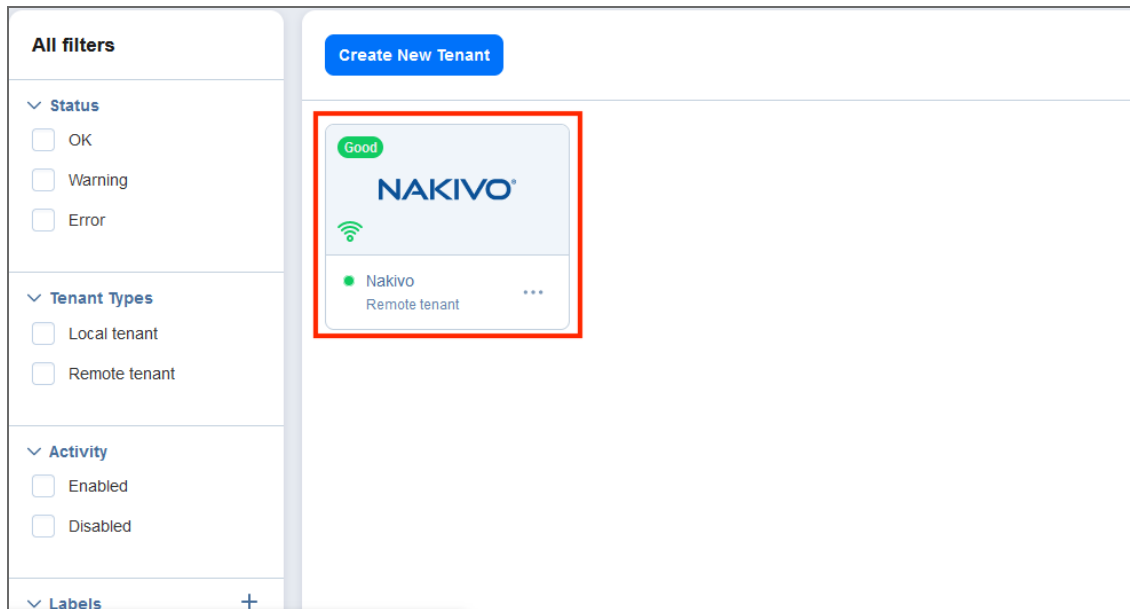
Remote tenant

...



Opening Tenant Dashboard

In order to work with a tenant's instance, you should open the tenant's **Dashboard**. For local tenants, this allows you to configure the tenant, create jobs and groups, and perform recovery. For remote tenants, this allows you to monitor their instance of NAKIVO Backup & Replication. To open a tenant's **Dashboard**, simply click the tenant.



Returning to Master Admin Dashboard

To return to the **Master Tenant Dashboard** from a local tenant's instance, click **Tenants** in the navigation bar. To return from a remote tenant's instance, click the arrow to the left of the tenant name.

Tenant A

Overview

Jobs

Group of Items 00

Group of Items 01

Group of Items 02

Group of Items 03

Group of group of Items 00

Group of group of Items o...

VMwares backup jo...

VMwares backup jo...

Overview

334 Issues

378 Jobs

20 Running

104 Failed

2 Stopped

293 Success

Recover

Jobs

Job name	Group	Priority	Status	Speed
Job A	Child group 01	1	Running	4 Mbit/s
Job A	Child group 01	1	Running	4 Mbit/s
Job A	Child group 01	1	Running	4 Mbit/s
Job A	Child group 01	1	Running	4 Mbit/s
Job A	Child group 01	1	Running	4 Mbit/s
Job A	Child group 02	2	Idle	4 Mbit/s (last run)
Job A	Child group 02	2	Idle	4 Mbit/s (last run)
Job A	Child group 02	2	Idle	4 Mbit/s (last run)
Job A	Child group 02	2	Idle	4 Mbit/s (last run)
Job A	Child group 02	2	Idle	4 Mbit/s (last run)

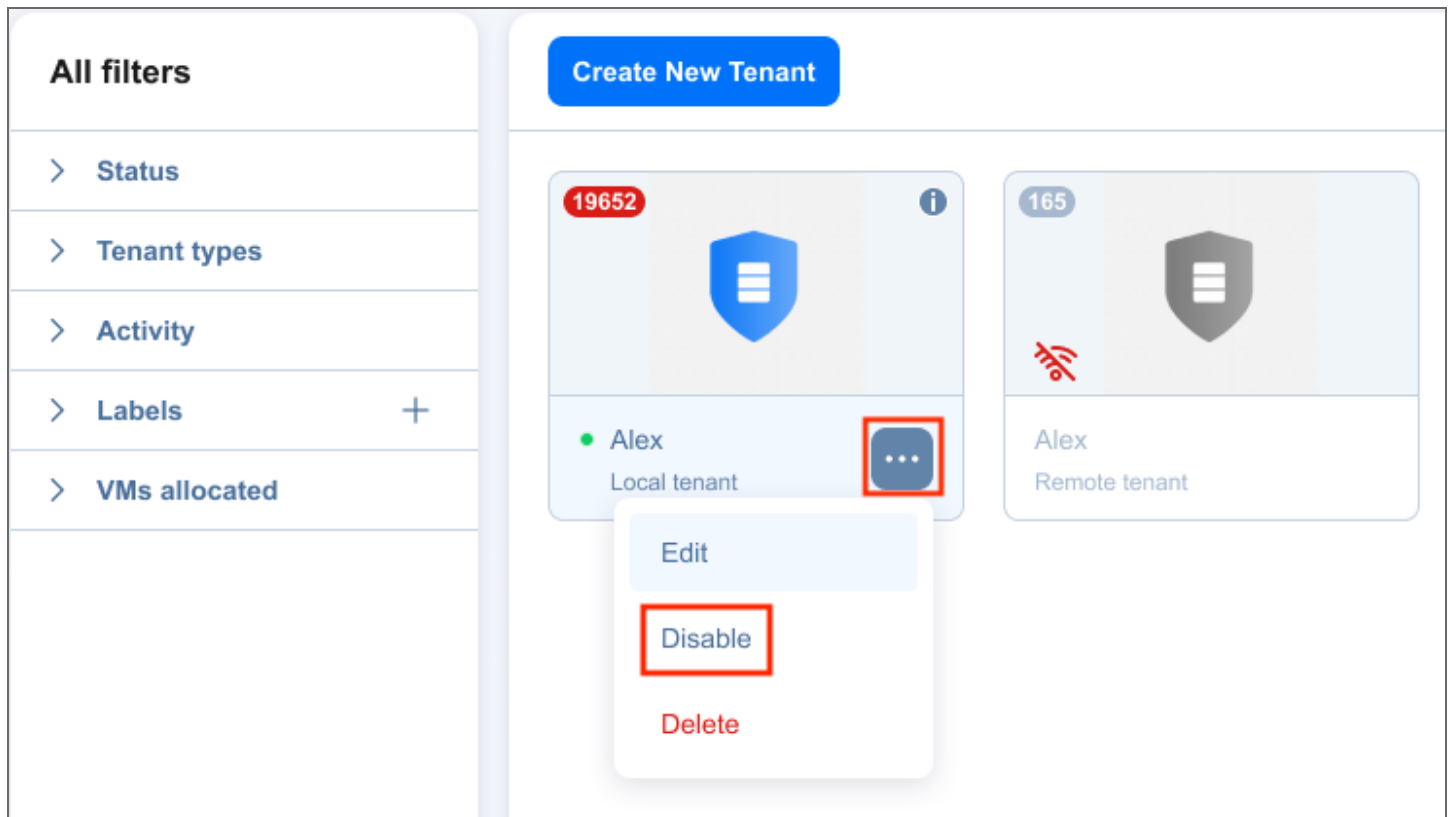
Page 1 of 100023 items in total

Disabling Tenants

In multi-tenant mode, you can disable a tenant to temporarily stop delivering backup, replication, and recovery services for that tenant. After disabling a tenant:

- Tenant admin and tenant guest will not be able to log in to the self-service interface. A message saying that the service has been disabled will be displayed after login attempts.
- Existing jobs will not be run on schedule.
- All currently running jobs will be allowed to complete.

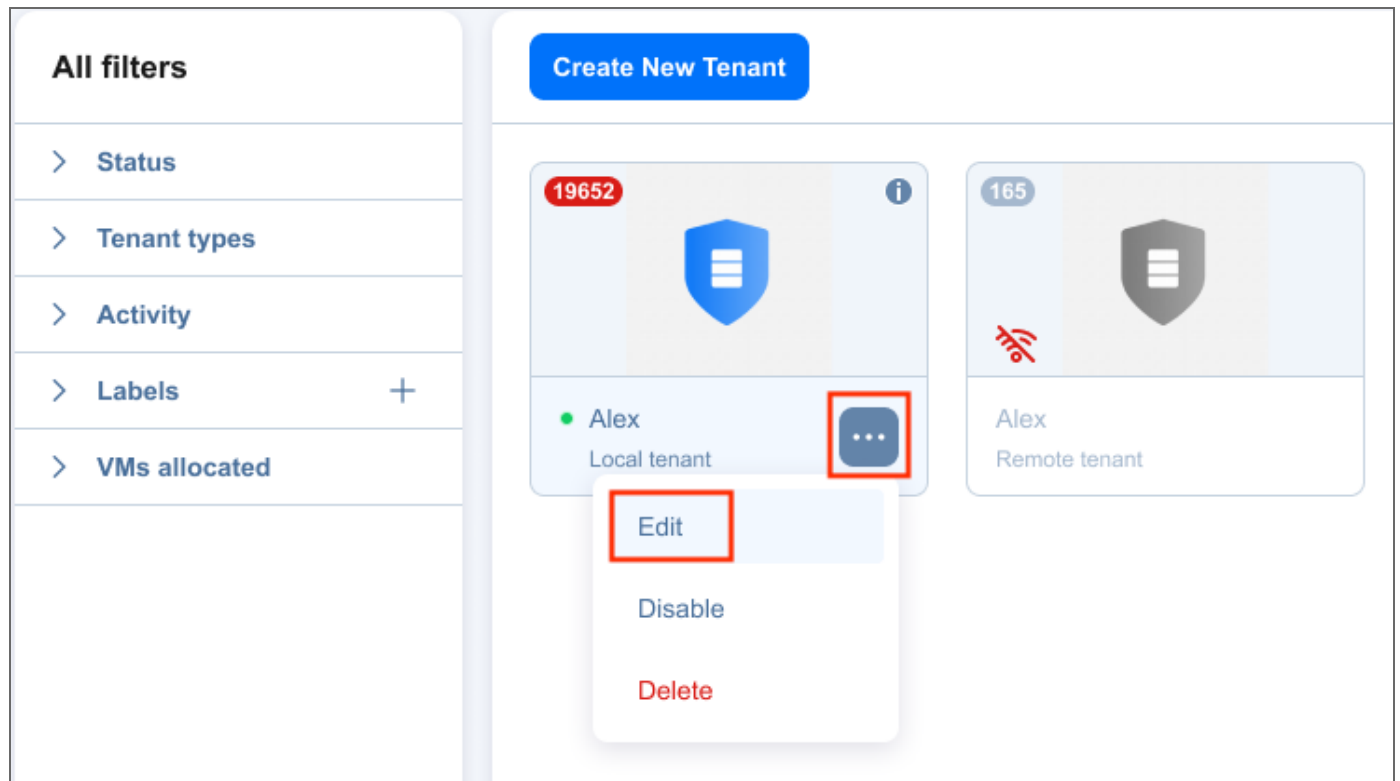
To disable a tenant, hover over the tenant card and click the ellipsis **Manage** button, then click **Disable**.



Editing Tenants

To edit a tenant, do the following:

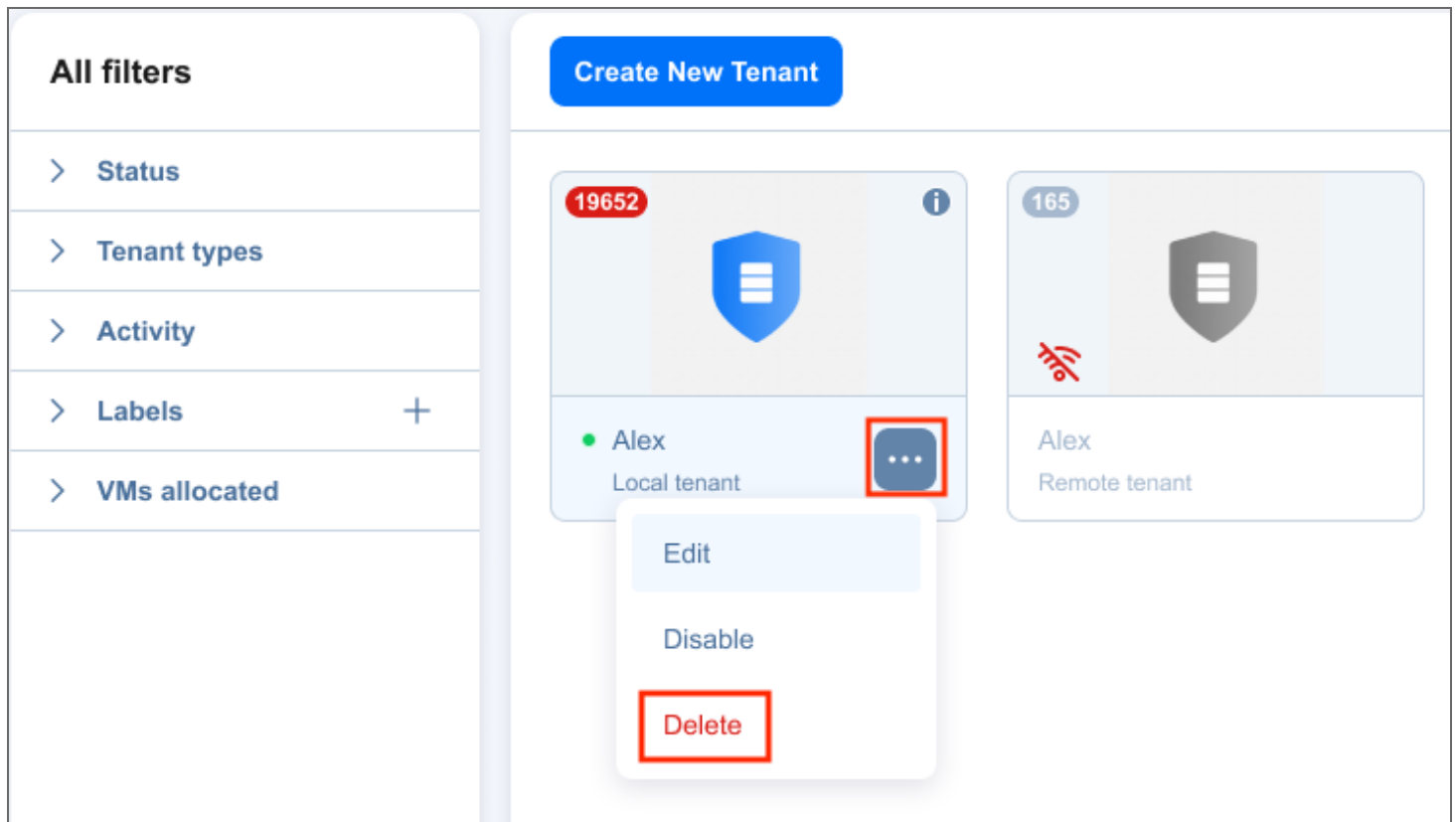
1. Hover over the tenant card and click the ellipsis **Manage** button, then click **Edit**.



2. In the **Edit** dialog box that opens, make the required changes and click **Save**.

Deleting Tenants

To permanently delete a tenant from the product, hover over the tenant card and click the ellipsis **Manage** button, then click **Delete**.



The tenant will be permanently deleted from NAKIVO Backup & Replication.

Tenant Transporters are not uninstalled and the Tenant Backup Repositories are not removed.

Granting Self-Service Access

In the multi-tenant mode, you can provide local tenants with access to their dashboards. By default, a tenant admin account is automatically created when you create a new local tenant. The tenant admin has full control over the product features inside the tenant dashboard (such as the ability to edit and update tenant inventory, Transporters, and Backup Repositories, and create and manage jobs and groups). For each local tenant, one guest account can also be created. The tenant guest has limited permissions inside the tenant instance and can only generate job and group reports by default. To provide a local tenant with access to the self-service interface, send the following information to the tenant:

- Link to NAKIVO Backup & Replication Director
- Tenant login
- Tenant password