

BEST PRACTICES

Nutanix Mine with HYCU

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1. Executive Summary

Nutanix is a highly resilient converged compute and storage system that adapts web-scale architecture to benefit all kinds of organizations. This document makes recommendations for optimizing and scaling HYCU with Nutanix Mine. In this guide, we show the elasticity of the platform and detail the scale-out capabilities of both HYCU and Nutanix.

Combining HYCU with Nutanix Mine and the Nutanix operating system (AOS) enables an end-to-end backup solution for large-scale deployments with minimal configuration. HYCU delivered the first purpose-built backup and recovery solution for the Nutanix platform and was the first to support our innovation pipeline. HYCU provides Nutanix customers with:

- A solution that supports Nutanix Files, volume groups, ROBO, and more so that customers get the most out of their Nutanix platform.
- A solution that strictly follows Nutanix best practices to ensure high-speed backup and recovery with zero performance impact.
- A world-class customer experience coordinated with the Nutanix team.
 - › HYCU has a Net Promoter Score of 91+, the highest of any data-protection vendor in the world.

2. Introduction

Audience

This best practice guide is part of the Nutanix Solutions Library. We wrote it for IT administrators and architects who want to understand the data protection and disaster recovery features built into Nutanix. Consumers of this guide should have a basic familiarity with Nutanix software.

Purpose

This document covers the high-level best practices for HYCU and Nutanix Mine. We include a best practice checklist to help you make sure you've implemented all the applicable guidance.

Unified Technology

Nutanix Mine with HYCU is a simple, purpose-built, scalable, secure, and cost-efficient solution. HYCU uses Nutanix APIs to efficiently backup virtual machines (VMs), volume groups, and Nutanix Files. The Nutanix Mine with HYCU solution takes advantage of the strengths of both products to provide network- and storage-efficient backups to meet aggressive recovery point objectives (RPOs) and recovery time objectives (RTOs). HYCU has proprietary write optimization for incremental backups, copies, and archives on Nutanix Objects storage in addition to built-in backup security features you can combine with the Nutanix Objects WORM (write once, read many) capability.

About HYCU

HYCU is a global leader in multicloud backup as a service. HYCU solutions are purpose-built for each of the cloud platforms a customer chooses and designed

to be simple, delivering a native experience with full application awareness.
Learn more at www.hycu.com or follow them on Twitter [@hycuinc](https://twitter.com/hycuinc).

Document Version History

Version Number	Published	Notes
1.0	October 2021	Original publication.
1.1	August 2022	Updated the sizing guidance in the Best Practice Checklist section.

3. Nutanix Mine with HYCU Solution Overview

Component Overview

The next two tables highlight the different components and virtualization or guest OS-related technologies for the joint solution.

Table: Backup Components

Component	Description
Nutanix AHV	Native Nutanix hypervisor included with AOS that delivers enterprise-ready virtualized solutions.
Nutanix Controller VM (CVM)	Runs AOS distributed storage and serves all I/O operations for the hypervisor and all VMs running on that host. The CVM pools and exports storage to the hypervisor as a datastore.
Nutanix Objects	S3-compatible object storage solution that environments can use as a backup target. Currently only supported on AHV.
HYCU backup controller	A VM that processes data collected from your sources and presents it in a web user interface. Protects VMs (including VM templates), physical machines, applications, file shares, and volume groups.
HYCU instance	A VM that HYCU uses to perform data protection operations for Nutanix Files, taking the load off the HYCU backup controller.

Component	Description
HYCU manager	A VM that resides in the source environment and collects data from all HYCU controllers in your on-premises and cloud data protection environments and presents it in the web user interface.

Table: Backup Technologies

Technology	Description
Nutanix AHV changed-block tracking (CBT)	Enhances the backup performance of Nutanix AHV virtual disks (vDisks). When you use Nutanix AHV CBT with HYCU, the system uses a REST API to detect the changed metadata regions of the vDisks by comparing snapshots. This feature can reduce the read operations required for full backups.
Microsoft VSS	The built-in framework for application-consistent backups. VSS lets you create a consistent snapshot of application data, such as Microsoft Exchange, SQL, Active Directory, or the NTFS file system.

HYCU Component Sizing

Use the requirements in the following table to size your HYCU virtual appliance.

Table: Sizing Requirements for HYCU Virtual Appliances

Size of Environment	Storage	CPU Cores	Memory
Small (100-200 VMs)	20-40 GiB	6	8 GiB
Medium (200-500 VMs)	100-200 GiB	8	32 GiB

For large environments (more than 500 VMs), the figures vary; contact HYCU customer support.

HYCU Firewall Configuration

The following table shows the network connectivity and firewall port configurations for HYCU.

Table: HYCU Network Connectivity and Firewall Port Configurations

Purpose	Source	Destination	Ports at Destination	Protocols
HYCU interface	System where you're accessing the HYCU interface	HYCU backup controller	8443	TCP
Access HYCU backup controller using SSH	System where you're accessing the HYCU interface	HYCU backup controller	22	TCP
Use a DNS server	HYCU backup controller, HYCU instance	DNS server	53	TCP, UDP
Use an NTP server	HYCU backup controller, HYCU instance	NTP server	123	UDP
Discover VMs running Linux and their applications	HYCU backup controller	VMs	22	TCP
Discover VMs running Linux and their applications	VMs	HYCU backup controller	8443	TCP
Discover VMs running Windows and their applications	HYCU backup controller	VMs	5985, 5986	TCP

Purpose	Source	Destination	Ports at Destination	Protocols
Discover VMs running Windows and their applications	VMs	HYCU backup controller	8443	TCP
Back up	HYCU backup controller	Nutanix CVMs	3205, 3260	TCP
Back up and restore file shares	HYCU instance	Nutanix Files server	445, 2049, 9440	TCP
Back up and restore file shares	HYCU backup controller	HYCU instance	8443	TCP
Back up and restore file shares	HYCU instance	HYCU backup controller	8443	TCP
Back up data to Mine v3	HYCU backup controller, HYCU instance	Nutanix Objects client IP	443	TCP
Restore from backups created with the Fast Restore policy option enabled	HYCU backup controller	Nutanix CVMs	3205	TCP
Restore applications or individual files	System where you're accessing the HYCU interface	HYCU backup controller	445	TCP
Restore files from a snapshot to a Windows VM	VMs	Nutanix CVMs	860, 3260	TCP

Purpose	Source	Destination	Ports at Destination	Protocols
Restore files from a target to a Windows VM	VMs	HYCU backup controller	139, 445	TCP
Restore files to a Linux VM	HYCU backup controller	VMs	22	TCP
Restore files to an SMB share	HYCU backup controller	System with an SMB share	445	TCP
Restore files to an NFS export	HYCU backup controller	System with an NFS export	NFS4: 2049, NFS3: 111, mountd port	TCP
Restore files to the local machine	System where you're accessing the HYCU interface	HYCU backup controller	8443	TCP
Protect data in a Nutanix AHV or Nutanix ESXi cluster or on a Nutanix Files server	HYCU backup controller	Cluster virtual IP	9440	TCP
Protect data in a Nutanix AHV or Nutanix ESXi cluster or on a Nutanix Files server	HYCU backup controller	Nutanix CVMs	9440	TCP
Protect VM data in a Nutanix cluster or volume group	HYCU backup controller	Cluster virtual IP	3205, 3260	TCP
Protect VM data in a Nutanix cluster or volume group	HYCU backup controller	ISCSI target discovery portal (data services IP)	3205, 3260	TCP

Purpose	Source	Destination	Ports at Destination	Protocols
Share telemetry data with HYCU controller	HYCU backup controller	Telemetry endpoint: callhome.hycu.com	443	TCP
Share telemetry data with HYCU controller	HYCU backup controller	Amazon S3 AWS Endpoint: s3.eu-central-1.amazonaws.com	443	TCP
Use an LDAP server	HYCU backup controller	LDAP server	LDAP: 389, LDAPS: 636	TCP
Use an SMTP server to send email notifications	HYCU backup controller	SMTP server	25	TCP

Nutanix Mine Hardware Sizing

To size hardware for Mine version 3, size an Objects deployment and the HYCU controllers. The following are basic instructions; we recommend that you use the [Nutanix Sizer](#) and work with a HYCU systems engineer to properly plan your deployment.

- Configure each Objects VM with 10 vCPU and 32 GB of memory.
 - › Don't overcommit on your vCPU-to-CPU ratio for Objects worker VMs or load balancers.
 - › Keep NUMA boundaries in mind for the AOS CVM.
- Configure each Objects load balancer with 2 vCPU and 4 GB of memory.
- Configure each HYCU VM with 8 vCPU and 32 GB of memory (use at least one HYCU VM).
- Configure 2 x 25 GbE NIC ports or 4 x 10 GbE NIC ports per node.
- For clusters with very large nodes (more than 240 TB), we recommend that you use replication factor 3.

Storage Efficiency

When you initially deploy Nutanix Objects, the process creates a new container to store the data on. For single-node deployments, the container has compression enabled by default. For deployments of four or more nodes, the container has compression and erasure coding enabled by default.

Data Resilience

Customers usually want to protect their backup data copy differently than they protect their primary copy. To shorten data retection times, the standard best practice is to use replication factor 2 for smaller Nutanix Objects deployments and replication factor 3 for deployments of 240 TB or more or deployments that use large capacity HDDs. If you can't configure replication factor 3, you can use HYCU's replication capability to place another copy on a separate infrastructure, such as the cloud.

Physical Networking

Each Nutanix node should have 10 Gbps or faster NICs. If you use 10 Gbps NICs, we recommend four ports. If you use 25 Gbps or faster NICs, we recommend two ports.

Nutanix Objects requires two VLANs: one for client access and the other for internal communication. You need at least 12 IP addresses for a four-node Objects deployment and additional IP addresses for each node after that. You need to put between two and four client-access IP addresses into DNS, each with the same A record. These DNS records serve as a DNS round-robin in front of the built-in load balancers.

4. Security

Ransomware attacks have become increasingly prevalent and pose a significant threat to businesses in all verticals. HYCU paired with Nutanix Mine secures your backups using three simple techniques:

1. Immutable storage
 2. Isolated backups
 3. Inhibited access
-

Immutable Storage

Nutanix Objects offers immutability through the WORM feature. When you configure WORM with HYCU, your configurations must match. For example, if your HYCU backup retention is set to 7 days with a backup chain length of 7, set your Objects WORM retention to 14 days.

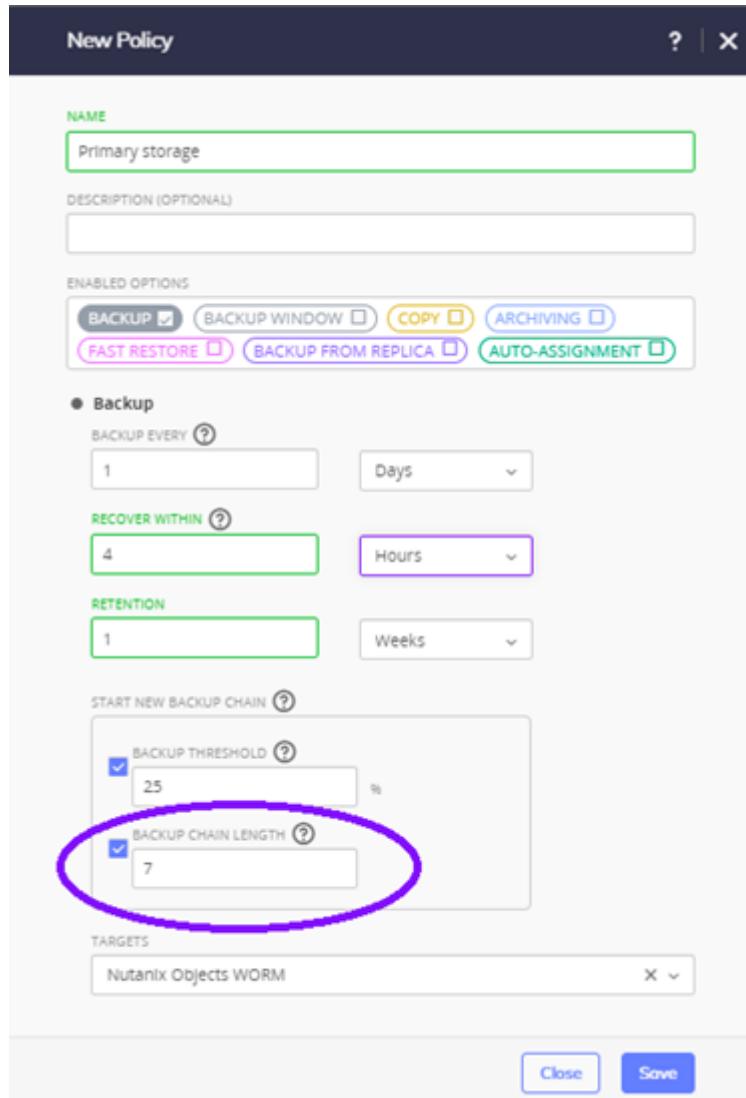


Figure 1: Example HYCU Backup Chain Length

Network Isolation

When you deploy Nutanix Objects, you should have two separate VLANs: one for the backup infrastructure (HYCU and Objects) and another for client-access traffic. When you deploy a backup solution with Nutanix Objects and HYCU, we recommend that you deploy the HYCU VMs on the client-access network to ensure that you don't need to route backup traffic. You can also treat the HYCU

virtual appliance as a black box, as it's based on a security-hardened CentOS Linux image with no root access and an option to disable SSH access.

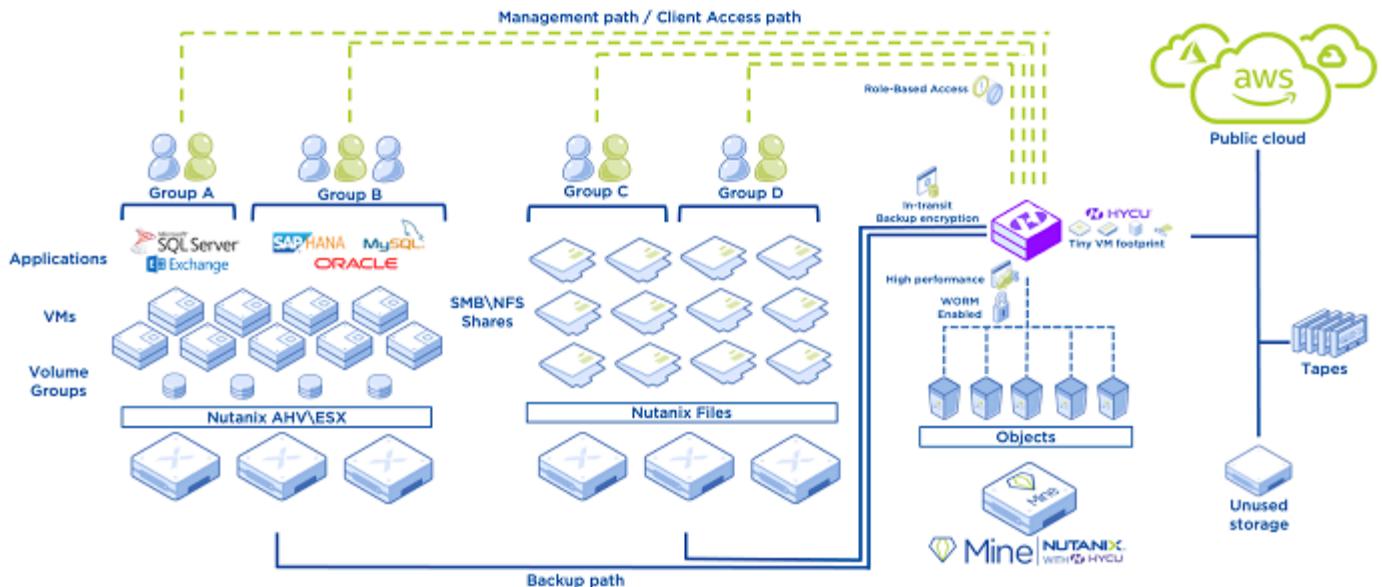


Figure 2: Overview of Nutanix Objects Deployment Network Isolation

Role-Based Access Control

Best practice for access control is to deny end users access to the backups, network, and backup storage, but if that's not possible you should at least restrict their access based on role. To do so, you need a solution with robust role-based access control (RBAC) policies and secure multitenancy that includes seamless integration with multiple Active Directory and LDAP over SSL (LDAPS) domains. You also must ensure that even administrators can't manually delete backups.

With HYCU's self-service and RBAC capabilities, organizations can host multiple groups in a shared environment. Every group's backup metadata (restore points, VM details, application inventory, and user data) is stored in secure databases where unauthorized users—even super-admins—can't access it. This metadata also includes events, alerts, and backup reports filtered down to the specific group's authorized resources in the multitenant environment.

HYCU disables manual backup deletion to protect backups from any malicious intent within the organization. HYCU also allows administrators to easily pause backup expiration based on policy retention time, which is useful during ad hoc compliance audits or emergencies.

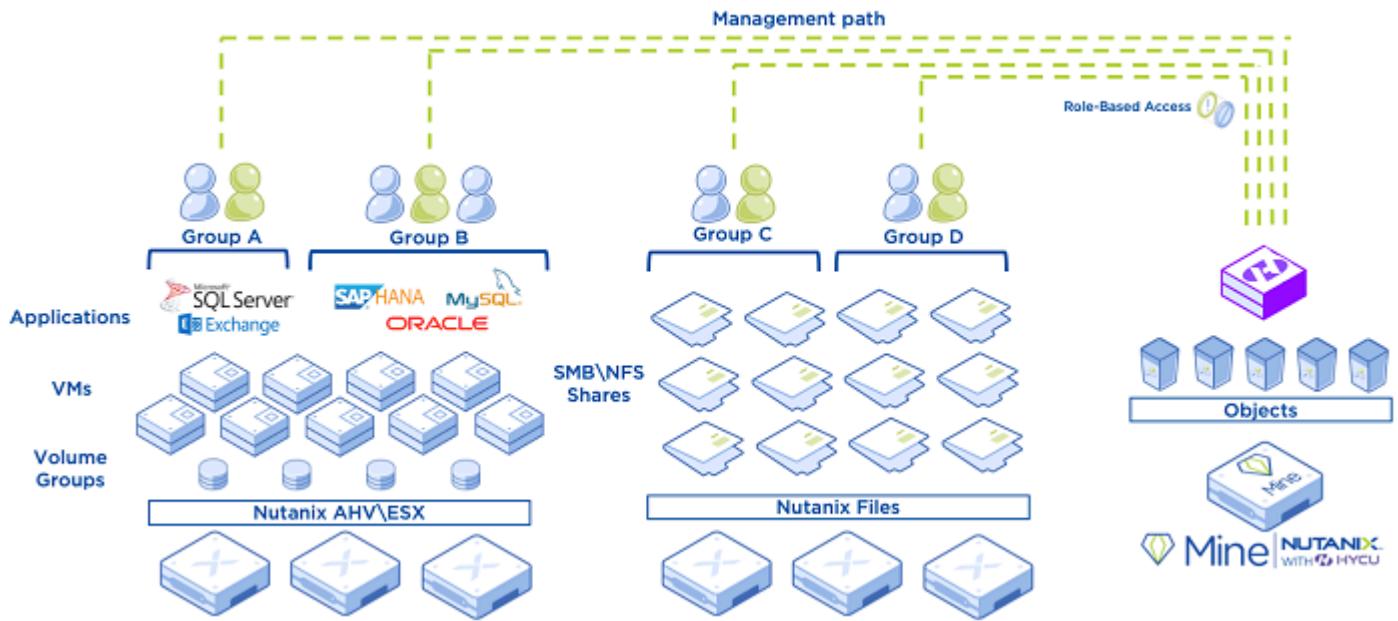


Figure 3: Overview of HYCU with Nutanix Mine RBAC Feature

5. Replication

Data Replication

Nutanix Objects offers streaming replication, which is a nearly synchronous replication method that offers an RPO of seconds to ensure that you can replicate your backups off-site with very little configuration. You need to set up secure VPN connections to encrypt intercluster traffic.

Data Tiering

Nutanix Objects allows you to tier objects to another S3-compatible object store (such as AWS S3) using object age or a tag. When you tier your backups to another S3-compatible object store, you can set up an easy-to-use archive for your backups that HYCU can still access through your primary Nutanix Objects deployment without any additional configuration.

6. Performance

Nutanix Objects uses the underlying AOS platform to provide high performance for your backup workloads and keep your backup windows and restore times short. We've included lab performance results for the Nutanix Mine version 3 with HYCU solution.

We used two four-node hybrid Nutanix clusters to test HYCU backup and restore performance. We deployed the source data VMs and HYCU instances on the first cluster and Nutanix Objects on the second cluster.

Additional configuration details:

- Data source: Nutanix cluster (4 NX-8155-G6 nodes)
- Target storage: Nutanix Objects
- HYCU instances: up to 4
- Network: 10 GbE on the source cluster and 25 GbE on the target cluster
- HYCU CPU: 16
- HYCU memory: 32 GB
- Total data backed up: 3.75 TB
- Number of disks: 7 per VM
- HYCU backup and restore threads for each VM: 8

Table: Average Throughput

Application	Average Throughput (MBps)
HYCU backup (two HYCU instances backing up to a single Objects target)	737.0
HYCU restore (four HYCU instances restoring from a single Objects target)	843.6

7. Conclusion

Nutanix Mine with HYCU provides granular data protection to meet the required recovery point objectives across a range of deployment models. As your application requirements change and your cluster grows, you can scale simply and quickly, with one-click node addition and no downtime. The Nutanix Mine with HYCU solution offers the reliability and flexibility necessary to fulfill your enterprise's backup and recovery needs. The best practices we offer in this document ensure that you can safeguard your applications with minimal impact to your production workloads.

8. Appendix

Best Practice Checklist

Sizing

- Maintain a 1:1 vCPU-to-CPU ratio, which requires that you size with 12--14 core processors.
- Size a dedicated Objects cluster with CVMs that have 64 GB of RAM, workers that have 32 GB of RAM, and load balancers that have 4 GB of RAM.
- Include the HYCU VMs in your sizing.

Networking

- Configure nodes with 4 x 10 GbE or 2 x 25 GbE NIC ports for LACP or equivalent.
- Put the CVM and Objects VMs on the same subnet or network.

Security

- Enable WORM for protection from ransomware.
 - Use HYCU's self-service and RBAC functionalities to add another layer of protection from ransomware.
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References

1. [Nutanix AHV Networking](#)
2. [Data Protection and Disaster Recovery](#)

About Nutanix

Nutanix is a global leader in cloud software and a pioneer in hyperconverged infrastructure solutions, making clouds invisible and freeing customers to focus on their business outcomes. Organizations around the world use Nutanix software to leverage a single platform to manage any app at any location for their hybrid multicloud environments. Learn more at www.nutanix.com or follow us on Twitter [@nutanix](https://twitter.com/nutanix).

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