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Getting Started

Welcome to the Nutanix Cloud Platform (NCP) Part1 Bootcamp! This workbook accompanies an instructor-led session that introduces Nutanix Core technologies and many everyday management tasks.

You will explore Prism Central (PC) and become familiar with its features and navigation. You will use PC to perform basic cluster administration tasks, including storage and networking. You will also walk through basic VM deployment and management tasks with Prism and AHV. The instructor explains the exercises and answers any additional questions that you may have.

At the end of this bootcamp and alongwith NCP Part2, attendees should understand the core concepts and technologies that comprise the Nutanix Cloud Platform and be well prepared for a hosted or onsite proof-of-concept (POC) engagement.

What's New

(Last updated 2025-01-22)

Labs are updated for the following software versions:

- AOS 6.10 LTS and PC 2024.2

Agenda

- Introductions
- Nutanix Presentation
- Technology Overview
- Storage Configuration
- Networking Configuration
- Deploying Workloads
- Managing Workloads
- Data Protection
- (Optional) Image Configuration

Introductions

- Name
- Familiarity with Nutanix

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Technology Overview

Overview

In this section, we will introduce the Prism Central (PC) graphical user interface (GUI), familiarize you with its layout, and navigation.

Prism Central

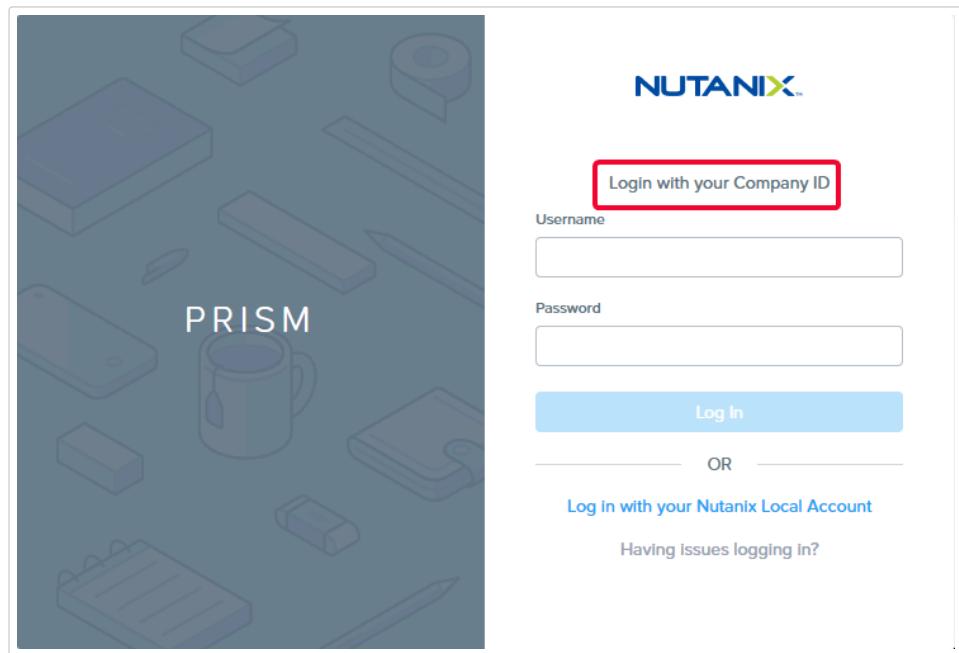
Prism Central is a centralized management platform that allows you to manage multiple Nutanix clusters from a single pane of glass. It provides a central dashboard for clusters, VMs (Virtual Machines), hosts, disks, and storage with drill-down for detailed information. You can centrally configure individual clusters, and use single sign-on for all registered Prism Element clusters.

From the Chrome or Firefox web browser, log into the Nutanix Prism GUI using the provided IP.

1. Enter `PC-IP-ADDRESS` into a new browser tab.

2. Log into Prism Central. Ensure the Login screen says **Login with your Company ID**

- **username** - <PC username> will be something like `adminuser##@ntnxlab.local`
- **password** - <PC password provided>



3. After you log in to PC, familiarize yourself with the GUI. This is the main dashboard of PC which gives you an overview of all clusters registered with this PC instance.

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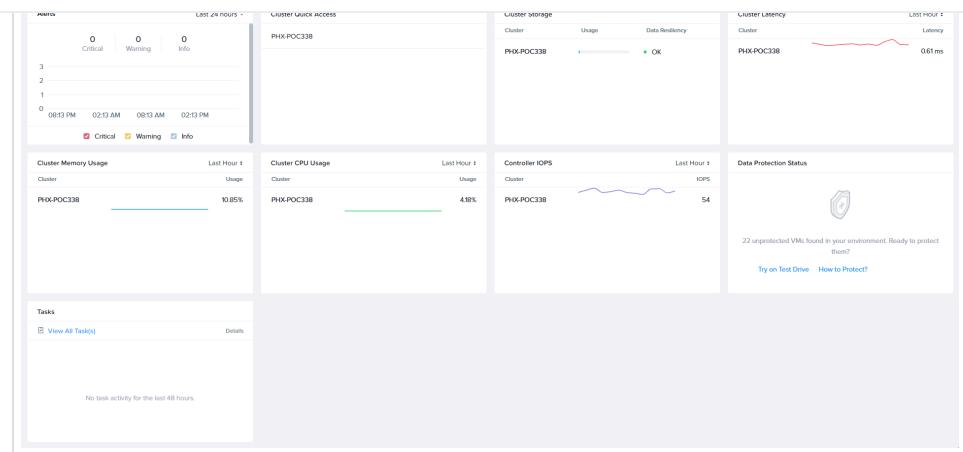
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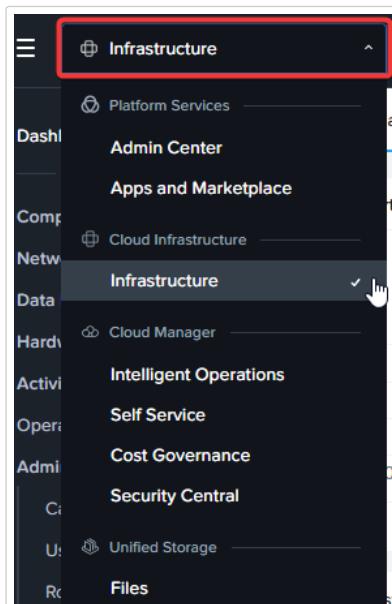
4. Review the widgets screen, and identify the following items:

- Alerts
- Cluster Quick Access
- Cluster Storage
- Cluster Latency
- Cluster Memory Usage
- Cluster CPU Usage
- Controller IOPS
- Tasks

5. Next, look at the App Switcher section in top left of Prism Central

Note

You can use the App Switcher to quickly navigate and access capabilities of Nutanix Cloud Platform enabled through Prism Central.



6. For a particular section, click on hamburger menu to look at various options for that section. For example, for infrastructure, you can access everything around the infrastructure like:

- Compute and Storage
- Network and Security
- Data Protection
- Hardware
- Activity

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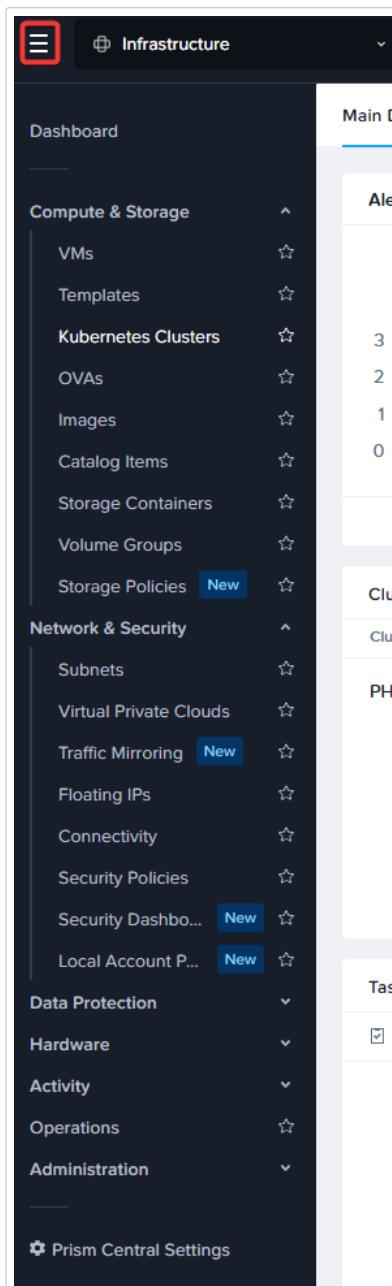
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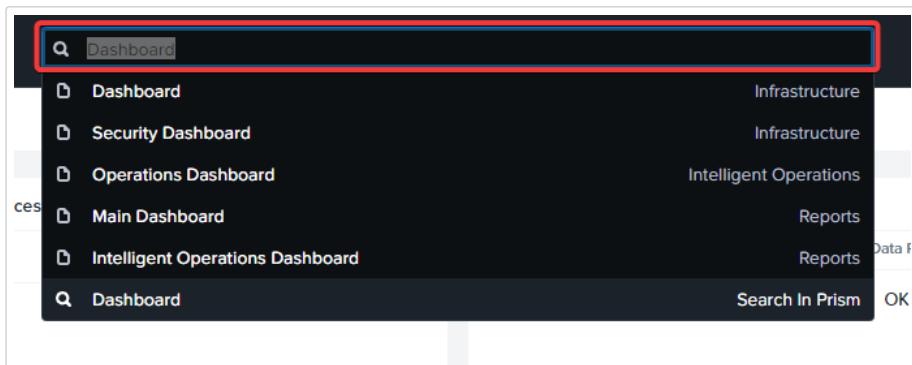
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We will go through some of these as part of this bootcamp but feel free to browse and click through some of them.

7. An easy way to navigate PC is to use the search function. You can use search to access individual entities or entire configuration pages and it also supports using regular expressions as part of it.



An example being you want to see what version of AOS is running on your clusters, just type AOS ver and it will give you a prompt for it.

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Takeaways

- Prism Central is the main control pane through which you interact and use your Nutanix Cloud Platform
- It provides an intuitive and easy to use interface with powerful search functionality to make an administrator's job easy

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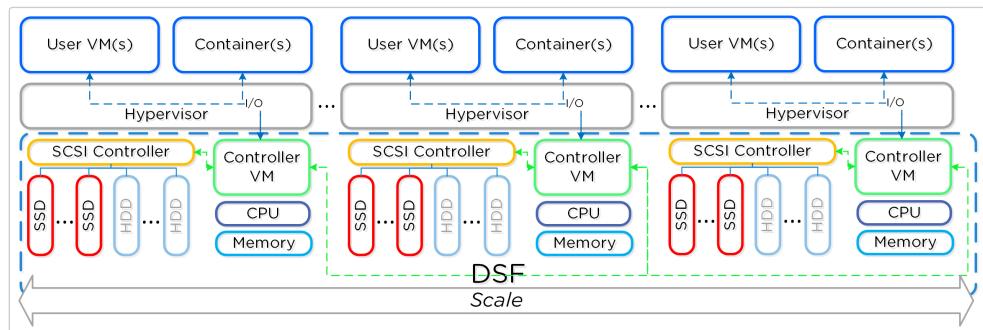
Storage Configuration

Overview

In this section, we will use Prism Central to perform storage configuration.

Nutanix AOS

Nutanix AOS presents storage to the hypervisor in a way that looks identical as if it were presented from any centralized storage array. However, Nutanix uses Controller VMs (CVMs) combined with the local storage within each node to provide shared storage for the cluster that is both redundant and resilient. The combination of computing and distributed local storage resources is now commonly referred to as Hyper-converged Infrastructure (HCI).



As a pioneer in the HCI space, Nutanix AOS is a mature solution capable of delivering the performance and resiliency needed to support [many different workloads](#), including enterprise databases, virtual desktops, Edge locations, Big Data, AI and more.

The two main storage constructs within AOS are the *Storage Pool* and *Storage Containers*.

The *Storage Pool* is the aggregation of all of the physical disks within a given Nutanix cluster. The cluster manages data distribution, so other storage pools (like LUNs in a traditional storage environment) are not required. As new nodes are added to a cluster, disks are automatically added to the pool, and the cluster will begin [re-distributing data to the new disks](#) as a background task.

The *Storage Containers* are software-defined, logical constructs that allow you to configure storage policy for groups of VMs or vDisks. In the next exercise, you will walk through the process for creating and configuring Nutanix storage within Prism Central.

Note

To learn more about additional AOS constructs such as vDisks, extents, and extent groups, refer to [this section](#) of the Nutanix Bible.

Prism Central Storage Configuration Items

Configure Storage Containers

Let's use PC to perform a basic container setup.

- From the side-bar menu, select **Compute & Storage** and in that section click on **Storage Container**

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The screenshot shows the Nutanix Prism Central interface. At the top left is the 'Infrastructure' logo with a red circle containing the number '1'. Below it is the 'Main Dashboard' header. On the left is a navigation sidebar with a dark background. The 'Compute & Storage' section is highlighted with a red box and has a red circle with '2' above it. Under 'Compute & Storage', 'Storage Containers' is also highlighted with a red box and has a red circle with '3' below it. Other items in the sidebar include 'VMs', 'Templates', 'Kubernetes Clusters', 'OVAs', 'Images', 'Catalog Items', 'Volume Groups', 'Storage Policies' (with a 'New' button), 'Network & Security', 'Data Protection', 'Hardware', 'Activity', 'Operations', and 'Administration'. At the bottom of the sidebar is a link to 'Prism Central Settings'. To the right of the sidebar is the 'Main Dashboard' area, which includes sections for 'Alerts' (0 critical alerts), 'Cluster Memory' (Cluster PHX-TEST003), and a timeline.

2. Click "Create Storage Container"

The screenshot shows the 'Storage Containers' list page. At the top, there are tabs for 'Storage Containers', 'Summary', 'List', 'Alerts', 'Events', and 'Metrics'. The 'List' tab is selected. Below the tabs is a search bar with the placeholder 'Type text to filter by'. A red box highlights the 'Create Storage Container' button. The main area displays a table titled 'Viewing all 3 Storage Containers'. The table has columns for 'Name', 'Physical Usage', and 'Replicati'. The data rows are:

Name	Physical Usage	Replicati
default	106.22 GiB	
NutanixManagementShare	182.24 GiB	
SelfServiceContainer	256 KiB	

3. Fill in the following fields, and then click **Create**.

- **Name** - Initials -Container
- Select **Advanced Settings**
 - The replication factor is already selected as 2 which means it will create 2 copies of data.
- **Reserved Capacity** - 0
- **Advertised Capacity** - 500 GiB
- **Compression** is already selected as a new container has **Inline Compression** enabled by default
- You can keep the rest as defaults but if desired, capacity deduplications and Erasure Coding can be enabled.

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Name: bd-container 1

Cluster: PHX-TEST003

Max Capacity: - (Physical Unreserved Capacity)

Advanced Settings ?

Replication Factor: 2

Reserved Capacity (Logical) ?: 0 GiB

Reserved Capacity (Physical) -

Advertised Capacity (Logical) ?: 500 GiB

Advertised Capacity (Physical) - 1000 GiB ?

Compression i

Compression Type: Inline Compression

Compression Delay: 0 min

Capacity Deduplication i

Erasure Coding i

Erasure Coding Delay

Cancel Create 3

4. The storage container is now instantly available across all nodes within the cluster.

Viewing all 4 Storage Containers							Export
Name	Physical Usage	Replication Factor	Compression	Capacity Deduplication	Erasure Coding	Cluster Name	
bd-container	0 GiB	2	On	Off	Off	PHX-TEST003	bd-container
default	106.22 GiB	2	Off	Off	Off	PHX-TEST003	
NutanixManagementShare	182.26 GiB	2	On	Off	Off	PHX-TEST003	
SelfServiceContainer	256 kB	2	Off	Off	Off	PHX-TEST003	

You can create multiple containers with different policies, all sharing capacity from the **Storage Pool**. For example, you may want to enable [deduplication](#) for a storage container used for full clone persistent virtual desktops or you may want to create a storage container with [erasure coding](#) enabled which gives better storage utilization for data that has not been accessed for some time.

5. Next, click on **default** storage container and let's look at its details.

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Name	Physical Usage
bd-container	0 GiB
default	106.22 GiB
NutanixManagementShare	182.31 GiB
SelfServiceContainer	256 KiB

6. You can see all the information related to this container on the summary page. It gives an overview of the properties of the container, the current usage stats, the data optimization and performance and alerts seen on the cluster.

7. You can click on tabs on top to look at detailed data. Click on **Metrics** tab to look at metrics for the container for past 24 hours.

Storage Policies

Rather than managing configuration at a container level, Nutanix now allows administrators to set up storage policies and apply it to individual VMs and Volume groups making it easier to manage attributes across multiple entities.

1. From the side-bar menu, select **Compute & Storage** and in that section click on **Storage Policies**

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The screenshot shows the Nutanix Prism Central dashboard. The left sidebar has sections like VMs, Templates, Kubernetes Clusters, OVA, Images, Catalog Items, Storage Containers, Volume Groups, Network & Security, Data Protection, Hardware, and Activity. The 'Storage Containers' section is expanded. A red box highlights the 'Storage Policies' button, which is blue with white text and says 'New'. A red circle with the number '2' is above the 'Storage Policies' button. Another red box highlights the 'New' button. A red circle with the number '3' is to the right of the 'Storage Policies' button.

2. There is already a default storage policy setup for administrators to use or they can create a custom one as desired. Click on "Default-Storage"

The screenshot shows the 'Storage Policies' list view. It has tabs for 'Create Storage Policy' and 'Actions'. Below is a search bar with placeholder 'Type text to filter by'. A table lists one storage policy: 'Default-Storage SYSTEM'. The table columns are Name, Replication Factor, and Encryption. The 'Default-Storage' row is highlighted with a red box. The 'Replication Factor' is set to 2 and 'Encryption' is set to 'Inherit from Cluster'.

3. Here you can see the values that are configured for this policy from replication factor, encryption, compression and QoS. This storage policy is tied to a category which is also created by default

The screenshot shows the 'Storage Policy' details view for 'Default-Storage'. It has tabs for 'Summary', 'Categories', and 'Entities'. Under 'Summary', there are buttons for 'Update', 'Clone', and 'Delete'. The 'Configuration' section includes 'Replication Factor' (2), 'Encryption' (Inherit from Cluster), 'Compression' (Inline), and two 'QoS Metric' fields ('Throttled IOPS' and 'Throughput') both set to '-'. The 'Association' section shows 'Categories' (1), 'Realized Entities' (0), and 'Unrealized Entities' (0).

Storage policies and other policies in general like security, protection in Prism Central uses categories to associate with entities such as VMs and VGs. Categories are key:value pairs

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Resiliency and Redundancy

The Nutanix platform uses replication factor (RF), and checksum to ensure data redundancy and availability in the case of a node or disk failure or corruption. RF sets the number of data copies to maintain (2 or 3). A replication factor of 3 adds an extra layer of data protection at the cost of storage an additional data copy.

Interested in learning about how RF writes and reads work? Check out the [video](#) below.

Tech TopX: Data Protection

RF policies are applied on a per-container basis.

Nutanix clusters can also enforce [availability domain policies](#) at the Block or Rack level for protection against block or rack failures.

Block Awareness ensures that secondary copies of data are not written to a node within the same physical enclosure as the primary copy. Block Awareness allows for the loss of a multi-node block without experiencing data unavailability. The same concept can be applied using a Nutanix cluster spanning multiple racks where the racks are defined by the administrator.

The basic requirement for rack/block fault tolerance is to have a minimum of 3 blocks in the cluster (for RF2) as we need to store three copies of metadata. Rack and block awareness can be supported with erasure coding enabled.

Next, let's take a look at the detailed resiliency data for a the cluster.

1. From the side-bar menu, select **Hardware** and in that section click on **Clusters**.

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2. Click on your cluster name.

3. Take a look at the various widgets and detailed information for your cluster. We will look at the Resiliency widget, so click on OK

AOS keeps tracks of how many failures can be tolerated without impacting the cluster for every individual service and component within an availability domain. Here at node level these are the components AOS tracks. Each service listed has a specific function in the cluster. For example, Zookeeper nodes maintain configuration data (service states, IPs, host information, etc.) for the cluster.

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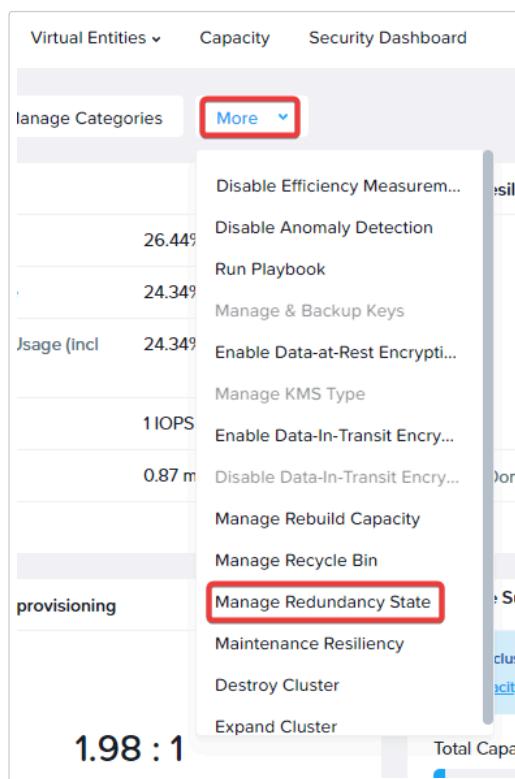
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Node		
Component	Failures Tolerable	Message
Extent Group	1	
Oprolog	1	
Cassandra Ring	1	
Zookeeper	1	
Free Space	1	
Static Configuration	1	
Erasure Coding	1	
Stargate Health	1	

[Close](#)

4. The redundancy state of a cluster can be managed by clicking **More** and then clicking **Manage Redundancy State**.



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⚠ Your cluster must have at least 5 nodes with storage to support Redundancy Factor 3

Cluster's redundancy factor determines its readiness to recover from an unexpected hardware failure. Based on your cluster configuration, you set this factor, which will define the no. of failures that your cluster can tolerate.

Your current cluster configuration is:

4

Nodes

2

Redundancy Factor

Desired Redundancy Factor

2

1 Node / 1 Drive failure

Impact on Replication Factor ⓘ

Supported replication factor(s) at storage container level will be 2.

Save

An RF2 cluster can be upgraded to support RF3 (which requires a minimum of 5 nodes), or downgraded to RF1 with the following caveat:

Warning

Enabling RF1 does not guarantee data availability. Nutanix recommends enabling RF1 when your primary cluster use case is running applications that do not require storage resiliency.

Takeaways

- Nutanix AOS provides resilient shared storage to applications by using replication factor values 2 or 3.
- Storage Containers allow you to define storage policy at a logical container level.
- Storage policies allow you to define storage policies and assign them to entities directly without being dependent on storage containers.

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In this section, you will learn how to set up a network. The networks you create in the steps below provide VMs with connectivity by assigning the appropriate networks to the VM's respective virtual network interface cards (NICs).

AHV Networking Background

Nutanix's Acropolis Hypervisor (AHV) leverages Open vSwitch (OVS) for all VM networking. OVS is an open-source software switch designed to work in a multi-server virtualization environment. Each AHV server maintains an OVS instance, and all OVS instances combine to form a single logical switch.

Each node is typically uplinked to a physical switch to multiple virtual LANs (VLANs), exposed as virtual networks.

VM networking is configured through Prism (or optionally CLI/REST), making network management in AHV very simple.

With AHV, you can also set up a DHCP server to automatically provide IP addresses for VMs on that network using the IP address management (IPAM) service. IPAM can potentially make network management more straightforward, as you wouldn't have to set up a separate DHCP server for the network.

Additional details about AHV networking can be found [here](#).

Virtual Networks

- Similar to a VMware distributed port group.
- Each virtual NIC belongs to precisely one virtual network.
- Each virtual network is a common point of configuration for a group of vNICs.
- Physical switch port must be configured to trunk VLAN.

Let's take a look at the networks on the cluster.

1. From the side-bar menu, select **Network & Security** and in that section click on **Subnets**.

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The screenshot shows the Nutanix Cloud Platform dashboard with the 'Compute & Storage' category expanded. Under 'Compute & Storage', the 'Network & Security' section is highlighted with a red box and a red circle containing the number 2. Below it, the 'Subnets' section is also highlighted with a red box and a red circle containing the number 3. Other visible sections include 'VMs', 'Templates', 'Kubernetes Clusters', 'OVAs', 'Images', 'Catalog Items', 'Storage Containers', 'Volume Groups', 'Storage Policies', 'Virtual Private Clouds', 'Traffic Mirroring', 'Floating IPs', 'Connectivity', 'Security Policies', 'Security Dashb...', and 'Local Account ...'. A sidebar on the right lists 'Main', 'Ale', 'Clu', 'Clu', and 'PH'.

2. This page lists the virtual subnets already present on the cluster. With Nutanix you can create 3 separate types of subnets:

- VLAN Basic : This is default subnet created on the cluster which is managed by the Acropolis leader of the cluster.
- VLAN : If the network controller is enabled, and a VLAN does not have the Basic label, it is a VLAN managed by the Network Controller. Starting AOS 6.7, administrators can create VLANs managed centrally by Network Controller. This can be made as default VLAN created if required through settings.
- Overlay Network : This is IP-based overlay subnet for a [Virtual Private Cloud \(VPC\)](#).

The screenshot shows the 'Subnets' list view. At the top, there are buttons for 'Create Subnet', 'Actions', 'Migrate', and 'Network Config'. Below this is a search bar and filter options. The table displays two subnets:

Name	External Connectivity	Type	VLAN ID	VPC	Virtual Switch	IP Prefix	Cluster	Hypervisor
primary	No	VLAN Basic	0	-	vs0	10.42.254.0/25	PHX-TEST003	AHV
secondary	No	VLAN Basic	2541	-	vs0	10.42.254.128/25	PHX-TEST003	AHV

3. Click on Primary and take a look at the configuration and settings of this subnet.

The screenshot shows the 'Summary' tab for the 'primary' subnet. It includes tabs for 'Update', 'Extend', 'Manage Categories', and 'Delete'. The 'Properties' section shows the Type (VLAN Basic), VLAN ID (0), Cluster (PHX-TEST003), and IP Address Prefix (10.42.254.0/25). The 'Domain Settings' section shows the Domain Name Servers (10.42.254.6) and Domain Search (ntnxlab.local). The 'IP Address Pools' section shows the Pool Range (10.42.254.39 - 10.42.254.125), IP Availability (121), and IP Usage (7). A circular progress bar indicates 7% of the IP pool is used.

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Virtual NICs of VMs

- Each vNIC belongs to exactly one virtual network.
- For IPAM-enabled networks, vNICs get life-long static IP assignments.
- User may configure pools to allocate IPs, either automatically or by specifying the IP manually.

vNIC Type	VLAN ID	Network Connection State	Subnet	VPC	Virtual Switch	MAC Address	Attachment Type	Trunked VLAN IDs	IP Address	Actions
Normal	0	Connected	primary	-	vs0	50:6b:8d:c4:9a:12	Access	-	10.42.254.8	Delete

IP Address Management (IPAM)

- Integrated DHCP Server.
- AHV intercepts DHCP requests from guests on IPAM networks, and injects responses.
- Virtualization admin manages a range of IP addresses.
- Supports DHCP options, with UI support for DNS and TFTP configuration.

Create Network

Network Name: XYZ-Network_IPAM

Virtual Switch: vs0

VLAN ID: 1337

Enable IP address management
This gives AHV control of IP address assignments within the network.

Network IP Address / Prefix Length: 10.0.0.0/24

Gateway IP Address: 10.0.0.1

Cancel Save

Configure Network

In the following exercise, you will create networks using invalid VLANs, meaning no VM traffic will be transmitted outside an individual host. This behavior is expected for demonstration/education purposes only.

Create Subnet without IPAM

Let's create a new subnet in Prism Central. We will create a VLAN basic subnet for this. Use any VLAN other than 0, and do not enable IP address management.

1. From the side-bar menu, select **Network & Security** and in that section click on **Subnets**.

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The screenshot shows the Nutanix Cloud Platform dashboard. On the left, there's a sidebar with sections like 'Compute & Storage', 'Kubernetes Clusters', 'OVAs', 'Images', 'Catalog Items', 'Storage Containers', 'Volume Groups', 'Storage Policies' (with a 'New' button), 'Network & Security' (highlighted with a red box and circled with a red number 2), 'Subnets' (highlighted with a red box and circled with a red number 3), 'Virtual Private Clouds', 'Traffic Mirroring', 'Floating IPs', 'Connectivity', 'Security Policies', 'Security Dashboard' (with a 'New' button), and 'Local Account' (with a 'New' button). The right side has a vertical bar with icons for Main, Alerts, Cluster, Cluster, and PH.

2. Click **Create Subnet**.

Name	External Connectivity	Type
primary	No	VLAN Basic
secondary	No	VLAN Basic

The screenshot shows the 'Subnets' list page. At the top, there are tabs for 'Subnets' and 'List'. Below that is a toolbar with 'Create Subnet' (highlighted with a red box), 'Actions', 'Migrate', and 'Network Config'. There's also a search bar with 'Type text to filter by'. The main area shows a table with two rows: 'primary' and 'secondary'. The 'primary' row has 'No' under 'External Connectivity' and 'VLAN Basic' under 'Type'. The 'secondary' row also has 'No' under 'External Connectivity' and 'VLAN Basic' under 'Type'. A note at the bottom says 'Viewing all 2 Subnets'.

3. Enter the following details and click **Create**:

- Subnet Name** - Initials -net
- Type** - VLAN (The other option is an overlay network which can be created for a VPC)
- Cluster** - Select your cluster
- VLAN ID** - A value (< 4096) other than your Primary or Secondary network VLANs. Select any number between 2000 and 3000.
- Virtual Switch** - vs0
- IP Address Management** - unchecked

You can click on Advanced Configuration dropdown to see that VLAN Basic Networking is selected which means this subnet will be managed by Acropolis leader and not the network controller. Also, if this was an overlay network subnet, you can toggle the switch to enable external connectivity for VPCs.

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Name: bd-net (1)

Type: VLAN (2)

Cluster: PHX-TEST003 (3)

VLAN ID: 2500 (4)

Virtual Switch: vs0 (5)

External Connectivity for VPCs: No (6)

IP Address Management

Create (7)

Create Subnet with IPAM

Let's now create another network, but this time we will enable IPAM to setup IP Address Management with AHV.

1. Click **Create Subnet**.

Create Subnet

Name	External Connectivity	Type
bd-net	No	VLAN Basic
primarv	No	VLAN Basic
secondary	No	VLAN Basic

2. Enter the following details and click **Create**:

- Subnet Name** - Initials -net-ipam
- Type** - VLAN (The other option is an overlay network which can be created for a VPC)
- Cluster** - Select your cluster
- VLAN ID** - A value (< 4096) other than your Primary or Secondary network VLANs. Select any number between 2000 and 3000.
- Virtual Switch** - vs0
- Check Enable IP Address Management**
- Network IP Address / Prefix Length** - 10.0.0.0/24

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- **Start Address** - 10.0.0.10
- **End Address** - 10.0.0.50
- Remember to click on blue checkmark to create the IP pool
- Scroll the page and Expand the Domain Settings option
 - Here you can provide entries for DNS, Domain Search Information, Domain Name, TFTP Server name and Boot File Information for PXE boot. We will keep it blank.
- **Override DHCP Server** - Unchecked. If you want to use a specific DHCP server you would check this and provide IP address of that server.
- **Advanced Configuration** - Expand that and this time **uncheck VLAN Basic Networking** to create this subnet that will be managed by the Network Controller.

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The screenshot shows the 'Network Configuration' section of the Nutanix Cloud Platform. A new IPAM subnet is being created with the following details:

- Name:** bd-net-ipam (marked with red circle 1)
- Type:** VLAN (marked with red circle 2)
- Cluster:** PHX-TEST003 (marked with red circle 3)
- VLAN ID:** 2800 (marked with red circle 4)
- Virtual Switch:** vs0
- External Connectivity for VPCs:** No (checkbox is unchecked)
- IP Address Management:** Checked (marked with red circle 5)
- Network IP Address / Prefix:** 10.0.0.0/24 (marked with red circle 6)
- Gateway IP Address:** 10.0.0.1 (marked with red circle 7)
- IP Pools:** A table showing one pool: Start Address 10.0.0.10, End Address 10.0.0.50. An 'Actions' column contains edit and delete icons (marked with red circle 8).
- Buttons:** 'Cancel' and 'Create' at the bottom right.

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Specify at least one IP address pool. IP Addresses will be used for assigning External IPs to VPCs. These External IPs could additionally be consumed as SNAT and Floating IPs.

Domain Setting 1

Domain Name Servers

(Comma or Space Separated): 0.0.0.0

Domain Search

(Comma or Space Separated): nutanix.com,nutanix.eng.com

Domain Name

nutanix.com

TFTP Server Name

Boot File Name

Override DHCP Server

Advanced Configuration 2

The default configuration of the subnet is set to use VLAN Basic. Unchecking the option **Allow** will change it use Network Controllers.

3

VLAN Basic Networking

Required for Flow Network Security 1.0 or to access features like trunked & kdirect NICs. These subnets cannot be used for Flow Network Security 2.0. [Learn more](#)

Cancel

Create

Note

It is possible to create multiple pool ranges for a network.

Viewing all 4 Subnets							
Name	External Connectivity	Type	VLAN ID	VPC	Virtual Switch	IP Prefix	Cluster
bd-net	No	VLAN Basic	2500	-	vs0	-	PHX-TEST003 AHV
bd-net-ipam	No	VLAN	2800	-	vs0	10.0.0.0/24	PHX-TEST003 AHV
primar	No	VLAN Basic	0	-	vs0	10.42.254.0/25	PHX-TEST003 AHV
secondar	No	VLAN Basic	2541	-	vs0	10.42.254.128/25	PHX-TEST003 AHV

The configured virtual network will now be available across all nodes within the cluster. VMs with vNICs on this network will receive a DHCP address from the range specified. This IP assignment lasts for the life of the VM, avoiding the need to depend on DHCP reservations or static IPs for many workloads.

Takeaways

- It's effortless to set up a network in the cluster to establish VM connectivity.
- AHV provides the capability to create subnets of different types including the ability to now also create overlay networks for VPCs for advanced networking setups

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Now that we have looked at storage and network provisioning, let's see how workloads can be deployed. VM creation, management, and monitoring can all be performed for Nutanix AHV directly through Prism Central. Prism also offers native support for VM CRUD (create, read, update, delete) operations for Nutanix clusters running ESXi.

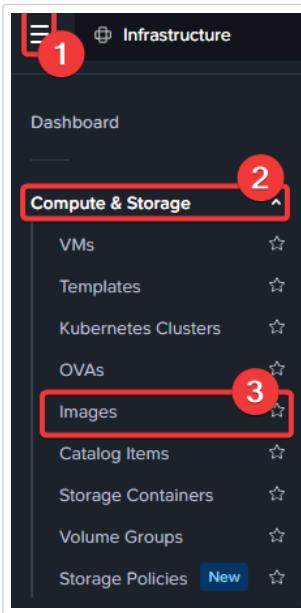
In the following exercise, we'll create VMs from source media and existing disk images.

Creating a Windows VM

You will now create a Windows Server VM from a Windows installation ISO image.

AHV provides an Image Service feature to build a store of imported ISO or disk image files. The Image Service supports raw, vhd, vhdx, vmdk, vdi, iso, and qcow2 disk formats. Let's look at the image repository

1. From the side-bar menu, select **Compute & Storage** and in that section click on **Images**.



2. You will see the list of images already uploaded to this cluster. We will be using some of these to deploy VMs in the next step.

 A screenshot of the Prism Central 'Images' list view. The table shows the following data:

Name	Description	Type	Size	Creator	Update Time
autoed.qcow2	autoed image with ideps support	Disk	50 GB	-	Jan 8, 2025, 03:04 PM
CentOS7.qcow2		Disk	10 GB	-	Jan 8, 2025, 03:14 PM
Nutanix-VirtIO-117.iso		ISO	144.46 MB	-	Jan 8, 2025, 03:16 PM
Rocky-9-GenericCloud Base latest.x86_64.qcow2	Rocky 9 Cloud Image	Disk	10 GB	-	Jan 8, 2025, 03:04 PM
Windows2019.iso		ISO	4.99 GB	-	Jan 8, 2025, 03:16 PM
Windows2019.qcow2		Disk	50 GB	-	Jan 8, 2025, 03:06 PM
wintools.qcow2		Disk	50 GB	-	Jan 8, 2025, 03:04 PM

Note

You can get to this page by searching **Images** in the search box

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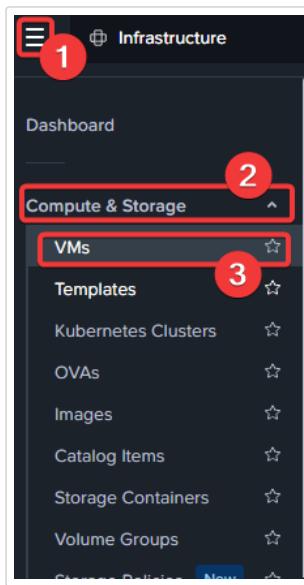
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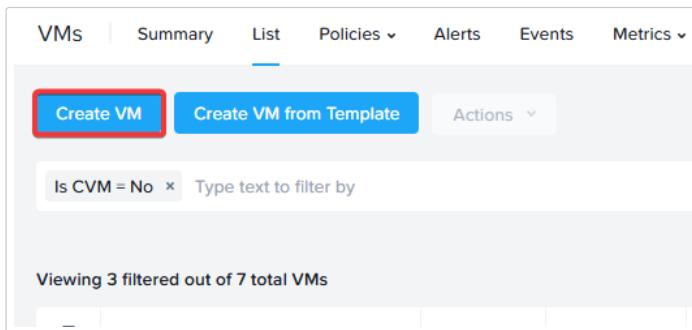
loaded during installation for the VM's disk to be accessible by the Windows installer.

Nutanix validates and distributes these drivers via the [Nutanix Portal](#). The ISO image containing the drivers has already been uploaded to the Image Service for this bootcamp.

1. From the side-bar menu, select **Compute & Storage** and in that section click on **VMs**.



2. Click the **Create VM** button to launch the create VM wizard.



3. Fill out the following fields in the configuration page and click **Next**:

Leave other settings at their default values.

- **Name** - Initials -winvm
- **vCPU(s)** - 2
- **Cores per CPU** - 1
- **Memory** - 4 GiB

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1 Configuration 2 Resources 3 Management 4 Review

Name: bd-winvm **1**

Description: (Optional)

Cluster: PHX-TEST003

Number of VMs: 1 **2**

VM Properties

CPU	Cores Per CPU	Memory
2 vCPU 3	1 Cores 4	4 GiB 5

Advanced Settings **6**

- Enable Memory Overcommit
- Enable advanced processor compatibility i

7 Next

Note

Under Advanced Settings you can see options for Enabling Memory Overcommit and Enabling advanced processor compatibility (APC) which allows VMs to move between hosts of difference CPU generations if needed. Below is an example of what it looks like when you want to enable APC where there is a baseline CPU generation it is mapped to but you can select a specific generation as needed.

Advanced Settings

Enable Memory Overcommit

Enable advanced processor compatibility i

Select CPU generation

Intel Broadwell (default baseline)

Intel SandyBridge

Intel IvyBridge

Intel Haswell

Intel Broadwell (default baseline)

Intel Skylake

4. Click the **Attach Disk** button.

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The screenshot shows the Nutanix Cloud Platform configuration interface. The top navigation bar has tabs: Configuration (selected), Resources, Management, and Review. A blue banner at the top provides a note about storage policies. Below the banner is a 'Disks' section with an 'Attach Disk' button.

5. Select the following options and click **Save**

- **Type** - CD-ROM
- **Operation** - Clone from Image
- **Image** - Windows2019.iso
- **Bus Type** - SATA

This will mount the Windows Server ISO from the Image Service for boot/installation.

Note

AHV provides both SATA and IDE bus types. For most use cases, SATA is the bus type to use for CD-ROMs. IDE should only be used when specific compatibility is needed like in case of older OS's. IDE CD-ROMs are not supported for UEFI boot.

The 'Attach Disk' dialog box contains the following fields with red numbers indicating steps:

- Type:** CD-ROM (1)
- Operation:** Clone from Image (2)
- Image:** Windows2019.iso (3)
- Bus Type:** SATA (4)
- Buttons:** Cancel (5) and Save (highlighted with a red circle)

6. Click on **Attach Disk**

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The screenshot shows the 'Disks' section of the Nutanix Cloud Platform. A table lists one existing disk entry:

#	Type	Source	Size	Bus Type	Actions
1	CD-ROM	Windows2019.iso	4.99 GiB	SATA	

A blue banner at the top right contains the text: "Any storage policy applied later, will manage the storage properties for all VM disks. Data placement will remain unaffected. [Learn More](#)". An 'Attach Disk' button is located in the top right corner of the table area.

7. Select the following options and click **Save**

- **Type** - Disk
- **Operation** - Allocate on Storage Container
- **Image** - Initials -Container
- **Capacity** - 50 GiB
- **Bus Type** - SCSI

The 'Attach Disk' dialog box has the following fields and settings:

- Type: Disk (Step 1)
- Operation: Allocate on Storage Container (Step 2)
- Storage Container: bd-container (Step 3)
- Capacity: 50 GiB (Step 4)
- Bus Type: SCSI (Step 5)
- Buttons: Cancel (white) and Save (blue, highlighted with a red box) (Step 6)

This will create a 50GiB empty vDisk on the selected Storage Container where we will install the OS.

8. Click on **Attach Disk** again.

9. Select the following options and click **Save**

- **Type** - CD-ROM
- **Operation** - Clone from Image
- **Image** - Nutanix-VirtIO-x.x.x.iso
- **Bus Type** - SATA

This attaches the VirtIO iso which will install the VirtIO drivers needed for the VM.

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Type
CD-ROM 1

Operation
Clone from Image 2

Image
Nutanix-VirtIO-1.1.7.iso 3

Bus Type
SATA 4

Cancel 5 Save

10. Next let's create a vNIC for the VM. Click **Attach to Subnet** to connect the VM to a network.

Create VM

Configuration 2 Resources 3 Management 4 Review

Any storage policy applied later, will manage the storage properties for all VM disks. Data placement will remain unaffected. [Learn More](#)

Disks

#	Type	Source	Size	Bus Type	Actions
1	CD-ROM	Windows2019.iso Image	4.99 GiB	SATA	▲ ⚒ ━
2	Disk	bd-container	50 GiB	SCSI	▲ ⚒ ━
3	CD-ROM	Nutanix-VirtIO-1.1.7.iso Image	0.15 GiB	SATA	▲ ⚒ ━

Attach Disk

Networks

Attach to Subnet

11. Select the following options and click **Save**.

- **Subnet** - Initials -net
- **Network Connection State** - Connected
- **Attachment Type** - Access

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Subnet Attachment

Subnet

bd-net	1
--------	---

VLAN ID 2500	IPAM Not Managed	Virtual Switch br0
-----------------	---------------------	-----------------------

Network Connection State

Connected	2
-----------	---

NIC Configuration

Attachment Type

Access	3
--------	---

Cancel 4 Save

This will add a single virtual NIC to the VM on the selected Virtual Network.

12. For boot configuration select **Legacy BIOS Mode** and click **Next**. If a pop-up comes up confirm yes on it.

Note

AHV supports UEFI BIOS mode which enables you to use Secure Boot with Windows Credential Guard as well as vTPM.

Boot Configuration

Legacy BIOS Mode 1

UEFI BIOS Mode supports enhanced Shield VM security settings.

UEFI BIOS Mode

Set Boot Priority

Default Boot Order (CD-ROM, Disk, Network)
--

Shield VM Security Settings

Secure Boot

Windows® Defender Credential Guard ?

Attach vTPM ?

Back 2 Cancel Next

13. On the Management page, we can customize the VM. Here we will apply the **Default Storage Policy** to this VM which will automatically apply the associated category to it. Administrators can also assign custom categories and values to VM that they would have created which will assign policies related to them. An example of this can be a protection policy or a security policy that gets applied to VM once it is assigned its corresponding category and value.

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- Keep rest as defaults
- Click **Next**

Create VM

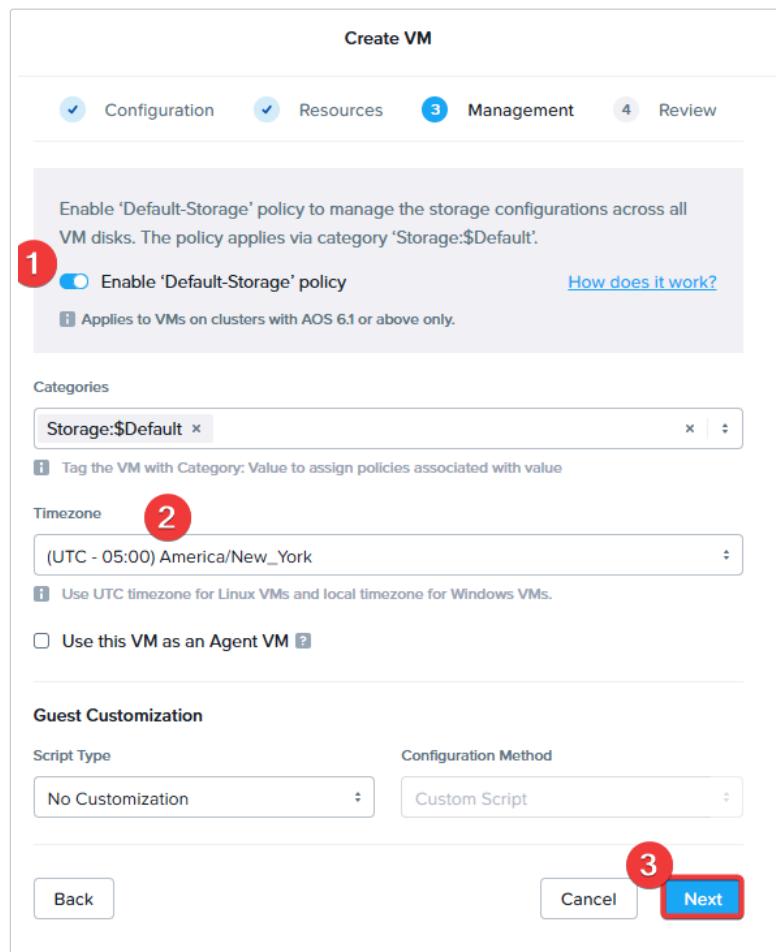
1 Configuration Resources Management Review

Enable 'Default-Storage' policy to manage the storage configurations across all VM disks. The policy applies via category 'Storage:\$Default'.
 Enable 'Default-Storage' policy [How does it work?](#)
Applies to VMs on clusters with AOS 6.1 or above only.

Categories
Storage:\$Default

Timezone
2 (UTC -05:00) America/New_York
Use UTC timezone for Linux VMs and local timezone for Windows VMs.
 Use this VM as an Agent VM

Guest Customization
Script Type: No Customization Configuration Method: Custom Script
[Back](#) [Cancel](#) [Next](#) 3



14. On **Review** page, you can review the settings and configuration selected for the VM and modify any if needed. Click **Create VM** to create the VM.

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Configuration [Edit](#)

VM Name	bd-winvm
Description	-
Cluster	PHX-TEST003
Number of VMs	1
Instance Properties	2 vCPU, 1 Core, 4 GB
Memory Overcommit	Disabled
Advanced processor compatibility	-

Resources [Edit](#)

Disks

#	Type	Source	Size	Bus Type
1	CD-ROM	Windows2019.iso Image	4.99 GiB	SATA
2	Disk	bd-container	50 GiB	SCSI
3	CD-ROM	Nutanix-VirtIO-1.1.7.iso Image	0.15 GiB	SATA

Networks

Subnet	VLAN ID / VPC	Private IP	Public IP
bd-net	2500	None	None

Security

Boot Configuration [Legacy BIOS Mode: Default Boot Order](#)

[Back](#) [Cancel](#) [Create VM](#)

15. Once the VM is visible in list, right click on the VM and click **Power On** to power the VM on.

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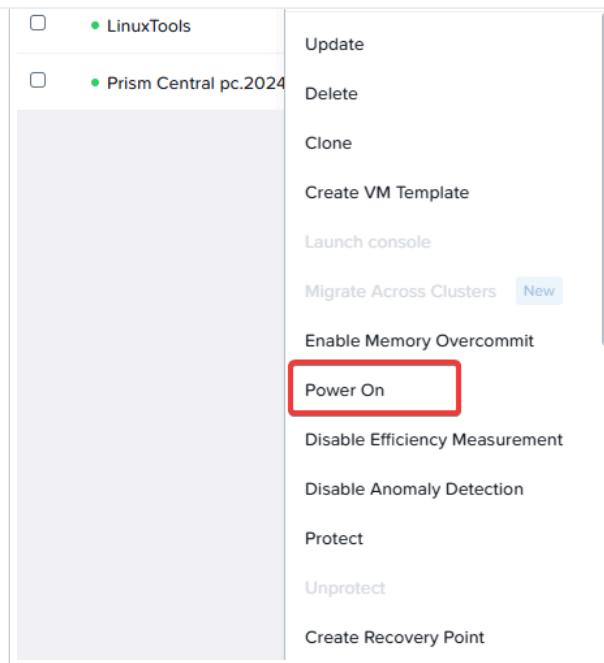
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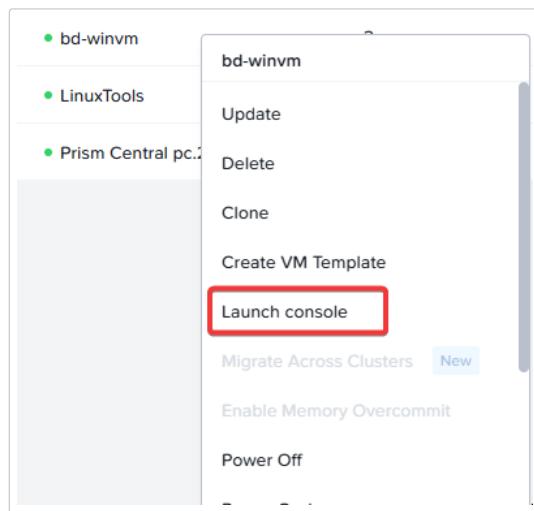
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16. Once the VM has a green dot next to it, you can right click again and click **Launch Console** to install OS on VM.



17. Progress through the standard install questions until you reach the Windows install location. When prompted choose

- I don't have a product key
- Windows Server 2019 Datacenter (Desktop Experience)
- Custom : Install Windows Only installation when presented with the choice.

18. Since the VM has no drivers it cannot see the vdisk attach to it. So first we will load and install the drivers. Click **Load Driver**, and navigate to the CD where the Nutanix VirtIO ISO is mounted and browse to folder corresponding to OS.

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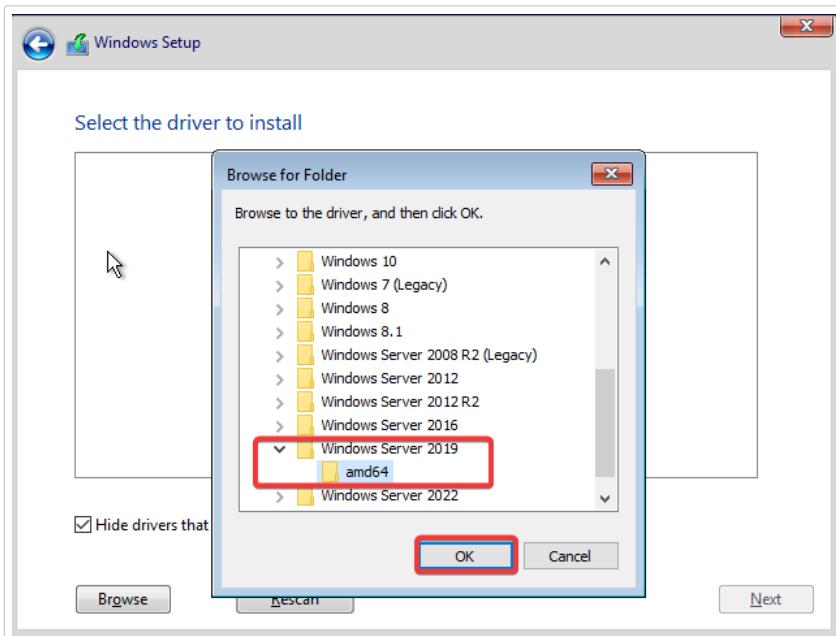
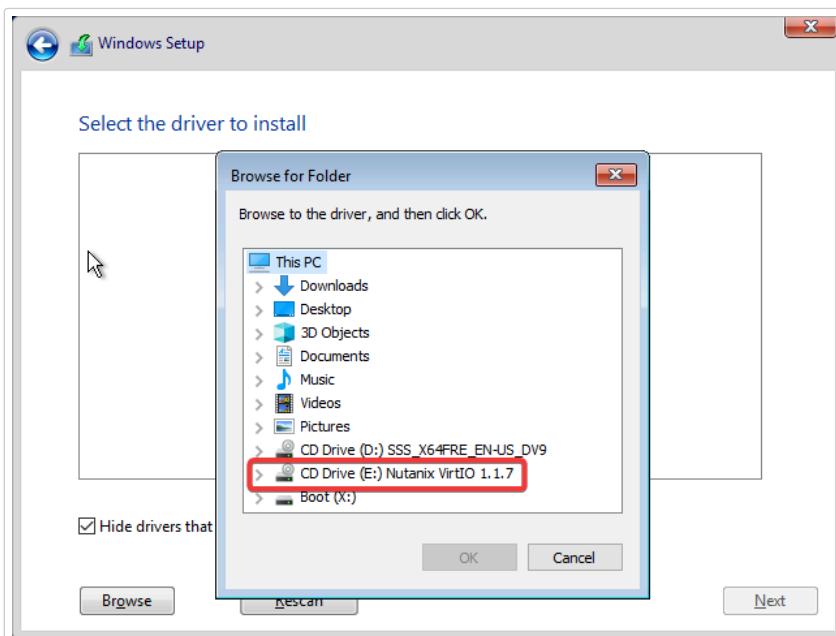
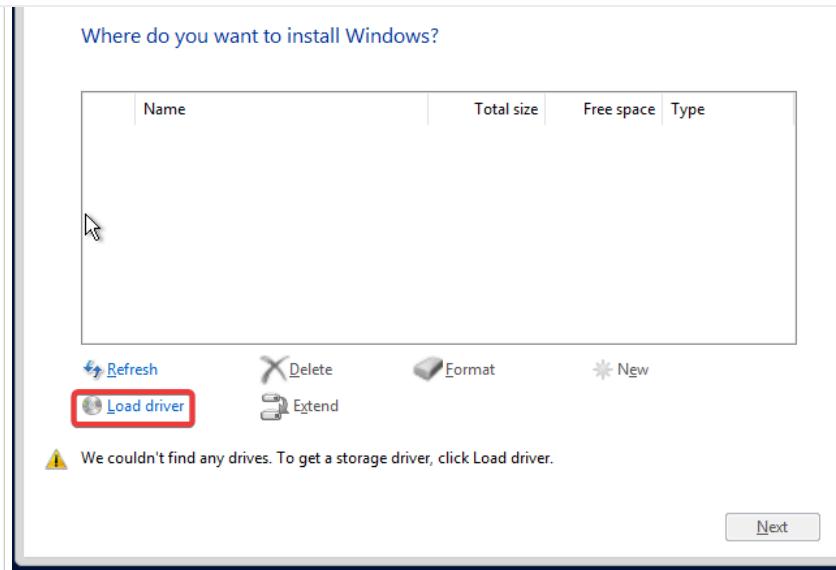
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19. Select all the Nutanix drivers displayed. Press and hold the **Ctrl** key to select all drivers and click **Next**.

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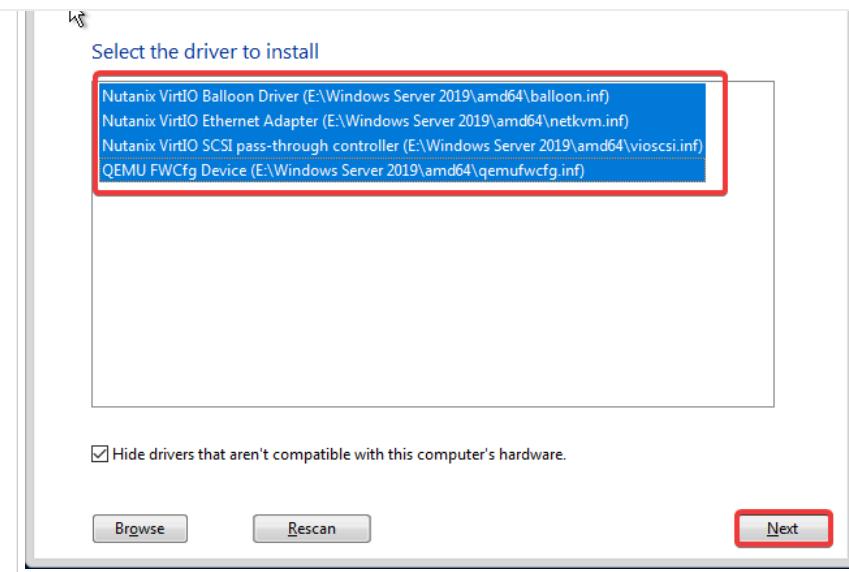
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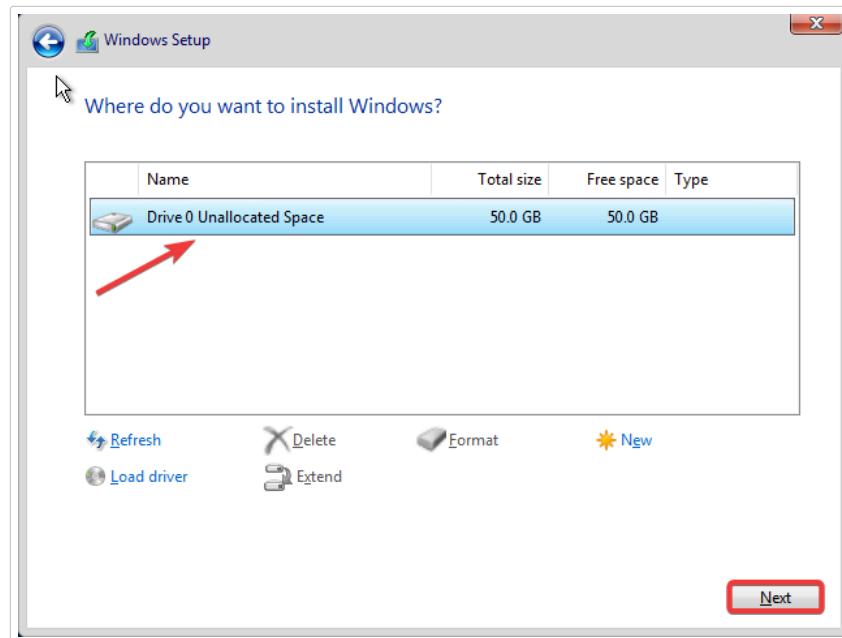
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20. After the drivers are loaded, the vdisk created above appears as an installation target.

Select that and Click **Next** to finish the installation of the OS.



Note

Time to grab a coffee ☕ or whatever your beverage of choice is. You can use this time to also explore Prism Central if you like.

21. Once the installation is finished, you can unmount the ISOs by using the **Unmount ISO** button in console.

Installing Nutanix Guest Tools (NGT)

Nutanix Guest Tools provide the ability for certain 3rd party backup tools and native Nutanix replication to leverage VSS and perform operations such as IP address changes during failover. They are not a requirement for all VMs but a good to have. We will next install NGT on this VM.

Previously you had to mount an ISO for doing this install too but now NGT can be deployed directly from Prism Central. If desired there is still an option to separately download a MSI installer for it and deploying it.

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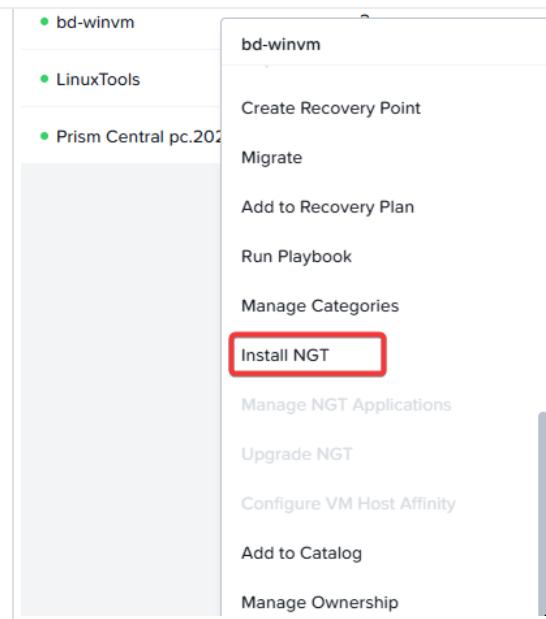
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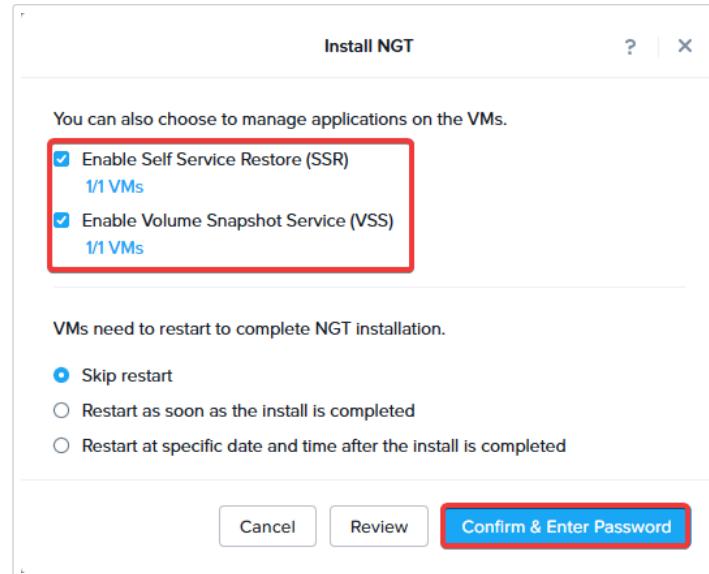
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2. Select check boxes for both **Enable Self Service** and **Enable Volume Snapshot Service** and click **Confirm & Enter Password**



3. If we had selected a routable network to the VM, at this point we could have provided the username and password for the VM and Prism Central would have automatically installed NGT. Since our network is non-routable we will manually install it. Click **Skip and Mount** to mount the NGT CD-ROM

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Disclaimer: Your data is completely secure. Nutanix will not store your passwords.

Paste the config file containing the username and passwords below.

[Download sample json](#)

Enter guest operating username and password below

Username

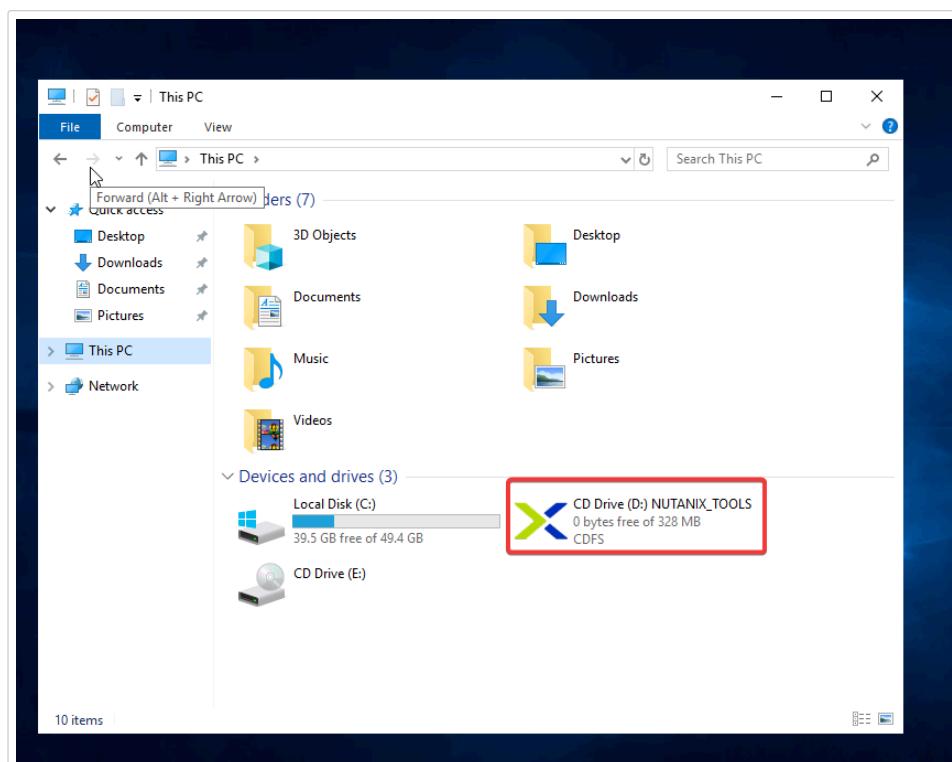
Or

Password

[Skip and Mount](#)

[Done](#)

4. From VM console, Run the NGT installer to install NGT.



5. Once NGT is installed on VM page, it will show the OS of the VM and the version of NGT installed. You now have your first working and deployed VM on AHV. 🎉 🎉

Name	vCPU	Memory	IP Addresses	Cluster	Hypervisor	OS	NGT Status
autoload	2	4 GiB	10.42.254.6	PHX-TEST003	AHV	-	Not Installed
bd-winvm	2	4 GiB	169.254.220.161, 16...	PHX-TEST003	AHV	Windows Server 2019 Data...	Latest
LinuxTools	6	10 GiB	10.42.254.8	PHX-TEST003	AHV	-	Not Installed
Prism Central pc.2024.2	22	70 GiB	10.42.254.7	PHX-TEST003	AHV	-	Not Installed

Creating a Linux VM

Next, we will now create a Linux VM from an existing, pre-installed disk image in the Image Service. It is common in many environments to have template-style images of pre-installed

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1. Click the **Create VM** button to launch the create VM wizard.

The screenshot shows the Nutanix Cloud Platform's VMs list screen. At the top, there are tabs for VMs, Summary, List, Policies, Alerts, Events, and Metrics. Below the tabs, there are two main buttons: 'Create VM' (highlighted with a red box) and 'Create VM from Template'. A search bar below these buttons includes filters for 'Is CVM = No' and 'Type text to filter by'. The main content area displays a message: 'Viewing 3 filtered out of 7 total VMs'.

2. Fill out the following fields and click **Next**:

Leave other settings at their default values.

- **Name** - Initials -linuxvm
- **vCPU(s)** - 2
- **Cores per CPU** - 1
- **Memory** - 4 GiB

The screenshot shows the 'Create VM' wizard, Step 1: Configuration. The steps are numbered 1 through 4 at the top. The configuration fields are as follows:

- Name:** bd-linuxvm (field 1)
- Cluster:** PHX-TEST003 (field 2)
- Number of VMs:** 1 (field 3)
- VM Properties:**
 - CPU:** 1 vCPU (field 4)
 - Cores Per CPU:** 1 Cores (field 5)
 - Memory:** 4 GiB (field 6)
- Advanced Settings:** A dropdown menu (field 7).

3. Click the **Attach Disk** button.

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The screenshot shows the 'Configuration' tab selected in the top navigation bar. A blue banner at the top states: 'Any storage policy applied later, will manage the storage properties for all VM disks. Data placement will remain unaffected. [Learn More](#)'. Below the banner, the 'Disks' section is visible with an 'Attach Disk' button.

4. Select the following options and click **Save**

- **Type** - Disk
- **Operation** - Clone from Image
- **Image** - CentOS7.qcow2
- **Capacity** - 20 GiB
- **Bus Type** - SCSI

The 'Attach Disk' dialog box is shown with the following settings highlighted:

- 1. Type: Disk
- 2. Operation: Clone from Image
- 3. Image: CentOS7.qcow2
- 4. Capacity: 20 GiB
- 5. Bus Type: SCSI
- 6. Save button

5. Next let's create a vNIC for the VM. Click **Attach to Subnet** to connect the VM to a network.

The screenshot shows the 'Create VM' screen with the 'Configuration' tab selected. A blue banner at the top states: 'Any storage policy applied later, will manage the storage properties for all VM disks. Data placement will remain unaffected. [Learn More](#)'. Below the banner, the 'Disks' section shows a table with one disk entry. The 'Networks' section has an 'Attach to Subnet' button highlighted with a red border.

#	Type	Source	Size	Bus Type	Actions
1	Disk	CentOS7.qcow2	20 GiB	SCSI	

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- Network Connection State - Connected
- Attachment Type - Access

The screenshot shows the 'Attach to Subnet' dialog box. It has four numbered callouts: 1 points to the 'Subnet' dropdown menu which is currently set to 'bd-net'. 2 points to the 'Network Connection State' dropdown menu which is currently set to 'Connected'. 3 points to the 'Attachment Type' dropdown menu which is currently set to 'Access'. 4 points to the 'Save' button at the bottom right of the dialog.

This will add a single virtual NIC to the VM on the selected Virtual Network.

7. For boot configuration select **Legacy BIOS Mode** and click **Next**. If a pop-up comes up confirm yes on it.

Note

AHV supports UEFI BIOS mode which enables you to use Secure Boot with Windows Credential Guard as well as vTPM.

The screenshot shows the 'Boot Configuration' screen. It has two numbered callouts: 1 points to the 'Legacy BIOS Mode' radio button, which is selected. 2 points to the 'Next' button at the bottom right of the screen.

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Create VM

Configuration Resources **Management** Review

Enable 'Default-Storage' policy to manage the storage configurations across all VM disks. The policy applies via category 'Storage:\$Default'.
 Enable 'Default-Storage' policy [How does it work?](#)
Applies to VMs on clusters with AOS 6.1 or above only.

Categories
Type to search...
Tag the VM with Category: Value to assign policies associated with value

Timezone
(UTC) UTC
Use UTC timezone for Linux VMs and local timezone for Windows VMs.
 Use this VM as an Agent VM

Guest Customization
Script Type: No Customization Configuration Method: Custom Script

Buttons: Back | Cancel | **Next**

9. On review page, review the selections and click **Create VM** to create our Linux VM.

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Configuration [Edit](#)

VM Name	bd-linuxvm
Description	-
Cluster	PHX-TEST003
Number of VMs	1
Instance Properties	1 vCPU, 1 Core, 4 GB
Memory Overcommit	Disabled
Advanced processor compatibility	-

Resources [Edit](#)

Disks

#	Type	Source	Size	Bus Type
1	Disk	CentOS7.qcow2 Image	20 GiB	SCSI

Networks

Subnet	VLAN ID / VPC	Private IP	Public IP
bd-net	2500	None	None

Security

Boot Configuration	Legacy BIOS Mode: Default Boot Order
--------------------	--------------------------------------

Management [Edit](#)

Categories	None
Timezone	UTC

[Back](#) [Cancel](#) [Create VM](#)

11. If you want, power on the created VM and connect to Console to view the new Linux Virtual Machine.

Takeaways

- In this lab, you saw how simple it is to deploy either a Windows and Linux VM.
- The Image Configuration tool allows you to catalog available images used in VM deployments as needed and cover broad format support that includes raw, vhd, vhdx, vmdk, vdi, iso, and qcow2.

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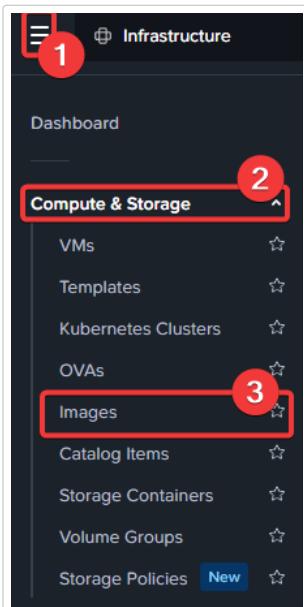
Now that you have a couple of VMs deployed, let's have some fun and explore some of the VM management tasks with AHV.

Workload Management

Power Actions and Console Access

Explore VM power actions and console access.

1. From the side-bar menu, select **Compute & Storage** and in that section click on **Images**.



2. Locate the Linux VM that you created in the last section and power on the VM if you did not power it on in last section by right clicking on VM and selecting **Power On**.

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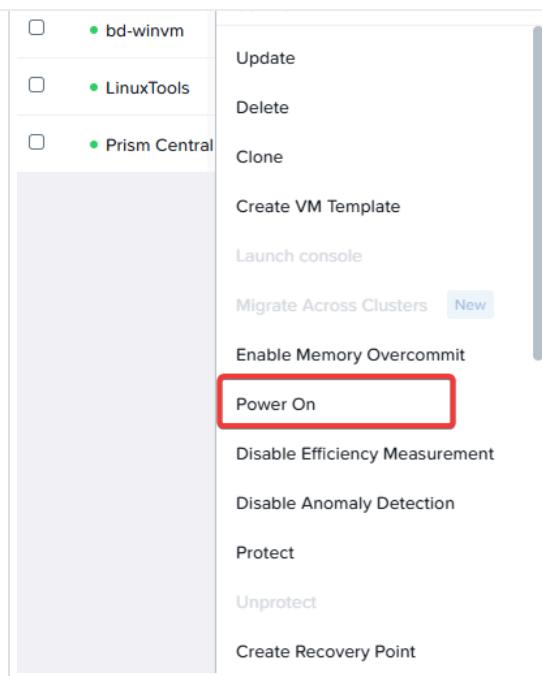
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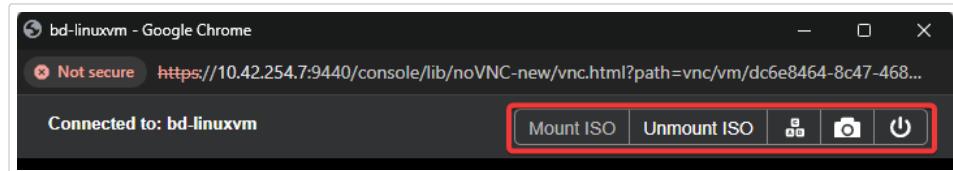
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3. Once VM is powered on, from the right click options, select **Launch Console**. The console window provides following options:

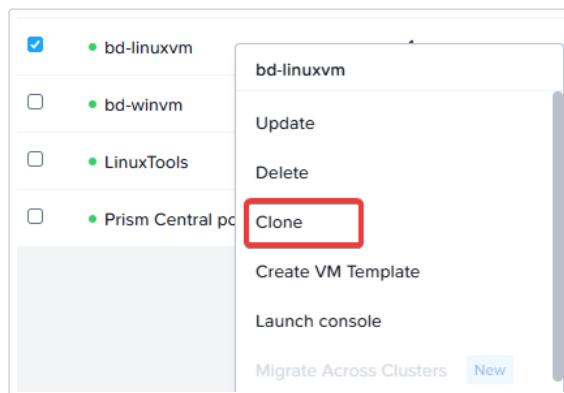
- Mount ISO
- Unmount ISO
- Ctrl+Alt+Del
- Take Screenshot
- Power Control



Cloning VMs

Nutanix makes it very easy and simple to create clones of VMs. Cloning VMs is useful for making multiple copies of same VM quickly. Nutanix clones and Nutanix snapshots use [redirect-on-write](#) algorithm to quickly and create space efficient and performant copies of VMs as a metadata operation.

1. From the VM page view, right-click on your `Initials -Linux` VM, and choose **Clone**.



2. Fill out the following fields, and then click **Next**:

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The advanced configuration allows you to modify configuration changes to clone VMs like CPU, memory, networking.

Clone VM

Name **1**

Cluster

Number of Clones **2**

VM Names will be suffixed with sequential numbers

Starting Index Number **3**

Example: web-server-clone-1, web-server-clone-1, and so on...

Guest Customization

Script Type	Configuration Method
No Customization	Custom Script

Advanced Configuration **4**

Cancel **5** **Next**

Clone VM

1 Configuration **2 Resources** **3 Management** **4 Review**

Name

Cluster

Number of Clones

VM Names will be suffixed with sequential numbers

Starting Index Number

Example: web-server-clone-1, web-server-clone-1, and so on...

VM Properties

CPU	Cores Per CPU	Memory
1 vCPU	1 Cores	4 GiB

Back to Quick Clone **Cancel** **Next**

- **Name** - Initials -LinuxVM-clone
- **Number of Clones** - 2
- **Starting Index Number** - 1

3. Review the configuration details which should be the same unless changes were made in **Advanced Configuration** and click **Clone VM**.

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Configuration

VM Name	bd-linuxvm-clone-[1-2]
Cluster	PHX-TEST003
Number of Clones	2
Instance Properties	1 vCPU, 1 Core, 4 GB

Resources**Disks**

#	Type	Source	Size	Bus Type
1	Disk	CentOS7.qcow2 Image	20 GiB	SCSI.O

Networks

Subnet	VLAN ID / VPC	Private IP	Public IP
bd-net	2500	None	None

Security

Boot Configuration Legacy BIOS Mode: Default Boot Order

Management

Categories	None
Timezone	UTC
Guest Customization	No Customization

Back

Cancel

Clone VM

4. The 2 cloned VMs will immediately be available in list of VMs that users can now modify and use as needed.

Creating Templates

Templates are an easy way to standardize creation of virtual machines at scale across multiple clusters from same Prism Central. Typically you would use a tool like sysprep for Windows or Cloud-Init for Linux to prepare the VM before creating a template from it.

Templates also have versioning built into them. This allows administrators to retain previous versions or have test versions once changes are made to image. Let's see how to create and use templates with AHV and Prism Central.

1. Power off your Windows VM by right clicking on it and clicking **Power Off**

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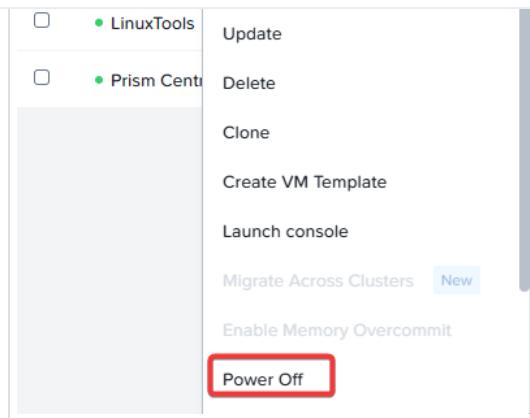
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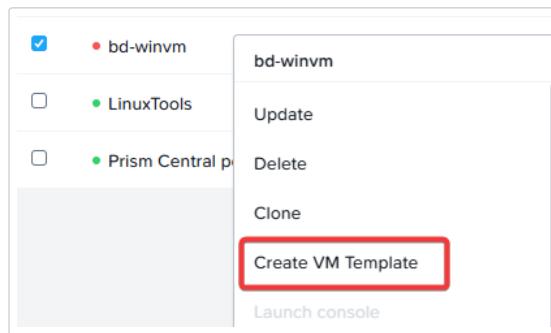
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2. After it is powered off, right click again and click **Create VM Template**



3. Fill out the following details and click **Next**

- **Name** - Initial -winvm-Gold
- **Description** - Gold template of Windows
- **Guest Customization** - Keep defaults

Create Template from VM

1 Name: bd-winvm-gold

2 Description: Gold Template of windows

3 Guest Customization: Keep defaults

Specify the type and method of Guest OS Customization

Script Type	Configuration Method
No Customization	Custom Script

Allow users to override at VM Deployment? No

4 Next

Note

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Cloud-Init script.

4. Review the configuration and click **Save** to create a template

Create Template from VM

Configuration

VM Template Name	bd-winvm-gold
Description	Gold Template of windows
Compute details	2 vCPU, 1 Core, 4 GB

Resources

Disks

#	Type	Source	Size	Bus Type
1	CD-ROM	-	-	SATA.0
2	Disk	bd-container	50 GiB	SCSI.0
3	CD-ROM	-	-	SATA.1

Networks

Subnet	VLAN ID / VPC	Private IP	Public IP
bd-net	2500	Auto-Assign	None

Security

Boot Configuration	Legacy BIOS Mode: Default Boot Order
--------------------	--------------------------------------

Management

Categories	Storage: \$Default
Timezone	America/New_York
Agent VM	No
Guest Customization	No Customization

Buttons

Back Cancel **Save**

When creating the template, AOS in background takes a **Recovery Point** which is basically a snapshot of the VM. This can be deployed on any cluster managed by this Prism Central.

Working with Templates

1. From the side-bar menu, select **Compute & Storage** and in that section click on **Templates**.

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The screenshot shows the Nutanix Cloud Platform interface. On the left, there's a sidebar with sections like 'Dashboard', 'Compute & Storage' (which is currently selected and highlighted in blue), 'VMs', 'Kubernetes Clusters', 'OVAs', and 'Images'. To the right, there's a panel titled 'VMs' with a 'Create' button and a dropdown menu for 'Is CVM'. A message '1 selected' is displayed, and there's a small icon for managing selected items.

2. Here you will see the template you just created. It provides information about resources required for a VM to be deployed, the last update time for template and the current Active Version.

This screenshot shows the 'Viewing 1 Template' page. At the top, there are buttons for 'Deploy VMs' and 'Actions'. Below that, a table displays the template details: Name (bd-winvm-gold), Compute (2 vCPU), Memory (4 GiB), Storage (50 GiB), Network (1 NIC), Updated On (Jan 16, 2025, 10:47 AM), Updated By (adminuser07@intnxlab.local), and Active Version (Initial Version). There are also 'Filters' and pagination controls at the bottom.

3. Click on Name of your template to see additional information and details about the template.

This screenshot shows the same 'Viewing 1 Template' page as above, but with the 'bd-winvm-gold' entry in the list highlighted by a red box. The rest of the interface is identical to the previous screenshot.

This screenshot shows the detailed configuration page for the 'bd-winvm-gold' template. At the top, it says 'bd-winvm-gold' and has a note: 'This Template will be used for deploying bd-winvm-gold VMs on all the clusters in my environment.' The 'Summary' tab is selected, showing the following details:

Template	Available Versions
bd-winvm-gold	1

Description: Gold Template of windows
Last Updated By: adminuser07@intnxlab.local
Last Updated On: Jan 16, 2025, 10:47 AM

Below this is the 'Active Version Configuration' section, which lists the 'Active Version' (Version Name: bd-winvm, Initial Version: bd-winvm) and the 'VM Properties' and 'VM Resources' sections.

4. Next, let's make a configuration update to this template. We will modify this template to create a template with more memory which will become a new version of this template.

5. Click **Actions** and then **Update Configuration**

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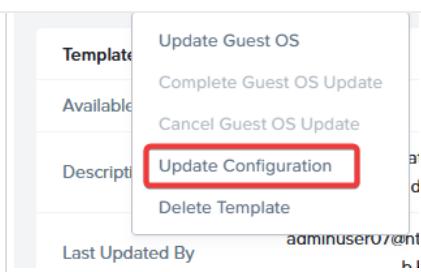
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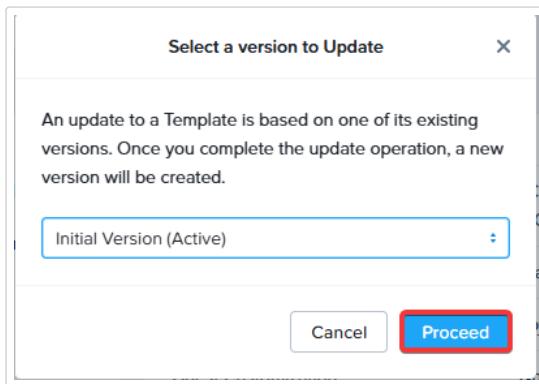
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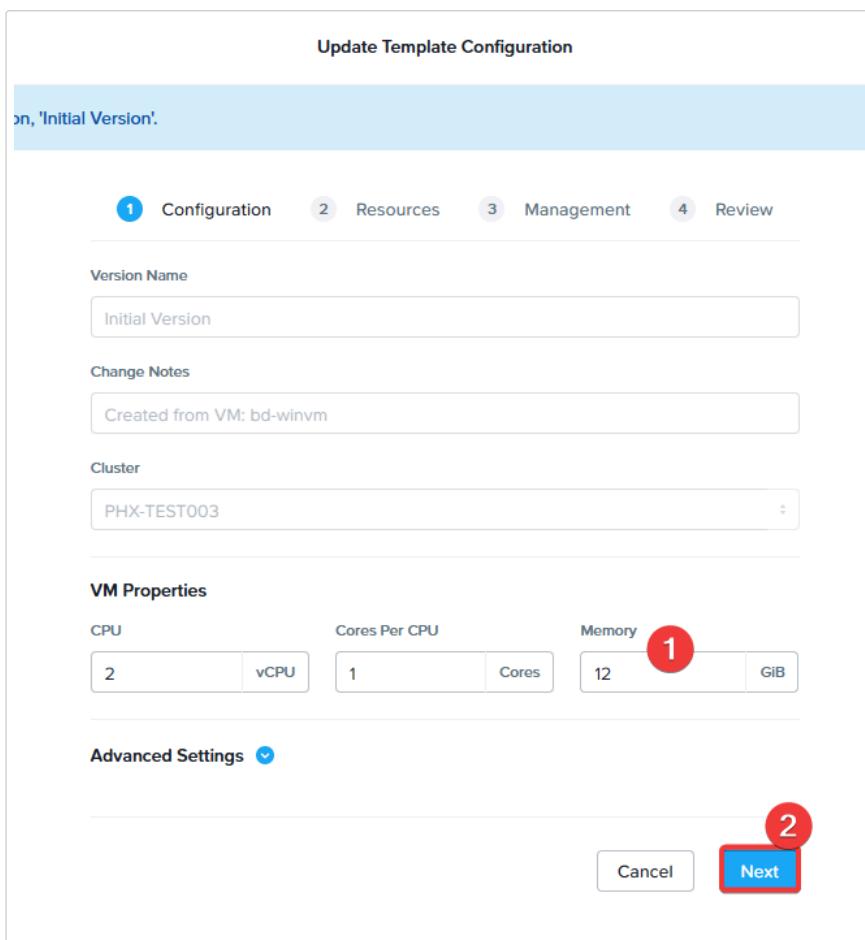
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6. We only have one version of this template which is the active one. Click **Proceed**



7. On the configuration page, update the memory to 12 GiB and click **Next**. You can click **Next** for resources and configuration pages too as we keep those as is.



8. On the Review page, fill out the following details and click **Save**

- **New Version Name**: Initial -winvm-12g
- **Change Notes**: Gold Windows image with 12G memory
- Check the box next to **Yes, set this new version as active**

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ion, 'Initial Version'.

Configuration Resources Management Review

New Template Version

New Version Name **1**
bd-winvm-12g

Change Notes **2**
Gold Windows image with 12G memory

Add a brief note to be attached to this revision of the Template.

3 Yes, set this new version as active
When a Template is updated and saved, a new version is created containing these changes along with any previously existing versions. You may also change a Template's active version at a later point in time.

Configuration **Edit**

Description	Created from VM: bd-winvm
Compute details	2 vCPU, 1 Core, 12 GB
Memory Overcommit	Disabled

Resources **Edit**

4

#	Type	Source	Size	Bus Type
1	Disk	-	50 GiB	SCSI.O
2	CD-ROM	-	-	SATA.O

Back Cancel Save

9. After saving, now you will see that the template has 2 versions with the Active version being the one we just created. If we do a Deploy VM, it will deploy the active version of the template.

Back To Templates Actions Deploy VMs

bd-winvm-gold

This Template will be used for deploying bd-winvm-gold VMs on all the clusters in my environment.

Available Versions **2**

Description	Gold Template of windows
Last Updated By	adminuser07@ntnxlab.local
Last Updated On	Jan 16, 2025, 11:12 AM

Active Version Configuration

Active Version	bd-winvm-12g
Change Notes	Gold Windows image with 12G memory

VM Properties

Compute	2 vCPU 1 cores/CPU 12 GiB
Boot Type	Legacy
Guest OS	Unknown
Guest Customization	None
NGT Status	Installed

VM Resources

GPU	-
Disks	1 Disks 50 GiB
Network	1 NICs

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The screenshot shows two main sections of the Nutanix Cloud Platform interface. The top section displays the 'bd-winvm-gold' template details. It includes a summary of the template's purpose ('This Template will be used for deploying bd-winvm-gold VMs on all the clusters in my environment.'), its last update ('Jan 16, 2025, 11:12 AM'), and its active version configuration. The active version is 'bd-winvm-12g' with a note 'Gold Windows image with 12G memory'. Below this are 'VM Properties' (Compute: 2 vCPU | 1 cores/CPU | 12 GiB; Boot Type: Legacy; Guest OS: Unknown; Guest Customization: None; NGT Status: Installed) and 'VM Resources' (GPU: -, Disks: 1 Disks | 50 GiB; Network: 1 NICs). The bottom section shows a table titled 'Viewing all 2 versions' with columns for Name, Computer, Memory, Storage, Network, Added On, Added By, and Notes. It lists two versions: 'bd-winvm-12g...' (Added On: Jan 16, 2025, 11:12 AM, Added By: adminuser07@ntnxlab.local) and 'Initial Version' (Added On: Jan 16, 2025, 10:47 AM, Added By: adminuser07@ntnxlab.local).

11. In addition to configuration changes, you can also update the image itself in template like adding software or patching the OS and create a new template from it. Let's see how to do that. From the Summary tab on left, click **Actions** and then click on **Update Guest OS**

The screenshot shows the 'bd-winvm-gold' template details again. A red box highlights the 'Summary' tab. The 'Actions' dropdown menu is open, with the 'Update Guest OS' option highlighted by a red box and circled with a red number '2'. The 'Update Guest OS' option is further expanded, showing 'Complete Guest OS Update' (circled with a red number '3') and other options like 'Cancel Guest OS Update', 'Update Configuration', and 'Delete Template'. The template details below show it was last updated by 'adminuser07@ntnxlab.local' on 'Jan 16, 2025, 11:12 AM'.

12. As before, it will ask which version to update and this time you can see that you can pick between either of the 2 templates we have. We will keep the Active template which is default and click **Proceed**

The screenshot shows a modal dialog titled 'Select a version to Update'. It contains a message: 'An update to a Template is based on one of its existing versions. Once you complete the update operation, a new version will be created.' Below this is a dropdown menu showing 'bd-winvm-12g (Active)'. At the bottom are 'Cancel' and 'Proceed' buttons, with 'Proceed' highlighted by a red box.

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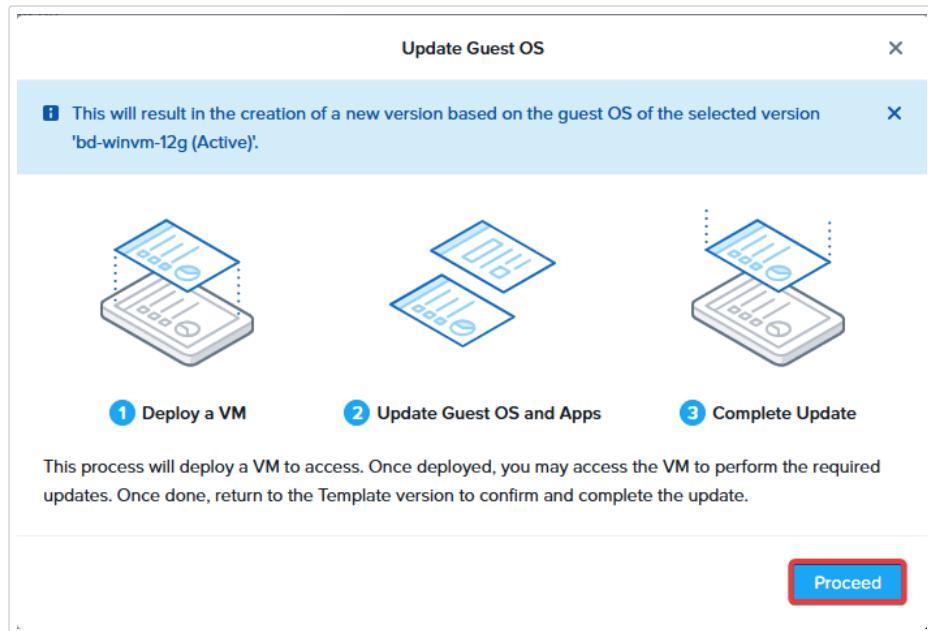
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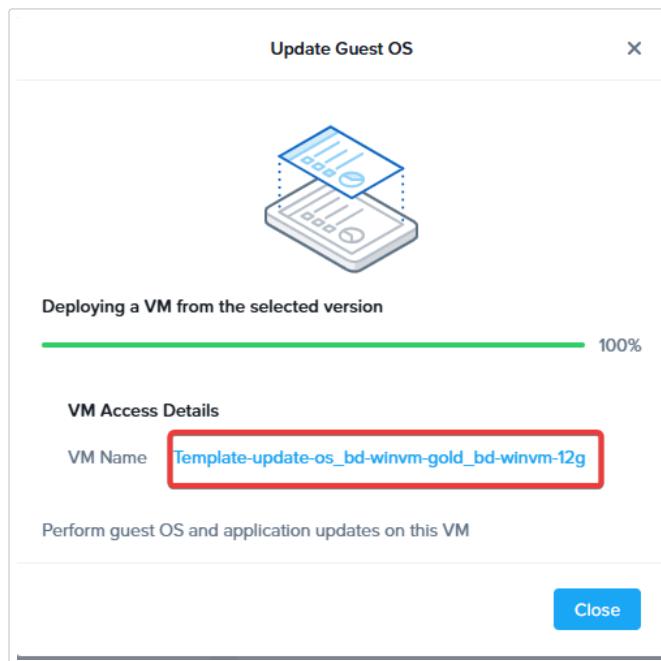
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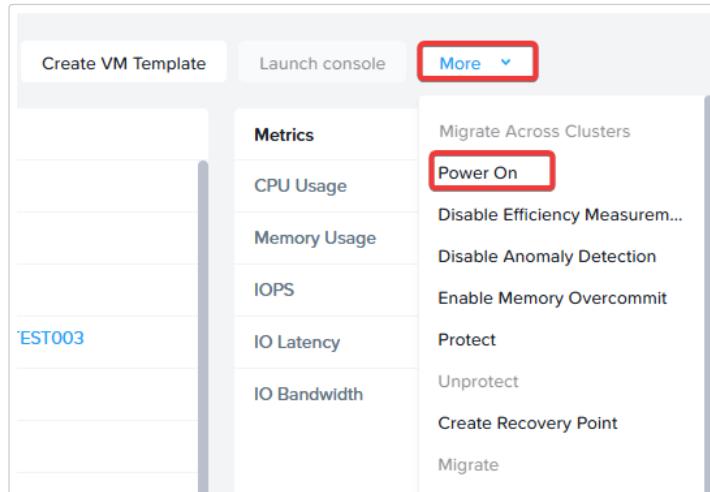
page. Click **Proceed**



14. Once the VM is deployed, click on the **VM name**



15. Power the VM by clicking on **More** and then **Power On** on the VM Summary page



either the password assigned to you or `nutanix/4u` .

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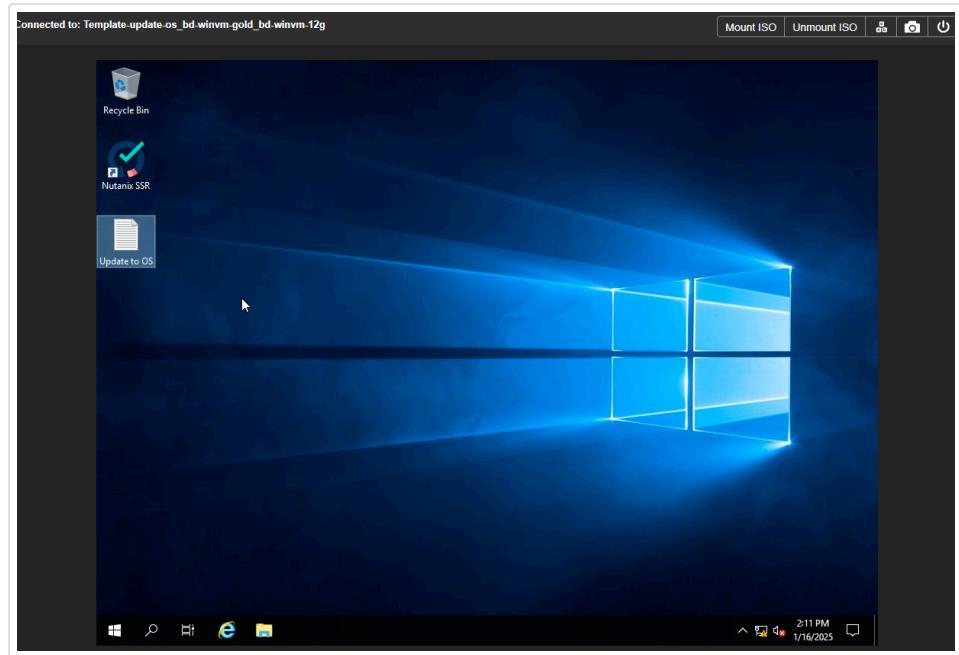
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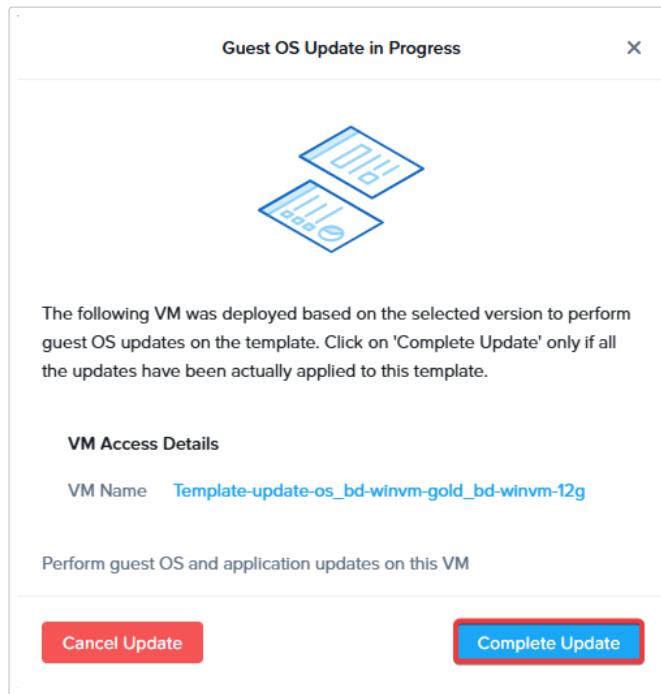
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17. Once updates are made, next we have to update the template modification process to let it know changes are completed. From side-bar menu, click **Templates** and then click **Update Initiated**.



18. Click on **Complete Update**



19. On the next screen, specify following details and click **Complete Update**

- **New Version Name** - Initial -winvm-updateOS
- **Change Notes** - Updates to OS
- Check box that says **Yes, set this new version as active**

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Ensure that you've applied necessary updates to the guest OS of the VM that was deployed from the selected version.

New Template Version

New Version Name

bd-winvm-updateOS

1

Change Notes

Updates to OS

2

Add a brief note to be attached to this revision of the Template.

Yes, set this new version as active

3 When a Template is updated and saved, a new version is created containing these changes along with any previously existing versions. You may also change a Template's active version at a later point in time.

4 Complete Update

20. Click on name of template and click on **Versions**. You will now see the latest template version alongwith other 2.

Viewing all 3 versions							
Name	Compute	Memory	Storage	Network	Added On	Added By	Notes
bd-winvm-gold	2 vCPU	12 GB	50 GB	1 NIC	Jan 16, 2025, 02:20 PM	adminuser07@ntrnlab.local	
bd-winvm-updateOS	2 vCPU	12 GB	50 GB	1 NIC	Jan 16, 2025, 11:12 AM	adminuser07@ntrnlab.local	
bd-winvm-12g	2 vCPU	12 GB	50 GB	1 NIC	Jan 16, 2025, 10:47 AM	adminuser07@ntrnlab.local	
Initial Version	2 vCPU	4 GB	50 GB	1 NIC	Jan 16, 2025, 10:47 AM	adminuser07@ntrnlab.local	

Deploying VM from template

Now that we know how to create templates and create versions from it, next let's go ahead and deploy VMs from a template. You can deploy VMs directly from the template page but it can also be done from the VMs page.

1. From the side-bar menu, select **Compute & Storage** and in that section click on **VMs**.

2. Click on **Create VM from Template**

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The screenshot shows the Nutanix Cloud Platform interface. At the top, there are two buttons: 'Create VM' (blue) and 'Create VM from Template' (red). Below these are filters for 'Is CVM = No' and a search bar 'Type text to filter by'. A message indicates 'Viewing 9 filtered out of 13 total VMs'. A table below lists VMs with columns for Name, vCPU, and other details.

3. Select the Windows template in the drop down and click **Begin**

The screenshot shows the 'Create VM from Template' dialog box. It displays a list of templates with one selected: 'bd-winvm-gold' (marked with a red circle labeled '1'). Below the list, there are fields for vCPU (2 vCPU), Memory (12 GiB), Storage (0 GiB), and Last Updated. At the bottom right, there are 'Cancel' and 'Begin' buttons, with 'Begin' being highlighted with a red circle labeled '2'.

Note

In this case there are no options as to which version to deploy. It will deploy a VM from the active version of this template. If a specific older version is desired, that can be done from the template page.

4. Fill out the following details and click **Next**

- **Name** - Initial -winvm-fromtemplate
- **Cluster** - Your cluster
- **Number of VMs** - 2
- **Starting Index Number** - 0
- Keep rest as defaults

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Name 1
bd-winvm-fromtemplate

Cluster
PHX-TEST003

Number of VMs 2
2

VM Names will be suffixed with sequential numbers [0-1]

Starting Index Number 3
0

Example: web-server-clone-0, web-server-clone-0, and so on...

Guest Customization

Script Type	Configuration Method
No Customization	Custom Script

Advanced Deploy Cancel 4 Next

5. Review the settings and Click **Deploy**

Deploy VM from Template

Configuration

VM Name	bd-winvm-fromtemplate-[0-1]
Cluster	PHX-TEST003
Number of VMs	2
Instance Properties	2 vCPU, 1 Core, 12 GB
Memory Overcommit	Disabled

Resources

Disk

#	Type	Source	Size	Bus Type
1	Disk	-	50 GiB	SCSI.0
2	CD-ROM	-	-	SATA.0
3	CD-ROM	-	-	SATA.1

Networks

Subnet	VLAN ID / VPC	Private IP	Public IP
bd-net	2500	None	None

Security

Boot Configuration: Legacy BIOS Mode: Default Boot Order

Back Cancel Deploy

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Name	vCPU	Memory	IP Addresses	Cluster	Hypervisor	OS	NGT Status	Project	Owner
autoload	2	4 GiB	10.42.254.6	PHX-TEST003	AHV	-	Not Installed	_internal	admin
bd-linuxvm	1	4 GiB	-	PHX-TEST003	AHV	-	Not Installed	_internal	adminuser07...
bd-linuxvm-clone-1	1	4 GiB	-	PHX-TEST003	AHV	-	Not Installed	_internal	adminuser07...
bd-linuxvm-clone-2	1	4 GiB	-	PHX-TEST003	AHV	-	Not Installed	_internal	adminuser07...
bd-winvm	2	4 GiB	-	PHX-TEST003	AHV	Windows Server 2019 Data...	Latest	_internal	adminuser07...
bd-winvm-fronttemplate0	2	12 GiB	-	PHX-TEST003	AHV	-	Not Installed	_internal	adminuser07...
bd-winvm-fronttemplate1	2	12 GiB	-	PHX-TEST003	AHV	-	Not Installed	_internal	adminuser07...
jcb-vm-match	1	4 GiB	-	PHX-TEST003	AHV	-	Not Installed	_internal	admin
LinuxTools	6	10 GiB	10.42.254.8	PHX-TEST003	AHV	-	Not Installed	_internal	admin
no-match-test	1	4 GiB	-	PHX-TEST003	AHV	-	Not Installed	_internal	admin
Prism Central pc.2024.2	22	70 GiB	10.42.254.7	PHX-TEST003	AHV	-	Not Installed	_internal	admin

Migrating a VM Between Hosts

VM live migration is a critical feature for any virtualized environment, allowing VMs to move seamlessly across hosts within a cluster to enable infrastructure maintenance or performance balancing. Let's take a look to see how to do that with AHV and Prism Central

1. On the VM list page, click on the Linux VM `Initial -linuxvm` you created earlier.

Name	vCPU	Memory	IP Addresses	Cluster	Hypervisor	OS
autoload	2	4 GiB	10.42.254.6	PHX-TEST003	AHV	-
bd-linuxvm	1	4 GiB	-	PHX-TEST003	AHV	-
bd-linuxvm-clone-1	1	4 GiB	-	PHX-TEST003	AHV	-

2. Make a note of the host on which the VM is currently running and then click on **More** and click **Migrate**.

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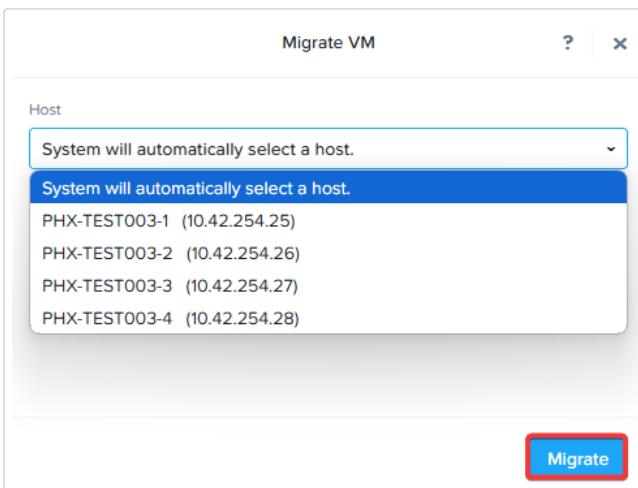
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The screenshot shows the Nutanix Cloud Platform interface. On the left, there's a sidebar with sections like 'Summary', 'Console', 'Recovery Points', 'Alerts', 'Events', 'Metrics', 'NICs', 'Disks', 'Categories', and 'Apps & Re'. In the main area, there's a 'Properties' table for a VM named 'PHX-TEST003'. The 'Host' field shows 'PHX-TEST003-2'. To the right of the table is a 'More' dropdown menu with various options like 'Disable Efficiency Measurement', 'CPU Usage', 'Memory Usage', etc. The 'Migrate' option is highlighted with a red box and a red number '2'.

3. You can either choose one of the other hosts in the cluster as a migration target for the VM or accept the default and let AHV automatically select a location. We will let AHV make the decision for us. Click **Migrate**



4. When the task completes, verify that your VM host location has changed from the host recorded above to the new location.

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The screenshot shows the Prism Central interface for managing a VM. The top navigation bar includes Summary, Console, Recovery Points, Alerts, Events, Metrics, NICs, Disks, and Categories. Below this is a toolbar with options: Update, Delete, Clone, Create VM Template, Launch console, and More. The main area is divided into two sections: Properties and Metrics. The Properties section lists the following details for a VM named 'PHX-TEST003-4' (highlighted by a red arrow pointing to its Host IP value):

Property	Value
Efficiency	-
IP Addresses	-
Description	-
Cluster	PHX-TEST003
Host	PHX-TEST003-4
Host IP	10.42.254.28
vCPU	1
Memory	4 GiB
Memory Overcommit	Disabled

The Metrics section displays performance data:

- CPU Usage: 3.93%
- Memory Usage: 11.17%
- IOPS: 0 IOPS
- IO Latency: 2.82 ms
- IO Bandwidth: 3 KBps

Below the metrics is an Associations section.

With Prism Central and AHV, it is very simple and straightforward to live migrate VMs around the cluster. Next, let's take a look at how to configure affinity policies for VMs so that they can run on only certain hosts.

Affinity Policies

VM-to-Host affinity rules are commonly used to configure VMs to only run on specific hosts. Affinity is typically done either for performance or licensing reasons. AHV can also create VM-to-VM anti-affinity rules in Prism Central (starting with AOS 7.0 and PC 2024.3), commonly used for highly available applications, or when you need to ensure multiple instances of an application do not run on the same node.

To create Affinity Policies in Prism Central, first let's create a category that we will assign to the VMs and hosts that tie them together in the affinity policy. As mentioned before categories are key:value pairs that Prism Central uses to associate with entities and define policies based on the categories.

- From the side-bar menu, select **Administration** and in that section click on **Categories**.

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The screenshot shows the 'Compute & Storage' section of the Nutanix interface. Under 'Operations', the 'Administration' category is highlighted with a red box and a circled '1'. Below it, the 'Categories' section is also highlighted with a red box and a circled '2'.

2. Here you can see the system defined categories already present. Let's go ahead and create a custom category to use for affinity policy we will create. Click **New Category**

Name	Values	Associated Entities	Associated Policies
ADGroup SYSTEM	Default	-	-
AnalyticsExclusion SYSTEM	AnomalyDetection, EfficiencyMeasurement	-	-
AppFamily SYSTEM	Backup, BI-Productivity, Containers, Databases, DevOps, ...	5 Blueprints, 78 Marketplace Items, 3 Apps	-
AppTier SYSTEM	Default	-	-
AppType SYSTEM	Apache_Spark, Default, Employee_Payroll, Exchange, Git...	-	-
CalmApplication SYSTEM	-	-	-
CalmClusterUuid SYSTEM	-	-	-
CalmDeployment SYSTEM	-	-	-
CalmPackage SYSTEM	-	-	-
CalmProject SYSTEM	-	-	-
CalmService SYSTEM	-	-	-
CalmUsername SYSTEM	-	-	-
Environment SYSTEM	Dev, Production, Staging, Testing	-	-
OSType SYSTEM	-	-	-
Quarantine SYSTEM	Strict, Forensic	-	-
Storage SYSTEM	\$Default	3 VMs	1 Storage Policy

3. Fill out the following details and click **Save**

- **Name** - Initial -affinity
- **Purpose** - VM-Host affinity
- **Values** - vm
- **Values** - host

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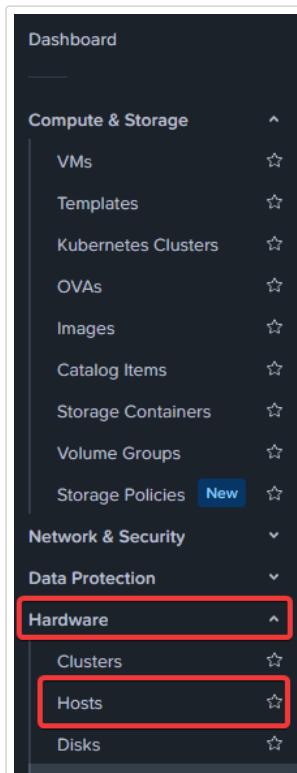
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The screenshot shows a configuration dialog for creating a new affinity policy. Step 1 highlights the 'Name' field containing 'bd-affinity'. Step 2 highlights the 'Purpose' field containing 'VM-Host affinity'. Step 3 highlights the 'Values' field containing 'vm'. Step 4 highlights the 'Values' field containing 'host'. Step 5 highlights the 'Save' button.

4. Next let's assign the categories to entities. First let's assign it to hosts. From the side-bar menu, Click **Hardware** and the click **Hosts**



5. On the hosts page, check the boxes next to the first 2 hosts, click **Actions** and then click **Manage Categories**

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The screenshot shows a list of hosts in the Nutanix Cloud Platform. A context menu is open over two hosts, PHX-TEST003-1 and PHX-TEST003-2. The 'Manage Categories' option is highlighted with a red box. The hosts listed are:

Host	IP Address
PHX-TEST003-1	10.42.254.25/255.25 5.255.128
PHX-TEST003-2	10.42.254.26/255.25 5.255.128
PHX-TEST003-3	10.42.254.27/255.25 5.255.128
PHX-TEST003-4	10.42.254.28/255.25 5.255.128

Note

We select more than one host, so the VM has a place to migrate to in the event of a node failure.

6. Search for the category your created and assign the `initial -affinity:host` value to the hosts and click **Save**

The screenshot shows the 'Set Categories' dialog. It displays a search bar with 'bd' and a list of categories. The category 'bd-affinity: host' is selected and highlighted with a red box. The 'Possible Associated Policies' section is empty.

The screenshot shows the 'Set Categories' dialog after saving. The 'bd-affinity: host' category is now listed in the selected categories section. The 'Possible Associated Policies' section indicates no policies are associated. A 'Save' button is visible at the bottom right.

7. Next, let's do the same thing with our VMs. From side-bar menu go to **VMs** page.

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The screenshot shows the Nutanix Cloud Platform interface under the 'VMs' tab. A search bar at the top left contains 'Is CVM = No'. Below it, a message says '2 selected out of 11 filtered VMs'. A table lists 11 VMs, with the second and third entries ('bd-linuxvm-clone-1' and 'bd-linuxvm-clone-2') circled with red numbers 1 and 2 respectively. To the right of the table is a vertical 'Actions' menu. A red circle with the number 3 is positioned above the 'Actions' button. The menu items listed are:

- Update
- Delete
- Clone
- Create VM Template
- Launch console
- Migrate Across Clusters New
- Enable Memory Overcommit
- Power On
- Disable Efficiency Measurement
- Disable Anomaly Detection
- Protect
- Unprotect
- Create Recovery Point
- Migrate
- Add to Recovery Plan
- Run Playbook
- Manage Categories** (This item is highlighted with a red rectangle)
- Install NGT
- Manage NGT Applications

9. On next screen, do the same thing as above but this time search and assign the `initial - affinity:vm` value to the VMs and click **Save**

The screenshot shows a 'Set Categories' dialog box. On the left, a section titled 'Set Categories' displays a message: 'You have selected 2 VMs. Only showing categories common to all of them and any changes will be applied to all of them.' Below this is a list box containing 'bd-affinity: vm' (with a red circle 1 above it) and 'bd'. On the right, a section titled 'Possible Associated Policies' shows a message: 'The categories you have selected are not associated with any policies.' At the bottom right of the dialog are 'Cancel' and 'Save' buttons, with 'Save' being highlighted by a red rectangle.

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11. Click Create Affinity Policy

You have no Affinity Policies

Affinity policies guarantee that certain VMs run on certain hosts. This is useful for licensing and performance purposes.

Assign categories to VMs and Hosts

Configure policy on these categories

Monitor policy enforcement

Note: Make sure the managed clusters are upgraded to AOS version 6.1 or above

+ Create Affinity Policy

Learn more about the [policy enforcement model](#) and [policy conflict resolutions](#).

12. Fill the following details and click Create

- **Name** - Initial -vm-host-affinity
- **Description** - VM to Host Affinity
- **VM category** - Initial -affinity-vm (It will say 2 VMs)
- **Host category** - Initial -affinity-host (It will say 2 hosts)

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bd-vm-host-affinity

Description: VM to Host Affinity (Optional)

VM Categories (2 Total): bd (3)

Host Categories (2 Total): bd (4), bd-affinity:host (2 Hosts)

Note: For VMs to retain Host Affinity post cross cluster migration or failover, ensure hosts from target cluster(s) are added.

Cancel Create (4)

Note

As part of this, if you have multiple clusters being managed and want to ensure affinity is maintained across clusters after cross-cluster live migration, you would define hosts from multiple clusters as part of the host category

13. Once policy is created, you will see the entities assigned to it and whether it is compliant or not

Name	VMs	Hosts	VM Compliance Status
bd-vm-host-affinity	2	2	✓ 2 Compliant

Modified By: adminuser07@intxlab.local Last Modified: Jan 16, 2025, 04:36 PM

14. Let's power on the VMs and verify it is running on one of the specified affinity hosts you selected within the affinity policy. Click **List**, ensure the 2 VMs are checked, click **Actions** and click **Power On**

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Is CVM = No Type text to filter by

2 selected out of 11 filtered VMs

	Name
<input type="checkbox"/>	autoad
<input type="checkbox"/>	bd-linuxvm
2 <input checked="" type="checkbox"/>	bd-linuxvm-clone-1
3 <input checked="" type="checkbox"/>	bd-linuxvm-clone-2
<input type="checkbox"/>	bd-winvm
<input type="checkbox"/>	bd-winvm-fromtemplate0
<input type="checkbox"/>	bd-winvm-fromtemplate1

Actions 4

- Update
- Delete
- Clone
- Create VM Template
- Launch console
- Migrate Across Clusters New
- Enable Memory Overcommit
- Power On**
- Disable Efficiency Measurement
- Disable Anomaly Detection
- Protect
- Unprotect
- Create Recovery Point

15. Click on the VM names and verify they were powered on the correct hosts that we defined the policies for.

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The screenshot displays two separate VM management interfaces. The top interface shows VM details for 'bd-linuxvm-clone-1' located on host 'PHX-TEST003-1' with IP 10.42.254.25. The bottom interface shows VM details for 'bd-linuxvm-clone-2' located on host 'PHX-TEST003-2' with IP 10.42.254.26. Both interfaces include tabs for Summary, Console, Recovery Points, Alerts, and Events, along with buttons for Update, Delete, Clone, and Create VM Template. The 'Properties' section lists Efficiency, IP Addresses, Description, Cluster (set to PHX-TEST003), Host, and Host IP.

16. Let's now migrate one of the VMs. Click **More** and then click **Migrate**

The screenshot shows the 'More' menu for VM 'bd-linuxvm-clone-2'. The 'Migrate' option is highlighted with a red box. Other options in the menu include Protect, Unprotect, Create Recovery Point, Add to Recovery Plan, Run Playbook, Manage Categories, Install NGT, Manage NGT Applications, Upgrade NGT, Configure VM Host Affinity, Add to Catalog, and Manage Ownership. The main VM details panel below shows the same information as the previous screenshot, including the host and IP.

17. You will see message that VM can only be migrated to some hosts as it is now part of the affinity policy. We will keep the default of letting AHV do it and click **Migrate**

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18. You should see that the VM has now moved to the other host you selected within the affinity policy.

Properties	Value
Efficiency	-
IP Addresses	-
Description	-
Cluster	PHX-TEST003
Host	PHX-TEST003-1
Host IP	10.42.254.25
vCPU	1

High Availability & Dynamic Scheduling

High availability is enabled by default for AHV and will restart VMs in a best-effort manner in the event of a host failure. Additional configuration can set resource reservations to ensure there is available capacity during an HA event.

With the Acropolis Dynamic Scheduler (ADS) service, AHV performs both intelligent initial placement of VMs, and also dynamically migrates VMs to other hosts within the cluster to optimize workload performance. ADS runs by default, and without additional configuration.

A benefit of a Nutanix AHV solution is making VM placement decisions not based solely on CPU/memory congestion avoidance but also on storage performance.

See [here](#) for additional details about the *Acropolis Dynamic Scheduler*.

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intuitive way.

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[← Deploying Workloads](#)

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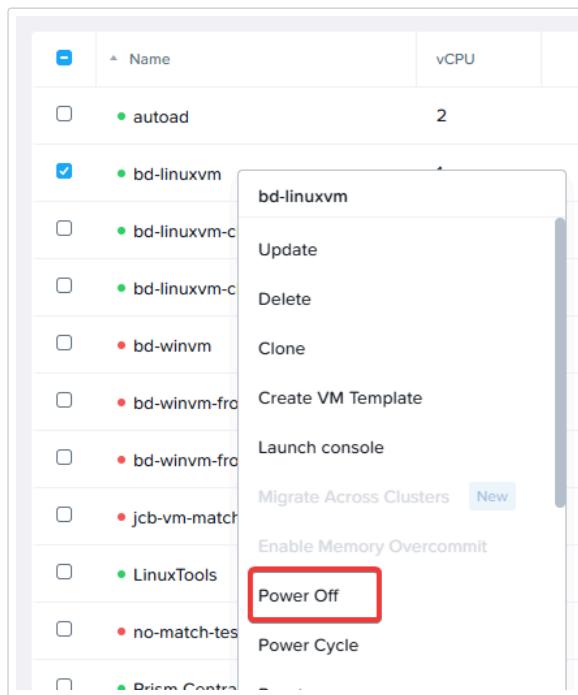
Nutanix provides the ability to perform VM/vDisk-level storage recovery points from Prism Central. Protection Policies are the construct for grouping VMs together where their recovery points are taken together and can also be used for replication.

In this section, you will use Prism Central to create and restore from VM snapshots and create a Protection Policy for your VMs.

VM Recovery Points

Recovery Points are basically snapshots but they are managed from within Prism Central across all clusters managed by PC. They can be replicated on demand to other clusters in environment is needed.

1. From the side-bar menu, under **VMs** (you should know where to find that by now 😊), find the linux VM and make sure it is powered off.



2. Next, right click and click **Create Recovery Point**

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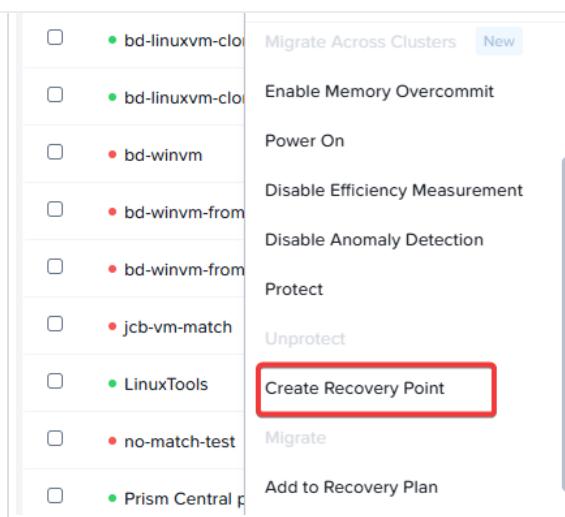
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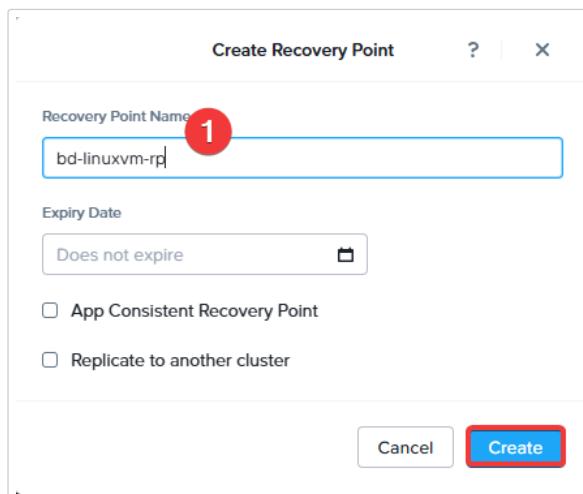
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3. Fill the following details and click **Create**

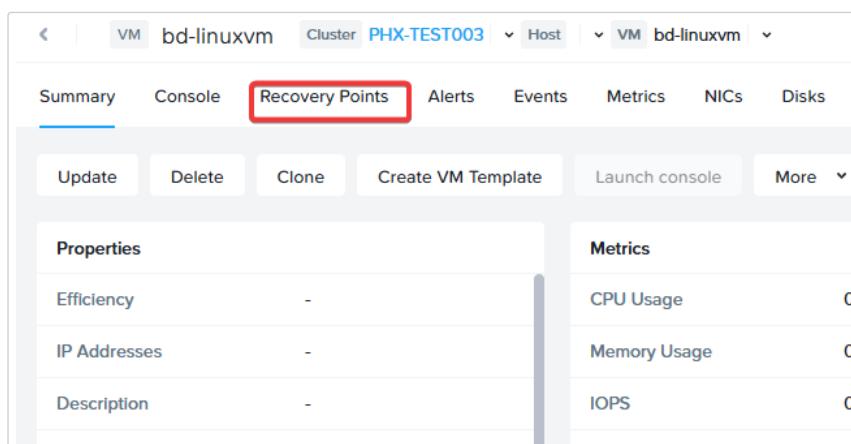
- Recovery Point Name - Initial -linuxvm-rp
- Expire Date - Keep default of does not expire. This means that even if VM is deleted the recovery point for that will not be removed from the system.



Note

App consistent recovery points leverage Nutanix Guest Tools to make the relevant calls to VSS to quiesce the application before taking a recovery point.

4. Click on VM name and then click **Recovery Points**



5. You can see the details of the recovery point we just took.

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Actions ▼							
1 Total Recovery Point(s)							
<input type="checkbox"/> Create Time (Name)	Location	Replicated From	Reclaimable Space	Expiry	Type	Owner	Action
<input checked="" type="checkbox"/> 5:27:49 PM, 16 Jan 2025 (bd-linuxvm-rp)	Local AZ : PHX-TE...	-	0 B	8:41:54 PM, 03 Feb 2093	Crash Consistent	adminuser@07dnrdx ab.local	Edit

Filter 1 1-1 of 1 1

1-1 of 1 1

Now let's break some stuff

6. On **Summary** page for VM, click **Update**

7. On Update VM page, you can either update any of the properties or keep it same and click **Next** and on configuration page under **Disks**, delete the disk by clicking the trash icon. Click **Next** on next few pages and **Save** on the review page to save the updates.

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1 Configuration 2 Resources 3 Management 4 Review

Name
bd-linuxvm

Description
(Optional)

Cluster
PHX-TEST003

VM Properties

CPU	Cores Per CPU	Memory
1 vCPU	1 Cores	4 GiB

Advanced Settings

Cancel **Next**

Update VM

1 Configuration 2 Resources 3 Management 4 Review

Disks

#	Type	Source	Size	Bus Type	Actions
1	Disk	CentOS7.qcow2	20 GiB	SCSI.0	

Flash Mode (for all Disks)

Networks [Attach to Cluster](#)

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Configuration [Edit](#)

VM Name	bd-linuxvm
Description	-
Cluster	PHX-TEST003
Instance Properties	1 vCPU, 1 Core, 4 GB
Memory Overcommit	Disabled
Advanced processor compatibility	Disabled

Resources [Edit](#)

Disks

No disks attached			
-------------------	--	--	--

Networks

Subnet	VLAN ID / VPC	Private IP	Public IP
bd-net	2500	Auto-Assign	None

Security

Boot Configuration	Legacy BIOS Mode: Default Boot Order
--------------------	--------------------------------------

Management [Edit](#)

Categories	None
Timezone	UTC
Agent VM	No

[Back](#) [Cancel](#) [Save](#)

8. On the VM page, Power On the VM, and once its powered on **Launch Console** to the VM. The VM won't power on since we just deleted its disk.

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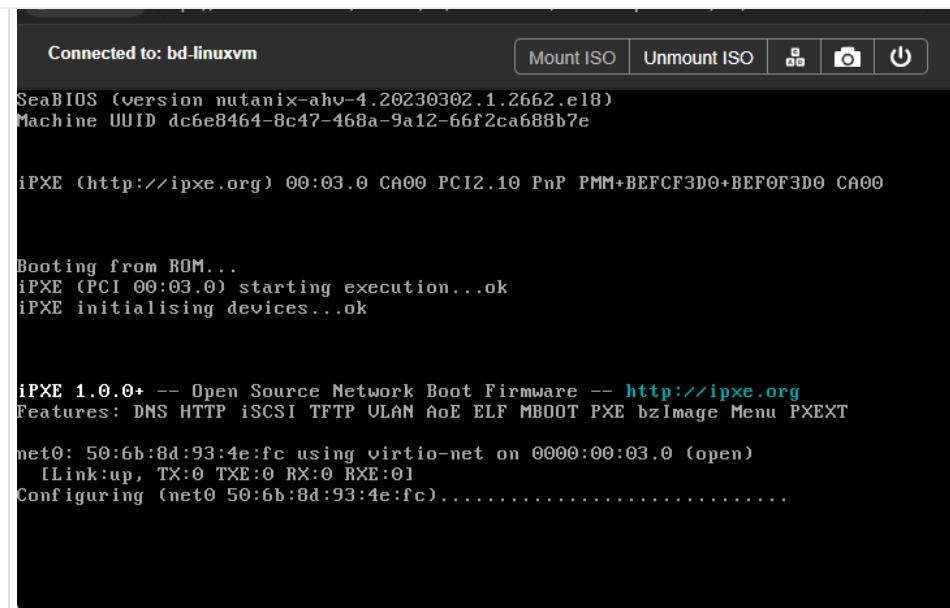
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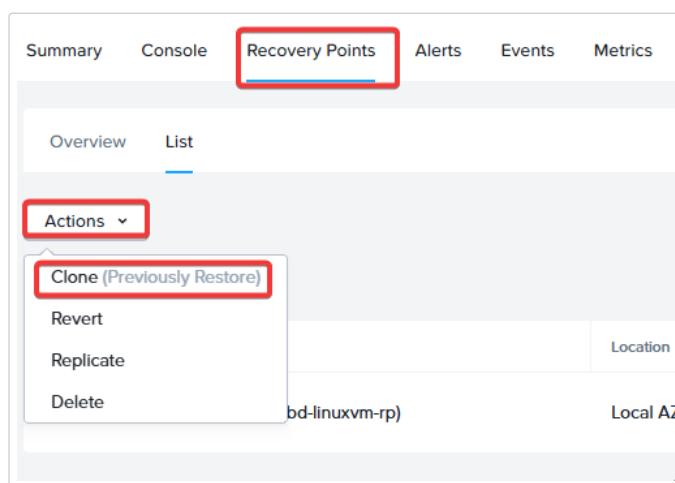
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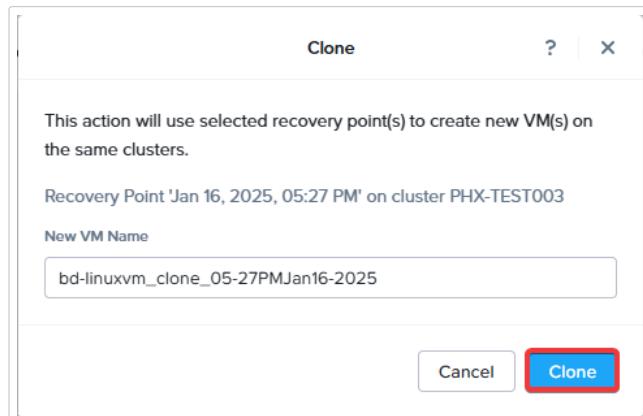
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9. Power off the VM and click on **Recovery Points**. Select the checkbox next to the Recovery Point we created, click **Actions** and click **Clone**



10. This basically restores the VM to this recovery point. In the window that comes up, you can provide a new name for the VM or keep the one suggested with timestamp. Click **Clone**



11. Go back to VMs list page and you will see the VM created with the same configuration that we had. Power ON the VM and open a console to VM and you can see that the VM boots up fine.

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Create VM **Create VM from Template** Actions ▾

Is CVM = No Type text to filter by

Viewing 12 filtered out of 16 total VMs

<input type="checkbox"/>	Name	vCPU	Memory	IP Address
<input type="checkbox"/>	autoload	2	4 GiB	10.42.254.7
<input type="checkbox"/>	bd-linuxvm	1	4 GiB	-
<input type="checkbox"/>	bd-linuxvm-clone-1	1	4 GiB	-
<input type="checkbox"/>	bd-linuxvm-clone-2	1	4 GiB	-
<input type="checkbox"/>	bd-linuxvm_clone_05-27PMJan16	1	4 GiB	-
<input type="checkbox"/>	bd-winvm	2	4 GiB	-
<input type="checkbox"/>	bd-winvm-fromtemplate0	2	12 GiB	-

bd-linuxvm_clone_05-27PMJan16-2025 - Google Chrome

Not secure https://10.42.254.7:9440/console/lib/noVNC-new/vnc.html?path=vnc/vm/af07296c-a97f-4fe2-b145-4dd719d72d76/proxy&title=af07296c-a97f-4fe...

Connected to: bd-linuxvm_clone_05-27PMJan16-2025

Mount ISO Unmount ISO

CentOS Linux 7 (Core)
Kernel 3.10.0-692.3.3.el7.x86_64 on an x86_64
centos login: _

As previously mentioned, Nutanix AOS snapshots use a [redirect-on-write](#) approach that does not suffer from the performance degradation of chained snapshots and are very space efficient.

Protection Policies

Protection policies is a configurable policy that provides a way for automating protection of your entities by taking recovery points based on a schedule. They can be setup to be taken locally and also replicating them to another cluster for disaster recovery. Since we have only 1 cluster, we will do local recovery points, but the workflow is same if you were setting it up for DR as well to a recovery location.

1. We will create another custom category and value that we will use with the protection policy we create. From the side-bar menu, select **Administration** and in that section click on **Categories**.

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The screenshot shows the left sidebar of the Nutanix Cloud Platform. The main categories listed are:

- Compute & Storage
- VMs
- Templates
- Kubernetes Clusters
- OVAs
- Images
- Catalog Items
- Storage Containers
- Volume Groups
- Storage Policies New
- Network & Security
- Data Protection
- Hardware
- Activity
- Operations
- Administration** (highlighted with a red box and circled 1)
- Categories** (highlighted with a red box and circled 2)
- Users
- Roles
- Projects

2. Let's go ahead and create a custom category to use for affinity policy we will create. Click **New Category**

The screenshot shows the 'Categories' list page. At the top, there are two tabs: 'Categories' (selected) and 'List'. Below the tabs, there are two buttons: 'New Category' (highlighted with a red box) and 'Actions'. A search bar below the buttons contains the placeholder 'Type text to filter by'. The main area displays a table titled 'Viewing all 19 Categories' with the following data:

Name	Values
ADGroup SYSTEM	Default
AnalyticsExclusions SYSTEM	AnomalyDetec
AppFamily SYSTEM	Backup, BI-Pro
AppTier SYSTEM	Default
AppType SYSTEM	Apache_Spark

3. Fill out the following details and click **Save**

- **Name** - Initial -protect
- **Values** - local

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1. Name: bd-protect

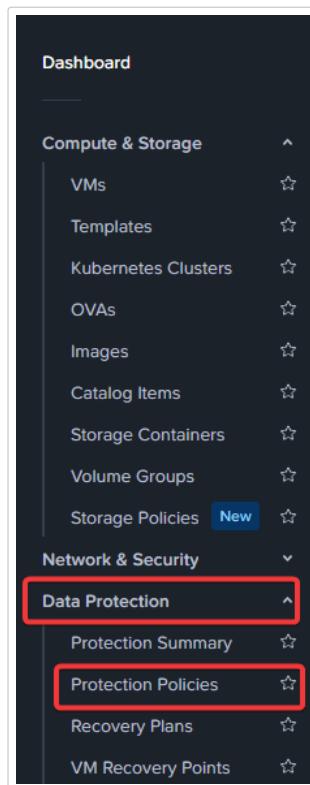
2. Purpose: Purpose of the category

3. Value: local

Value of the category

Cancel Save

4. Now, let's create our protection policy. From side-bar menu, click **Data Protection** and click **Protection Policies**



5. Click **Create Protection Policies**

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Use Protection Policies to automate creation and replication of recovery points by configuring RPO, retention and recovery location.

Global Policies	Entity Centric Protection	Entity Recovery Point
Policies are automatically synced to recovery locations and will protect entities from both the location.	Policies create and replicate recovery points for individual entities. Entities can be protected individually or automatically using categories.	Policies create grouped Entity Recovery Points accumulating all the individual recovery points for the protected entity.

[Try on Test Drive](#) [Create Protection Policies](#)

6. Fill out the following details:

- **Policy Name** - Initial -pp-hourly
- **Primary Location**
 - **Location** - Local AZ (Each Prism Central instance becomes its own Availability zone or AZ)
 - **Cluster** - Your Cluster
- Click **Save**

Protection Policy will be automatically synced to all connected locations and pri

Policy name	bd-pp-hourly	1
-------------	--------------	---

Primary Location

Location	Local AZ
Cluster	PHX-TEST003 x +

2 Save

7. If we had another cluster, under recovery location we would have provided that information. The location can be local AZ or remote AZ depending on if you are using same Prism Central to manage the recovery cluster or a separate Prism Central instance. Click **Cancel**

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8. Let's add the local recovery point schedule. Under Primary, click **Add Local Schedule**

9. Add the following details for the schedule and click **Save Schedule**

- **Hours :** 1
- **Retention Type :** Linear
- **Retention on Local AZ :** 24

The above means that the policy will take a local recovery point for the entities every hour and keep 24 of them on the local cluster deleting the oldest one as it goes past 24 recovery points. Also hover over the ? next to linear and Roll up to understand the differences of the retention types.

Note

Recovery points taken manually are not accounted in the number of recovery points to keep and to delete defined by the protection policy. The manual recovery points or recovery points taken by 3rd party backup solutions will follow their own retention and deletion policies defined

10. Click **Next** in bottom right hand corner

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VMs and VGs only on Primary and Recovery
Location will be protected

1 categories selected

Category Name
bd
<input type="checkbox"/> bd-affinity : host
<input type="checkbox"/> bd-affinity : vm
<input checked="" type="checkbox"/> bd-protect : local

Add Create

11. In the this we will assign the category we created above to this policy. Find the category you created above, check the box next to it and click **Add** and click **Create** on bottom right hand corner

12. Curious minds would be wondering, we assigned the category to the policy but we have not assigned any entity to the category so let's do that now. From side-bar menu, click and go to **VMs**

13. We will assign the category to the 2 Windows VM we deployed from the template. Check the checkbox next to those VMs, click **Actions** and click **Manage Categories**

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Is CVM = No Type text to filter by

2 selected out of 12 filtered VMs

	Name
<input type="checkbox"/>	● autod
<input type="checkbox"/>	● bd-linuxvm
<input type="checkbox"/>	● bd-linuxvm-clone-1
<input type="checkbox"/>	● bd-linuxvm-clone-2
<input type="checkbox"/>	● bd-linuxvm_clone_05-27PMJan16
<input type="checkbox"/>	● bd-winvm
1 <input checked="" type="checkbox"/>	● bd-winvm-fromtemplate0
2 <input checked="" type="checkbox"/>	● bd-winvm-fromtemplate1
<input type="checkbox"/>	● jcb-vm-match
<input type="checkbox"/>	● LinuxTools
<input type="checkbox"/>	● no-match-test
<input type="checkbox"/>	● Prism Central pc.2024.2

- Update
- Delete
- Clone
- Create VM Template
- Launch console
- Migrate Across Clusters New
- Enable Memory Overcommit
- Power On
- Disable Efficiency Measurement
- Disable Anomaly Detection
- Protect
- Unprotect
- Create Recovery Point
- Migrate
- Add to Recovery Plan
- Run Playbook
- Manage Categories
- Install NGT
- Manage NGT Applications

14. These VMs will already have the storage default category applied to them as they were part of template. Search for the protection category we created above, click the "+" to add it and then click **Save**

Set Categories

You have selected 2 VMs. Only showing categories common to all of them and any changes will be applied to all of them.

Possible Associated Policies
For all categories associated with a policy, please go to the policy page.

Policy Type	Policy Name	Applies Because Of
Storage Policy	Default-Storage	Storage: \$Default
Protection Policy	bd-pp-hourly	bd-protect: local

Storage: \$Default

bd-protect: local

bd-affinity: host

bd-affinity: vm

Cancel Save

Note

Another way to manually assign the policy to individual VMs is to right click on a VM and select **Protect** from the options which would then allow you to select the

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15. Once the VMs get assigned to the category which was tied to the protection policy, the VMs will start creating recovery points according to schedule which in our case was immediately. So click on one of the VM names and click **Recovery Points** and you can see the details of the recovery point that was taken.

Location	Replicated From	Reclaimable Space	Expiry	Type	Owner	Action
Local AZ : PHX-TE...	-	0 B	10:46:19 AM, 18 Jan 2025	Crash Consistent	adminuser07@intnlab.local	Details

That's it! You've successfully configured automated data protection for your entities and if you had a remote cluster, similarly disaster recovery can be setup. This was done using native snapshots in AOS and Prism Central without the need for additional software to be installed to take the snapshots and orchestrate its automation. It comes in built into the platform itself to make administrators job easy and seamless

Takeaways

- Nutanix offers data protection solutions for virtual datacenters via different strategies, including one-to-one or one-to-many replication.
- Nutanix provides data protection functions at the VM, file, and volume group level, so VMs and data remain safe.
- VM-level snapshot and replication policies can be managed through Prism Central for any supported hypervisor.

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AOS

Pulse

Prism Element

Prism Central

Node

Block

Storage Pool

Storage Container

Anatomy of a Read I/O

Anatomy of a Write I/O

Nutanix Flow

Application Security Policy

Isolation Environment Policy

Quarantine Policy

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Nutanix Core

AOS

AOS stands for Acropolis Operating System, and it is the OS running on the Controller VMs (CVMs).

Pulse

Pulse provides diagnostic system data to Nutanix customer support teams so that they can deliver proactive, context-aware support for Nutanix solutions.

Prism Element

Prism Element is the native management plane for Nutanix. Because its design is based on consumer product interfaces, it is more intuitive and easier to use than many enterprise application interfaces.

Prism Central

Prism Central is the multi-cloud control and management interface for Nutanix. Prism Central can manage multiple Nutanix clusters and serves as an aggregation point for monitoring and analytics.

Node

An industry-standard x86 server with server-attached SSD and optional HDD (All-Flash & Hybrid Options).

Block

2U rackmount chassis contains 1, 2, or 4 nodes with shared power and fans and no shared backplane.

Storage Pool

A storage pool is a group of physical storage devices, including PCIe SSD, SSD, and HDD devices for the cluster.

Storage Container

A container is a subset of available storage used to implement storage policies.

Anatomy of a Read I/O

Performance and Availability

- Data is read locally
- Remote access only if data is not locally present

Anatomy of a Write I/O

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Anatomy of a Read I/O

Anatomy of a Write I/O

Nutanix Flow

Application Security Policy

Isolation Environment

Policy

Quarantine Policy

Environment Details

Data is written locally

- Replicated on other nodes for high availability
- Replicas are spread across the cluster for high performance

Nutanix Flow**Application Security Policy**

Use an application security policy to secure an application by specifying allowed traffic sources and destinations.

Isolation Environment Policy

Use an isolation environment policy when you want to block all traffic, regardless of direction, between two groups of VMs identified by their category. VMs within a group can communicate with each other.

Quarantine Policy

Use a quarantine policy when you want to isolate a compromised or infected VM and optionally wish to subject it to forensics. You cannot modify this policy, and the two modes to quarantine a VM are Strict or Forensic.

Strict: Use this value when you want to block all inbound and outbound traffic.

Forensic: Use this value when you want to block all inbound and outbound traffic except the traffic to and from categories that contain forensic tools.

AppTier

Add values for the tiers in your application (ex. web, application_logic, and database) to this category and use the values to divide the application into tiers when configuring a security policy.

AppType

Associate the VMs in your application with the appropriate built-in application type such as Exchange and Apache_Spark. You can also update the category to add values for applications not listed in this category.

Environment

Add values for environments that you want to isolate from each other and then associate VMs with the values.

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Environment Details

Nutanix Bootcamps are designed to run within the Nutanix Hosted POC environment. The Nutanix cluster(s) have been provisioned with all necessary images, networks, and VMs required to complete the exercises.

Credentials

Your Bootcamp Instructor or Nutanix representative will provide you with several usernames and unless otherwise stated, they'll all use the same `HPOC-PASSWORD` to access resources.

Usernames fall into two main categories: **HPOC Lab Access** and **Cluster Level Access**

Note

The `HPOC-PASSWORD` is unique to each cluster and will be provided by the leader of the Bootcamp.

HPOC Lab Access Credentials

Lab Access credentials follow a similar pattern and are named after the physical cluster you'll be accessing. For example, clusters residing in our Phoenix data center will have usernames like Based Clusters: `PHX-P0Cxxx-User01` through `PHX-P0Cxxx-User20`

Cluster Access Credentials

Different Services running on the Nutanix cluster could require different usernames but will use the same `HPOC-PASSWORD`.

Credential	Username	Password
Prism Element	admin	HPOC-PASSWORD
Prism Central	admin	HPOC-PASSWORD
Controller VM	nutanix	HPOC-PASSWORD
Prism Central VM	nutanix	HPOC-PASSWORD

Each cluster has a dedicated domain controller VM (AutoAD), responsible for providing AD services for the `NTNXLAB.LOCAL` domain. The domain is populated with the following users and groups:

Group	Username(s)	Password
Administrators	Administrator	HPOC-PASSWORD
SSP Admins	adminuser01-adminuser25	HPOC-PASSWORD
SSP Developers	devuser01-devuser25	HPOC-PASSWORD
SSP Consumers	consumer01-consumer25	HPOC-PASSWORD
SSP Operators	operator01-operator25	HPOC-PASSWORD
SSP Custom	custom01-custom25	HPOC-PASSWORD
Bootcamp Users	user01-user25	HPOC-PASSWORD

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Access Instructions

The Nutanix Hosted POC environment can be accessed in several ways including VPN or VDI connections.

For more details on using these environments or troubleshooting please visit our [HPOC Help Center](#)

Parallels VDI

- PHX Based Clusters Login to: <https://phx-ras.xlabs.nutanix.com>
- RTP Based Clusters Login to: <https://dm3-ras.xlabs.nutanix.com>
- BLR Based Clusters Login to: <https://blr-ras.xlabs.nutanix.com>

Ivanti Pulse Secure VPN

Download the client

- Ivanti Connect Secure - DM3: <https://dm3-vpn.xlabs.nutanix.com>
- Ivanti Connect Secure - PHX: <https://phx-vpn.xlabs.nutanix.com>
- Ivanti Connect Secure - BLR: <https://blr-vpn.xlabs.nutanix.com>

Install the client

In Pulse Secure Client, **Add** a connection:

PHX Example:

- **Type** - Policy Secure (UAC) or Connection Server
- **Name** - X-Labs - PHX
- **Server URL** - phx-vpn.xlabs.nutanix.com

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