VERTIV.

Power Management Application AHV Plugin

Installer/User Guide

The information contained in this document is subject to change without notice and may not be suitable for all applications. While every precaution has been taken to ensure the accuracy and completeness of this document, Vertiv assumes no responsibility and disclaims all liability for damages result from use of this information or for any errors or omissions.

Refer to local regulations and building codes relating to the application, installation, and operation of this product. The consulting engineer, installer, and/or end user is responsible for compliance with all applicable laws and regulations relation to the application, installation, and operation of this product.

The products covered by this instruction manual are manufactured and/or sold by Vertiv. This document is the property of Vertiv and contains confidential and proprietary information owned by Vertiv. Any copying, use, or disclosure of it without the written permission of Vertiv is strictly prohibited.

Names of companies and products are trademarks or registered trademarks of the respective companies. Any questions regarding usage of trademark names should be directed to the original manufacturer.

Technical Support Site

If you encounter any installation or operational issues with your product, check the pertinent section of this manual to see if the issue can be resolved by following outlined procedures.

Visit https://www.vertiv.com/en-us/support/ for additional assistance.

TABLE OF CONTENTS

This page intentionally left blank

1 Product Overview

AHV Plugin is a power management application that enables you to administer Vertiv™ Power Insight UPS data and Nutanix Servers associated with the UPSs.

1.1 Keywords

Abbreviation	Description
AHV	Nutanix Acropolis Hypervisor
CVM	Nutanix Controller VM
UVM	Nutanix User VM
AOS	Nutanix Acropolis OS
VM	Virtual Machine
RF	Redundancy Factor
UPS	Uninterruptible Power Supply
HCI	Hyperconverged Infrastructure

1.2 Features and Advantages

Following are the features and advantages of AHV Plugin:

- Simple deployment using virtual appliance.
- Convenient setup using web application.
- Power Insight integration.
- Nutanix Prism integration.
- Centralized access to UPSs and Nutanix HCI systems for association.
- Automatic graceful shutdown of Nutanix AHV hosts and clusters.

1.3 Compatible Version of AHV and Power Insight

Name	Version
AHV	AOS 6 or above
Power Insight	Power Insight 2.4

1.4 System Requirements

The hardware and network pre-requisites for the installation of AHV plugin are as follows:

1.4.1 Hardware

- Nutanix AHV environment, with at least one cluster and three AHV servers.

- One or more Vertiv UPSs.
- At least one server to run a virtual machine with 2 CPUs, 2 GB memory, and 10 GB hard disk, outside of the AHV Cluster.

1.4.2 Network and ports

- Only IPv4 addresses are supported.
- Plugin must be connected to the same management network where Power Insight application and Nutanix Cluster are running to ensure plugin has access to Power Insight application and Nutanix Cluster at all times.
- Plugin must be installed to run outside of the AHV Cluster it is configured to manage.
- SSH port 22 must be opened on all AHV Hosts and CVMs to ensure Plugin can connect and execute Nutanix acli, ncli, and cluster commands remotely.
- HTTPS port 8443 (or any custom port) must be opened on Power Insight server and network to ensure plugin can make REST API calls and retrieve UPS details successfully.
- HTTPS port 9440 must be opened on CVMs and network to ensure plugin can make REST API calls and retrieve AHV Cluster and Host details from Prism successfully.

1.4.3 Integration

- Nutanix Prism Central and Prism Element are supported.
- Plugin establishes SSH connections with AHV Hosts and CVMs to perform graceful shutdown and authenticates using trusted SSH public key and *Nutanix* user. When connected with Host, SSH user *Nutanix* must have permission to shutdown hypervisor. When connected with CVM the SSH user *Nutanix* user must have permission to shutdown UVMs, initiate maintenance mode, stop cluster and shutdown CVM.
- Nutanix AHV 1-Node, 3-Node, and 5-Node clusters are supported. 1-Node cluster is supported in RF1 configuration while 3-Node and 5-Node clusters are supported in both RF2 and RF3 configurations.
- Nutanix Pinned UVMs or non-migratable UVMs are always shutdown during a graceful shutdown of AHV Host.
- Plugin registers with Power Insight application for receiving alarms and invokes REST APIs during its operation to retrieve UPS IDs, UPS names, and UPS metrics. Permission to carry out these actions are assigned to admin user, by default. Credentials of admin user or any other users with necessary permissions are required for plugin to work.

2 Installation

The instructions in this chapter will help you to download and install the AHV plugin.

2.1 User Account Registration

If the power management AHV plugin is your first time downloading Vertiv software, you need to register first on the Vertiv software download portal. Once registration is complete you will be able to download and install the latest version of the application.

To register new users, follow the below steps:

1. Go to www.vertiv.com in the web browser.
1. Click *My Account Login* at the right top corner of the page.
2. Click *Create an account*.
3. Create your Vertiv account page will appear on screen.
4. To create an account, enter the mandatory field details.
5. Once you have entered all the necessary details and then click *NEXT STEP* button.
6. Click the checkbox to confirm that you not a robot.
7. Click the checkbox to agree to the conditions of Vertiv's use and privacy policy.
8. Click *CREATE AN ACCOUNT*.
9. Welcome message will appear on screen.
10. In order to complete the process follow the instructions mentioned on screen to verify the email address or else click *Continue Browsing*.

To download the AHV Plugin application, follow the below steps:

1. Click *Products & Services* at the top of the page.
2. Click *Software* under Monitoring & Management.
3. List of software appears on screen, search and click on *Vertiv™ Power Insight*.
4. Scroll down and click on *Documents & Downloads* tab.
5. Search for Software and click on *Software Download: Vertiv™ Power Insight Application*.
6. You will get the list of associated software and firmware.
7. Follow the instructions mentioned on screen to start the software download. Once the application is downloaded, you can install the power management application.

NOTE: AHV Plugin application is available in virtual appliance format (.ova). An OVA file is an archive file in tar format.

2.2 Power Management AHV Plugin Installation

Install Plugin in Nutanix Prism Element web console to generate a virtual machine and set the virtual machine IP address manually or automatically.

NOTE: Plugin should not be installed on the same AHV Cluster it is configured to manage.

NOTE: Ensure that you have downloaded the Plugin installation package from the www.Vertiv.com website.

To create a AHV Plugin VM from download OVA file, follow the below steps:

Figure 2.1 Extracting Files from OVA

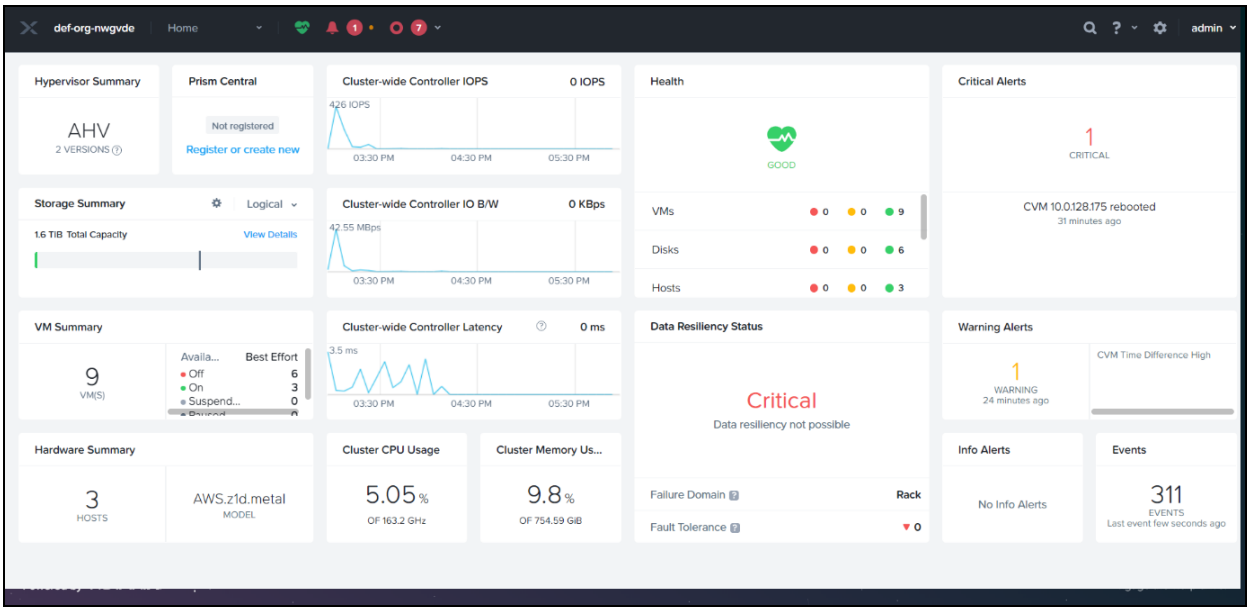
1. Extract files from the downloaded OVA file (an archive in tar format).

NOTE: 7-Zip is one of the popular tools used to extract files from an OVA.

Figure 2.2 Checking Virtual Machine Settings

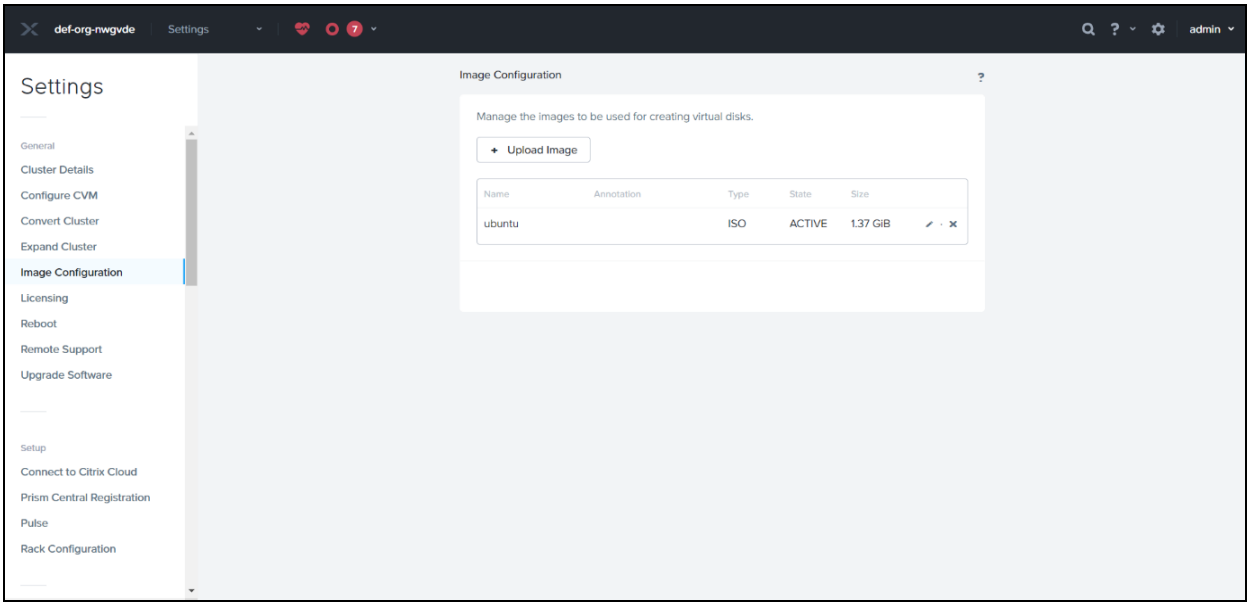
2. The OVA file has a .OVF file (XML format). Open the .OVF file in a text editor and check VM settings such as CPU, memory.

Figure 2.3 Uploading VMDK File in Prism Element Console



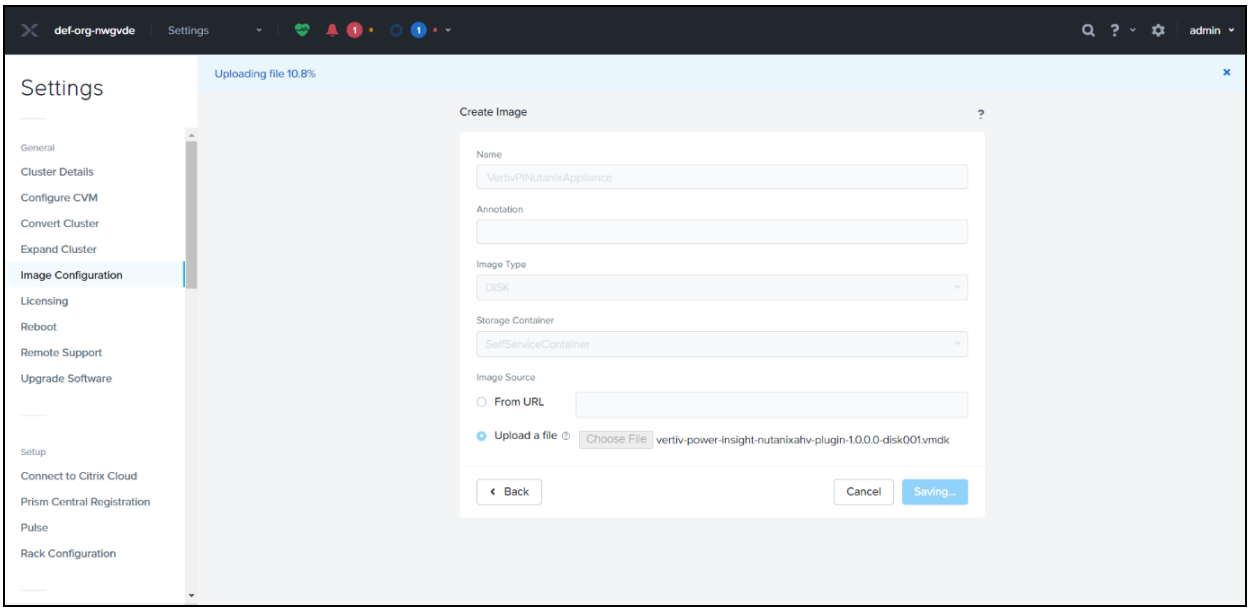
3. The OVA file also has a .VMDK file (disk image). Upload the VMDK file by using Nutanix Prism Element web console by clicking the *gear icon* in top right corner.

Figure 2.4 Opening Image Upload Screen



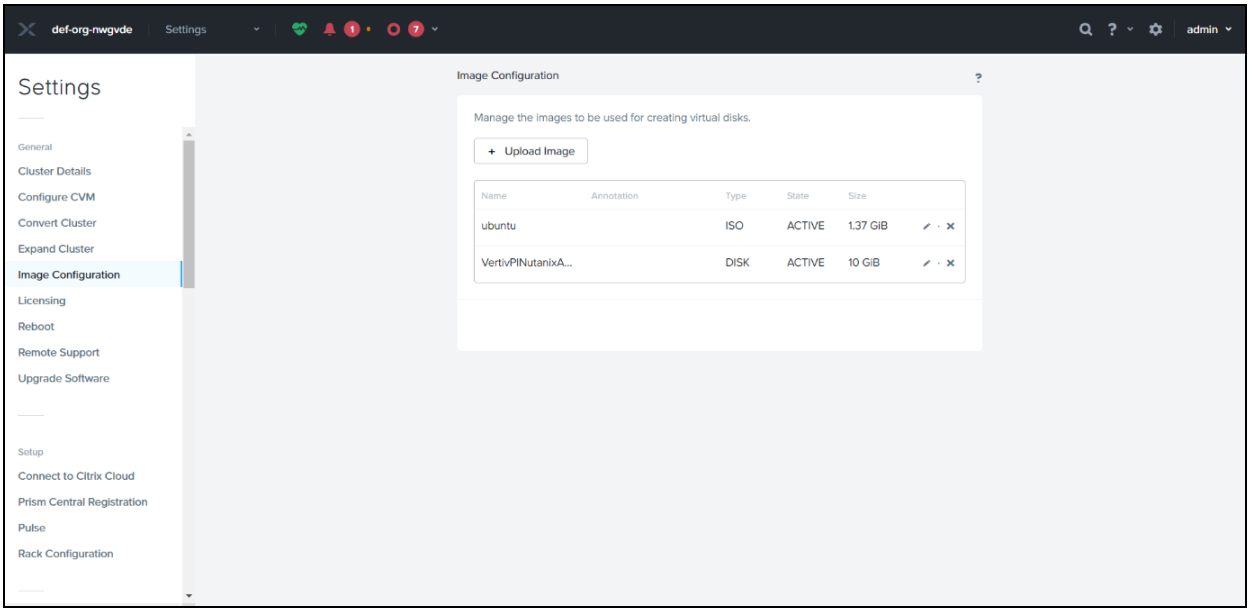
4. Click *Image Configuration* and in the Image Configuration screen, click *+ Upload Image*.

Figure 2.5 Starting Image Upload



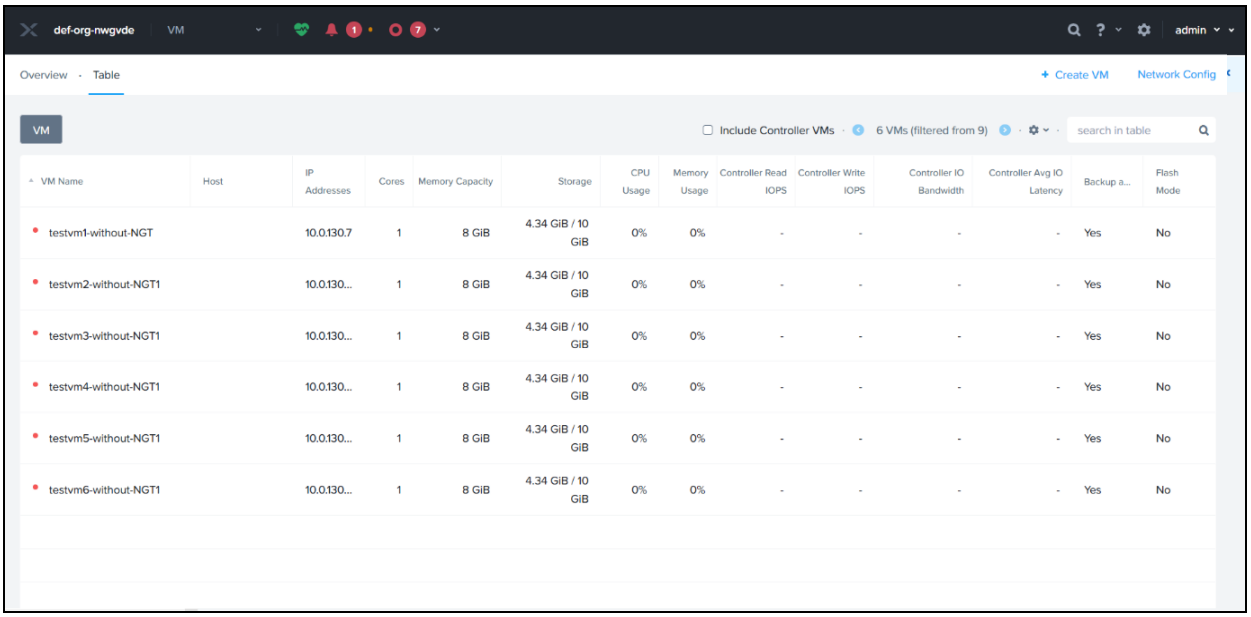
5. In the Create Image screen, specify the necessary details. Select *DISK* in the *Image Type* drop-down list, browse and select your *VMDK file* for upload and Click *Save*. This will initiate image upload.

Figure 2.6 Viewing Uploaded Image



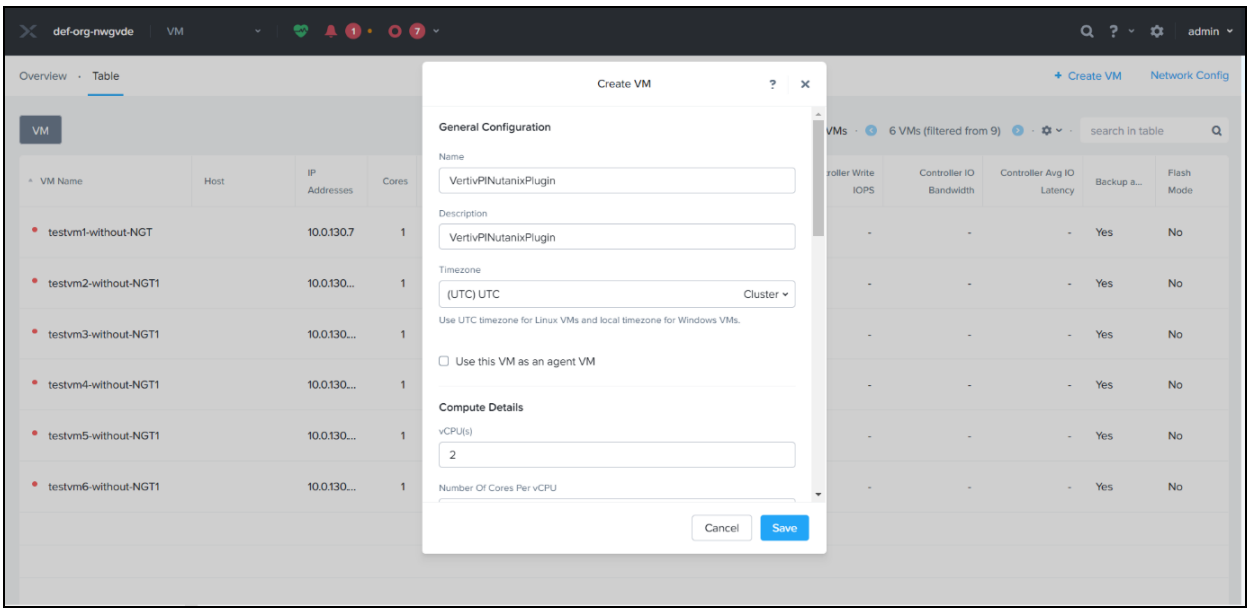
6. When upload is 100% complete, Create Image screen closes automatically and the uploaded image appears in the Image Configuration.

Figure 2.7 Opening Create Virtual Machines Screen



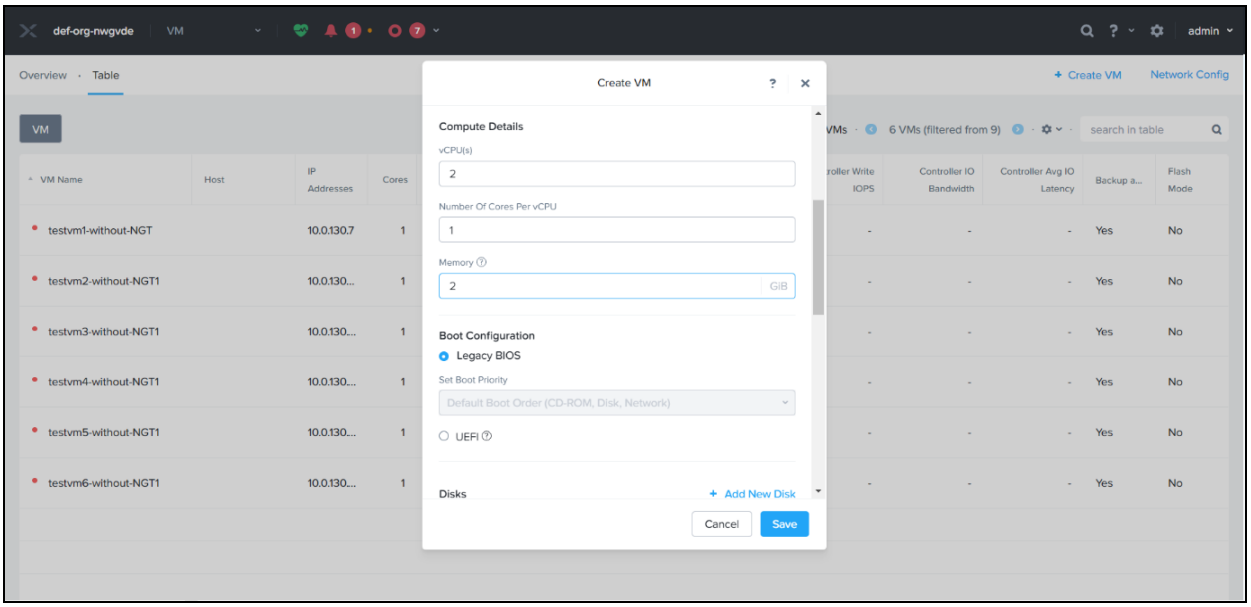
7. Open VM screen and select Table format. This page displays any VMs already created and some details for each VM. In top right corner, click on *+ Create VM*.

Figure 2.8 Entering Name for the VM



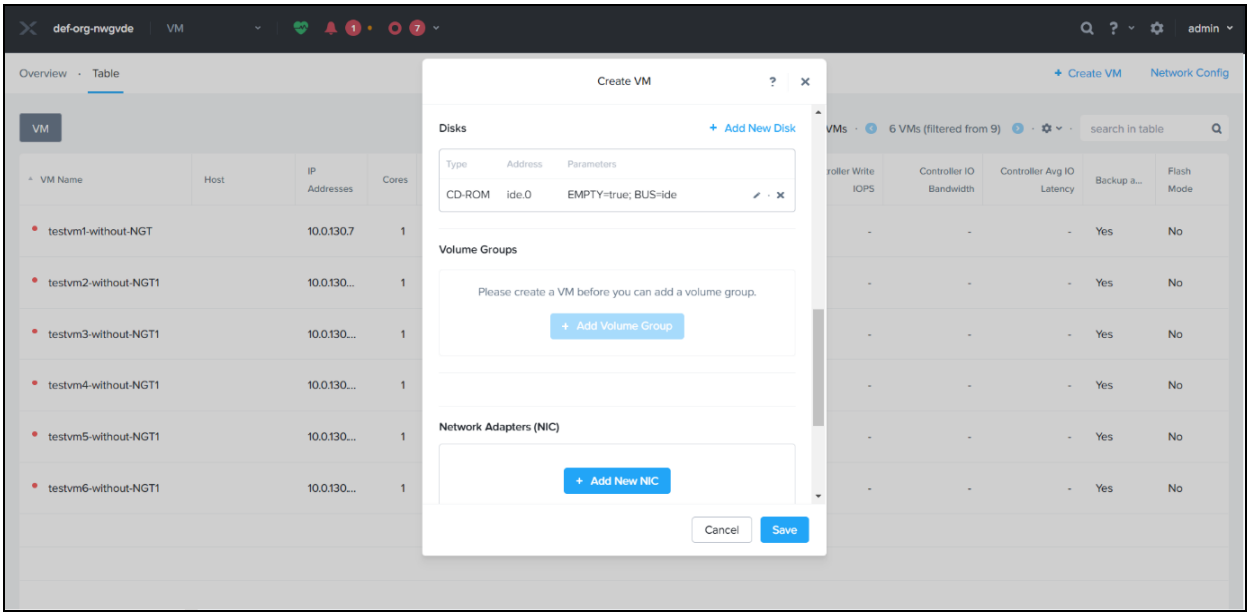
8. Enter name for the VM.

Figure 2.9 Entering VM Settings



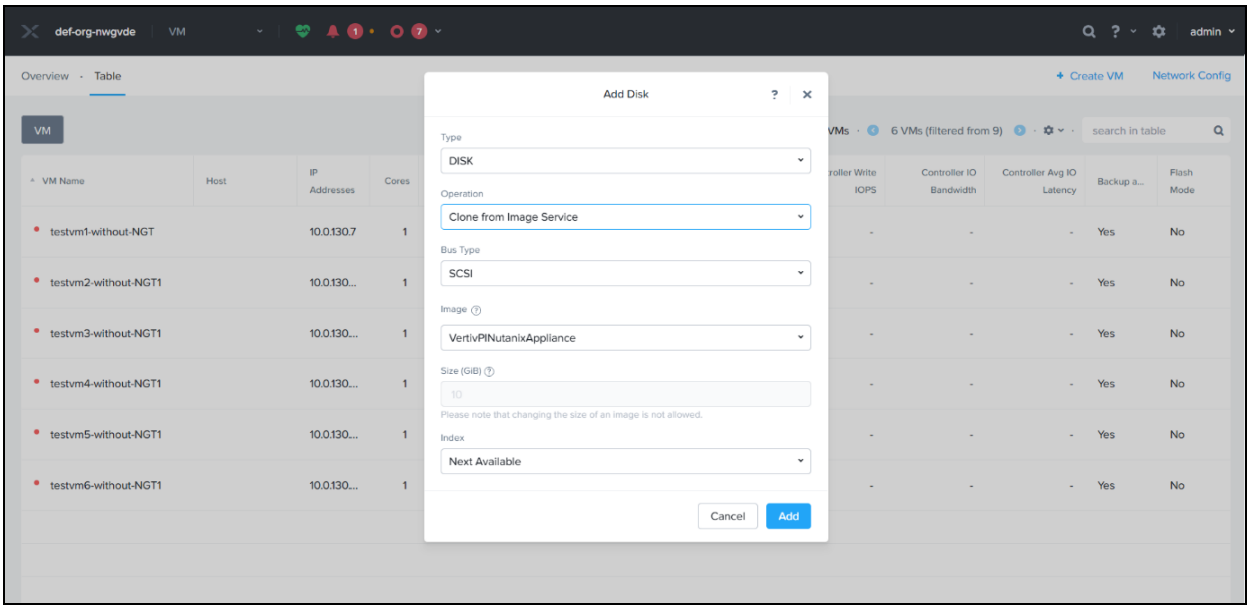
9. Enter values for CPU, memory and other settings similar to the settings in the .OVF file from Step 2.

Figure 2.10 Adding New Disk



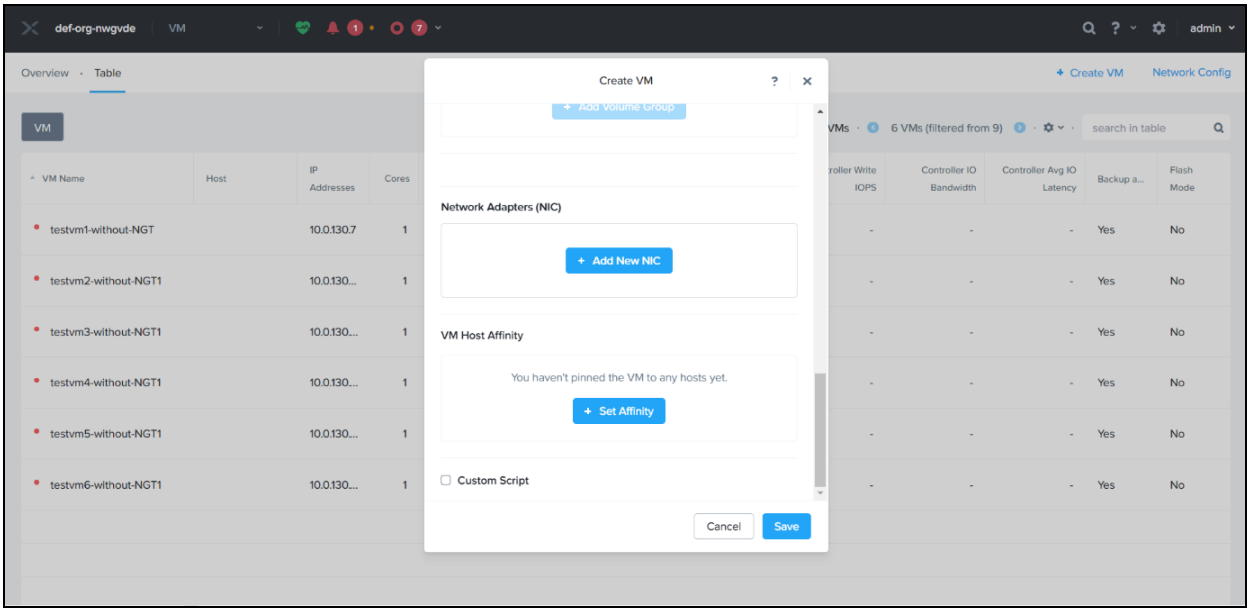
10. Click *+ Add New Disk*.

Figure 2.11 Setting Up New Disk



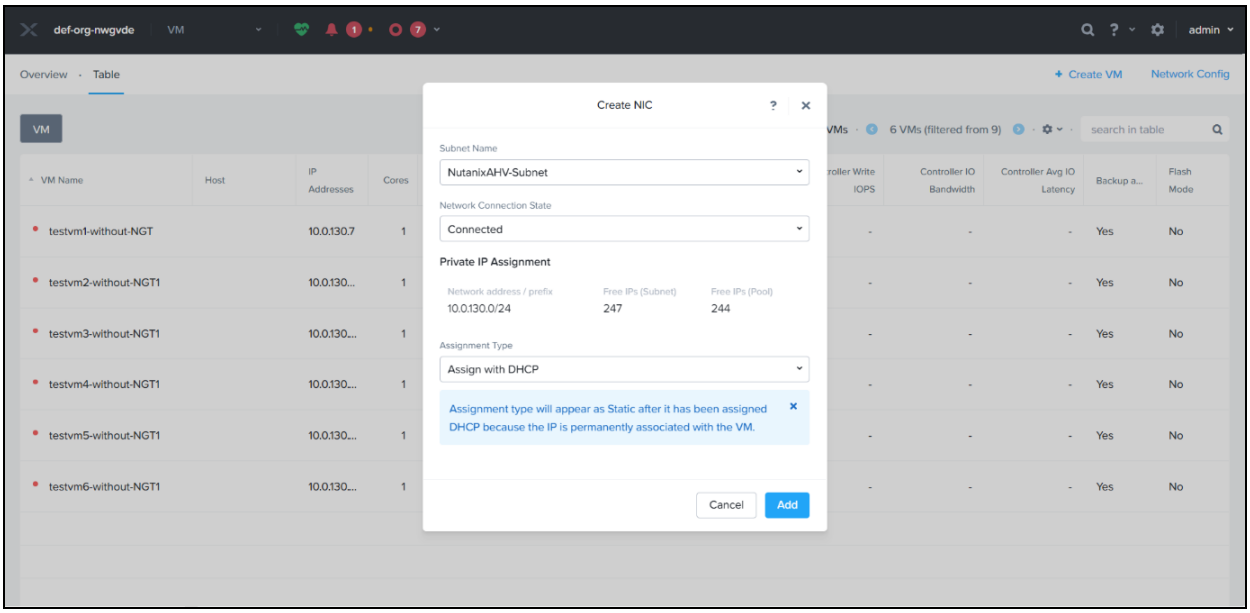
11. Select *Clone from Image Service* from the Operation drop-down list, *DISK* from *Type* drop-down list and Image that you uploaded in Step 3 .
12. Click *Add*.

Figure 2.12 Adding New NIC



13. You are back in Create VM screen. Scroll down and click *+ Add New NIC*.

Figure 2.13 Setting Up Network

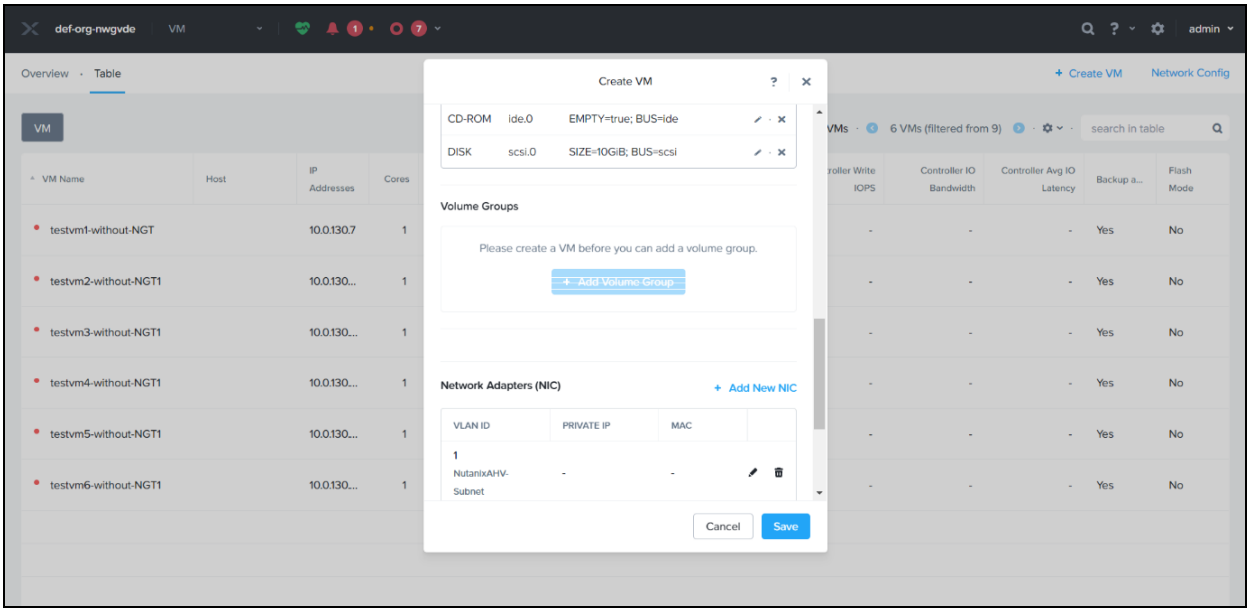


14. Select the subnet for AHV Plugin VM and let DHCP assign an IP address or manually enter IP configuration.

NOTE: Ensure you choose a subnet that gives AHV Plugin VM access to Nutanix AHV management network.

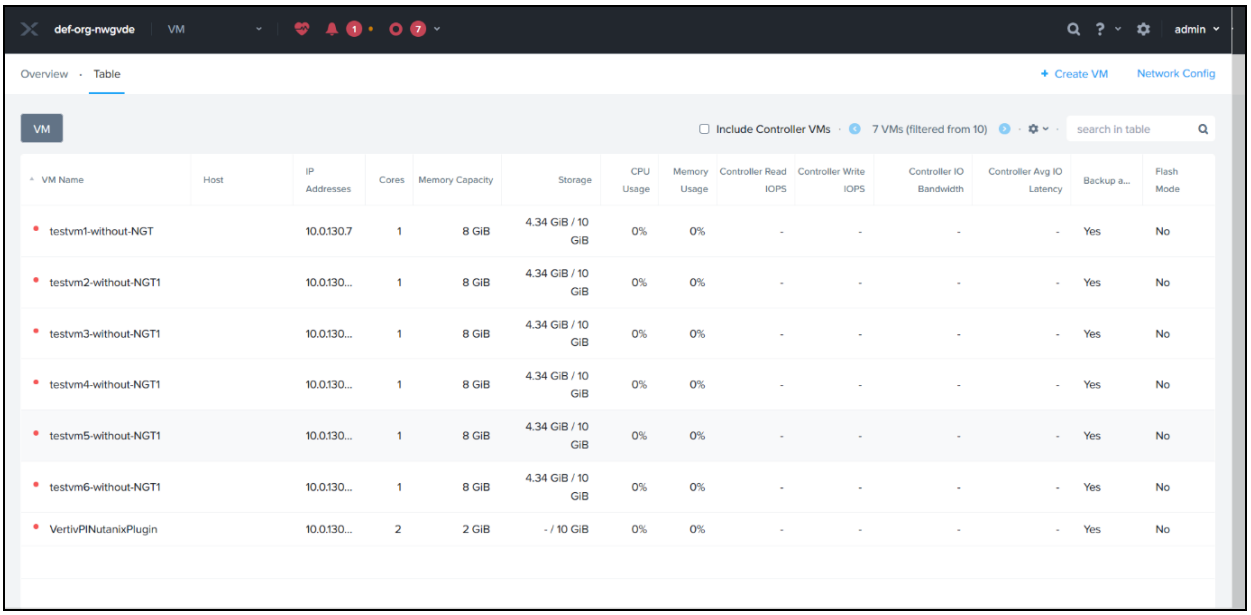
15. Click *Add*.

Figure 2.14 Viewing Network Adapters



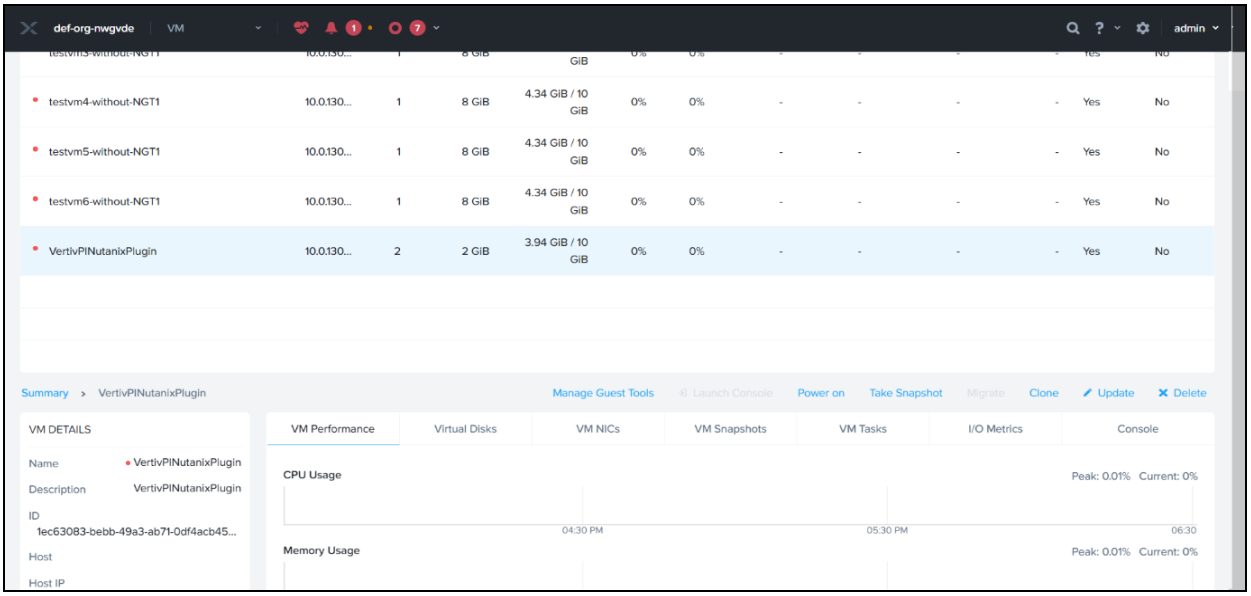
16. You are back in Create VM screen and the new NIC is displayed under Network Adapters.

Figure 2.15 Viewing Created VM



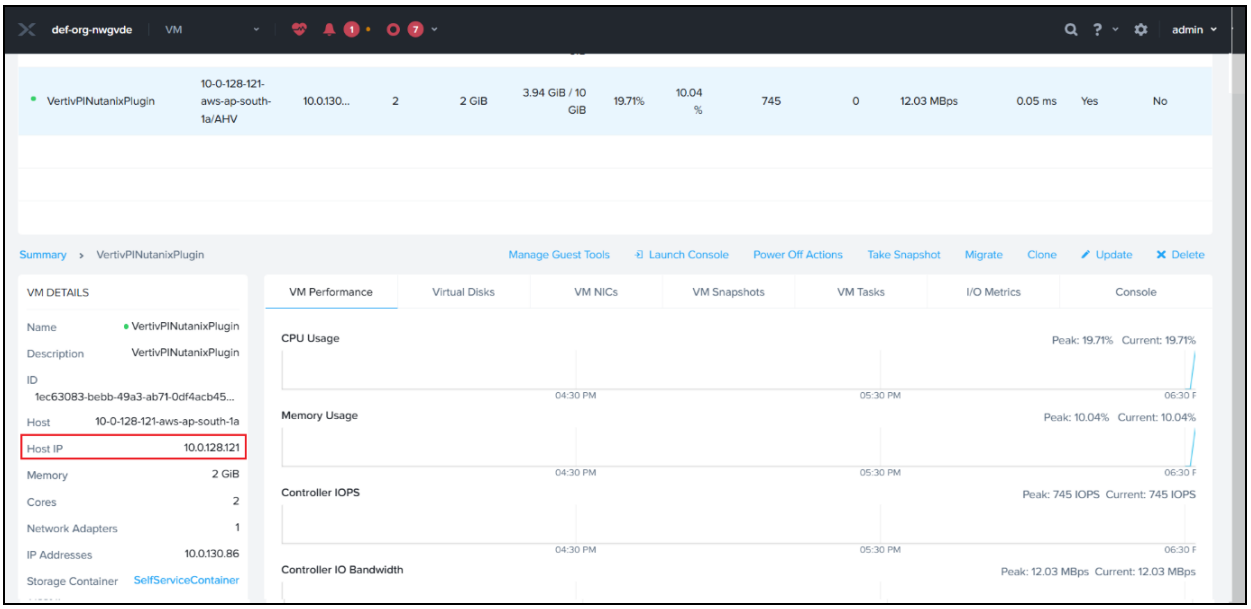
17. Click *Save* to create the VM. In few moments, new VM will be displayed in table.

Figure 2.16 Powering on VM



18. Click the new VM name and scroll down until you see VM actions.
19. Click *Power on* and wait for few seconds.

Figure 2.17 Noting VM IP Address and Launching Console



20. When VM starts running Power on option disappears and Power Off Actions and Launch Console options appear.

NOTE: At this point you may click *Launch Console* to check whether VM boot process is complete and Ubuntu server login prompt is displayed. When Ubuntu server login prompt appears, AHV Plugin VM is ready and AHV Plugin web application can be launched.

21. Make note of the VM IP address in Prism Element UI.

3 Application Usage

The instructions in this chapter describe the screen elements of the User Interface (UI).

3.1 Overview

AHV Plugin enables Nutanix Administrators to configure and automate graceful shutdown actions on Nutanix AHV hosts and clusters, based on automatic event triggers (alarms) from Vertiv Power Devices such as low battery level of UPS.

To setup AHV Plugin, follow the steps below:

1. Open AHV Plugin UI and sign in with default credentials.

NOTE: It is recommended to change the default password on first login.

2. Setup integration with Nutanix Prism management platform (Prism Element or Prism Central). This allows AHV Plugin to discover and gather details on AHV hosts, clusters and CVMs.
3. Setup integration with Power Insight application. This enables Power Insight application to send alarms to AHV Plugin.
4. Associate UPSs with each AHV host in the clusters you would like to manage. AHV Plugin uses these details to determine specific AHV Hosts where graceful shutdown actions must be performed, upon receipt of an alarm.
5. Copy SSH public key from AHV Plugin VM and add in Prism management console to allow SSH connectivity between AHV Plugin and AHV hosts and CVMs.
6. Verify SSH user *nutanix* is available on AHV hosts and CVMs. AHV Plugin uses *nutanix* user when establishing SSH connections with AHV hosts and CVMs for graceful shutdown management.

At this point AHV Plugin is setup to receive alarms and perform graceful shutdown actions.

WARNING! Once UPS associations are setup, these stay in AHV Plugin database forever. If you wish to change the Prism settings and integrate AHV Plugin with a different Prism server, it is highly recommended that you assess implications of the change because this can have an impact on graceful shutdown of AHV Hosts. When Prism settings are changed to point to a new Host, the previous associations are not removed and stay as is.

If you no longer with to perform graceful shutdown management of AHV Hosts in a cluster and remove these from management by AHV Plugin, select the corresponding Cluster and remove all associations from all Hosts. Click *Apply* when done. All associations are removed from AHV Plugin database and the Cluster is reverted to unmanaged state.

AHV Plugin database name is vertivpluginb and table names where associations are stored are hosts and hostpdassociation respectively.

Graceful shutdown actions are performed in response to the following four alarms received from Power Insight application:

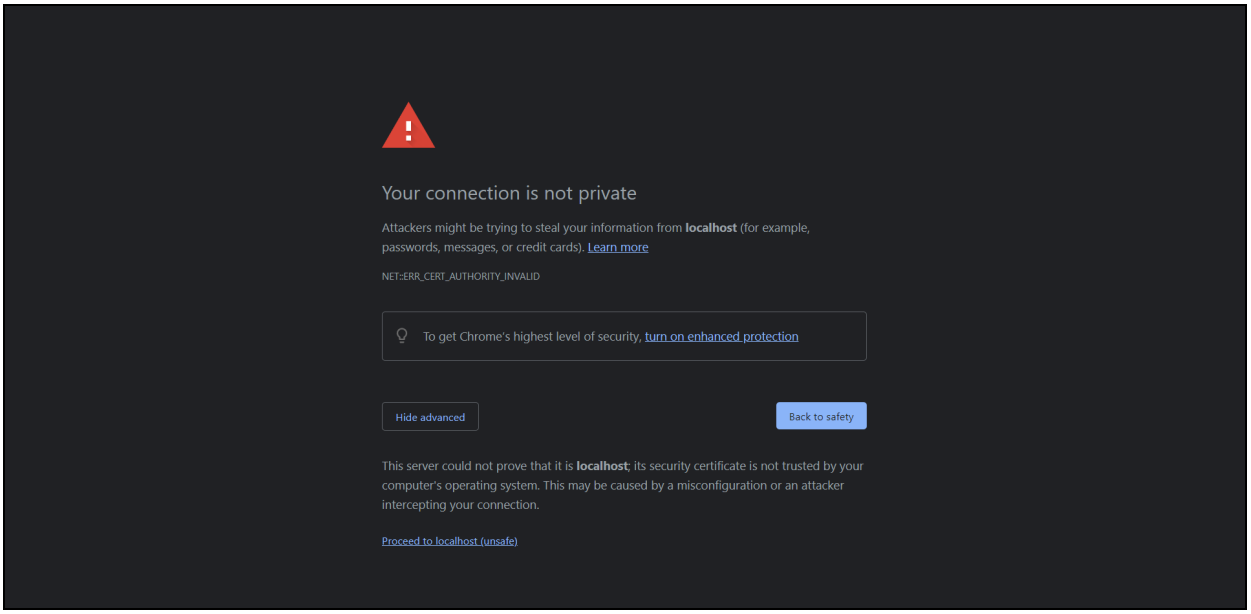
- Trigger Event from UPS - UPS on Battery (Automatic or Manual)
- Trigger Event from UPS - UPS Low Battery (Automatic or Manual)
- Trigger Event from UPS - UPS Overload (Automatic or Manual)
- Trigger Event from UPS - UPS Over Temperature (Automatic or Manual)

3.2 Plugin Login

To login, follow the below steps:

1. Open a web browser and enter the Plugin IP address to access Plugin UI. For example, if Plugin VM IP address is *1.1.2.2* then open https://1.1.2.2/ in web browser to access login page. Since AHV Plugin is setup to use self-signed certificates, this generates a security warning.
2. Click *Proceed to localhost (unsafe)* to launch AHV Plugin login page.

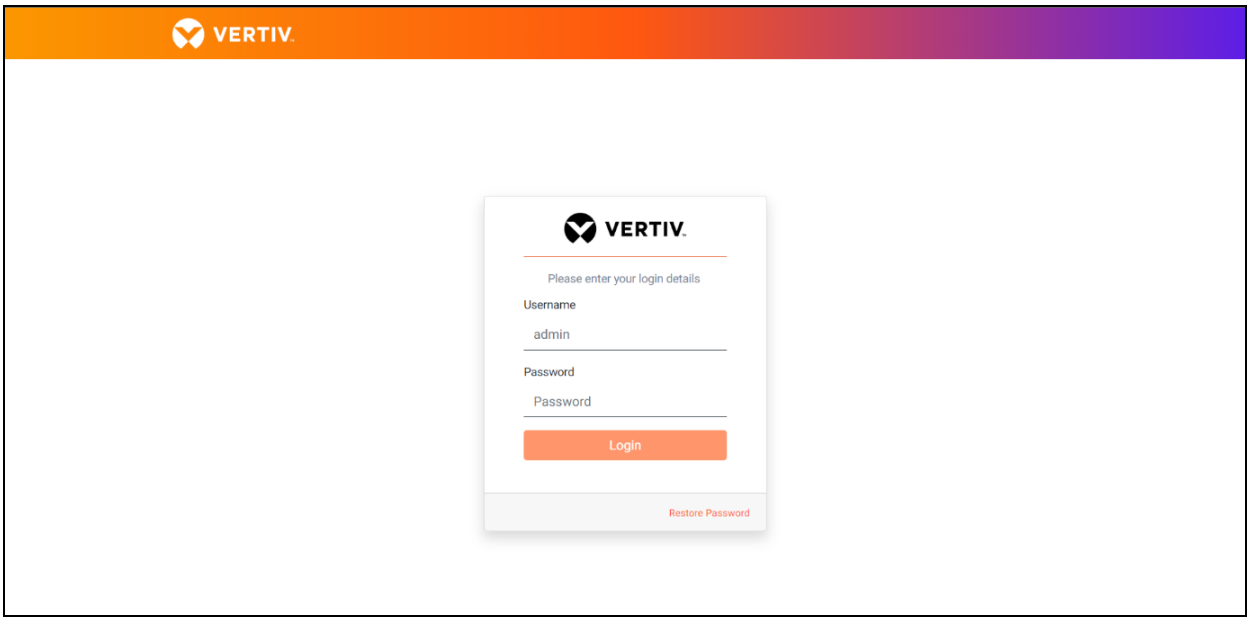
Figure 3.1 Launching AHV Plugin



3. Once login page is displayed, enter default user name and password and then click *Login*. The default login credentials are:
    a. User name: admin
    b. Password: vertiv-pi

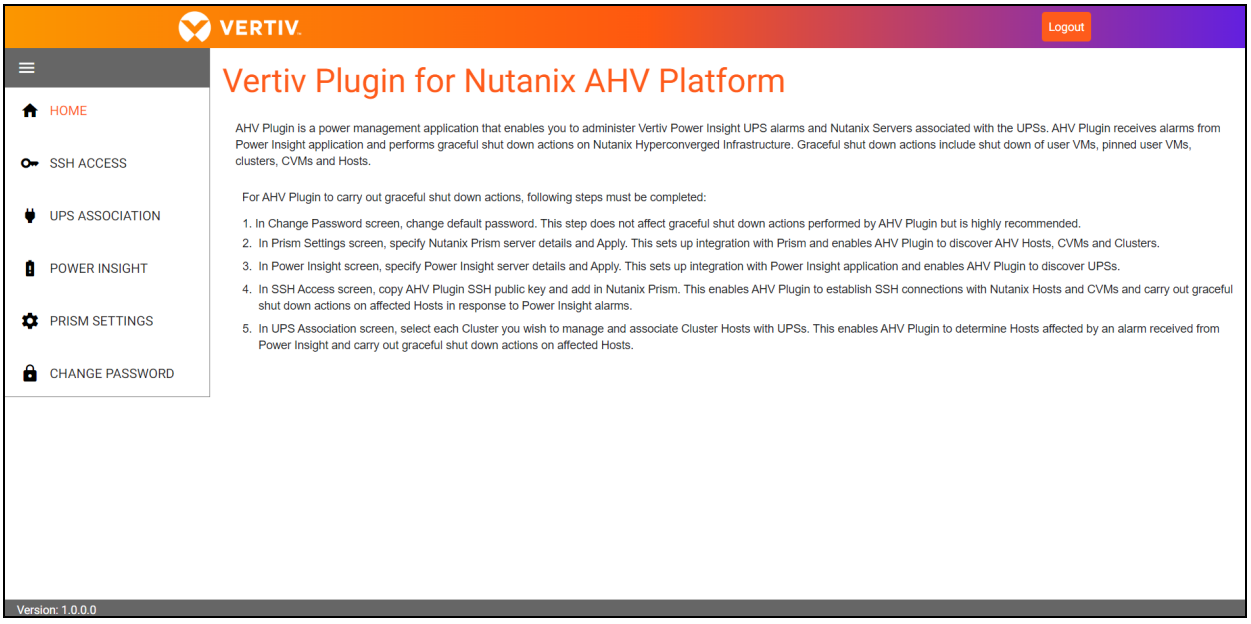
NOTE: It is recommended to change the default password on first login.

Figure 3.2 Plugin Login Page



4. Successful login opens AHV Plugin Home Page. Configuration options are displayed in vertical menu on the left side of the screen, *Logout* button on top right and plugin version number in footer section.

Figure 3.3 Home Page



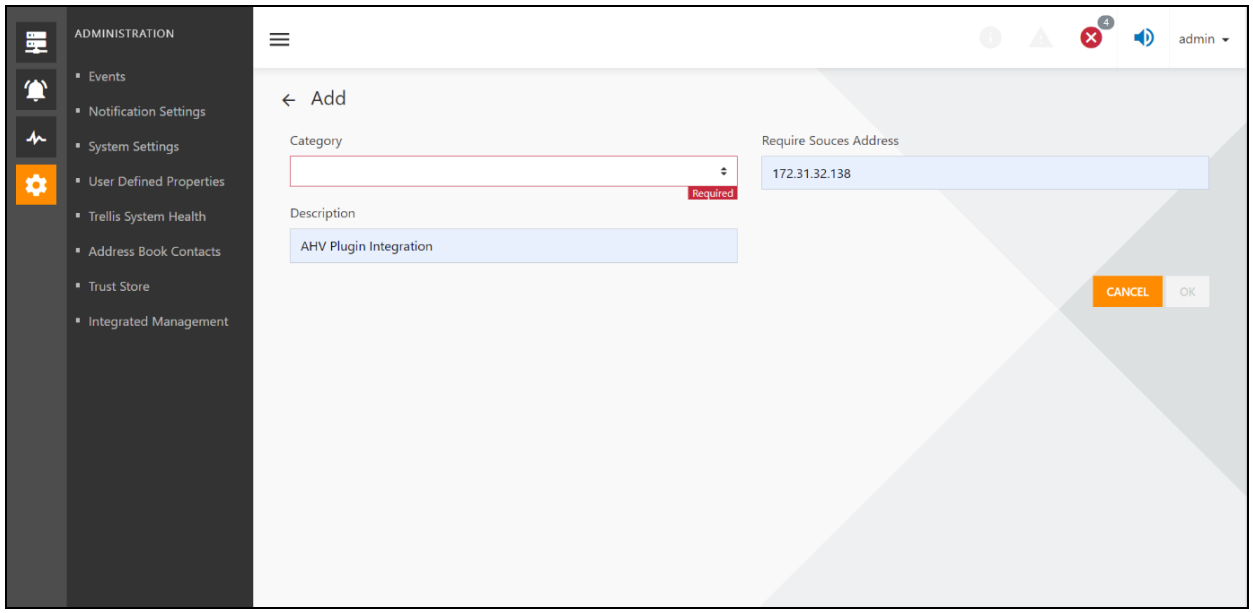
3.3 Power Insight Integration

1. Integration with Power Insight application enables AHV Plugin to achieve the following:

- Receive UPS alarms from Power Insight.
- Make REST API calls to Power Insight to retrieve list of UPSs and UPS metrics.

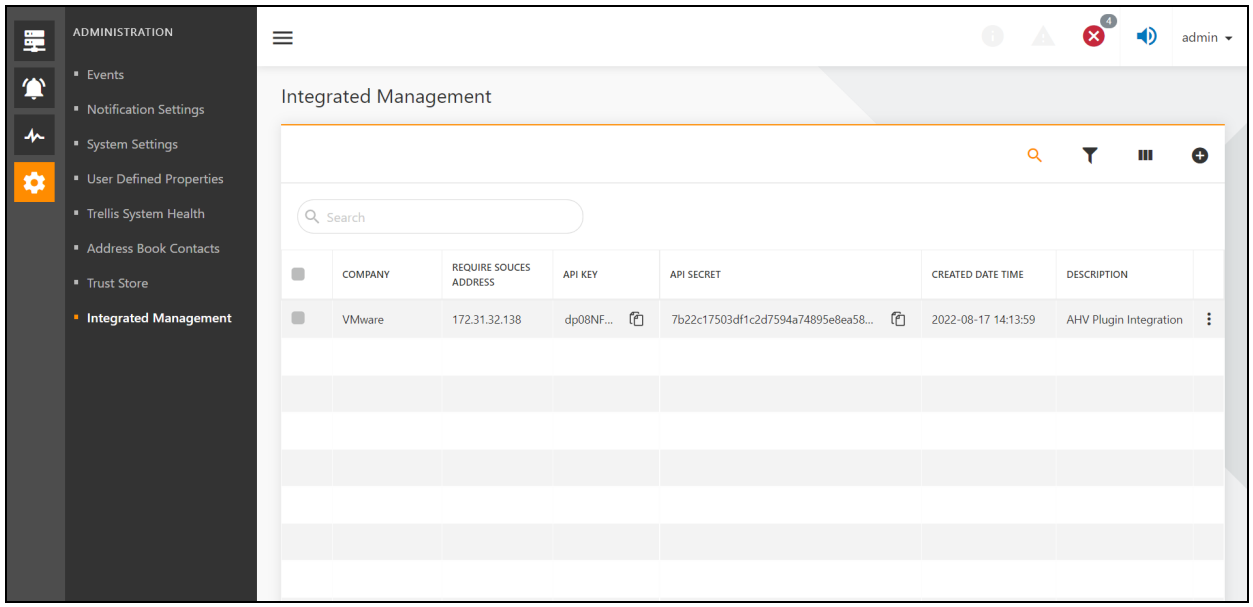
- To complete this step, user must create API key and secret in Power Insight application and copy the details over to AHV Plugin UI. In Power Insight application, browse to Settings and open Integrated Management section. Click the *plus (+) icon* to open the Add page. Choose the category corresponding to Nutanix AHV integration, enter IP address of your AHV Plugin VM in *Require Source Address* and enter a meaningful description.

Figure 3.4 Power Insight API Key and Secret



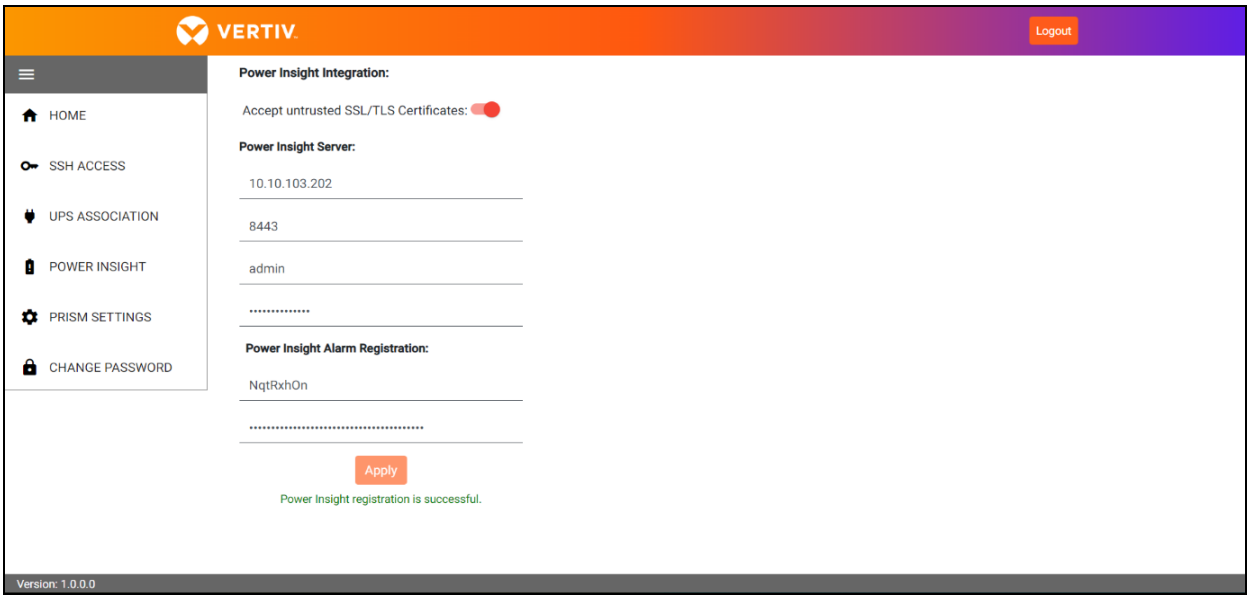
2. Save the settings. Power Insight application will generate a unique API key and secret for you.
3. Make note of API key and secret.

Figure 3.5 Integrated Management



4. In AHV Plugin UI, open Power Insight Integration tab. Enter IP address, port of the VM where Power Insight application is running as well as user name and password that will allow AHV Plugin to authenticate with Power Insight and make REST API calls.
5. Enter API key and secret you copied from Power Insight Integration Management section under Power Insight Alarm Registration to register AHV Plugin with Power Insight application for receiving alarms.
6. Click *Apply*.

Figure 3.6 Power Insight Integration



3.4 Nutanix Prism Integration

Nutanix Prism is the centralized management solution for Nutanix environments.

Prism Element is a service built into the platform for every Nutanix cluster deployed. It provides the ability to fully configure, manage, and monitor Nutanix clusters but only manages the cluster it is part of.

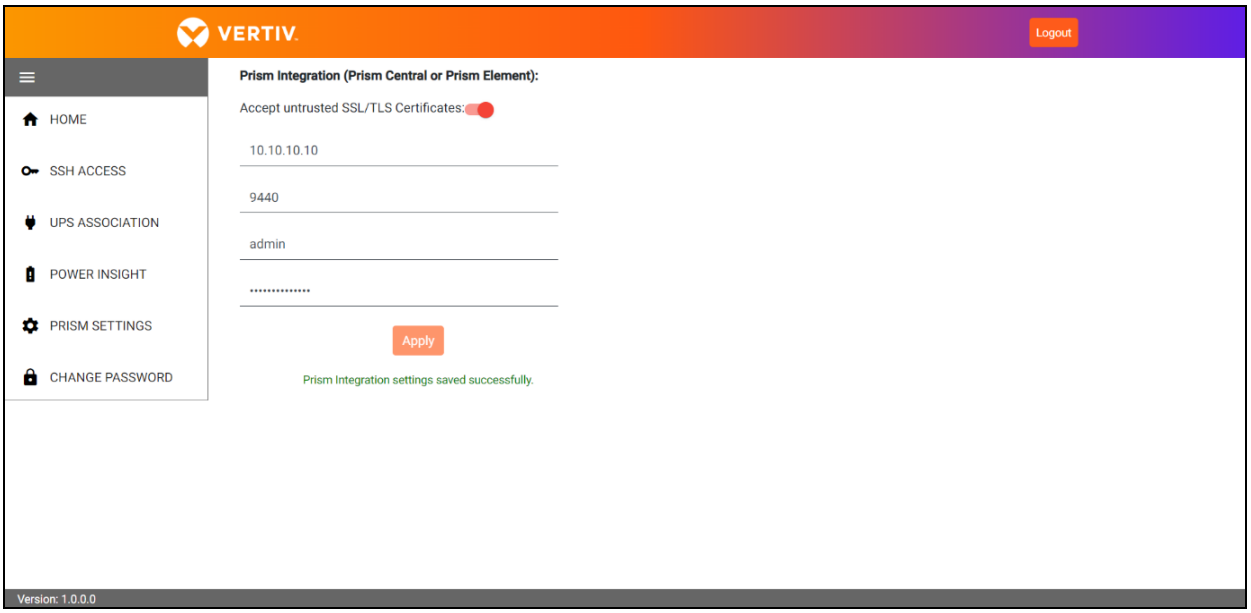
Prism Central is a centralized management tool to monitor and manage multiple clusters through a single web console that runs as a separate instance comprised of either a single VM or a set of VMs.

AHV Plugin retrieves details about AHV Clusters, Hosts and CVMs by making REST API calls to Prism.

Open Prism Settings link in plugin menu, add Prism details and click *Apply*. AHV plugin authenticates the Prism details entered and saves in AHV plugin database if authentication is successful.

Both Prism Element and Prism Central are supported by AHV plugin. With Prism Element configuration, AHV plugin can manage one cluster while with Prism Central configuration, AHV plugin supports association and graceful shutdown of multiple clusters.

Figure 3.7 Prism Integration



3.5 Specifying Associations Between UPSs and AHV Hosts, Clusters

An Administrator specifies associations between UPSs and corresponding AHV Hosts. These associations are stored in AHV Plugin database. Each association record consists of identifiers that uniquely identify a Vertiv UPS from Power Insight repository as well as AHV Host from Nutanix Infrastructure. When AHV Plugin receives an alarm, it uses the association information to identify the AHV Hosts affected so it can carry out graceful shutdown if required.

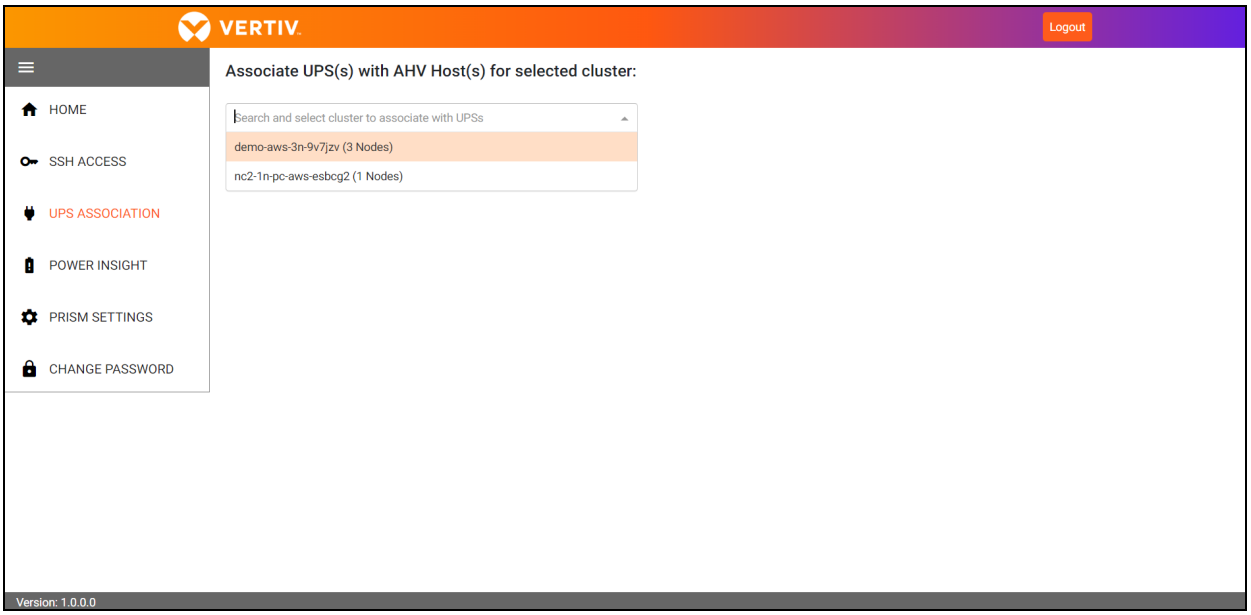
NOTE: An Administrator must select a minimum of one UPS for each AHV Host before applying the associations.

To add UPS associations, follow the below steps:

Prism and Power Insight integrations must be completed successfully before adding UPS associations.

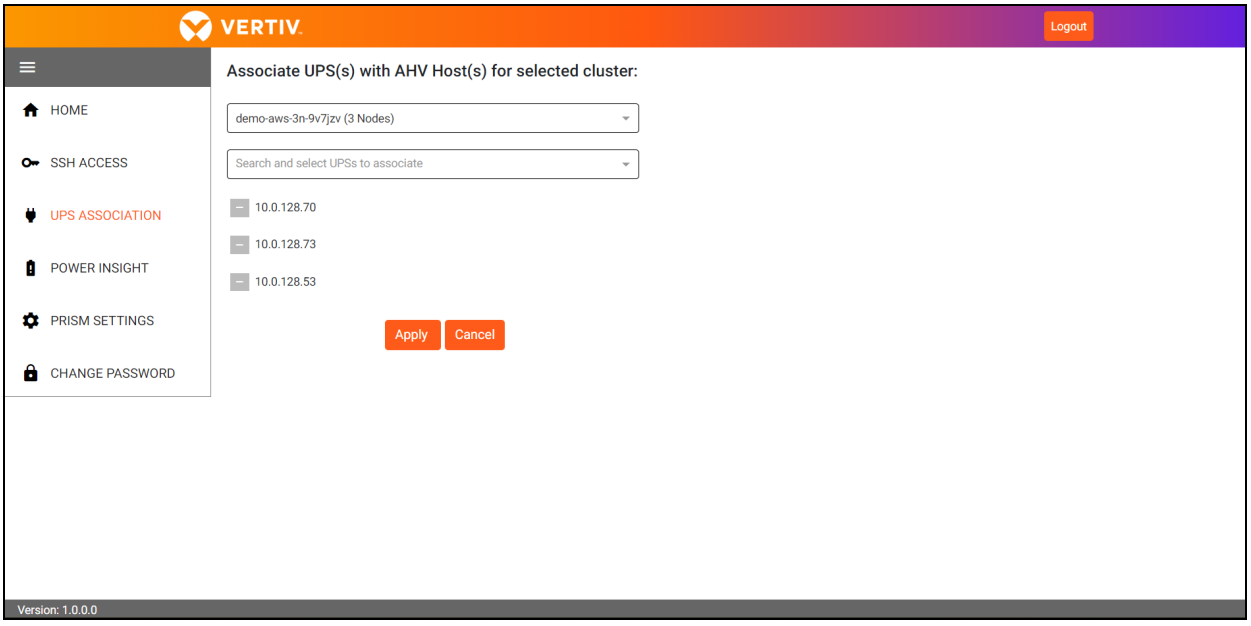
1. Click on *UPS ASSOCIATION* in Plugin menu to open associations screen.
2. Names of all clusters available in Prism along with their number of nodes are populated in drop-down with placeholder text *Search and select cluster to associate with UPSs.*
3. Select the cluster you would like to add associations for.

Figure 3.8 Selecting AHV Cluster



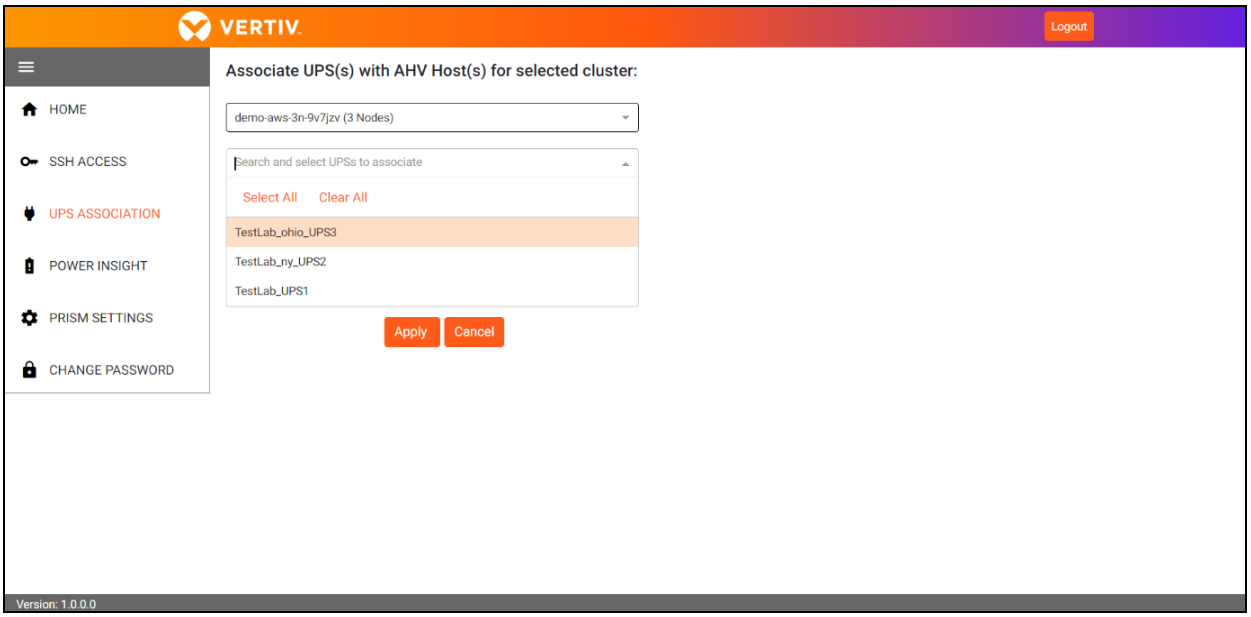
4. All AHV Hosts in the selected cluster are displayed in expanded form to list any UPS associations. To add or remove associations open the UPS filter drop-down with placeholder text *Search and select UPSs to associate*.

Figure 3.9 AHV Host from the Selected Cluster are Displayed along with Associated UPSs (if Any)



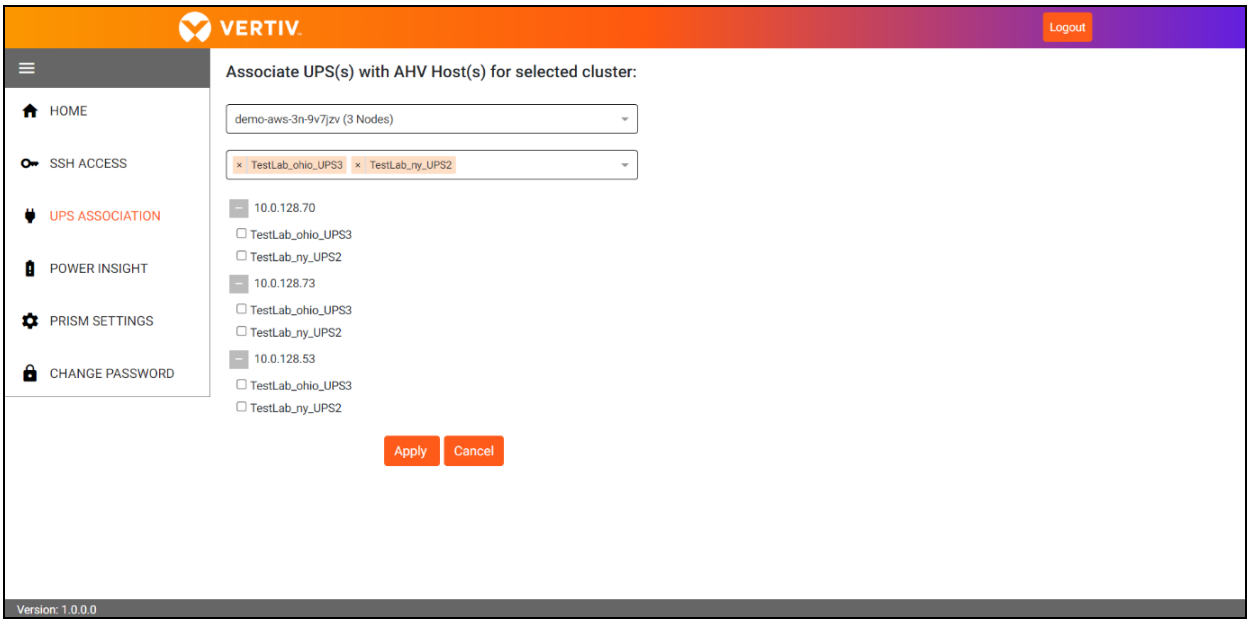
5. When UPS filter drop-down is opened, all UPSs available in Power Insight are displayed. You may selectively associate one or more UPSs or use the *Select All* option. To apply UPSs selected, close the filter drop-down.

Figure 3.10 Selecting One or More UPSs to Associate



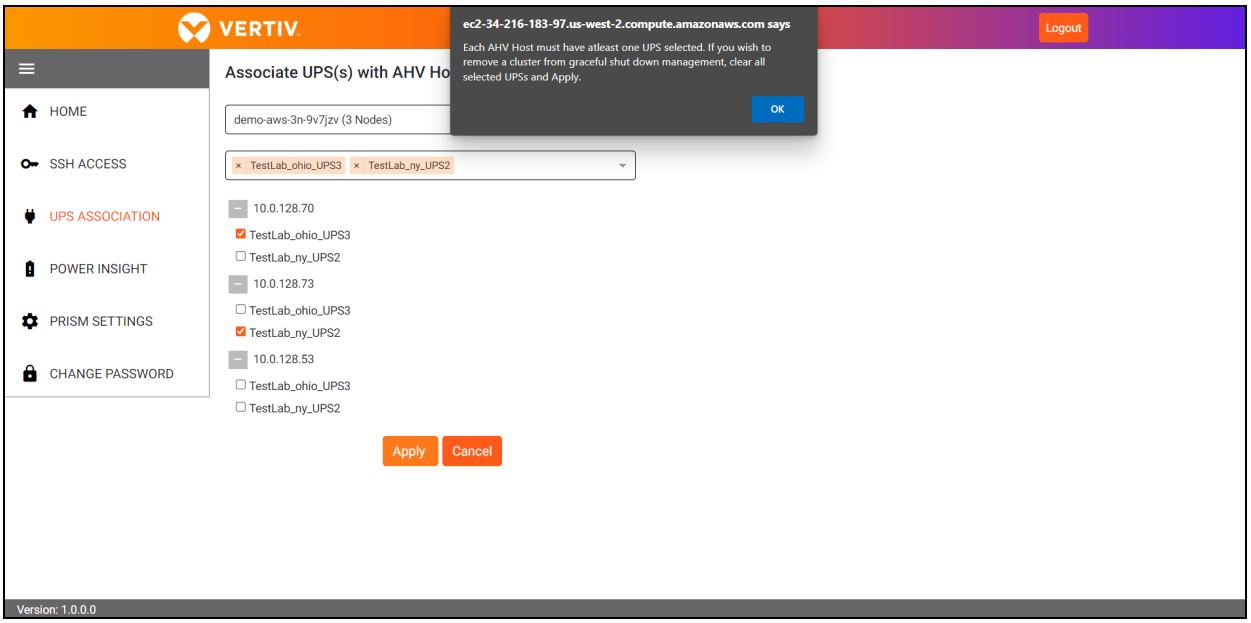
The selected UPSs are now displayed under each AHV Host in unselected state.

Figure 3.11 UPSs are Displayed Under Each AHV Host



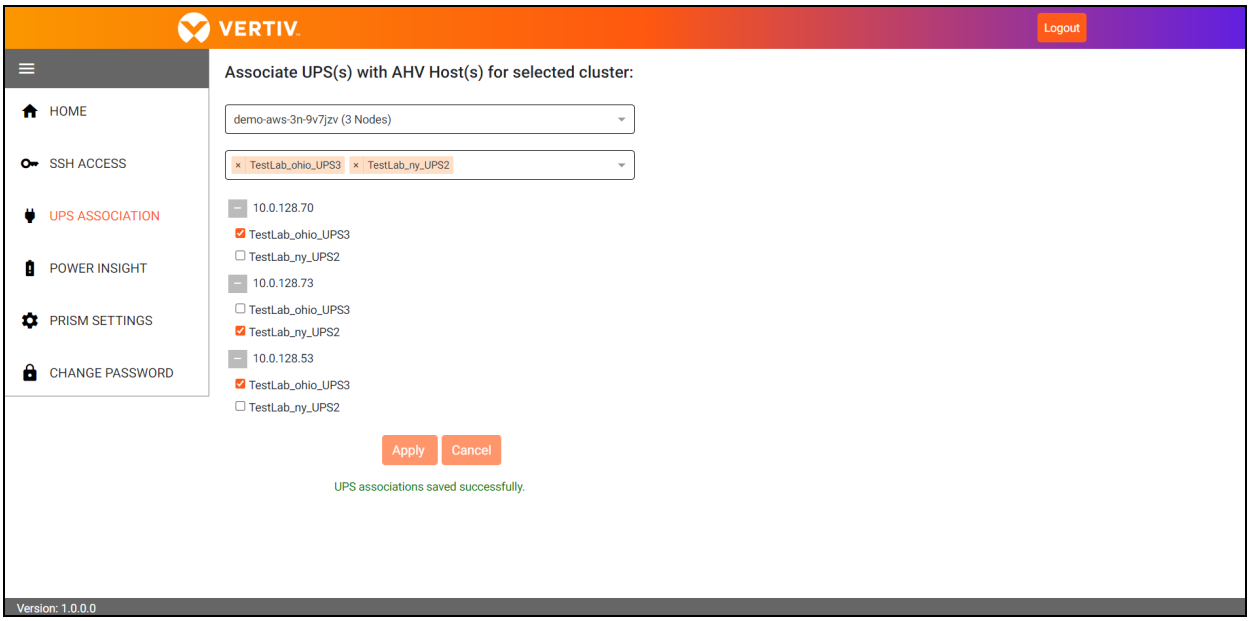
In case association is missing for one or more AHV Hosts in the selected cluster and you click *Apply* button, error message is displayed, see Figure 3.12 on the facing page.

Figure 3.12 Each AHV Host Associating with at Least 1 UPS



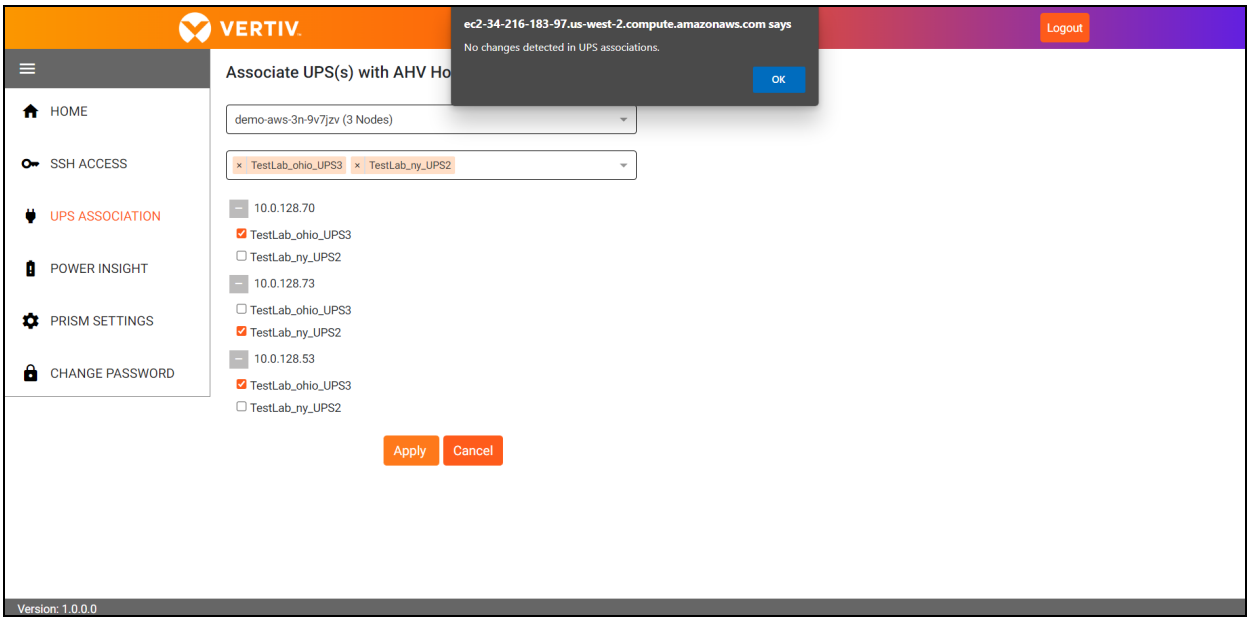
6. Ensure at least one UPS is selected for each AHV Host and then click *Apply*.

Figure 3.13 Applying Associations



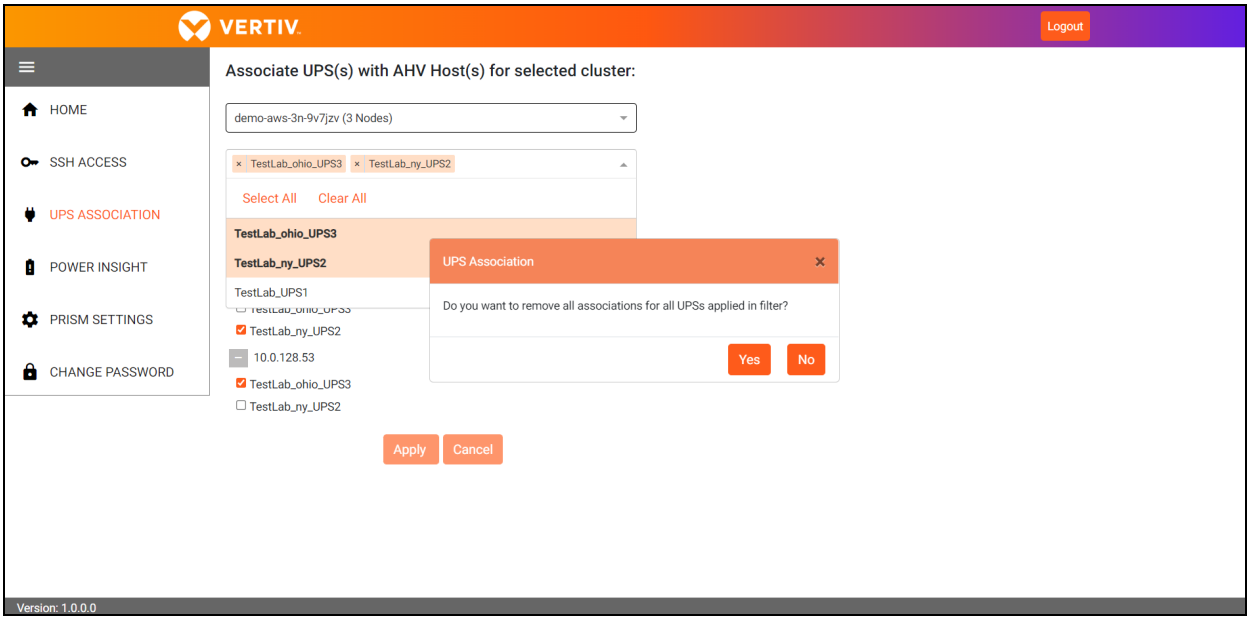
AHV Plugin keeps track of changes made in associations and allows associations to be applied only if changes are detected since the last time associations were applied.

Figure 3.14 No Changes Detected in Associations



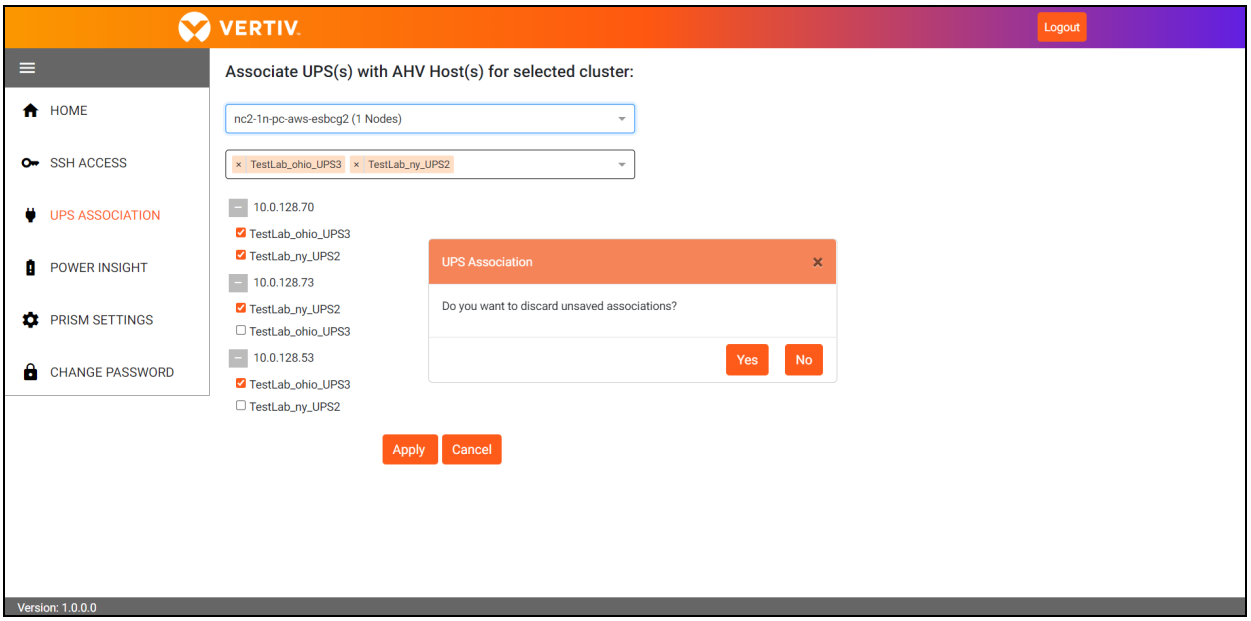
7. In the filter drop-down if you want to clear all UPSs from filter and remove all associations, click the *Clear All* option and confirm by clicking the *Yes* button. If *Clear All* was clicked in error, cancel the operation by clicking the *No* button.

Figure 3.15 Clearing All UPSs in Filter



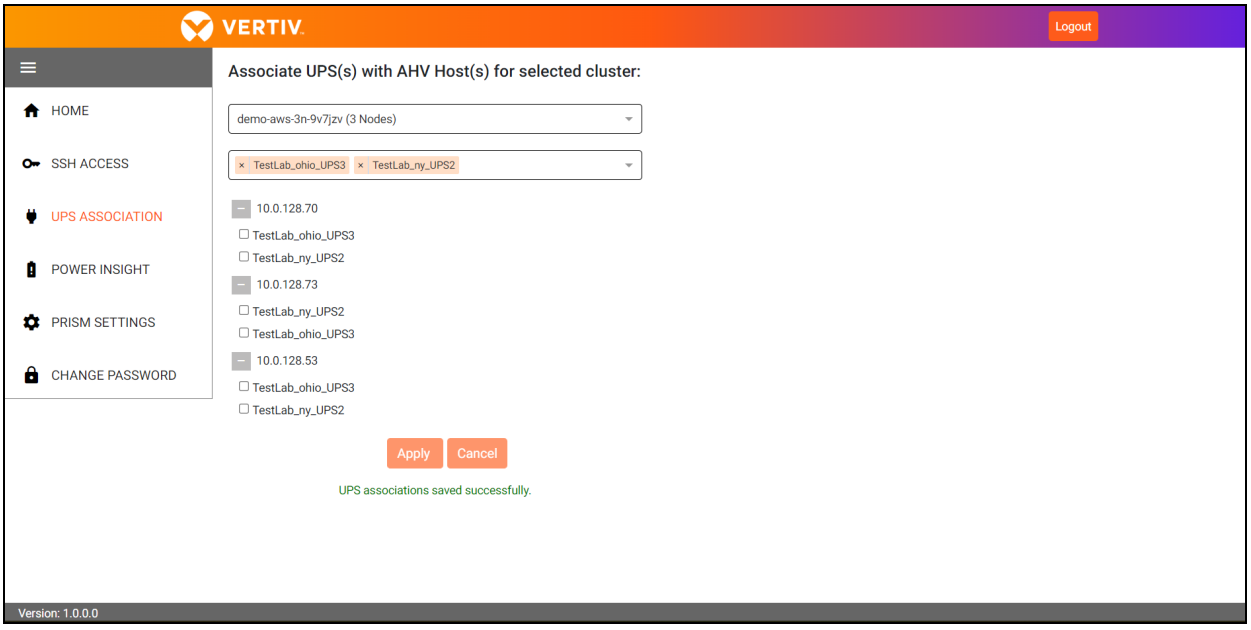
8. At any point, if you switch to a different cluster from the cluster drop-down you may receive a warning if any unsaved changes in associations of currently selected cluster are found. If the unsaved associations are important click the *No* button.

Figure 3.16 Switching Cluster Selection



NOTE: If you no longer with to perform graceful shutdown management of AHV Hosts in a cluster and remove these from management by AHV Plugin, select the Cluster and remove all associations from all Hosts. Click *Apply* when done. All associations are removed from AHV Plugin database and the Cluster is reverted to unmanaged state.

Figure 3.17 Unmanage AHV Hosts to Exclude from Graceful Shutdown Management

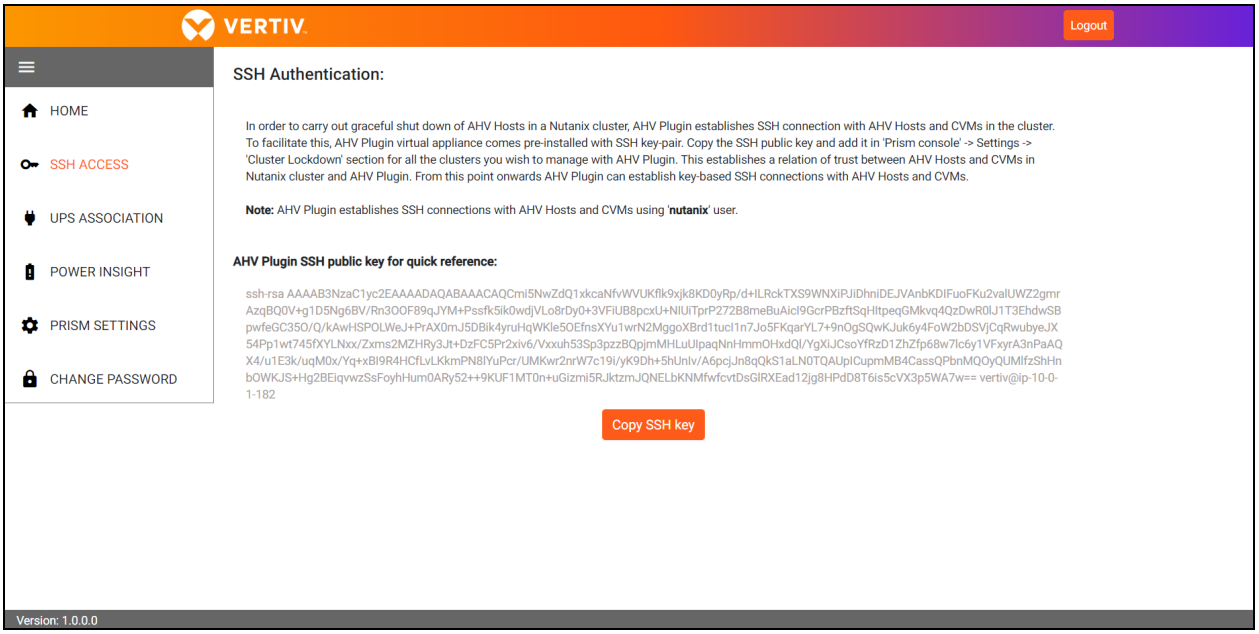


3.6 Establishing SSH Trust between AHV Hosts, CVMs and AHV Plugin

In order to perform a graceful shutdown of AHV hosts in a cluster, AHV Plugin must be able to establish SSH connection with the hosts and cvms.

1. Click *SSH Access* from Plugin menu.
2. Click *Copy SSH key* button to copy the SSH public key of AHV plugin to clipboard.
3. Open Prism console for clusters you would like to manage with AHV plugin and add the copied key in Prism cluster lockdown section. From this point onwards AHV can establish SSH connection with hosts and cvms in the cluster.

Figure 3.18 SSH Authentication



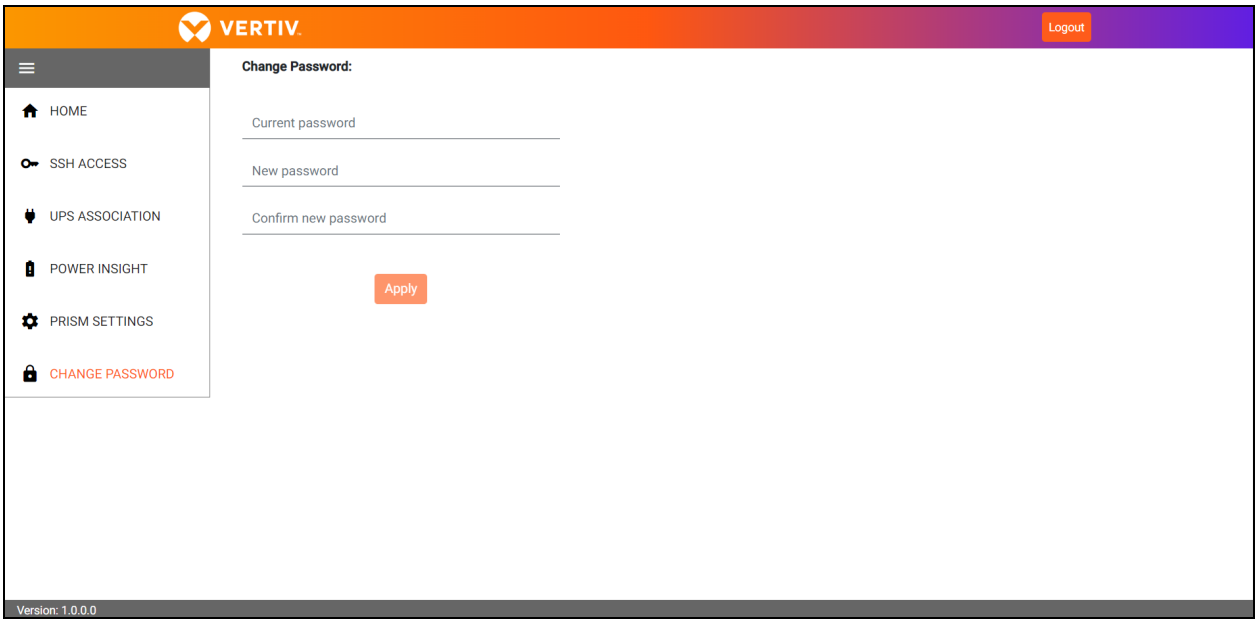
3.7 Change Password

To change password for admin user, follow the below steps:

1. Click *Change Password* in Plugin menu.
2. Enter current password, new password and then re-type new password.
3. Click *Apply*.

NOTE: It is recommended to change the default password on first login.

Figure 3.19 Change Password



This page intentionally left blank

4 Troubleshooting

This chapter details various problems or cases you may encounter and provides a troubleshooting actions. See Table 4.1 below to find the solution for the listed problems.

Table 4.1 Troubleshooting

Problem	Solution
When you open the UPS association screen, and you may observe one of the following errors: • Cannot find Power Insight registration details in database. • Prism Settings are unavailable, add details in Prism Settings section and try again. • 503 SERVICE UNAVAILABLE: *Http request to endpoint 127.0.0.1:9080 failed with error. Response status: 2.* • Error connecting with Prism *https://nutanix-ahv-server-name:9440/PrismGateway/services/rest/v2.0/clusters: java.net.ConnectException: Connection timed out.*	Check you have valid Host details setup in Power Insight and Prism Settings sections.
To uninstall AHV Plugin.	• If you copied AHV Plugin SSH public key and added it in Nutanix Prism cluster lockdown section, delete it from Prism. • If you created Power Insight API key and secret and added these in AHV Plugin Power Insight integration section, open Power Insight application, browse to Integration Management section and delete the API key and secret. • Shutdown AHV Plugin VM and delete the virtual machine.
If you need to use two AHV plugin instances, it may happen that the IP addresses of the two virtual machines running the plugins are the same.	Run the following command to reset the IP address: • echo -n> /etc/machine-id • systemd-machine-id-setup

This page intentionally left blank

Connect with Vertiv on Social Media


https://www.facebook.com/vertiv/


https://www.instagram.com/vertiv/


https://www.linkedin.com/company/vertiv/


https://www.twitter.com/Vertiv/

Vertiv.com | Vertiv Headquarters, 505 N Cleveland Ave, Westerville, OH 43082 USA

SL-71059_REVA_04-23