Dell EMC Technical White Paper

Dell EMC OMIVV as a Hardware Support Manager for VMware vSphere Lifecycle Manager

Abstract

Dell EMC OpenManage Integration for VMware vCenter version 5.1 is enhanced to support the firmware update capabilities of vSphere Lifecycle Manager in vSphere 7.0. This technical white paper illustrates how OMIVV can be used as a Hardware Support Manager to update firmware using vSphere Lifecycle Manager.

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Acknowledgments

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Contents

Terminology

Terminology	Description
OMIVV	OpenManage Integration for VMware vCenter
iDRAC	Integrated Dell Remote Access Controller
HSM	Hardware Support Manager
HSP	Hardware Support Package
vSAN	Virtual Storage Area Network
OS	Operating System
HCL	Hardware Compatibility List
OOB	Out-of-band
CIFS	Common Internet File System
NFS	Network File System
BIOS	Basic Input/Output System
FC	Fiber Channel
DRM	Dell Repository Manager
RAID	Redundant Array of Independent Disks
NIC	Network Interface Controller
HCG	Hardware Compatibility Guide

Executive summary

In vSphere 7.0, VMware enhanced the VMware Update Manager to include capabilities for baselining and remediation of firmware along with Operating System (OS) and add-on components for vSphere 7.0-based clusters and upgraded the feature to vSphere Lifecycle Manager.

This technical white paper describes how the existing baselining and remediation capabilities in Dell EMC OpenManage Integration for VMware vCenter (OMIVV) is enhanced in version 5.1 and also describes how OMIVV can be used as a Hardware Support Manager (HSM) for supporting firmware update functionalities on Dell EMC PowerEdge servers using vSphere Lifecycle Manager.

1 Introduction

Data center is a complex and sensitive environment. Maintaining the software and firmware running on each of the devices at a standard level becomes crucial in order to achieve uniformity and better manageability. According to their technical and security assessments, data center admins define the standard levels of software and firmware and maintain them at the specified levels. These levels are reviewed periodically and upgraded as needed.

To help the data center administrators in maintaining the firmware levels on their PowerEdge servers in VMware-based virtualization environment, OMIVV provides an ability to baseline the ESXi clusters to a desired level and to remediate when there is a drift. With the release of vSphere 7.0, VMware also allows administrators to baseline vSphere 7.0-based clusters for the desired state of ESXi base image, add-ons, and firmware for the servers.

This technical white paper describes how baselining is achieved in OMIVV and how the same baselining mechanism is enhanced to support the vSphere Lifecycle Manager feature in vSphere 7.0 and later versions using OMIVV as an HSM.

2 Baselining and remediation in OMIVV

OMIVV provides an ability to baseline the clusters with respect to a desired state.

Baselining in OMIVV is achieved using cluster profile. A cluster profile consists of firmware repository profile, driver repository profile, and system profile, or any combination of these profiles.

When a cluster is associated to a cluster profile, all the OMIVV-managed hosts in the corresponding cluster automatically becomes part of the drift detection job.

2.1 Firmware repository profile

Based on your environment and requirements, you can choose to use one of the default available repositories, or create a custom repository using Dell EMC Repository Manager (DRM) that matches your server inventory and your data center requirements. You can use the firmware repositories in cluster profile.

For vSAN, the storage controller must be at specific levels. Online repositories can be updated every two weeks, and those updates may move a specific vSAN cluster out of VMware support compliance. Hence, baselining vSAN cluster baselining against online repository is not supported.

Create a custom repository using DRM that aligns with the vSAN firmware requirements as per Hardware Compatibility List (from VMWare) and copy it in either CIFS or NFS share and create a firmware repository profile in OMIVV. For more information, see OMIVV 5.1 user guide.

2.2 Driver repository profile

Baselining against driver repository profile is supported only for vSAN clusters. Download the drivers as applicable to your vSAN clusters and copy them in a CIFS or NFS. Create a driver repository profile in OMIVV pointing to the share location, it can be used in cluster profile. For more information, see OMIVV 5.1 user guide.

2.3 System profile

System profile can be created referencing either a bare-metal server or a managed host. This profile captures the component-level settings and configuration of iDRAC, BIOS, RAID, Event Filters, FC, and NICs.

Baselining against a system profile helps you in getting notification when a configuration drift is detected in any of the machines in the baselined cluster against the desired state in machine-level settings.

2.4 Update cluster profile

The cluster profile will not refresh itself when the source repository changes. To identify the updated profiles that are associated with cluster profile, go to the **Cluster Profiles** page. Yellow warning icon will be displayed next to the updated cluster profile.

To update the cluster profile with the latest available driver or firmware, or system profiles, select the impacted cluster profile, click **Update Profiles** on the cluster profile page. For more information, see OMIVV 5.1 user guide

2.5 Drift detection in OMIVV

Configuration drift job runs in OMIVV immediately after the cluster profile is created or modified. Later, the drift detection job also runs for each cluster profile at the scheduled time of each week.

When a new host is added to a cluster after the cluster profile is created (and added to host credential profile in OMIVV), the host automatically gets added to the list of hosts for the drift detection process during the next scheduled run of the drift detection job. For more information, see OMIVV 5.1 user guide.

2.6 Remediation in OMIVV

Remediation of firmware and driver drifts can be achieved by using the firmware update functionality available in OMIVV.

Note: Driver updates are mainly for clusters running legacy 6.x versions of ESXi, or admins not using vSphere Lifecycle Manager (which will handle drivers in its image build).

For the configuration drift, you must correct the drifted attributes by logging in to the corresponding iDRAC consoles. For more information, see OMIVV 5.1 user guide.

3 Baselining using VMware vSphere Lifecycle Manager

In vSphere 7.0, VMware released a new feature called vSphere Lifecycle Manager. It enables you to create the cluster image and associate it to the cluster within in vCenter.

Cluster image can contain the following:

- Base image—ESXi image and it can be major version or minor version.
- add-on (Driver Components)—consists of components and theses components should be of higher version than the components present in the base image.
- Hardware Support Package (HSP)—consists of firmware section and it contains the firmware baseline image.

This section describes how you can enable OMIVV to act as an HSM. In order to use OMIVV as HSM, you must have OMIVV version at least version 5.1 and later.

3.1 Register vSphere Lifecycle Manager in OMIVV

Before selecting HSM in vSphere Lifecycle Manager image, ensure that you register vSphere Lifecycle Manager in OMIVV.

During first-time installation, you can select the **Register with vSphere Lifecycle Manager (vCenter 7.0 and later)** check box while registering vCenter.

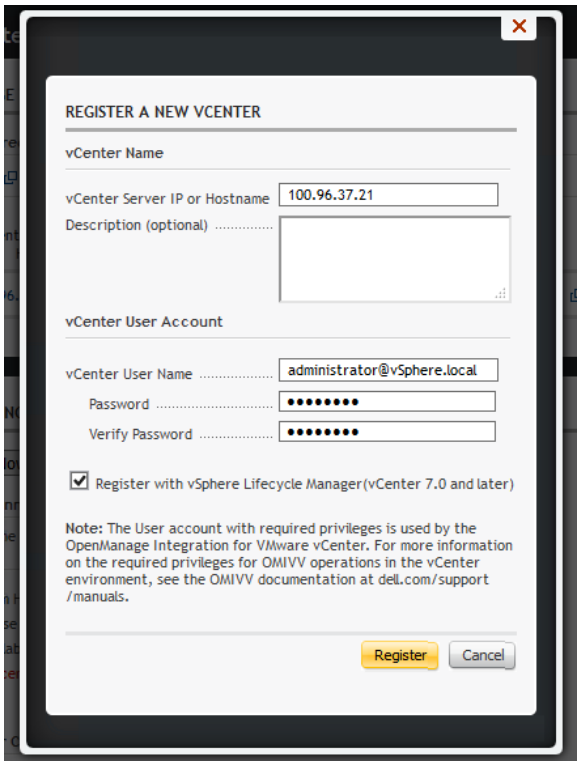

Figure 1: vCenter registration

If you want to modify the vSphere Lifecycle Manager status, on the **vCenter Registration** page, select **Register** or **Unregister**.

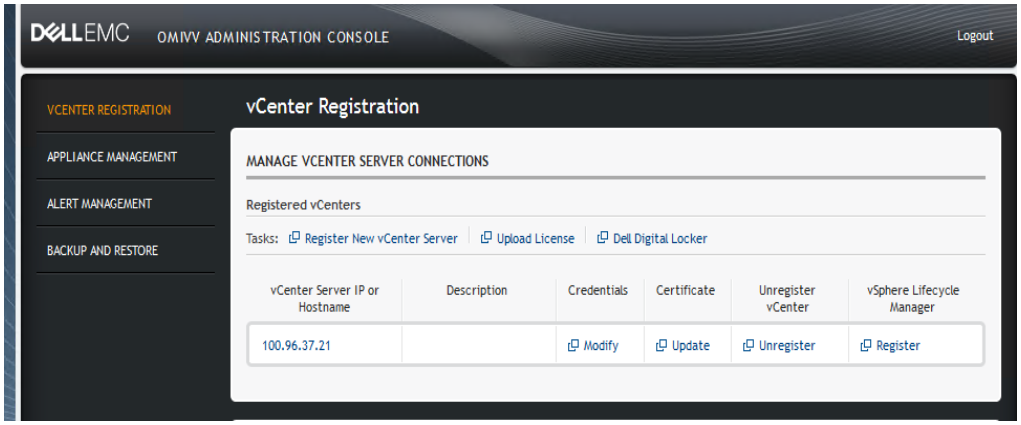

Figure 2: After vCenter registration, register option to enable vSphere Lifecycle Manager

If you upgrade OMIVV to 5.1 or later versions using Backup and restore or RPM upgrade method, vCenters which are registered in earlier OMIVV versions are automatically registered in the updated OMIVV version.

If any vCenter 7.0 and later versions are present under registered vCenter in updated OMVV version, you can register the vSphere Lifecycle Manager by clicking **Register** in the **vSphere Lifecycle Manager** column.

In case, if you want to unregister vSphere Lifecycle Manager with OMIVV, you can click **Unregister** in the **vSphere Lifecycle Manager** column.

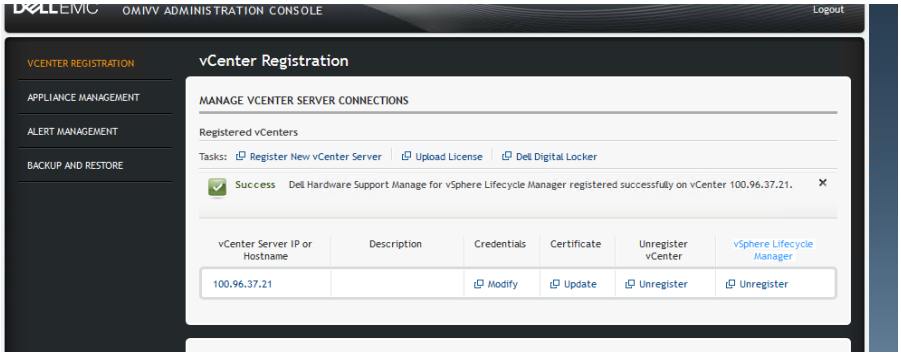

Figure 3: Unregister vSphere Lifecycle Manager in OMIVV

3.2 Prerequisites to use OMIVV as HSM in vSphere Lifecycle Manager

- Register vSphere Lifecycle Manager in OMIVV. For more information, see Register vSphere Lifecycle Manager in OMIVV.
- **Create Host credential profile (HCP)**
  HCP contains credentials of the hosts that is required to manage the hosts components such as getting the host inventory and updating firmware.
  Create at least one HCP and associate all your Dell EMC PowerEdge servers to HCP.
  If HCP is not created and inventory is not successful, you cannot use OMIVV as HSM. For more information about HCP, see OMIVV 5.1 user guide.
- **Create firmware repository**
  Firmware repository contains firmware metadata of server components of Dell EMC PowerEdge servers and the connection information to where the firmware executables are stored.
  Create a firmware repository to manage the firmware components of servers in vSphere Lifecycle Manager image.
  By default, Dell EMC provides two firmware repositories.
  One for managing Dell EMC PowerEdge servers and other for managing MX chassis.
  The default firmware repositories maps to the metadata which points to Dell online which will have latest firmware versions.
  The online catalogs are updated frequently, and new information is posted across all the PowerEdge servers every two weeks.
  For baseline tracking, Dell Technologies recommends creating an offline firmware repository.
  Offline repositories are required for vSAN clusters. For more information about creating firmware repository, see OMIVV 5.1 user guide.
- **Create Cluster Profile**
  Once firmware repository is created, you must create a cluster profile. Cluster profile contains meta data of firmware repository, driver repository, and system profile.

Note: OMIVV supports only firmware repository with respect to vSphere Lifecycle Manager context. Associate only firmware repository to a cluster profile.

Once the cluster profile associated with firmware repository, you must associate this cluster profile to the cluster to manage the firmware baseline.
In this way, cluster profile becomes HSP for an associated cluster. You can have single cluster profile for multiple clusters. The cluster profiles are called as HSPs in the vSphere Lifecycle Manager context. For more information about cluster profile creation, see OMIVV 5.1 user guide.

3.3 Associate OMIVV as HSM in vSphere Lifecycle Manager image

Ensure that you have all the prerequisites that are mentioned in the Prerequisites to use OMIVV as HSM in vSphere Lifecycle Manager section. If you fail to complete any of the prerequisites, you may not be able to create or edit an image to include firmware.

1. Go to vSphere Lifecycle Manager.
2. Create or edit the cluster image.
   You can see Dell EMC HSM as **DellEMC OMIVV**.

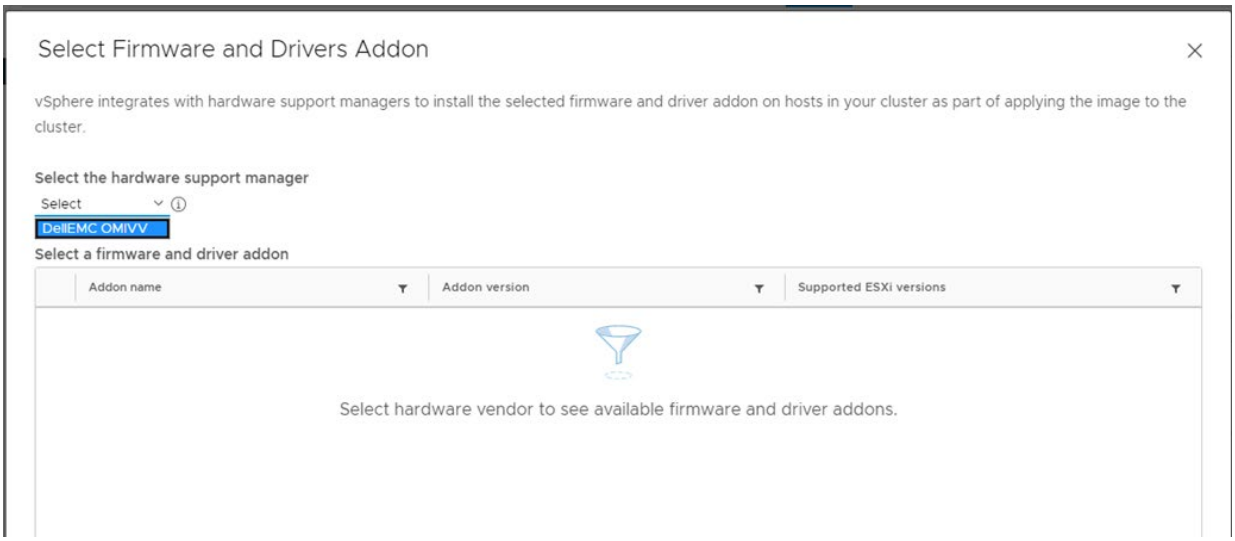

Figure 4:Select DellEMC OMIVV as HSM

After you select the Dell EMC OMIVV, all the HSPs (called cluster profile in OMIVV) are displayed.

3. Select relevant HSP which is relevant for the selected cluster.
   To identify the HSP associated to the selected cluster, see the description present in the HSP.

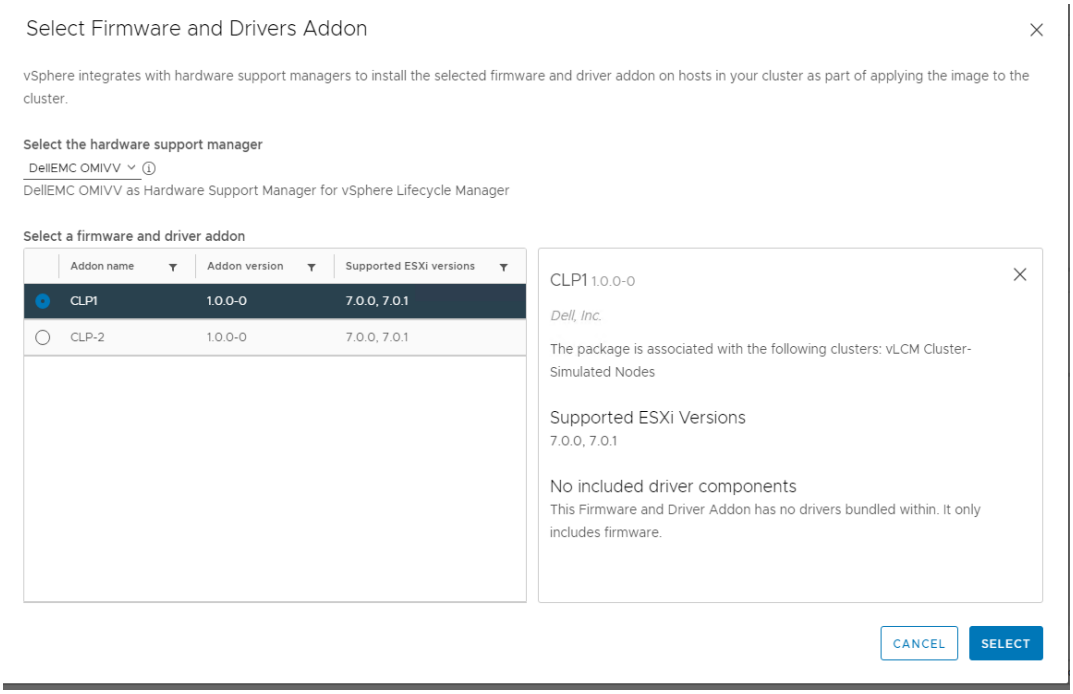

Figure 5: Select HSP and view description.

After you select OMIVV as HSM, all the available HSPs are displayed in the **firmware and driver addon** section in vSphere Lifecycle Manager image.

When you click the HSP, the supported ESXi version is displayed in the **Supported ESXi Versions** section.

If you select the unsupported ESXi version as base image, you cannot save the image with selected HSP. Select relevant base image and HSP while saving an image.

For example, OMIVV 5.1 supports only base image having ESXi 7.0. If you select the base image as ESXi 7.0 U1, you cannot save the HSP. To resolve this issue, use the supported version of OMIVV.

After you select OMIVV as HSM, all the available HSPs are displayed in the firmware and driver addon section in vSphere Lifecycle Manager image.

Each HSP contains version number which indicates the changes available in the respective cluster profile. The version is incremented when the firmware content is modified.

As of now, you cannot view the HSP version with respect to cluster profile in OMIVV page.

4. After selecting the HSP, save the image.
   vSphere Lifecycle manager computes drift for all the hosts against image, add on, and HSP.

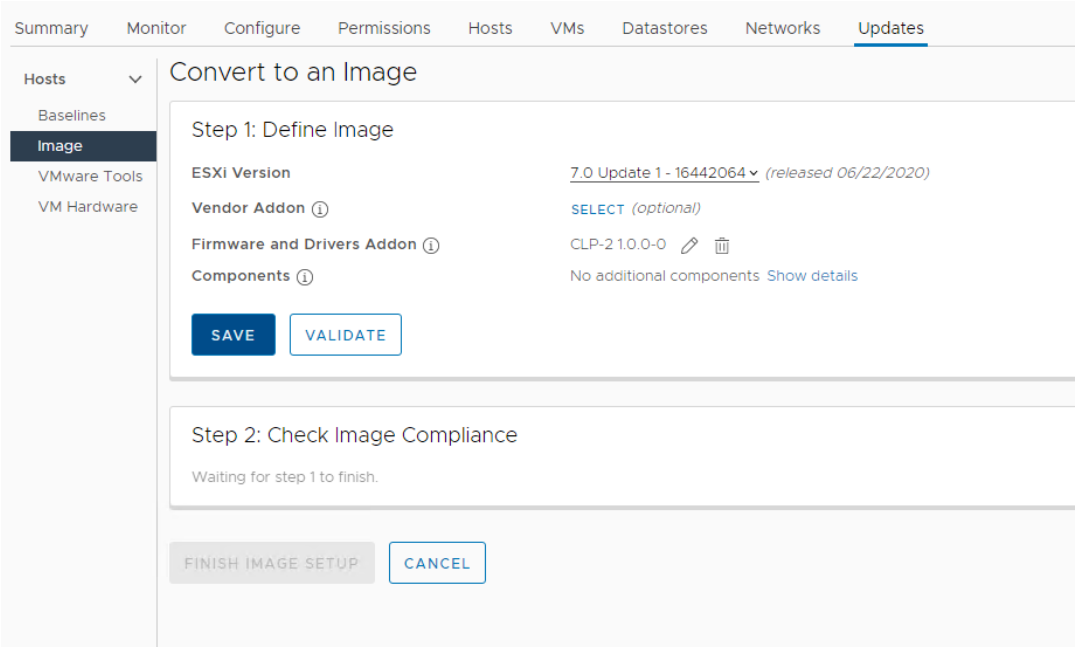

Figure 6: Save image

3.4 Examine drift status and resolution

After you save the image, any of the following states is displayed for the host:

- **Compliant**: Host is compliant with the image, add-on as and HSP.
- **Non-Compliant**: Host is not compliant with at least image, or add-on, or HSP.
- **Unknown**: Host might be not reachable.
  To resolve the issue, ensure that host is in reachable state. If the host is reachable, check whether iDRAC associated to the respective host is reachable or not.
  Ensure that hosts that are associated to cluster are inventoried successfully.
- **Incompatible**: The HSP selected in the vSphere Lifecycle Manager image is not associated to this cluster. Select relevant HSP which is applicable to the selected cluster. See the description present in each HSP to get HSP and cluster mappings.

Access OMIVV user facing logs for any errors that are related to intermediate failures in this operation.

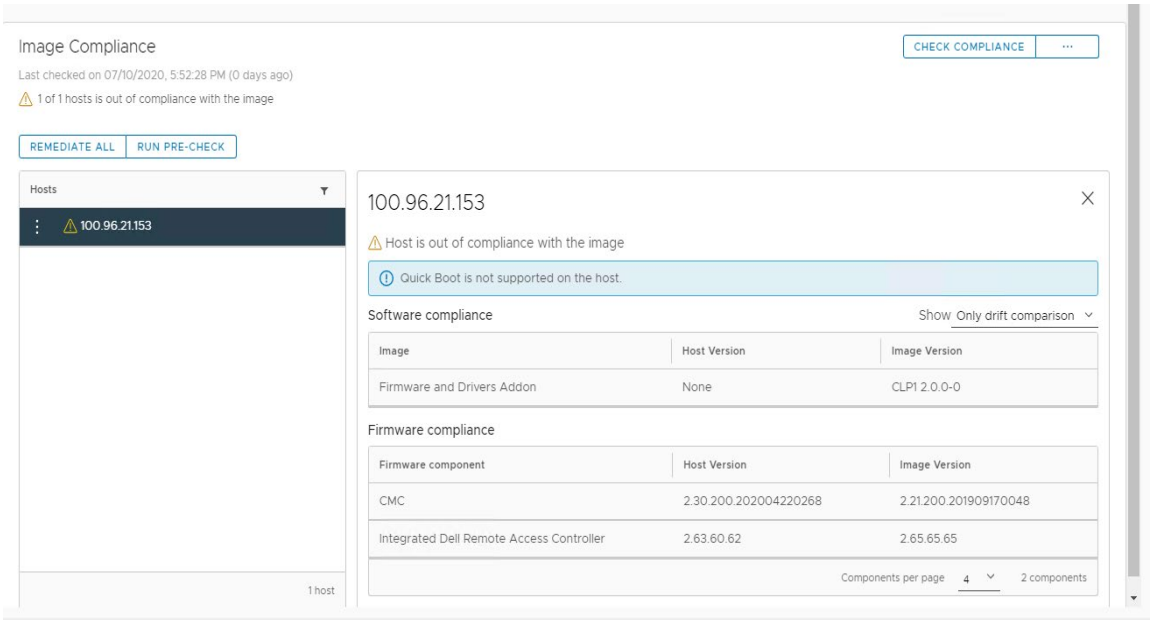

Figure 7: Firmware components drift

3.5 Pre-Check

During Pre-Check, OMIVV will check whether all pre-requisites required to remediate firmware are met or not.

As part of pre-check, OMIVV performs the pre-requisites check of the following:

- iDRAC reachability
- iDRAC Lock down mode (prevents any updates until unlocked)
- Status of firmware update job (if any) triggered from OMIVV for any hosts for the selected cluster
- Collect System Inventory on Reboot (CSIOR) enablement
- Connectivity to the firmware repository and the required firmware components.

Access OMIVV user facing logs for any errors that are related to intermediate failures in this operation.

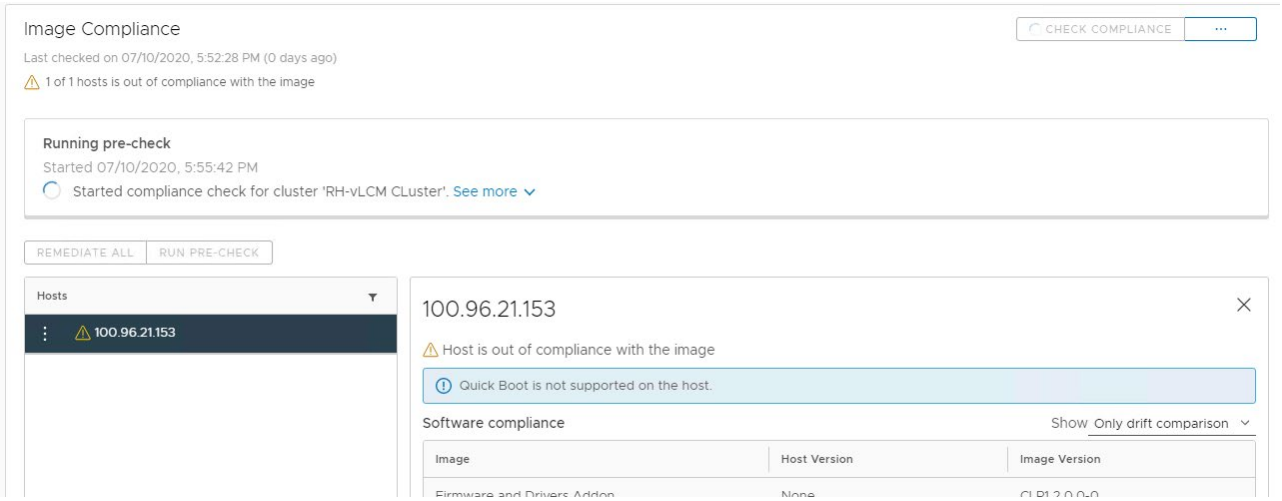

Figure 8: Pre-check in progress

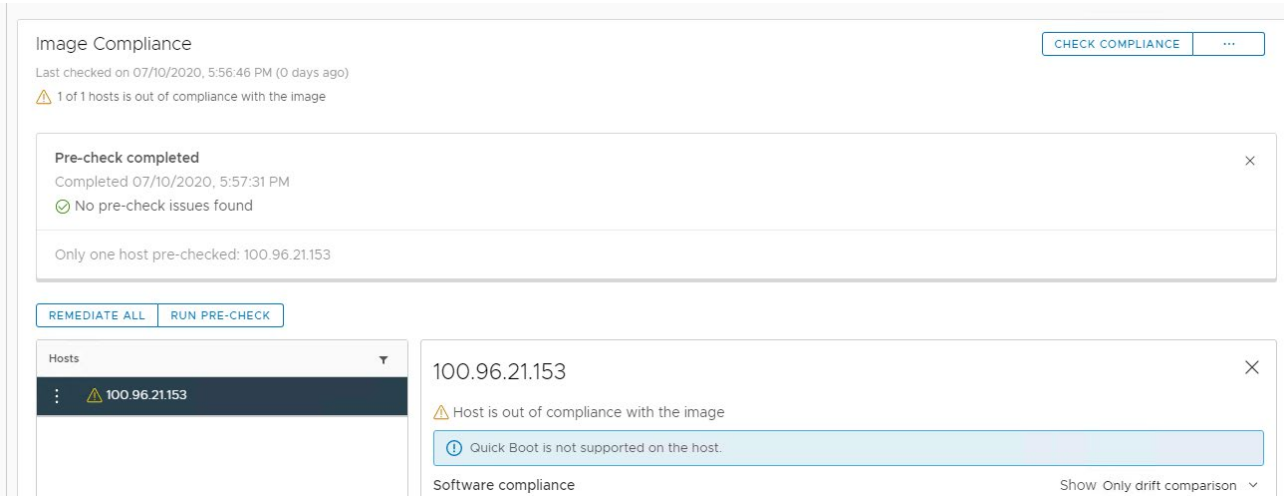

Figure 9: Pre-check results

3.6 Remediation in vSphere Lifecycle Manager

For the firmware remediation, the HSM must be associated to vCenter. HSP selected in the cluster image should be active (Optional).

During remediation, OMIVV performs the following:

- **Download firmware components from network share to OMIVV Share**
  OMIVV downloads all the drifted firmware components from the share that is given in the firmware repository that is attached to cluster profile to OMIVV share. If there are any failures occurred at this stage, access OMIVV user facing logs for more information.
  Ensure that the share that is given in the firmware repository is reachable. If there is a private network, ensure that OMIVV is reachable using proxy.

- **Upload firmware components to iDRAC**
  OMIVV uploads all the drifted firmware components from the OMIVV share to iDRAC. If there are any errors, access OMIVV user facing logs. Ensure that the server model present in the cluster is having an entry in the firmware repository catalog that you have selected.

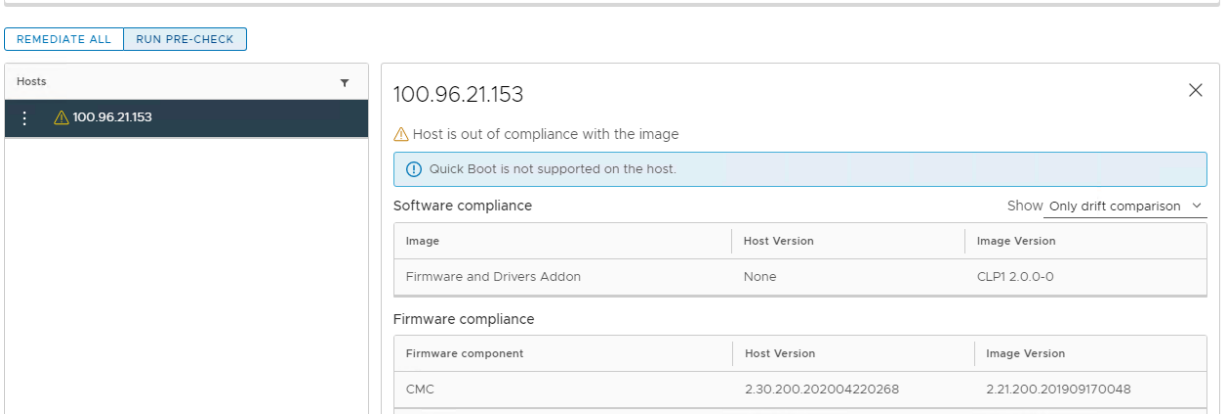

Figure 10: Remidiate option

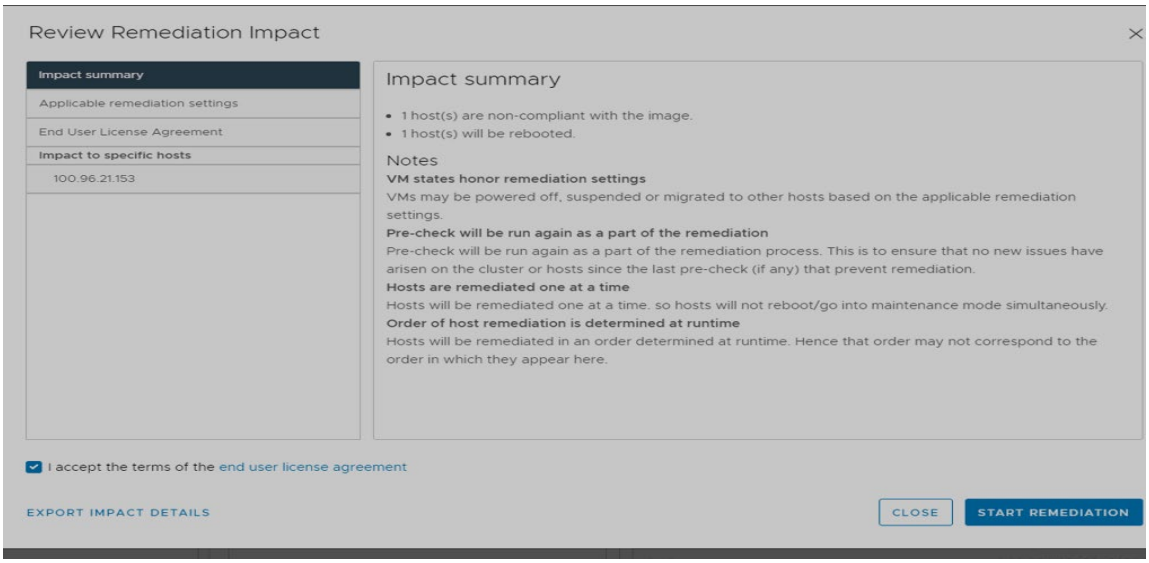

Figure 11: Start Remediation

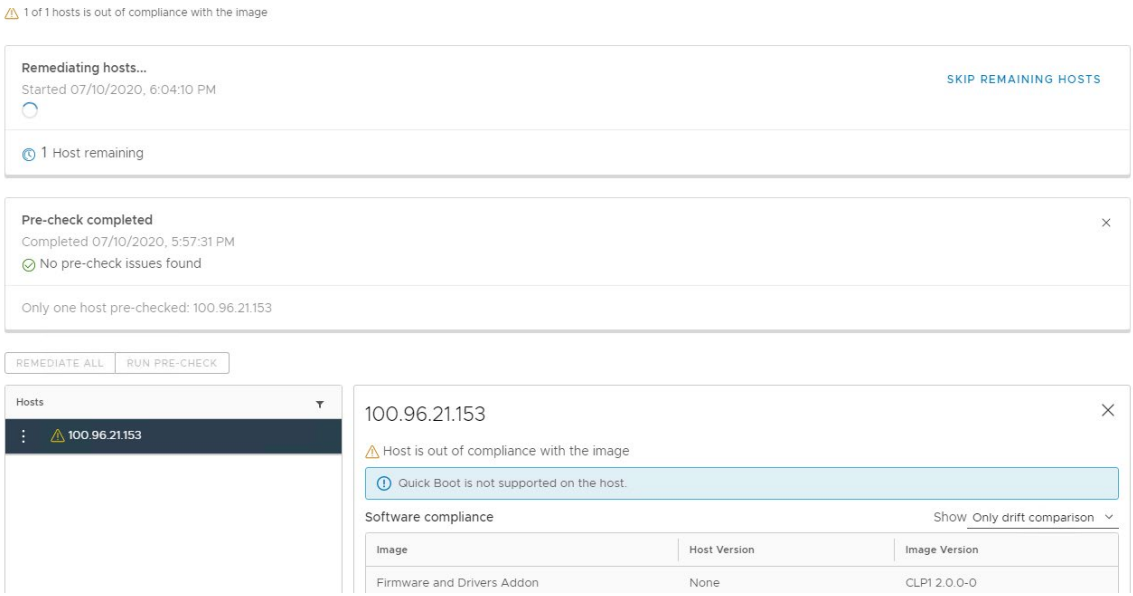

Figure 12: Remediation in progress

3.7 vSAN Hardware Compatibility Listing (HCL)

If you have enabled vSAN service on cluster, all the servers within the cluster must maintain compatible firmware and driver mappings which are certified by VMware. You can find the certified mappings in VMware Compatibility Guide (VCG).

For more information about the certified vSAN Hardware compatibility matrices that contains required firmware for specific drivers, see the VMware Compatibility Guide.

For example, the following URL provides supported driver and firmware combination for vSphere as 7.0 version and Dell EMC as OEM provider:

https://www.vmware.com/resources/compatibility/search.php?deviceCategory=vsanio&details=1&vsan_type=vsanio&io_partner=23&io_releases=448&vsanio_vsan_type=All%20Flash&page=1&display_interval=10&sortColumn=Partner&sortOrder=Asc

OMIVV acts as a firmware provider to supply firmware for this feature in vSphere Lifecycle Manager.

Until vSphere 7.0, VMware shows firmware versions only for storage controller component. Before remediating, you can view the HCG and see whether driver and firmware that is selected in the image are vSAN HCL compliant or not. If it is compliant, then that server component will not be shown in HCG. Only non-compatible components are shown in HCG.

Ensure that you modify an image with supported driver and firmware mappings before remediation. Supported driver and firmware mappings are shown in vSAN HCG.

See the following image for non-compatible storage controller component and how supported versions are shown in vSAN HCG.

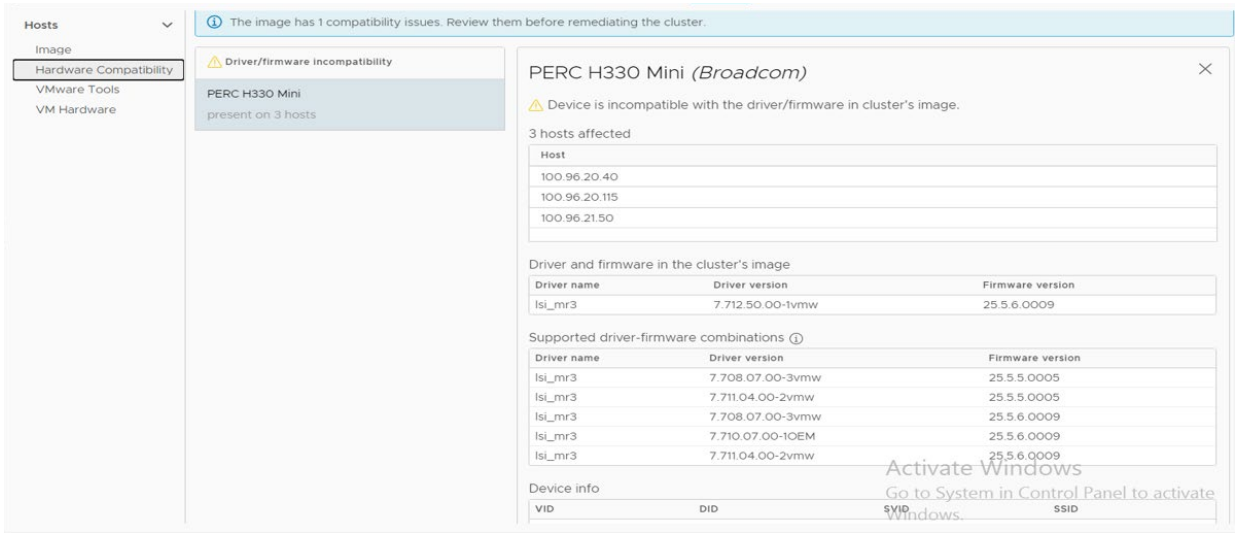

Figure 13: Hardware Compatibility page

4 Common issues when using OMIVV as a Hardware Support Manager

Issue 1: “DellEMC OMIVV” is not listed as the HSM (Hardware Support Manager) while creating vSphere Lifecycle Manager image.

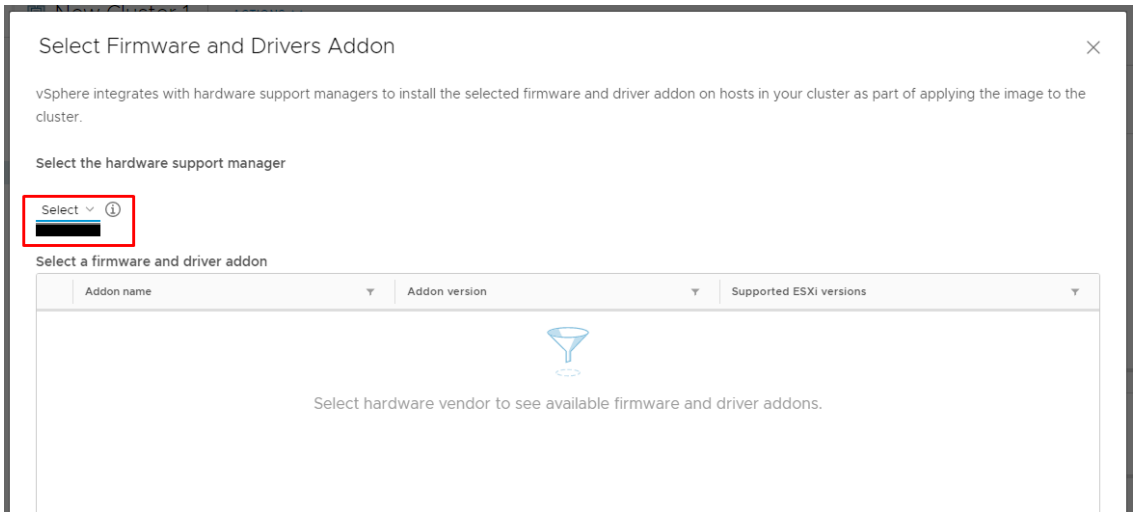

Figure 14: DellEMC OMIVV not listed as HSM

Resolution: Start **OMIVV Administration Console**, and then register the vCenter for vSphere Lifecycle Manager.

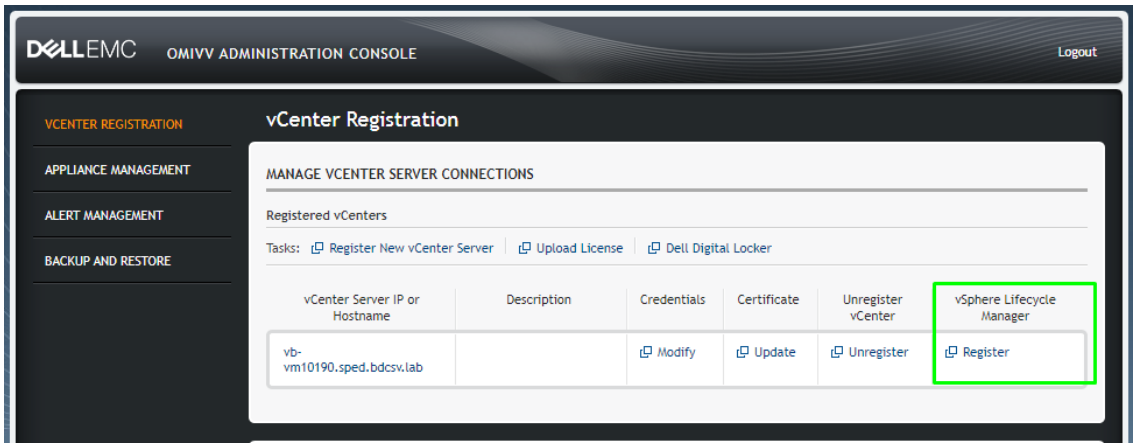

Figure 15: Register vSphere Lifecycle Manager

Issue 2: Cluster profile (called as HSP in vSphere Lifecycle Manager) created in OMIVV is not listed in vSphere Lifecycle Manager.

Resolution:

a. Ensure that firmware repository profile is associated with cluster profile.

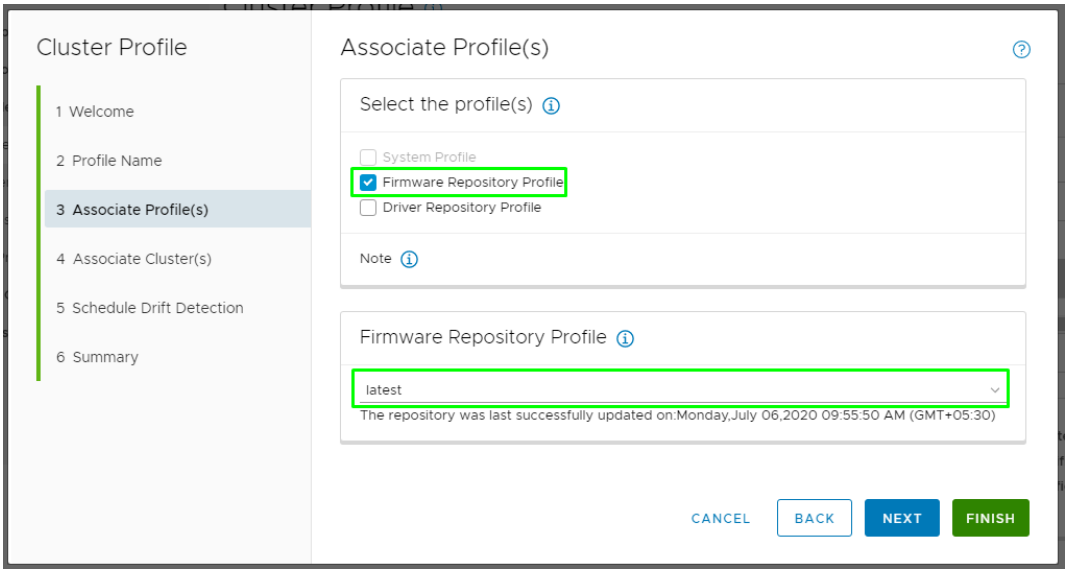

Figure 16: Associate firmware repository profile

b. Ensure that cluster (that you have selected for creating vSphere Lifecycle Manager image) is associated with the cluster profile.

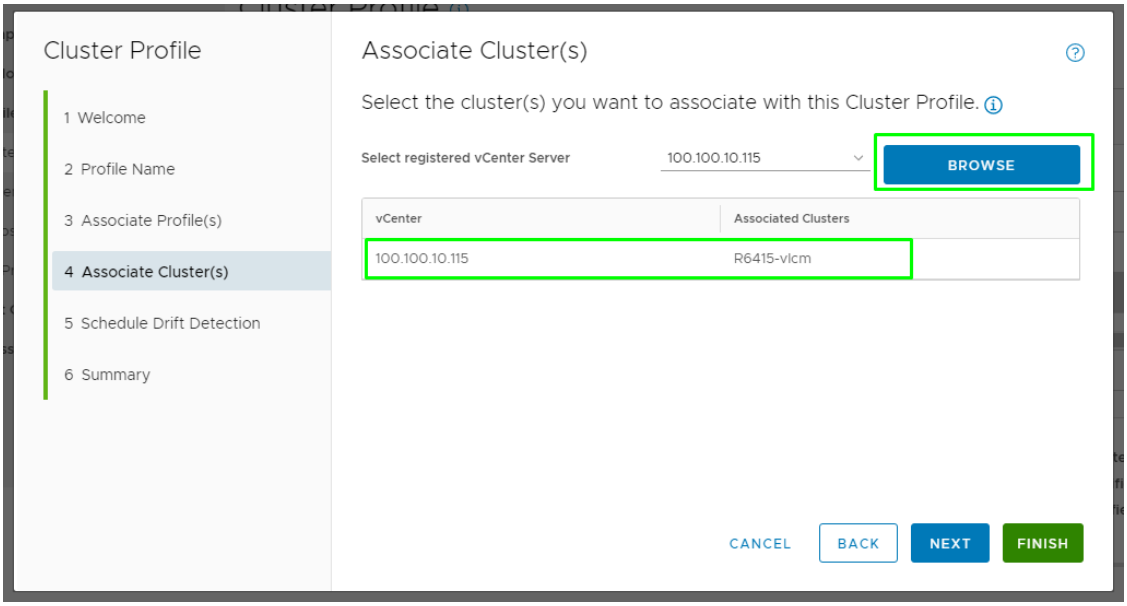

Figure 17: Associate clusters

Issue 3: Getting “Host not compatible with the image” error after creating the image.

Firmware compliance shows following error: This host is not compatible with the firmware in the “Firmware and Drivers Addon” <Name of HSP>.

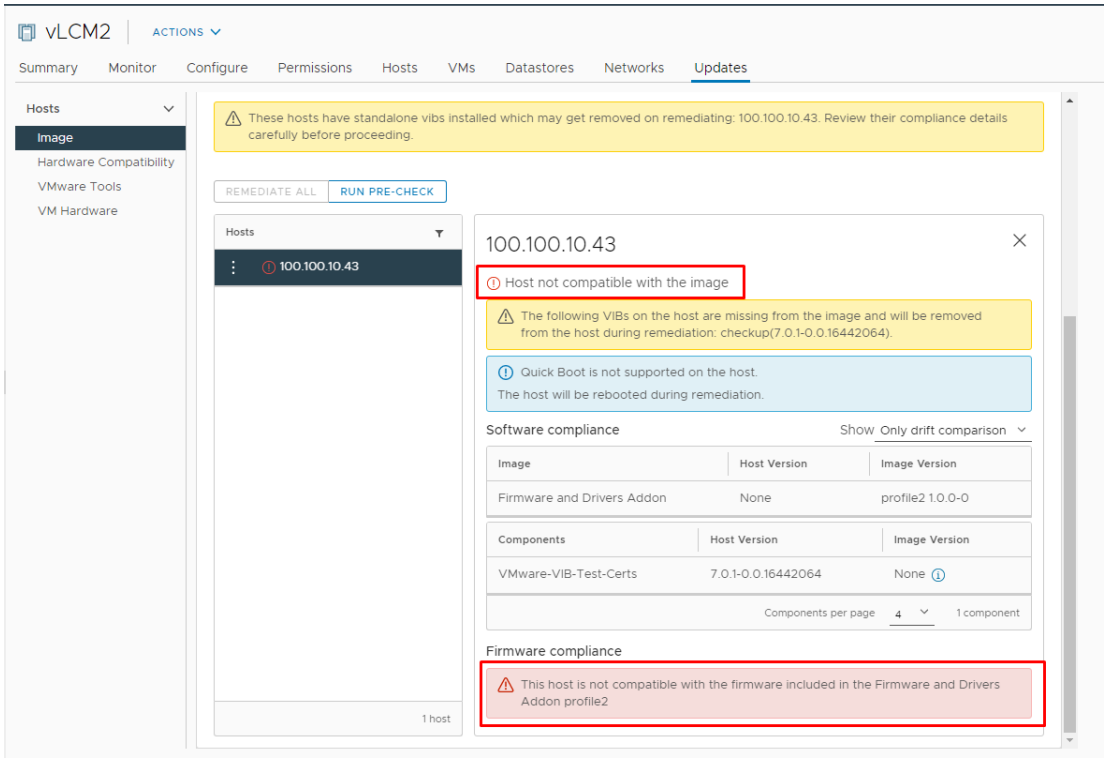

Figure 18: Firmware compliance error message

Resolution:

This error will occur if you select the HSP which is not relevant for the selected cluster.

Check the description of the HSP and ensure that you are selecting only the HSP created for the cluster on which you are trying to create vSphere Lifecycle Manager image.

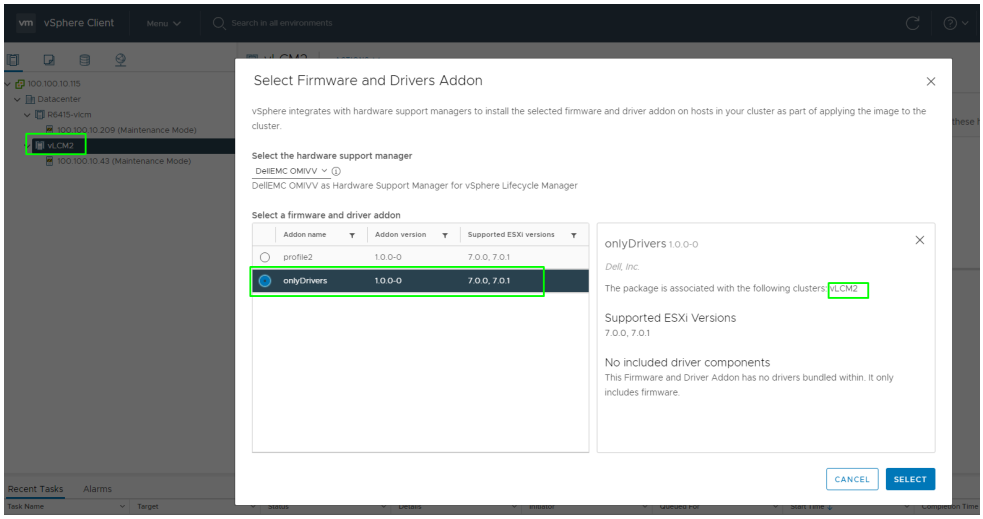

Figure 19: Select HSP and view description

You can also see the OMIVV Logs section and search the log with description “[Scan Task]” and check the error message.

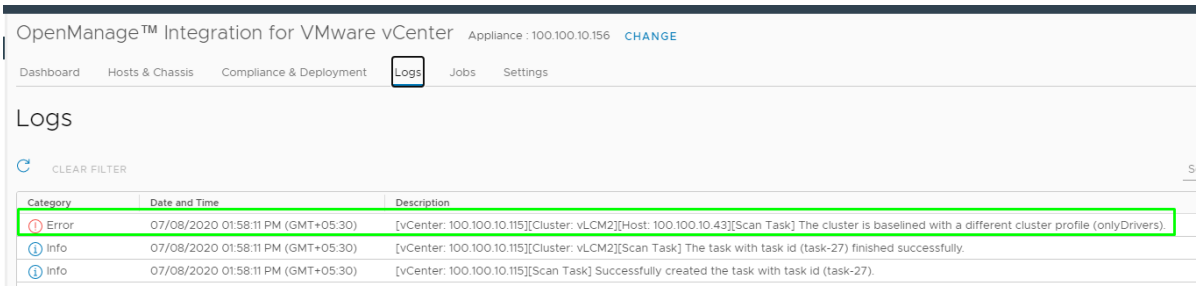

Figure 20: OMIVV logs page

Issue 4: Getting host compliance status is unknown, and firmware compliance shows following message: Applicable Bundle not found in cluster profile (<Cluster Profile Name>).

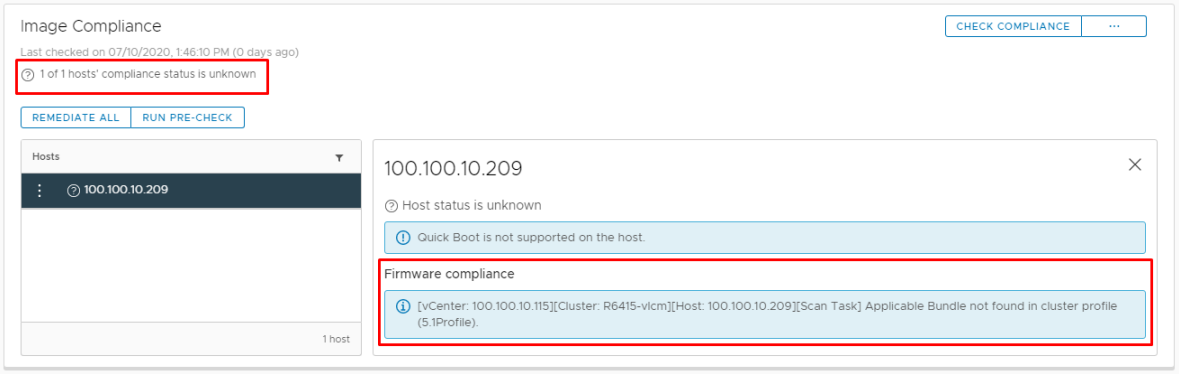

Figure 21: Firmware compliance error message

Resolution: Firmware repository profile that is associated with cluster profile does not have firmware for the host present in the cluster.
“Dell Default Catalog” repository profile is a factory created profile present in OMIVV carries firmware for all the servers that are released by Dell EMC. It can be used if your OMIVV appliance is having Internet access and you are managing non-vSAN cluster.
If you have created the repository profile using DRM, ensure that your repository is having platform bundle for the hosts.

Issue 5: The cluster is managed using vSphere Lifecycle Manager with HSP. The firmware repository profile that is associated with the cluster profile in OMIVV or HSP version is modified. In this case, if you run the check compliance in vSphere Lifecycle Manager, shows following error: “Unable to find the cluster profile with provided version.”

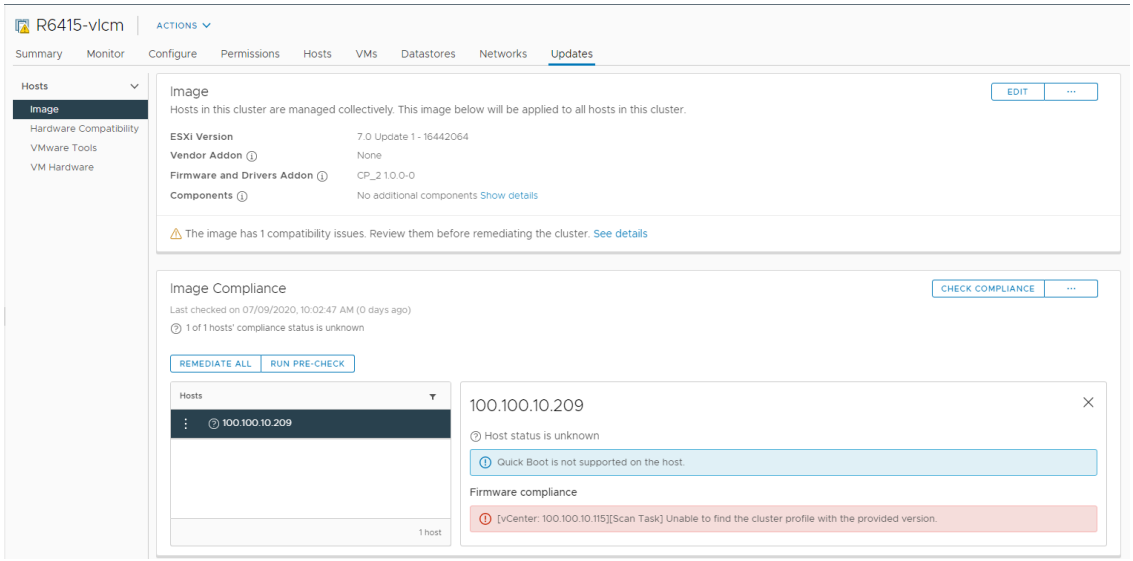

Figure 22: Firmware compliance error message

Resolution: Edit the vSphere Lifecycle Manager image, edit the “Firmware and Driver Addon”, and then select the HSP (this time it will be shown with updated version because of the changes you have done for firmware repository that is associated with cluster profile) and save the image.

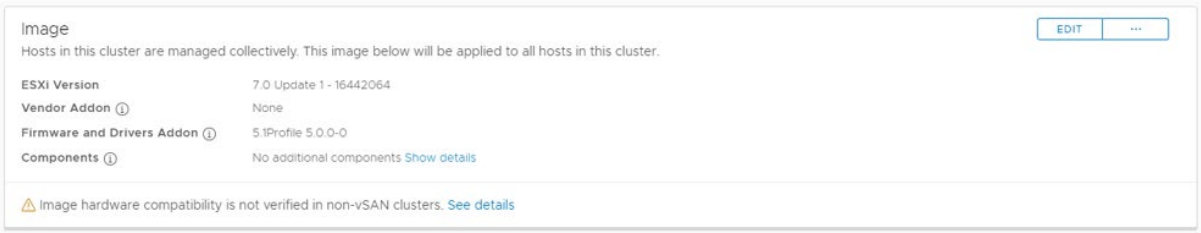

Figure 23: vSphere Lifecycle Manager image edit option

Issue 6: Getting host compliance status is unknown, and firmware compliance shows following message: “The host (<host-ID>) is currently not managed by OMIVV.”

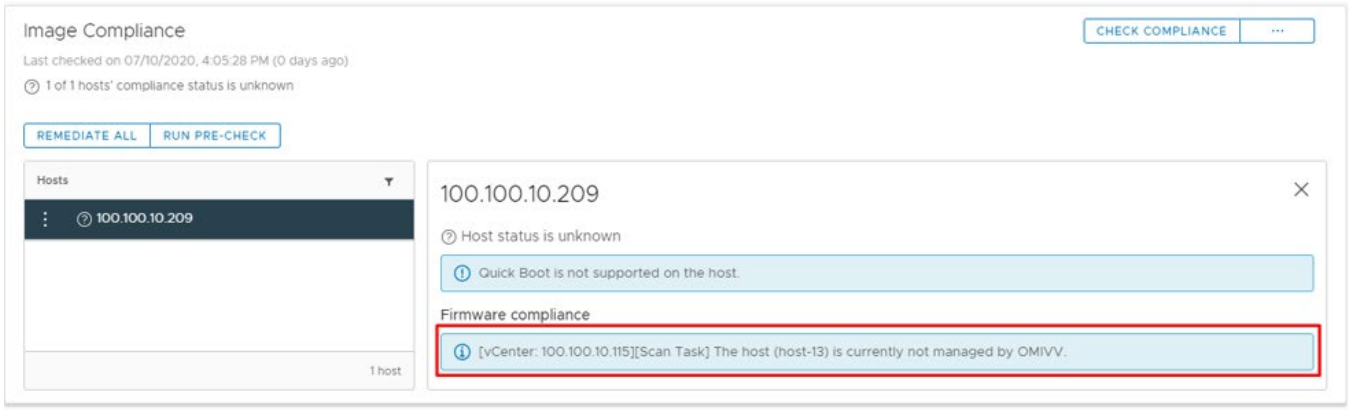

Figure 24: Firmware compliance error message

Resolution: Ensure that the host credential profile is created in OMIVV and inventory ran successfully for the host.

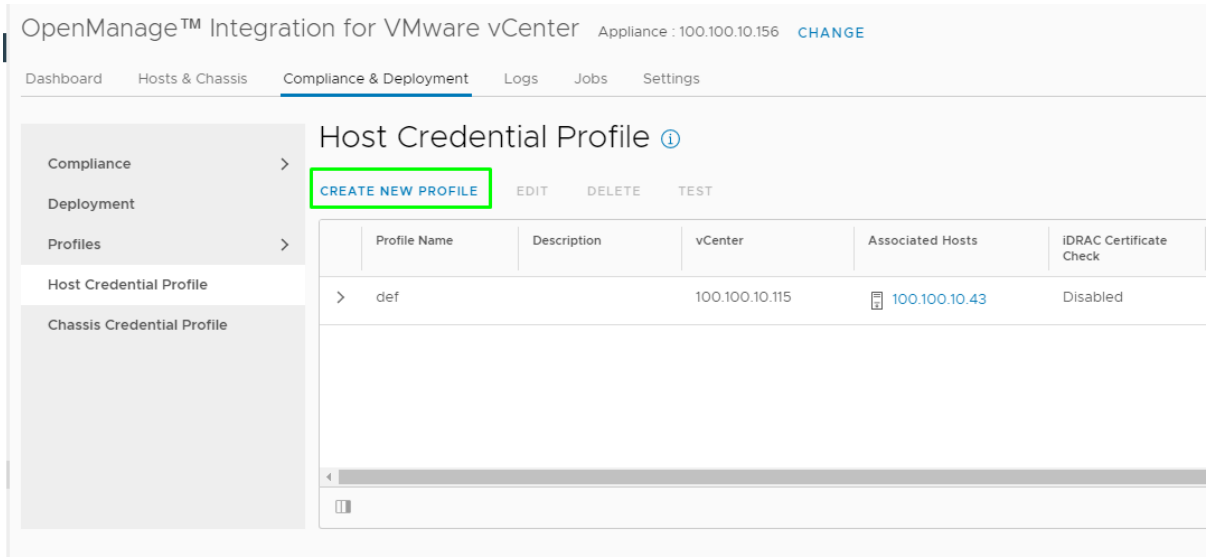

Figure 25: Create host credential profile

Issue 7: Remediation failed with error “Host reported non-compliance after remediation.”

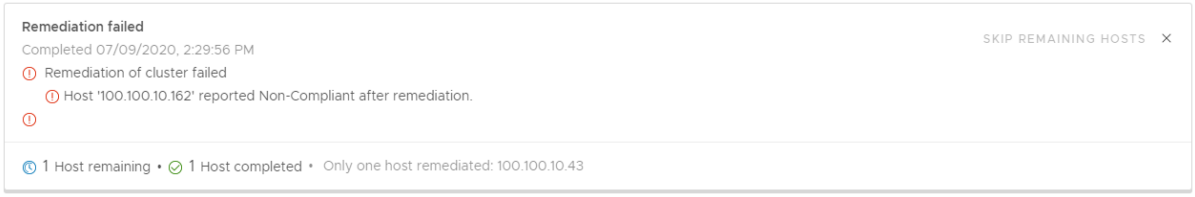

Figure 26: Remediation result

Resolution: This error will occur if one or more firmware components failed to update. Rerunning the Check Compliance will show the firmware components which are failed to update.

OMIVV updates the host firmware components using iDRAC channel, if any issue during this process, some of the firmware component may get failed to update.

Resetting the iDRAC once and then trying remediation may resolve this issue.
Select “Clear iDRAC Jobs and Reset iDRAC” as shown in below figure and try remediation again.

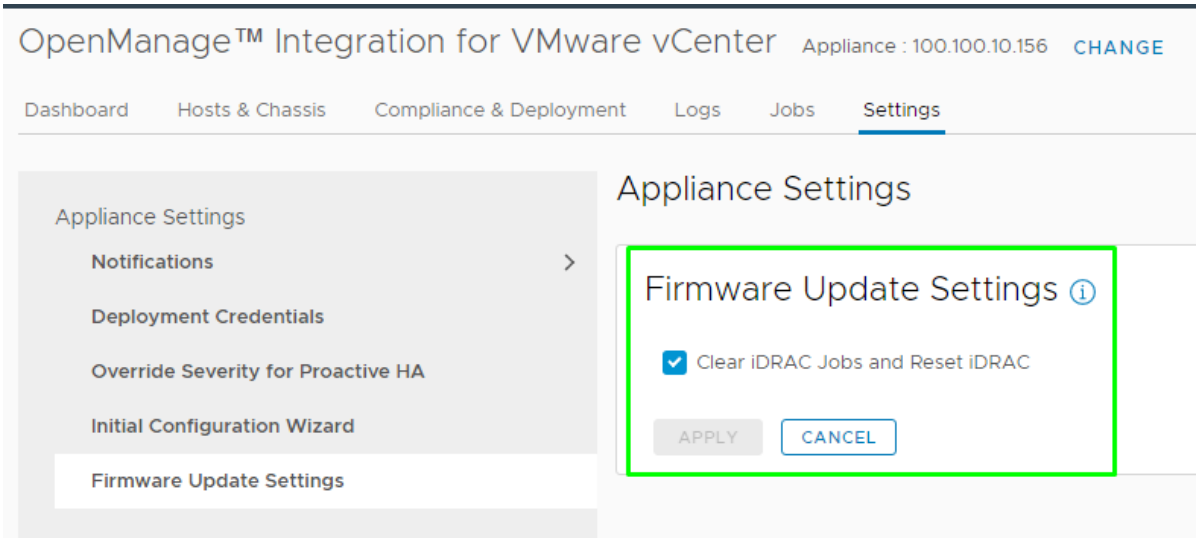

Figure 27: Firmware update settings

5 Conclusion

Since the past several releases, OMIVV has been offering ability to baseline clusters in the vCenter against drivers, firmware and configuration drift, and provides abilities to report the drift with periodical checks and allows users to remediate the drift against the baseline. OMIVV offers this functionality for clusters having any supported ESXi versions starting from ESXi 6.0.

With the introduction of vSphere Lifecycle Manager in vCenter 7.0, VMware offers the capabilities to baseline ESXi 7.0 host-based clusters against base image, add-on, and firmware, and allows admins to remediate the host to align with the baseline. In this scenario, Dell EMC OMIVV acts as the Hardware Support Manager to achieve firmware baselining on Dell EMC PowerEdge servers.

6 Technical Support and Resources

Dell.com/support

OMIVV product page

OMIVV Documentation page

VMware Docs

YouTube Video:

Dell EMC OMIVV as a hardware support manager in vSphere Lifecycle Manager

https://www.youtube.com/watch?v=IUtfuAskL94