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Using Quick Boot in VMware ESXi 7.0 on Lenovo ThinkSystem Servers

Introduces the features of vSphere Quick Boot

Explains the prerequisites and limitation for using vSphere Quick Boot

Shows how to use vSphere Quick Boot on Standalone Host

Shows how to use vSphere Quick Boot on vSphere Lifecycle Manager

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Abstract

vSphere Quick Boot is an innovative feature that speeds up the upgrade process of an ESXi server. A regular reboot involves a full power cycle that requires firmware and device initialization. Quick Boot optimizes the reboot path to skip time-consuming hardware initialization, saving time from the upgrade process. Lenovo® ThinkSystem™ servers support Quick Boot starting with ESXi 7.0.

This document provides a briefly technical overview of the Quick Boot and describes how to configure and use Quick Boot in VMware vSphere 7.0 on Lenovo ThinkSystem servers. This document is intended for IT administrators who are familiar with VMware vSphere products.

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Introduction

vSphere Quick Boot is a creative feature to speed up system reboot. Quick Boot restarts the VMware ESXi hypervisor without rebooting the physical host, thus the hardware does not go through the normal process of reboot operations such as power-on self-test (POST), loading firmware, re-initialization of hardware resources, and reloading ACPI/SMBIOS tables. It helps us speed up the upgrade process of an ESXi server.

Quick Boot workflow

vSphere Quick Boot feature lets us restart only the hypervisor without rebooting the physical host. A regular reboot involves a full power cycle that requires power-on self-test (POST) and all hardware initialization processes.

Figure 1 shows the workflow of Quick Boot.

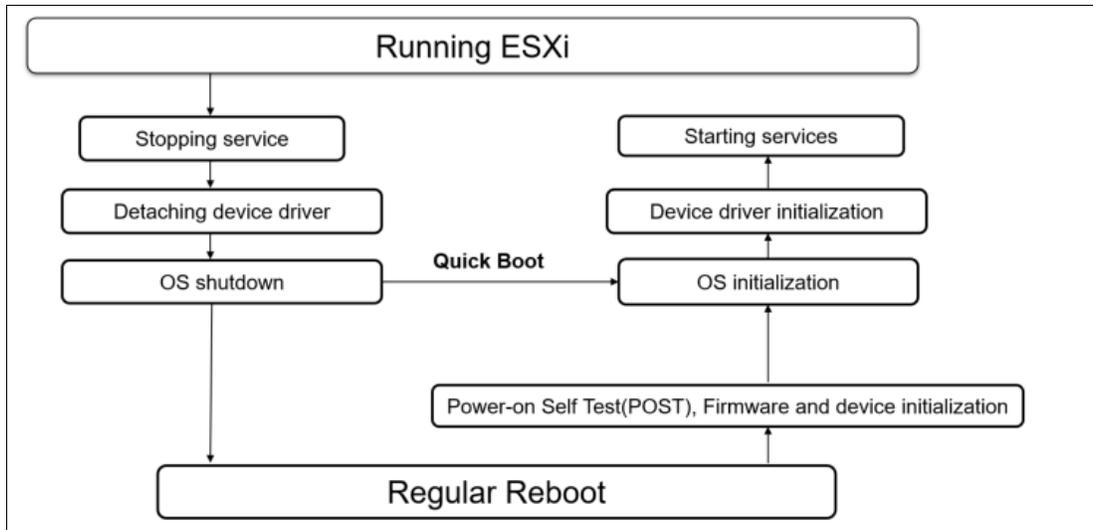


Figure 1 Quick Boot workflow

Quick Boot and Regular Boot performance comparison

Quick Boot optimizes the reboot path to save time from the upgrade process. Regular boot takes much more time to reboot when there are more PCIe devices in the system. Table 1 shows a performance comparison between Quick Boot and Regular Boot on the ThinkSystem SR650 server.

Table 1 Quick Boot and Regular Boot performance comparison

Reboot Mode	Boot time (SR650)
Regular Boot	3 minutes 55 seconds
Quick Boot	1 minute 30 seconds

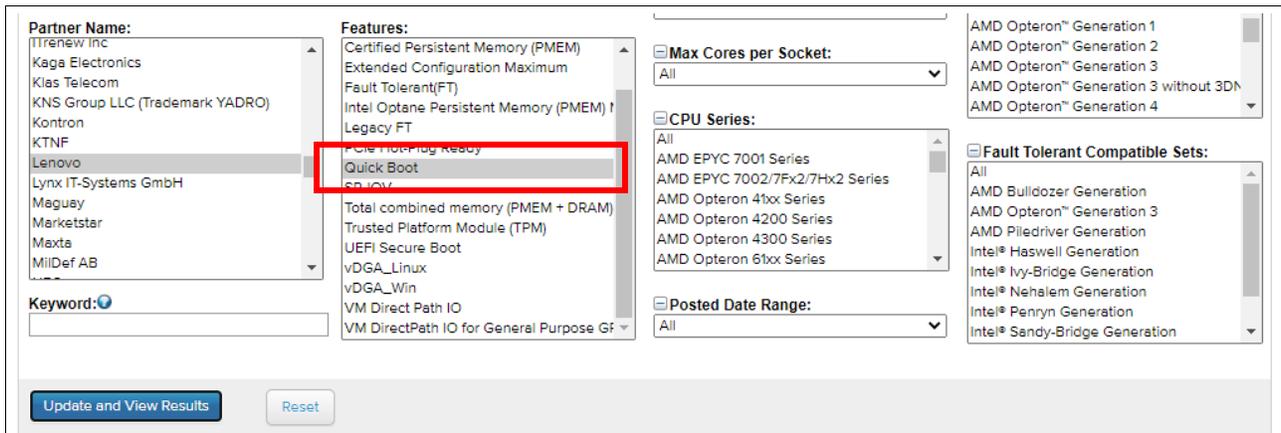
Quick Boot Support and Hardware Compatibility Check

Quick Boot is supported on specific set of Lenovo ThinkSystem servers running ESXi 7.0b (build# 16324942) or later. ESXi hypervisor maintains a platform whitelist which is used to validate the Quick Boot compatibility. Quick Boot uses the platform name exposed by SMBIOS tables to match the server model listed in the platform whitelist.

You can verify the Quick Boot compatibility of Lenovo ThinkSystem servers using the VMware Compatibility Guide available at the following address:

<https://www.vmware.com/resources/compatibility/search.php>

Filter the servers by selecting the **Quick Boot** feature as shown in Figure 2.



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Server Device and Model Information

The detailed lists show actual vendor devices that are either physically tested or are similar to the devices tested by VMware or VMware partners. VMware provides support only for the devices that are listed in this document.

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Partner Name	Model	CPU Series	Supported Releases
Lenovo	ThinkSystem SR635	AMD EPYC 7002/7Fx2/7Hx2 Series	ESXi 7.0 U1 7.0
Lenovo	ThinkSystem SR650	Intel Xeon Gold 6200/5200 (Cascade-Lake-SP/Refresh) Series	ESXi 7.0 U1 7.0
Lenovo	ThinkSystem SR650	Intel Xeon Platinum 8200 (Cascade-Lake-SP) Series	ESXi 7.0 U1 7.0
Lenovo	ThinkSystem SR650	Intel Xeon Silver 4200, Bronze 3200 (Cascade-Lake-SP/Refresh) Series	ESXi 7.0 U1 7.0
Lenovo	ThinkSystem SR655	AMD EPYC 7002/7Fx2/7Hx2 Series	ESXi 7.0 U1 7.0

Figure 2 Quick Boot compatible check

Not all the servers or configurations support the Quick Boot feature. Quick Boot is supported with a limited set of hardware platforms, drivers, and is not supported on ESXi hosts that use TPM or passthrough devices.

To check if your host platform is compatible with Quick Boot, you can run the following command on the ESXi host from the shell:

```
~# /usr/lib/vmware/loadesx/bin/loadESXCheckCompat.py
```

If your platform configuration meets the Quick Boot hardware and software requirements, you will get the similar output as shown in Figure 3.

```
[root@localhost:~] /usr/lib/vmware/loadesx/bin/loadESXCheckCompat.py  
This system is compatible with Quick Boot.
```

Figure 3 Quick Boot compatibility check on a supported platform

If your platform configuration does not meet the Quick Boot hardware and software requirements, you will get the similar output as shown in Figure 4.

```
[root@localhost:~] /usr/lib/vmware/loadesx/bin/loadESXCheckCompat.py  
This system is not QuickBoot compatible: violating one or more strict requirements (Quick Boot is not supported on this machine)  
The host does not fulfill the following hard dependencies:  
- a TPM module is in use  
The host does not fulfill the following soft dependencies:  
- Unsupported device driver(s) in use: tpmdriver
```

Figure 4 Quick Boot compatibility check on an unsupported platform

For more information about Quick Boot compatibility, refer to the following VMware KB article:

<https://kb.vmware.com/s/article/52477>

TPM must be disabled

ESXi Quick Boot requires that TPM be disabled, however there is no UEFI option to disable TPM 2.0 on the ThinkSystem SR650 and SR630. There are two methods to disable TPM 2.0: switch to TPM 1.2 and disable it, or use OneCLI to hide TPM 2.0.

Switch to TPM 1.2 and disable

The first method to disable TPM 2.0 is toggling the system to TPM 1.2, and then disabling the TPM 1.2. The detailed steps are listed as follows.

Note: You can only toggle between TPM 1.2 and TPM 2.0 a total of 128 times.

1. Power on the server and press F1 when prompted to enter System Setup.
2. In System Setup, navigate to the System Configuration and Boot Management page.

3. Select **System Settings** → **Security** → **Trusted Platform Module** → **Update to TPM1.2 compliant**, toggling to TPM 1.2. See Figure 5.

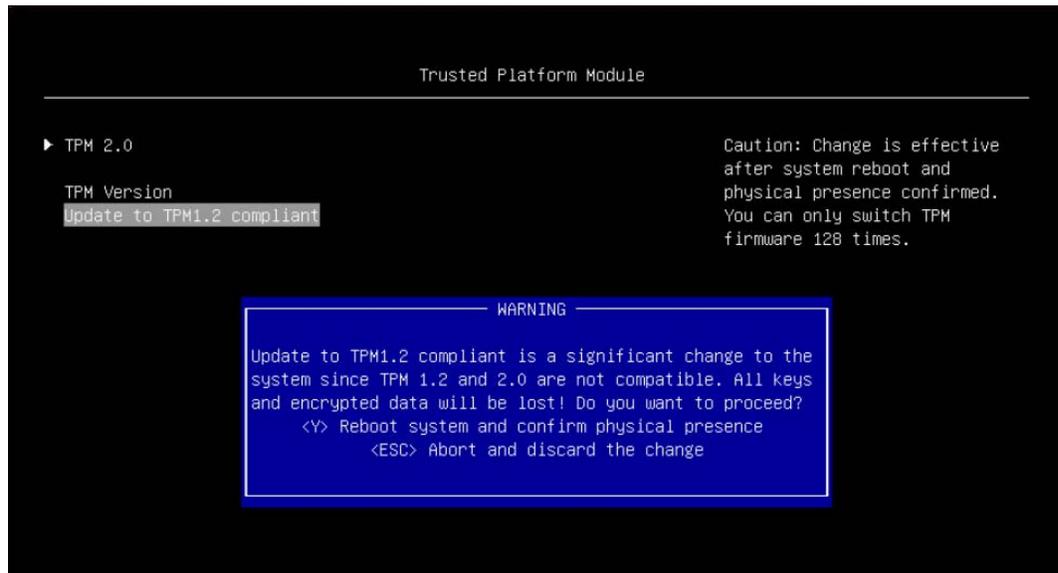


Figure 5 Toggling to TPM 1.2

4. Reboot system and press F1 to go to UEFI System Setup page again.
5. In System Setup, navigate to the System Configuration and Boot Management page.
6. Navigate to **System Settings** → **Security** → **Trusted Platform Module** → **TPM 1.2** → **TPM Device**, select **Disable** to disable TPM1.2 as shown in Figure 6.



Figure 6 Disable TPM 1.2

7. Reboot the system.

3. Access ESXi via SSH and run the following command to check if TPM2.0 is present.

```
~# vsish -e get /hardware/tpm/present
```

Figure 10 shows TPM 2.0 is present in ESXi.

```
[root@localhost:~] vsish -e get /hardware/tpm/present
1
```

Figure 10 TPM 2.0 is present in ESXi

How to Use Quick Boot on Standalone Host

The following are steps for configuring and using Quick Boot in vSphere 7.0 on a standalone ThinkSystem SR650 server.

1. Access ESXi via SSH and run the following command to check if your host platform is compatible with Quick Boot:

```
~# /usr/lib/vmware/loadesx/bin/loadESXCheckCompat.py
```

The output of the command is shown in Figure 11.

```
[root@localhost:~] esxcli hardware platform get | grep -i ThinkSystem
  Product Name: ThinkSystem SR650 -[7X05RCZ000]-
[root@localhost:~] /usr/lib/vmware/loadesx/bin/loadESXCheckCompat.py
This system is compatible with Quick Boot.
[root@localhost:~] vmware -lv
VMware ESXi 7.0.1 build-17235175
VMware ESXi 7.0 Update 1
```

Figure 11 Quick Boot compatibility check on the ThinkSystem SR650

2. Run the following command to enable Quick Boot on a standalone host as shown in Figure 12.

```
~# /bin/loadESXEnable -e
```

The output is shown in Figure 12.

```
[root@localhost:~] /bin/loadESXEnable -e
INFO: LoadESX Enabled
INFO: Precheck options:
INFO: All prechecks are enabled.
```

Figure 12 Enable Quick Boot

3. Run the following command to prepare Quick Boot as shown in Figure 13.

```
~# /usr/lib/vmware/loadesx/bin/loadESX.py
```

The output is shown in Figure 13.

```
[root@localhost:~] /usr/lib/vmware/loadesx/bin/loadESX.py
INFO: Target version: 7.0.1-0.25.17235175
INFO: Installers initiated are ('boot': <vmware.esximage.Installer.BootBankInstaller.BootBankInstaller object at 0xcdcf39d128>, 'locker': <vmware.esximage.Installer.LockerInstaller.LockerInstaller object at 0xcdcf41ff60>, 'live': <vmware.esximage.Installer.LiveImageInstaller.LiveImageInstaller object at 0xcdcf2735c0>)
INFO: Adding VIB VMware_locker_tools-light_11.1.1.16303738-16850804 to ImageProfile ESXi-7.0U1c-17235175-standard
INFO: runcmd called with: args = ['!'/sbin/excfcg-advocfg', '-U', 'https-acceptance-level', '-G'], outfile = 'None', returnoutput = 'True', timeout = '30.0'.
INFO: Verifying hash on vibid VMW_bootbank_vmkusb_0.1-1vmw.701.0.0.16850804, payload vmkusb, expected hash f8ae31dcb37353ce89ed1e9bf12fa2589eb255d
INFO: Verifying hash on vibid VMW_bootbank_qedrntv_3.40.4.0-13vmw.701.0.0.16850804, payload qedrntv, expected hash 1818dc0ff04d12ad9eaac0592e122f2cdd02e46
INFO: Verifying hash on vibid VMW_bootbank_pvscsi_0.1-2vmw.701.0.0.16850804, payload pvscsi, expected hash c5f3be6fdffb2bala6324e6136b589cdda744e4ef
INFO: Verifying hash on vibid VMware_bootbank_cpu-microcode_7.0.1-0.25.17235175, payload uc_amd, expected hash c80f5a5c51c2728e7148d11b221c3b1509da23f
INFO: Verifying hash on vibid VMware_bootbank_cpu-microcode_7.0.1-0.25.17235175, payload uc_hygon, expected hash 03d144cf8df2dd39d931812ebd6866f4436823f
INFO: Verifying hash on vibid VMware_bootbank_cpu-microcode_7.0.1-0.25.17235175, payload uc_intel, expected hash faced2bd2a54dca5582579093da0c3305a7d97
INFO: Verifying hash on vibid VMware_bootbank_lsuv2-lsiv2-drivers-plugin_1.0.0-4vmw.701.0.0.16850804, payload lsuv2-ls, expected hash b2d5b5bd1b427e466da3adec813c3097704182
INFO: Verifying hash on vibid VMW_bootbank_ixgben_1.7.1.28-1vmw.701.0.0.16850804, payload ixgben, expected hash ec62ce53e41f22c177b939c8e714c3e60d621b01
INFO: Verifying hash on vibid VMW_bootbank_lpic_11.4.62.0-1vmw.701.0.0.16850804, payload lpnic, expected hash 22e0679820127a1024dea018a45481a7a1343ef
INFO: Verifying hash on vibid VMware_bootbank_esx-ui_1.34.4-16668064, payload esx-ui, expected hash 02b011e4983d343f53017d18f9f34f649e5048d
INFO: Verifying hash on vibid VMW_bootbank_i40iwn_1.1.2.6-1vmw.701.0.0.16850804, payload i40iwn, expected hash 4889f7d3340d264487a605e398872b0f21835ec1
INFO: Verifying hash on vibid VMware_bootbank_esx-dvfilter-generic-fastpath_7.0.1-0.25.17235175, payload esx-dvfi, expected hash 63159007a02ded8ebc1055e2f20ac3403d627820
INFO: Verifying hash on vibid VMW_bootbank_nmlx5-rdma_4.19.16.8-2vmw.701.0.0.16850804, payload nmlx5-rd, expected hash 5e0341a43d556def593b9d1b9a3ec3c80cf998fb
INFO: Verifying hash on vibid VMware_bootbank_lsuv2-smartpqi2-plugin_1.0.0-4vmw.701.0.0.16850804, payload lsuv2-sm, expected hash 8ef405f5a7756a9c3a5aea082e59a3e74542e446
INFO: Verifying hash on vibid VMW_bootbank_sfvmk_2.4.0.0010-15vmw.701.0.0.16850804, payload sfvmk, expected hash fba692a4ae2aba810860b5c0d67073ec49a91f5
INFO: Verifying hash on vibid VMware_bootbank_crx_7.0.1-0.25.17235175, payload crx, expected hash 23a98bc969abf46c18595f4885f0fa5f9110963
INFO: Verifying hash on vibid VMW_bootbank_nvmmnet3-ens_2.0.0.22-1vmw.701.0.0.16850804, payload nvmmnet3, expected hash c06888e1bb95f208e906ea291dalb92bb099c
INFO: Verifying hash on vibid VMW_bootbank_lser_1.1.0.1-1vmw.701.0.0.16850804, payload lser, expected hash d25490f4d9e732103c0aa20690ed6075d5db7fe
INFO: Verifying hash on vibid VMW_bootbank_nmlx4-rdma_3.19.16.8-2vmw.701.0.0.16850804, payload nmlx4-rd, expected hash 57c692a120a2be8b7e87b83dd423bd93alad811
INFO: Verifying hash on vibid VMW_bootbank_nvmmnet3_2.0.0.30-1vmw.701.0.0.16850804, payload nvmmnet3, expected hash 2f202df3d51410cf8b58713ddadf0cc6e9b50bd
INFO: Verifying hash on vibid VMW_bootbank_lpic_12.6.278.10-8vmw.701.0.0.16850804, payload lpic, expected hash 105ffc353cbb025c42cb64d2a543e98479cf2cf
INFO: Verifying hash on vibid VMW_bootbank_lsi-mr3_7.712.51.00-1vmw.701.0.0.16850804, payload lsi-mr3, expected hash 8fe8c3f97bddd2fa6894f4e3a392e22e83fcf
INFO: Verifying hash on vibid VMware_bootbank_vsanhealth_7.0.1-0.25.17235175, payload vsanhealth, expected hash 306328b9714aca7e6333ccf43130f840aacdc6766
INFO: Verifying hash on vibid VMware_bootbank_vsanhealth_7.0.1-0.25.17235175, payload vsanmgt, expected hash 36a4722291b7776f2002eca50c5186d0aac6ecb1
INFO: Verifying hash on vibid VMW_bootbank_vmkfc0e_1.0.0.2-1vmw.701.0.0.17230124, payload vmkfc0e, expected hash bad792c6b9d27daa79b9475dc97e9ade4ad98507
INFO: Verifying hash on vibid VMW_bootbank_brcmfcoe_12.0.1500.0-1vmw.701.0.0.16850804, payload brcmfcoe, expected hash c980331be89734335e909d7282e2e3f2d1fa09a
INFO: Verifying hash on vibid VMW_bootbank_brcmvmfc_12.6.278.10-3vmw.701.0.0.16850804, payload brcmvmfc, expected hash a7e45960794d450351a8092230242f8e5d2ed8
INFO: Verifying hash on vibid VMware_bootbank_esx-base_7.0.1-0.25.17235175, payload b, expected hash eb383aed36b5c32597c844433e395db8489254ac
INFO: Verifying hash on vibid VMware_bootbank_esx-base_7.0.1-0.25.17235175, payload bldr, expected hash f58bdaaf70af0f221e165751f42126c2e6ace7dc
INFO: Verifying hash on vibid VMware_bootbank_esx-base_7.0.1-0.25.17235175, payload k, expected hash 1f189657bbc204359b27ac6f58e20fc347323cc3
```

Figure 13 Prepare for Quick Boot

4. Graceful reboot ESXi from ESXi shell or Direct Console User Interface (DCUI).

You will now see the host is performing Quick Boot to only restart the hypervisor without rebooting the physical host. Quick Boot/var/log/loadESX.log contains events related to restarting an ESXi host through Quick Boot.

How to use Quick Boot on vSphere Lifecycle Manager

vSphere Lifecycle Manager (vLCM) is a service that runs in vCenter Server and does not require any additional installation to use it. Upon deploying the vCenter Server appliance, the vLCM user interface becomes automatically enabled in the HTML5-based vSphere Client.

vLCM leverages Quick Boot feature to reduce the remediation time for hosts that undergo patch and upgrade operations. If the Quick Boot feature is enabled, vLCM skips the hardware reboot and then the maintenance time is reduced and the risk of failures during remediation is minimized.

The following steps list how to use Quick Boot in vLCM to upgrade ESXi from previous version:

1. Login to vCenter Server 7.0 and go to the HTML5-based vSphere web client.
2. Create a datacenter, cluster and then add an ESXi host to the vCenter server.

3. In the vSphere web client, navigate to **Menu** → **Lifecycle Manager** → **Settings** → **Baselines**, edit Baselines Remediation Settings to enable Quick Boot as shown in Figure 14. Quick Boot is disabled by default.

Do not change VM power state
Leave virtual machines and virtual appliances in their current power state

Retry entering maintenance mode in case of failure

Retry Delay minutes

Number of retries

Allow installation of additional software on PXE booted hosts

Migrate powered off and suspended VMs to other hosts in the cluster, if a host must enter maintenance mode

Disconnect removable media devices that might prevent a host from entering maintenance mode

Enable Quick Boot

Figure 14 Edit Baselines Remediation Settings in vLCM

4. In the vSphere web client, navigate to **Menu** → **Lifecycle Manager** → **Imported ISOs**, click **IMPORT ISO** to import the ESXi image as shown in Figure 15.

Import ISO

You can import an ISO file or enter a URL.

ISO

Figure 15 Import ESXi image in vLCM

- In the vSphere web client, navigate to **Menu** → **Lifecycle Manager** → **Baselines**, click **NEW** to create a baseline for imported ESXi image as shown in Figure 16.

Figure 16 Create Baseline in vLCM

- The new created baseline will be listed in the Baseline section as shown in Figure 17.

Baselines	Content	Type	ESXi version	Last Modified
<input type="radio"/> ESXi7.0U1_upgrade	Upgrade	Custom	7.0.2	3 days ago
<input type="radio"/> Non-Critical Host Patches (Predefined)	Patch	Predefined	7.0.1, 7.0, 7.0.*	4 days ago
<input type="radio"/> Critical Host Patches (Predefined)	Patch	Predefined		4 days ago
<input type="radio"/> Host Security Patches (Predefined)	Patch	Predefined		4 days ago

Figure 17 Baselines list in vLCM

- In the vSphere web client, navigate to **Menu** → **Hosts and Clusters**, select an ESXi host and navigate to **Updates** tab, and click **ATTACH** to attach a baseline which was created in the previous step. Attach baseline to the ESXi host as shown in Figure 18.

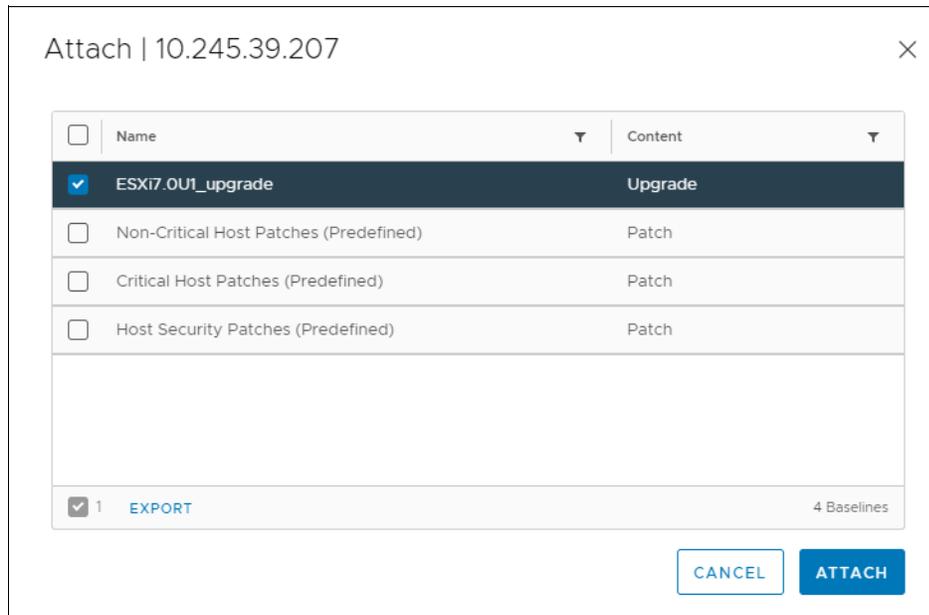


Figure 18 Attach baseline to a ESXi host

- Select the attached baseline and click **REMEDIATE** to upgrade the ESXi host as shown in Figure 19.

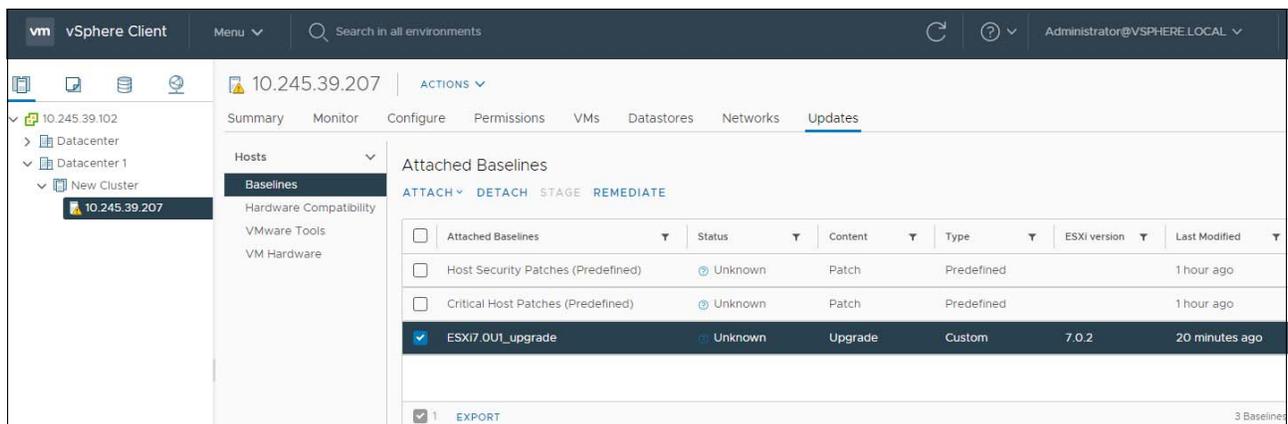


Figure 19 Select baseline and remediate

- Under Remediation settings, double check and make sure that Quick Boot is enabled as shown in Figure 20.

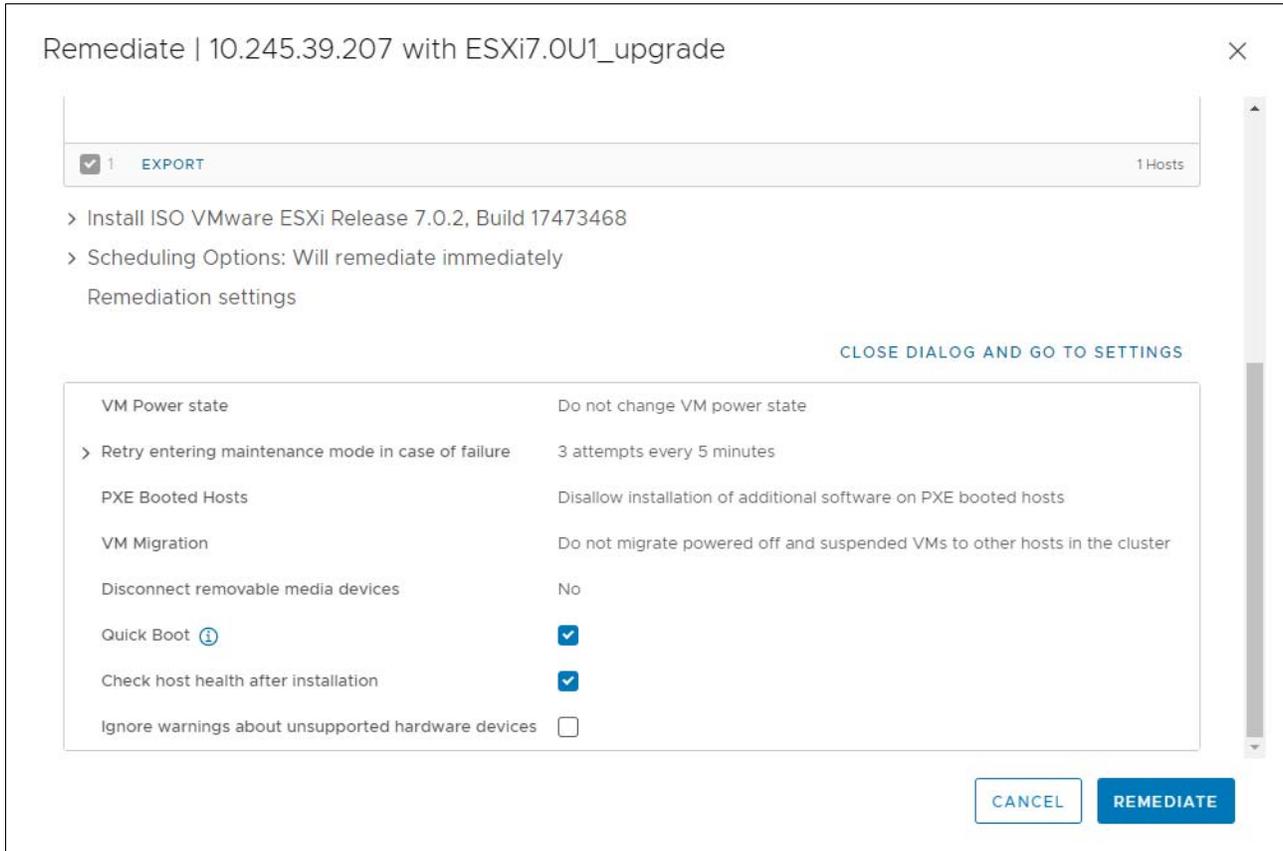


Figure 20 Check remediation settings

- Click the **REMEDiate** button to upgrade the ESXi host, and then the host enters into maintenance mode and upgrade is in progress as shown in Figure 21.

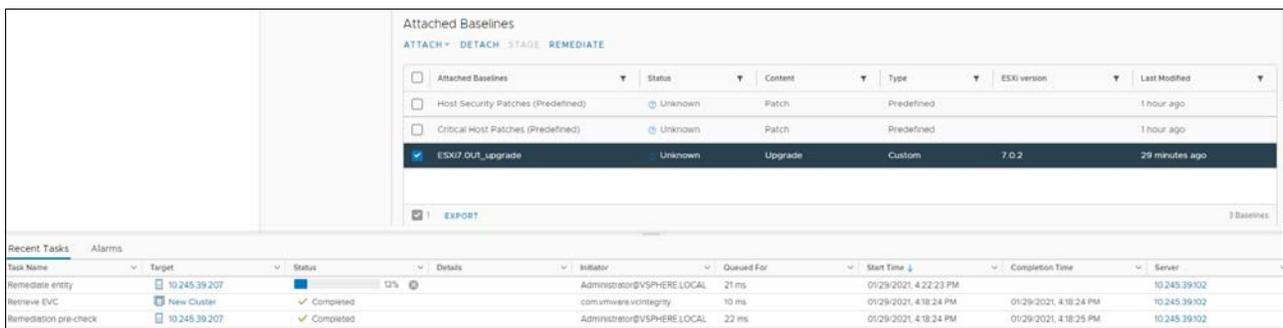


Figure 21 Upgrade is in progress

- The ESXi host enters into Quick Boot cycle without rebooting hardware when the upgrade progress finished. We can find Quick Boot related log in vmksummary.log as shown in Figure 22.

```
2021-01-29T16:17:27Z bootstop: Host is rebooting
2021-01-29T16:19:19Z bootstop: Host has booted via loadESX
```

Figure 22 Quick Boot related log

References

- ▶ VMware vSphere Documentation
<https://docs.vmware.com/en/VMware-vSphere/7.0/com.vmware.vsphere-lifecycle-manager.doc/GUID-11C3E6A4-01E6-4427-A803-0647504B8E4C.html>
- ▶ vSphere VCG
<https://www.vmware.com/resources/compatibility/search.php>

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