Boot and Network Configuration Deployment using Server Template with Dell EMC OpenManage Essentials (OME)

Dell EMC Engineering
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Revisions

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
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<tbody>
<tr>
<td>August 2017</td>
<td>Initial release</td>
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<td>Redfish Streaming Support update</td>
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## Contents

1 Executive Summary ........................................................................................................... 4

2 OME features discussed .................................................................................................... 5

3 Preparing OME for device configuration ........................................................................... 6
   3.1 Redfish Streaming Support .......................................................................................... 6
   3.2 File Share settings ....................................................................................................... 6
      3.2.1 File Share requirement explanation ....................................................................... 6
      3.2.2 Setting up File Share ........................................................................................... 6
   3.3 Target server requirements ........................................................................................ 8

4 Example use cases .............................................................................................................. 9

5 Creating template from server .......................................................................................... 11
   5.1 Creating template from a reference server .................................................................. 11
   5.2 Boot and Network Configuration ................................................................................ 12
      5.2.1 First Boot Configuration ..................................................................................... 12
      5.2.2 Network Interface Setting .................................................................................. 18

6 Editing template to configure first-boot and network interface settings ....................... 19

7 Deploying template on target server ............................................................................... 22
   7.1 Adding devices to the Repurpose and Bare-metal device group .................................. 22
   7.2 Deploying reference template on target server ......................................................... 22

A Additional resources .......................................................................................................... 24
1 Executive Summary

This technical white paper describes the feature to guide the template editing process, which is introduced in OME 2.3 and later. The use case flows for configuring the Bare-metal servers to boot from SAN, PXE, and drive are explained in detail along with configuring network parameters.
2 OME features discussed

- Guidance to use the Boot and Network Configuration section of the server template
- Requirements and setup for using the features
- Create template from a server which is capable to boot from SAN
- Edit server template to configure first boot and network settings
- Deploy template to a target server by using the boot from SAN settings
3 Preparing OME for device configuration

Device prerequisites and file share settings are required to use the configuration and deployment features in OME. This section describes about the device requirements and setting up File Share settings.

3.1 Redfish Streaming Support

With OpenManage Essentials version 2.4, the device configuration and deployment feature now makes use of the Redfish Streaming interface if iDRAC.

- For PowerEdge servers, the minimum supported version of iDRAC is 2.50.50.50 and later for Redfish support.

With Redfish Streaming support available, the existing file share option becomes redundant. The file share can be disabled, as described in the later sections. It is highly recommended to upgrade iDRAC to the minimum supported version.

3.2 File Share settings

The Device Configuration and Deployment feature now makes use of iDRAC’s Redfish interface. However, for servers not having the minimum supported iDRAC version 2.50.50.50, a staging area (file share) is required. This section describes about the file share and setting up the file share.

3.2.1 File Share requirement explanation

The File Share is a staging area for deployment. To use the deployment features, a file share is required to send and receive configuration files to and from a device. During the ‘create’ or ‘deploy’ task, configuration files will briefly exist in the file share folder. After completion of the ‘create’ or ‘deploy’ task, the file is deleted. Security attributes (passwords and other sensitive data) are not included in the file.

3.2.2 Setting up File Share

The File Share settings must be entered in OME. The File Share settings require a user name and a password. The user name and password must be of a user on the OME system that has sufficient privileges to read and write files to the system. During a deployment or configuration task, the user name and password are sent to the remote targets to access the File Share. Using an Administrator account is recommended.

1. Navigate to the Deployment portal.
2. In the Common Tasks section, in the left pane, click File Share Settings.
3. Type the user name and password of a user on the OME system with sufficient privileges to read and write files to the system.
4. If there are server devices being managed without having the minimum supported iDRAC version 2.50.50.50, select the Allow using file share for Device Configuration feature on server check box. If iDRAC on all the servers is upgraded to version 2.50.50.50 or later, clear the check.
5. Click Apply. If the Allow using file share for Device Configuration feature on server check box is selected, a message is displayed to upgrade servers to latest firmware:

![Firmware Warning](image)

Figure 2  Firmware Warning

6. Click Yes to continue to use the file share.
7. After configuring the file share, if check box is cleared at a later time, a message is displayed to indicate that the configuration compliance of those servers will be lost whose iDRAC version is earlier than the minimum supported version of 2.50.50.50
3.3 **Target server requirements**

- For 12th and 13th generation PowerEdge servers, the minimum supported version of iDRAC is 2.30.30.30.
- For 14th generation PowerEdge servers, the minimum supported version of iDRAC is 3.00.00.00 and later.
- If you want to configure FC or FCoE as the first-boot device, the target server must have at least one FC or FCoE CNA card similar to the reference server.
- For the list of supported HBA or CNA cards, see **Supported cards for I/O Identity Optimization** in the iDRAC User’s Guide at [Dell.com/idracmanuals](http://Dell.com/idracmanuals).
- iDRAC Enterprise or iDRAC Express license. This is a separate license from the ‘Server configuration for OpenManage Essentials’ license.
- Server configuration for the OME license installed on the iDRAC. This is a separate license from the iDRAC license.

**Note:** Server configuration for OME license is required only for deployment and not required to create a template.
4 Example use cases

Use case 1: You want to set the boot type as FC or FCoE and deploy the storage target WWPN and LUN ID so that the server can boot from SAN.

1. Create a template from a server which is capable to boot from SAN (See How to create template from a server section).
2. On the storage array, create a new boot LUN by using its management utility.
3. Make a note of the WWPN of the controller on storage array and the LUN ID of the boot LUN created on the storage array.
4. Edit the template to set the boot type to either FC or FCoE based on your SAN environment (See How to edit the template to configure First Boot and Network Interface Settings section).
5. Enter the target storage controller’s WWPN and LUN ID information and save the template.
6. Deployment of the edited template can be done in two ways:
   i. Create a Stateless Deployment task by using the Virtual IO pool created in OME (See Deploying the template in stateless environment section in Editing and Deploying Server Template by using OME whitepaper) and make a note of the Virtual WWPN being deployed for the FC or FCoE controller on the server.
   
   ![Virtual Identities generated using virtual pool.](image)

   ii. Bare metal deployment of the template on the server (See the Deploying reference template on target server section) and make a note of the physical WWPN from the FC or FCoE controller BIOS on the target server.
7. After successful deployment of the template, configure the network switch to create a zone in which server’s FC or FCoE controller’s Virtual/Physical WWPN, and storage FC or FCoE controller’s WWPN are part of the zone so that they can communicate with each other and the server can boot from the assigned LUN in the SAN environment in next reboot cycle.
• In case server and storage WWPN identities are zoned already in the network switch infra, then post the deployment of the template, the server will boot to the assigned LUN in the SAN environment automatically.

**Note:** See the vendor-specific procedures to configure the network switch and storage device.

**Use case 2:** You want to change the boot type to Hard Drive or PXE on the server.

1. Create a template from a server which is capable of PXE or Hard Drive boot.
2. Edit the template to select the boot type to either Hard Drive or PXE (See the Editing template to configure first-boot and network interface settings before deployment section).
3. Deploy the template on the server (See the Deploying reference template on target server section).
4. After successful deployment, the server would boot from the selected boot type device.

**Use case 3:** You want to enable partitioning on the Network Interface Card and set minimum or maximum bandwidth (%) for each partition.

1. Create a template from a server with NIC card supporting partitioning.
2. In the Network Interface Settings section of the template, change the necessary settings (See the Editing template to configure first-boot and network interface settings before deployment section).
3. Deploy the template on the server (See the Deploying reference template on target server section).
5 Creating template from server

To create the server template, the server must be discovered and should at least have one FC or FCoE CNA card

5.1 Creating template from a reference server

1. Click Deployment tab.
2. In the left pane, under Common Tasks section, click Create Template.
3. In the Create Template dialog box, type a unique name for the template.
4. Select Create from Device.
5. Select the target server from the device tree.

Note: Alternately, you can select the target by entering the device name or Service Tag in the search box next to the Create from Device button.

6. Type the execution credentials of the target. The credentials must have the administrator privileges on the target iDRAC.
7. Click Finish.

8. Click OK. A task is created.
9. To view the created task, under Deployment portal, click Tasks tab.
To view the progress of the task, view the Task Execution History grid. To view the information about the execution history, double-click the task execution history entry, or right-click the task execution history entry, and then select Details. Information about any issues such as incorrect credentials is displayed.

If the task is successful, a template is created and displayed in the Server Templates tree.

If the task is not successful, view the details of the task by double-clicking the execution history. The task can be run again by right-clicking the task execution history or the task and clicking Run. To rerun the task, type the iDRAC credentials.

5.2 Boot and Network Configuration

This section lists First Boot Configuration and Network Interface Settings and allows the user to modify the values for the listed configuration setting parameters.

5.2.1 First Boot Configuration

In this section, the following boot parameters are described:

- **Boot mode**
- **Boot type**
- **Boot sequence and hard drive sequence**

5.2.1.1 Boot mode

The available boot modes are BIOS and UEFI. User will be able to select the boot mode and type, by selecting the radio buttons.
5.2.1.2 **Boot type**

The boot types available are Hard Disk, PXE, FC, and FCoE.

<table>
<thead>
<tr>
<th>Boot Type</th>
<th>BIOS Mode</th>
<th>UEFI Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard Disk</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>PXE</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>FC</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>FCoE</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>iSCSI</td>
<td>✗</td>
<td>✗</td>
</tr>
</tbody>
</table>

When FC or FCoE boot type is selected, options to enter the target WWPN and LUN ID is displayed.

In case of FC boot type, you can type information about first and second target. For FCoE, type only the first-target information.

---

**Figure 7** Boot modes listed in the template

**Figure 8** FC boot type and target details
World Wide Port Name (WWPN)

WWPN is a unique identifier for each Fibre Channel port presented to a Storage Area Network. Each port on a Storage Device has a unique and persistent WWPN. It is recommended to define this in FCoE and FC environments only.

Restrictions: WWN prefixes require an NAA value of 2, 5, or 6. An NAA value (Network Address Authority) is a 4-bit field used to guarantee uniqueness of WW names. The NAA value is the first four bits of the address (Therefore, the address must start with 2, 5, or 6).

Logical Unit Number (LUN)

LUN is an identification scheme for storage drives that typically support a small number of units addressed as LUN 0 through 7, 15, or 31, based on the technology. For example, Fibre Channel supports 32 addresses (0–31). A LUN may refer to a single drive, a subset of a single drive, or an array of drives.

If the template is created from a reference server which does not have any of the listed boot types, those options will be greyed out and will not be allowed to select.
5.2.1.3 **Boot sequence and hard drive sequence**

Expanding More Settings in the First Boot Configuration lists the boot sequence and hard drive sequence. The sequence can be changed by using the up and down arrow buttons.

Boot Sequence and Hard Drive Sequence changes are not allowed beyond the scope of the selected boot type when it cannot be satisfied.

For example, if the boot type is changed to FCoE, first capable NIC instance (say, Integrated NIC 1 Port 1 Partition 1) available in the boot sequence will be automatically selected to be booted from (made first entry in the boot sequence). One can make another capable NIC instance (say, Integrated NIC 2 Port 1 Partition 1) as first entry in the boot sequence, when required.

The following screen shots indicate the boot- and hard drive sequence for each available boot types. If multiple FC or NIC instances are available then all those instances will be shown in the boot and hard drive sequence.

![First Boot Configuration](image)

**Figure 11** Boot- and hard drive sequence with multiple network interface instances
Boot and Network Configuration Deployment using Server Template with Dell EMC OpenManage Essentials (OME)

First Boot Configuration

Select Boot Mode: UEFI

Select Boot Type: Hard Disk

- First Target WWPN: 20:00:00:00:00:00:00:00
- First Target LUN Id: 1

More Settings

- Boot Sequence
  - Integrated NIC 1 Port 1 Partition 1
  - Hard Drive 1-1
- Hard Drive Sequence
  - Fibre Channel in Slot 6-1
  - Integrated RAID Controller 1-1

Figure 12 Boot- and hard drive sequence when FCoE is selected as the boot type

First Boot Configuration

Select Boot Mode: UEFI

Select Boot Type: Hard Disk

- First Target WWPN: 50:00:03:10:00:00:00:00
- First Target LUN Id: 1
- Second Target WWPN: 50:00:03:10:00:00:00:00
- Second Target LUN Id: 2

More Settings

- Boot Sequence
  - Hard Drive 1-1
  - Integrated NIC 1 Port 1 Partition 1
- Hard Drive Sequence
  - Fibre Channel in Slot 6-1
  - Integrated RAID Controller 1-1

Figure 13 Boot- and hard drive sequence when FC is selected as the boot type
Figure 14  Boot- and hard drive sequence when Hard Disk is selected as boot type

Figure 15  Boot- and hard drive sequence when PXE is selected as boot type
5.2.2 Network Interface Setting

Under the Network Interface Settings section, all Network Interface and FC cards that are available in the (template) source server are listed with following information:

- User friendly name with location
- Type of fabric—NIC, CNA, or FC
- Port layout
- Partitioning capability and option to enable or disable it
- Minimum or maximum bandwidth allocation per partition
- IOA VLAN attributes corresponding to the network ports (for modular server templates only)

**Note:** Dual port card will always provide four partitions per port. Whereas, Quad port card will always provide two partitions per port. Also, cards that can support more number of virtual functions per port than defined here are not supported yet. However, if tried, template deployment might eventually fail. Example cards: Intel(R) 10GbE 2P X710-k bNDC and Emulex OCm14102-U5-D - F8:BC:12:FB:00:02.
6 Editing template to configure first-boot and network interface settings

Before deploying, the source template can be edited to change the Boot and Network configuration.

1. Click **Deployment** tab.
2. In the left pane, select a template by clicking **Templates → Server Templates**.
3. Select **Boot and Network Configuration** tab on the right pane.
4. Expand **First Boot Configuration**.
5. Select the boot type.
6. If FC is selected as the boot type, type the target storage First and Second Target WWPN, and LUN ID.
7. If FCoE is selected as the boot type, type the target storage First Target WWPN and LUN ID.
8. Click **Save**.

**Note:** In OME 2.3 and later, if you want to boot the server from SAN, in the **First Boot Configuration** section, you can select only FC and FCoE as the boot type for a server.

**Note:** While configuring first boot, boot mode cannot be changed in templates created from 13th generation of servers and later. This is a limitation because the profile XML provides boot sequence and other attributes for current boot mode only.

**Note:** For templates created from (and deployed to) 12th generation of servers or later running with older firmware, PXE boot in UEFI mode will not work. Nor will it get identified in the template if set so. To resolve the issue, update the iDRAC firmware to the available latest version.

In the **Network Interface Settings** section you can enable or disable partitioning, allocate minimum and maximum bandwidth, and assign tagged and untagged VLANs to the available network interfaces.

To change the network interface settings:

1. Click **Deployment** tab.
2. In the left pane, under **Templates → Server Templates**, select a template.
3. Click **Boot and Network Configuration** tab on the right pane.
4. Expand **Network Interface Settings**.
5. Select the required NIC.
6. To enable partitioning, select the **Enable** check box.
7. Type the minimum and maximum bandwidth for each partition per port.
8. Click **Save**.
Enable partitioning on a NIC
To assign tagged VLANs and untagged VLANs on corresponding IOA ports of server’s NIC:

1. Expand the required NIC.
2. Type the tagged and untagged VLAN IDs per port.
3. Click **Save**.

![Network Interface Settings](image)

Figure 17 Assign tagged VLANs and untagged VLAN
7 Deploying template on target server
Before deploying the template, the target server must fulfill the requirements of the target server. It has to be discovered and added to the Repurpose and Bare-metal Devices list.

7.1 Adding devices to the Repurpose and Bare-metal device group
1. Click the Deployment tab.
2. In the left pane, under Deploy Device Configuration Portal, click Deployment Portal.
3. Click Repurpose and Bare Metal Devices.
4. Click the Modify Devices button in the bottom right corner of the grid.
5. Select the target devices (Target servers which are discovered and having the Server configuration for OME license are listed) in the dialog box.
6. Click Ok.

![Modify Devices of the Repurpose and Bare Metal Device Group](image)

Figure 18  Devices in Repurpose and Bare-metal List

7.2 Deploying reference template on target server
1. Navigate to the Deployment tab.
2. In the left pane, click Deploy Template under Common Tasks.
3. Type a unique name for the task. The name is optional since a default name is supplied, but it is a generic name, and the same default name is always supplied. Selecting a name that is relevant to what is being deployed is suggested.

4. Select the edited template with Boot & Network configurations to be deployed on the target server or iDRAC, and then click Next.

5. Select the target devices, and then click Next.

6. Enter the system-specific attributes for each target device and click Next.

7. Set the schedule of when the deploy template task will run. Run now will run the task when the wizard is closed. Run at will run the task on the selected future date. Type the credentials for all target devices. The credentials must be valid for all target devices and must have Operator or Administrator privileges on the iDRAC. Click Next.

8. Review the task in the Summary pane and click Finish.

9. Review the warning message. The deploy action can be destructive. It is important you review and understand the template you are deploying.

To view the progress and details of the task, look at the ‘Task Execution History’ grid.

**Note:** After successful deployment of the template OME will not be able to check if the server has successfully booted from SAN. User has to check the server if it has booted from SAN and may require to make additional vendor specific configuration on FC or CNA cards.

**Note:** To deploy Hard Disk or PXE as the boot type, Bare Metal Deployment procedure can be used.
A Additional resources

Support.dell.com is focused on meeting your needs with proven services and support.

DellTechCenter.com is an IT Community where you can connect with Dell EMC Customers and Dell EMC employees for the purpose of sharing knowledge, best practices, and information about Dell EMC products and installations.

On a storage target to get the WWN details, refer to the IO port section. A sample screen shot from SC8000 is given here.

Referenced or recommended Dell EMC publications:


- Dell EMC iDRAC Licensing and Manuals: http://en.community.dell.com/techcenter/systems-management/w/wiki/3204.dell-remote-access-controller-drac-idrac.aspx#iDRAC7_licensing
