Dell EMC Ready Bundle for Red Hat OpenStack Platform

PowerEdge R-Series Hardware Deployment Guide

Version 10.0.1

DELL EMC

Dell EMC Converged Platforms and Solutions

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Trademarks

Notes, Cautions, and Warnings

A **Note** indicates important information that helps you make better use of your system.

A **Caution** indicates potential damage to hardware or loss of data if instructions are not followed.

A **Warning** indicates a potential for property damage, personal injury, or death.

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Chapter

1

Overview

Topics:

- *Deployment Methodology*
- *Intended Audience*
- *Dependencies*

This guide provides information necessary to deploy the Dell EMC Ready Bundle for Red Hat OpenStack Platform, on Dell EMC PowerEdge R630 and Dell EMC PowerEdge R730xd servers with the Dell EMC PowerEdge H730 disk controller; and the network with Dell Networking S3048-ON and S4048-ON switches.

Deployment Methodology

To perform a deployment of the Dell EMC Ready Bundle for Red Hat OpenStack Platform:

1. Use the Dell EMC Ready Bundle for Red Hat OpenStack Platform Hardware Deployment Guide.
2. Then, depending on the methodology that you prefer, use the Dell EMC Ready Bundle for Red Hat OpenStack Platform Software Deployment Guide to perform either:

   a. An automated deployment using scripts and methods developed and validated by Dell EMC
   b. A manual deployment using methods developed and validated by Dell EMC

Intended Audience

This guide assumes the reader is familiar with:

- OpenStack
- Dell EMC PowerEdge R630 and Dell EMC PowerEdge R730xd RAID configuration
- Red Hat Enterprise Linux (RHEL)
- Red Hat OpenStack Platform (RHOSP) documentation
- Network Configuration
- The concepts and procedures in *Red Hat's Red Hat OpenStack Platform update/upgrade documentation*

Dependencies

For customers performing a self-installation, these files are available on request from Dell EMC. Please contact your account representative, or email *openstack@dell.com* for instructions.

Dell EMC Ready Bundle for Red Hat OpenStack Platform Hardware Deployment Guide dependencies and prerequisites include:

- IPMI Utilities - used for validating server IPMI configuration

  - For Linux® - *http://sourceforge.net/projects/ipmitool/*
  - For Windows® - *http://ipmiutil.sourceforge.net/*
- The Dell EMC Open Source Hardware Configuration Toolkit (OS-HCTK)

  - A copy of the archive: JetPack-manual-10.0.1.tgz, which contains:

    - The OS-HCTK ISO
    - Sample switch configs
    - Solution Workbook
  - Creating the OS-HCTK ISO requires a Linux® environment that has the following programs installed:

    - `cpio`
    - `rpm`
    - `rpm2cpio`

Chapter
2

Hardware Setup

Topics:

- *Unpacking and Installing the Equipment*
- *Powering Up the Equipment*
- *Verifying the Equipment*
- *Tested BIOS and Firmware*

These procedures ensure that your hardware is installed correctly prior to installing the Dell EMC Ready Bundle for Red Hat OpenStack Platform.

Unpacking and Installing the Equipment

Before you proceed you must perform the following procedures following all standard industry safety procedures:

1. Unpack and install the racks.
2. Unpack and install the server hardware.
3. Unpack and install the switch hardware.
4. Unpack and install the network cabling.
5. Connect each individual machine to both power bus installations.
6. Apply power to the racks.

> **Note:** This is usually performed by the Dell EMC EDT Team.

Powering Up the Equipment

To perform the power on test:

> **Note:** This is usually performed by the Dell EMC EDT Team.

1. Power on each server node, individually.
2. Wait for internal system diagnostic procedures to complete.
3. Power on the network switches.
4. Wait for the switches' internal system diagnostic procedures to complete.

Verifying the Equipment

The cluster hardware should be verified before physical installation begins. After installation, the final functional tests should be run.

Recommended validation steps:

1. All power on tests complete successfully.
2. All drives should be powered on, verify that the hardware diagnostic LEDs and system console does not report any errors.
3. All nodes should be checked for correct memory size.
4. All network ports and cables should be checked for connections.

Tested BIOS and Firmware

Table 1: Dell EMC PowerEdge R630/Dell EMC PowerEdge R730xd Tested BIOS and Firmware Versions on page 11 lists the server BIOS and firmware versions that were tested for the Dell EMC Ready Bundle for Red Hat OpenStack Platform.

Table 2: Dell Storage Tested Software and Firmware Versions on page 11 lists the Dell Storage Center, PS Series, and SC Series software and firmware versions that were tested for the Dell EMC Ready Bundle for Red Hat OpenStack Platform.

Table 3: Dell Networking Tested Firmware Versions on page 11 lists the S3048-ON, S4048-ON, and S6000-ON switch firmware versions that were tested for the Dell EMC Ready Bundle for Red Hat OpenStack Platform.

⚠ **Caution:** You must ensure that the firmware on all servers, storage devices, and switches is up to date. Otherwise, unexpected results may occur.

Table 1: Dell EMC PowerEdge R630/Dell EMC PowerEdge R730xd Tested BIOS and Firmware Versions

Product	Version
BIOS	2.3.4
iDRAC Firmware	2.41.40.40
Lifecycle Controller	2.41.40.40
Intel® X520 10G NIC	17.5.10
PERC H730 RAID Controller	25.5.0.0018

Table 2: Dell Storage Tested Software and Firmware Versions

Product	Version
Dell Storage Center Software	2016 R2 Build 16.2.1.228
PS Series Firmware	9.0.5
SC Series Firmware	6.5.20.17

Table 3: Dell Networking Tested Firmware Versions

Product	Version
S3048-ON Firmware	9.11(0.0)
S4048-ON Firmware	9.11(0.0P2)
S6000-ON Firmware	9.11(0.0P2)

Chapter

3

Configuring Your Network

Topics:

- *Network Configuration Overview*
- *Using the Workbook*
- *Dell Networking Switches Default Solution Values*
- *Optional: S6000-ON Switches*
- *Splitting Ports on S6000-ON*
- *Third-Party Network Hardware*

This topic describes the procedures required to configure the Dell EMC Ready Bundle for Red Hat OpenStack Platform network.

Network Configuration Overview

Complete the following steps to set up your network:

1. Determine the VLANs to be used and how they are used.
2. Determine the IP ranges and associate them to a VLAN.
3. Fill in the Solution Workbook. See *Using the Workbook* on page 13.
4. Ensure that the cabling matches your Workbook.
5. Configure your switches per the Workbook:

    • *Dell Networking Switches Default Solution Values* on page 14

Using the Workbook

> **Note:** The Solution Workbook was designed for Dell EMC and Red Hat deployment services to use as a general worksheet for planning a deployment. It is available upon request, as explained in *Dependencies* on page 8, for customers performing a self-deployment. For the Network Configuration portion of the deployment procedure, only the worksheets on Dell Networking are required. The rest of the worksheets are optional.

The *Solution Workbook* is set up to enable the installers to use the same information to:

• Program the switches
• Build the configuration for each node

Using the worksheet you must complete the following tasks for each connection from Server to Switch.

On Any Page:

• If the information is indicated as *required*, then it is needed in order to ensure a successful install.
• We provide a table for you to complete, similar to *Table 4: Example VLAN Assignments* on page 13.

> **Note:** When configuring your networks they must be aligned so that the tenant networks can be expanded by adding a VLAN for each OpenStack virtual network. This is accomplished by assigning all the other networks to lower VLAN numbers than that of the internal tenant network. The solution, as tested, uses a single external network for tenants. A service motion can be arranged to allow dedicated external tenant networks.

Table 4: Example VLAN Assignments

VLAN Name	Recommended VLAN
Management/Out of Band (OOB) Network	110
Provisioning Network VLAN	120
Tenant Tunneling Network VLAN	130
Private API Network VLAN	140
Storage Network VLAN	170
Storage Clustering Network VLAN	180
Public API Network VLAN (API, GUI)	190
External Network VLAN for Tenants (tenants' floating IP addresses)	191

VLAN Name	Recommended VLAN
Internal Networks VLAN for Tenants	200+

> **Note:** Management/Out of Band network ports Management 1/1 is used by the VLT for the heartbeat, and must terminate on the same VLAN in the same IP address range.

On the General Configuration Page:

• Fill in the information needed as required by the site.

On the Switch Configuration Pages:

• **Name** - The Port name on the switch.
• **Connector** - The type of connector used.
• **Device Name** - The name of the server/device connected to the switch. It is helpful to use a name that describes the server usage and associated bond.
• **Port** - The Network Interface Card (NIC) name and port number as the OS would generate.
• **Untagged** and **Tagged** - Used to indicate what VLAN(s) the port should be used, and how.
• **Port-channel number** - The unique number on the switch that represents the port-channel. Each pair in a server bond must have their own unique port-channel number, which is the same on both switches.
• **Mode** - The mode the port-channel will use *802.3ad* for all nodes.

Working switch configurations based on the validated solution are included within the Open Source Hardware Configuration Toolkit (OS-HCTK) tgz file.

Dell Networking Switches Default Solution Values

> **Note:** The VLT ports differ, and are defined in the example.

Table 5: Switch Port Defaults

CLI Command	Reccomended Default	Example
`ip address`	No IP address assigned	`no ip address`
`portmode`	Hybrid mode	`portmode hybrid`
`switchport`	Enabled - after portmode hybrid executed	`switchport`
`mtu`	9216 on S3048-ON; 9216 on S4048-ON	`mtu 9216` or `mtu 9216`
`flowcontrol`	Flow control receive on, transmit off	`flowcontrol rx on tx off`
`spanning-tree`	Rapid Spanning Tree set to Edge-Port going to servers.	`spanning-tree rstp edge-port`

Optional: S6000-ON Switches

The *Dell EMC Ready Bundle for Red Hat OpenStack Platform Reference Architecture* is prescriptive in its hardware, software, networking, and installation definitions. This ensures a consistent experience when you create your OpenStack environment.

The Reference Architecture uses Dell Networking™ S4048-ON switches. However, when the solution is expanded, or initially built beyond ten (10) systems, it can benefit from using Dell EMC's newest aggregation and Top-of-Rack (TOR) switches - the Dell Networking S6000-ON switches. The S6000-ON provides the following benefits:

- Leverages a non-blocking switching architecture
- Delivers line-rate L2 and L3 forwarding capacity
- Provides up to 96 ports of 10Gbe, and eight (8) additional ports of 40Gbe

To utilize the S6000-ON in the solution:

1. Replace up to four S4048-ONs with two S6000-ONs.
2. Mount the two switches in separate racks, so that they draw power from different Power Distribution Units (PDUs).
3. Using the 40G to 10G splitter cables, wire the servers so that each of the two 10Gb ports is connected to a port on a separate switch (e.g., no single NIC has both ports connected to the same switch).

Splitting Ports on S6000-ON

There are several considerations you must take into account when splitting ports on Dell Networking S6000-ON switches:

- Splitting a single 40G port into four 10G ports is supported only on a standalone unit.
- Split ports cannot be used as stack-link to stack an S6000-ON.
- Split ports cannot be a part of any stacked system.
- Some of the ports on an S6000-ON are fixed 40G ports. Therefore, splitting those ports is not allowed.

  - Fixed ports include ports 4, 12, 20, 28, 100, 108, 116, and 124.
- Reload is mandatory when:

  - QSFP ports are converted into 4x 10G SFP+ ports using the `portmode quad` CLI command
  - Converting quad ports back to a QSFP port

To split a port:

1. Log onto the switch.
2. Execute the following command:

```
stack-unit 0 port 48 portmode quad
```

Third-Party Network Hardware

If you are not using Dell Networking S3048-ON and/or S4048-ON switches, you must program the switches to support your cloud instantiation. Your switches are expected to support the following:

- Support for IEEE 802.1Q VLAN traffic and port tagging
- Support for using one untagged and multiple tagged VLANs on the same port
- The ability to provide a minimum of 170 Gigabit Ethernet ports, in a non-blocking configuration, within the Provisioning VLAN

  - Configuration can be a single switch or a combination of stacked switches, to meet the additional requirements
- The ability to create link aggregation groups (LAGs) with a minimum of two physical links in each LAG
- If multiple switches are stacked:

- The ability to create a LAG across stacked switches
- Full-bisection bandwidth
- Support for VLANs to be available across all switches in the stack
- 250,000 packets-per-second capability per switch
- A managed switch that supports both SSH and serial line configuration
- SNMP v3 support

Chapter
4

Configuring PowerEdge Hardware

Topics:

- *Configuring the SAH Node*
- *Configuring Overcloud Nodes*

This section describes manually configuring PowerEdge server hardware for the Dell EMC Ready Bundle for Red Hat OpenStack Platform with Red Hat OpenStack Platform:

- IPMI Configuration
- BIOS Configuration
- RAID Configuration

Configuring the SAH Node

The SAH is configured using the Open Source Hardware Configuration Toolkit (OS-HCTK) tool.

IPMI Configuration

The servers' iDRACs must be configured correctly for Dell EMC Ready Bundle for Red Hat OpenStack Platform deployment. Dell EMC recommends that you use the OS-HCTK to configure the iDRAC on the SAH node. See *iDRAC Default Settings* on page 19 for further details. Overcloud nodes' iDRACs should be configured correctly by the factory, with the possible exception of network settings. See *Configuring Server Network Settings* on page 20 for details on configuring iDRAC network settings.

Open Source Hardware Configuration Toolkit

The Open Source Hardware Configuration Toolkit (OS-HCTK) is a configuration utility with sample scripts and configuration files that is used to automate the setup and configuration of BIOS and RAID settings for Dell EMC servers used for OpenStack and Hadoop open source software solutions.

> **Note:** The OS-HCTK ISO is run **only** on the system that will be configured as the SAH.

The OS-HCTK enables you to create a USB key from which you can boot a Dell EMC PowerEdge R630 or Dell EMC PowerEdge R730xd, and apply the BIOS and RAID settings.

Topics discussed include:

- *Creating the Open Source Hardware Configuration Toolkit ISO* on page 18
- *Customizing the ISO* on page 19
- *iDRAC Default Settings* on page 19
- *SAH BIOS Specification* on page 19
- *Running the Open Source Hardware Configuration Toolkit ISO* on page 20

Creating the Open Source Hardware Configuration Toolkit ISO

To create the OS-HCTK ISO:

1. Ensure you are running in a Linux® environment that has the following programs installed:
    - `cpio`
    - `rpm`
    - `rpm2cpio`
2. Ensure the user you are logged in as has passwordless `sudo` rights.
3. Copy the bootimage.iso included in the OS-HCTK tgz file to your home directory.
4. Run the following command to ensure that the loop module is loaded, so that the script has access to loopback devices:

```
$ sudo modprobe loop
```

5. Copy the ISO onto a USB key using the following command:

```
$ sudo dd if=~/bootimg.iso of=/dev/sdx bs=2048
```

Where: `/dev/sdx` is the device that was created when the USB key was inserted into the system. The USB key must be at least 512MB in size.

Customizing the ISO

This utility creates a CentOS 6.6 Live CD ISO that has the Dell EMC OS-HCTK installed. It uses `syscfg`, `raidcfg` and `racadm` to configure the system. The main customization point is `bootimg/node-config.sh`, which automatically runs when the ISO finishes booting.

iDRAC Default Settings

Table 6: iDRAC Specification for SAH Nodes on page 19 lists and describes iDRAC default `racadm` settings that will be set by the OS-HCTK.

Table 6: iDRAC Specification for SAH Nodes

Menu Choice	iDRAC Setting
iDRAC.IPMILan.Enable	Enabled
iDRAC.IPMILan.PrivLimit	4
iDRAC.IPv4.Enable	Enabled
iDRAC.Users.2.Enable	Enabled
iDRAC.Users.2.IpmiLanPrivilege	4
iDRAC.Users.2.Privilege	0x1ff
iDRAC.WebServer.Enable	Enabled

SAH BIOS Specification

Table 7: SAH BIOS Specification on page 19 lists and describes the default BIOS settings for the OpenStack servers that will be set by the OS-HCTK.

Table 7: SAH BIOS Specification

Display Name	Attribute	Settings
Boot Mode	BootMode	BIOS
Boot Sequence Retry	BootSeqRetry	Enabled
DCU IP Prefetcher	DcuIpPrefetcher	Enabled
DCU Streamer Prefetcher	DcuStreamerPrefetcher	Enable
Logical Processor Idling	DynamicCoreAllocation	Disabled
Integrated RAID Controller	IntegratedRaid	Enabled
Internal SD Card	InternalSdCard	Off
I/OAT DMA Engine	IoatEngine	Enabled
Logical Processor	LogicalProc	Enabled
Memory Operating Mode	MemOpMode	OptimizerMode
System Memory Testing	MemTest	Disabled
Node Interleaving	NodeInterleave	Disabled
OS Watchdog Timer	OsWatchdogTimer	Disabled
Adjacent Cache Line Prefetch	ProcAdjCacheLine	Enabled
Number of Cores per Processor	ProcCores	all

Display Name	Attribute	Settings
Execute Disable	ProcExecuteDisable	Enabled
Hardware Prefetcher	ProcHwPrefetcher	Enabled
CPU Power Management	ProcPwrPerf	MaxPerf
Turbo Mode	ProcTurboMode	Enabled
Virtualization Technology	ProcVirtualization	Enabled
QPI Speed	QpiSpeed	MaxDataRate
Alternate RTID (Requestor Transaction ID) Setting	RtidSetting	Disabled
SR-IOV Global Enable	SriovGlobalEnable	Enabled
System Profile	SysProfile	PerfOptimized

Running the Open Source Hardware Configuration Toolkit ISO

📝 **Note:** The OS-HCTK ISO is run **only** on the system that will be configured as the SAH.

To run the OS-HCTK ISO:

1. Boot the SAH to be configured from the USB key.
2. Once the SAH finishes booting it displays the detected RAID controllers, along with their current configuration, and offers you a choice of system configurations.
   a. Select **OpenStack SAH**.
3. The OS-HCTK automatically configures the RAID and BIOS settings. Once finished, it will ask you to provide basic iDRAC connectivity information, including:
   a. Whether the iDRAC should use DHCP
   b. Or, basic IPv4 settings if not using DHCP
4. The system configures the iDRAC with some default settings plus the network settings from Step 3 above. Once it finishes applying those settings, it prompts you to reboot the system.
5. Assuming there were no errors, remove the USB key and then reboot the system.

The changes are applied, and the system is configured for its role.

Configuring Overcloud Nodes

This topic describes procedures you will use to configure Overcloud nodes. Procedures described, in the order they should be performed, include:

Configuring Server Network Settings

1. Set the iDRAC IP address source:
   a. If the Overcloud nodes were ordered with the iDRACs configured for DHCP, or are currently configured for DHCP, then no further configuration is necessary.

    b. If you wish to use static IP addresses, then configure the Overcloud nodes' DRAC IP address, subnet mask, default gateway IP, and default VLAN (ID = *110*, if required) using the iDRAC GUI.

Repurposing Servers

In addition to configuring the network, ensure that the following settings are configured as indicated:

1. Set the iDRAC NIC mode to *Dedicated*.
2. Configure the IPMI over LAN Setting to *Enabled*.

Configuring Server User Information

1. Set credentials for the root user, including changing the password based upon good password standards.
2. Set privileges for the user to the Admin level, including over LAN.
3. Enable the user, if disabled.

Validating Server IPMI Configuration

Validating that remote commands can be executed is an essential part of the IPMI setup.

1. Install the IPMI Utilities to your workstation from SourceForge:

    a. For Linux® - *http://sourceforge.net/projects/ipmitool/*
    b. For Windows® - *http://ipmiutil.sourceforge.net/*
    c. Validate that you have all the requirements, and that it will run.

2. Plug your Ethernet port into a switch port that is on the same VLAN as your iDRACs.
3. Configure your NIC to use an IP address in the iDRAC network range.
4. Execute the following IPMI command, replacing "username" and "password" with the credentials for the iDRACs:

```
for i in $(seq 162 170); do ipmitool –P "password" –U "username" -I
  lanplus –H 192.168.200.$i power status; done
```

This will perform a simple, non-destructive poll of the power status of the iDRAC from *192.168.200.162* to *192.168.200.170*.

> **Note:** You will need to replace the IP address range and subnet with correct information for the deployed iDRAC subnet.

    a. You can replace the keyword status with *reset*, *off*, or *on*.

> **Note:** These may change the power state of the nodes.

5. Ensure that all machines return responses to the command.

Chapter

5

Dell Storage PS Series Storage Group

Topics:

- *Dell Storage PS Series Configuration Information*

The PS Series Storage Group can consist of one or more storage arrays with one or more storage groups.

> **Note:** The configuration of the arrays is beyond the scope of this document. Please refer to the Dell Storage PS Series Support Website (*https://eqlsupport.dell.com/secure/login.aspx*) for the latest guides, whitepapers, and best practices on how to setup your Storage Group for your application.

Dell Storage PS Series Configuration Information

Once the Storage Group(s) are setup, the information contained in *Table 8: PS Series Information Needed from Configuration* on page 23 must be collected to configure your storage backend.

Note: To reduce volume initialization time, Dell EMC recommends that `san_thin_provision` be set to *true*.

More information can be found at *https://access.redhat.com/documentation/en/red-hat-openstack-platform/8/dell-equallogic-back-end-guide/dell-equallogic-back-end-guide*.

Table 8: PS Series Information Needed from Configuration

[DEFAULT]	Description
`volume_driver = cinder.volume.drivers.eqlx.DellEQLSanISCSIDriver`	Dell Storage PS Series volume driver
`san_ip = <IP_address_of_EQLX>`	IP address used to reach the PS Series Group through SSH
`san_login = <user_name>`	User name to login to the Group manager via SSH at the `san_ip`
`san_password = <password>`	Password to login to the Group manager via SSH at the `san_ip` (not used when `san_private_key` is set)
`san_thin_provision = <true|false>`	Enable/disable creation of thin-provisioned volumes
`san_ssh_port = 22`	Port used for SSH
`ssh_conn_timeout = 30`	Timeout value, in seconds, used by CLI commands over SSH
`san_private_key = <filename>`	Filename of the private key used for SSH authentication
`ssh_min_pool_conn = 1`	Minimum number of SSH connections in the pool
`ssh_max_pool_conn = 5`	Maximum number of SSH connections in the pool
`eqlx_chap_login = admin`	Existing CHAP account name
`eqlx_chap_password = password`	Password for specified CHAP account name
`eqlx_cli_max_retries = 5`	Maximum retry count for reconnection
`eqlx_cli_timeout = 30`	Timeout for the Group Manager CLI command execution
`eqlx_group_name = group-0`	Group name to use for creating volumes

[DEFAULT]	Description
`eqlx_pool = default`	Pool in which volumes will be created
`eqlx_use_chap = False`	Use CHAP authentication for targets?

Chapter

6

Dell Storage SC Series Storage Arrays

Topics:

*   *Dell Storage SC Series Configuration Information*

The SC Series can consist of one or more Dell Storage Centers with Dell Storage Enterprise Manager platform.

📝 **Note:** The configuration of the cluster is beyond the scope of this document. Please refer to the Dell Storage SC Series support website, *http://www.dell.com/support/contents/us/en/19/article/Product-Support/Dell-Subsidiaries/compellent*, for the latest guides, white papers, and best practices on how to setup your storage cluster.

Dell Storage SC Series Configuration Information

Once the Dell Storage SC Series with the Dell Storage Enterprise Manager platform is setup according to the Dell EMC Ready Bundle for Red Hat OpenStack Platform Reference Architecture, the information contained in *Table 9: SC Series Information Needed from Configuration* on page 26 must be collected to configure your storage backend.

More information can be found at *https://access.redhat.com/documentation/en/red-hat-openstack-platform/version-8/dell-storage-center-back-end-guide/*

Table 9: SC Series Information Needed from Configuration

[DEFAULT]	Description
Required Values	
`volume_backend_name = delliscsi`	Name given to the storage backend
`volume_driver = cinder.volume.drivers.dell.dell_` `storagecenter_iscsi.DellStorageCenterISCSIDriver`	Dell Storage SC Series iSCSI volume driver
`san_ip = <IP_address>`	IP address of Enterprise Manager
`san_login = <user_name>`	User name to log into Enterprise Manager at the `san_ip`
`san_password = <password>`	Password to log into the Enterprise Manager at the `san_ip`
`iscsi_ip_address = <IP_address>`	The Storage Center iSCSI IP address
`dell_sc_ssn = <serial_number>`	The Storage Center serial number to use
Optional Vaules	
`dell_sc_api_port = <port_to_use>`	Configured Enterprise Manager API port, default is 3033
`dell_sc_server_folder = <folder_name>`	Server folder in which to place new server definitions
`dell_sc_volume_folder = <folder_name>`	Volume folder in which to place created volumes
`iscsi_port = <port_number>`	iSCSI port to use, if you do not wish to use the default port number 3260

Chapter

7

Bills of Materials

Topics:

- *Bill of Material for Dell EMC PowerEdge R-Series Solution*
- *Optional Compute Nodes*
- *Optional Storage Nodes*
- *Software Subscriptions for All Solutions*

This guide provides Bill of Material information necessary to purchase the proper hardware to deploy the Dell EMC Ready Bundle for Red Hat OpenStack Platform.

Note: SKUs in these Bills of Materials are valid as of the publication date. If any SKUs are subsequently superceded please contact your Dell EMC sales representative for replacement SKUs.

Bill of Material for Dell EMC PowerEdge R-Series Solution

The base Dell EMC PowerEdge R-Series Solution is comprised of:

* 1 Dell EMC PowerEdge R630 Solution Admin Host
* 3 Dell EMC PowerEdge R630 Controller nodes
* 3 Dell EMC PowerEdge R630 Compute nodes
* 3 Dell EMC PowerEdge R730xd Storage nodes
* 1 Dell Networking S3048-ON switch
* 2 Dell Networking S4048-ON switches

Topics discussed include:

Nodes Overview

The minimum hardware needed is:

* 1 Solution Admin Host (SAH)
* 3 Controller nodes
* 3 Compute nodes
* 3 Storage servers

The hardware includes:

* Dell EMC PowerEdge R630 and Dell EMC PowerEdge R730xd.
* Dell Networking S3048-ON and S4048-ON network switches
* All Build of Materials for Computes and Storage are written for the minimum needed for the Validated Solution, additional nodes of these can be in a quantity of one (1) or more.
* Optional hardware: there are optional hardware available for the Compute and Storage nodes. When designing a solution all nodes of a class (Compute or Storage) must be the same.
* In addition to the network switches listed above, theDell Networking S6000-ON is available - Technical Guide Using Dell Networking S6000-ON Switches Version 6.0

Please consult with your Dell EMC sales representative to ensure proper preparation and submission of your hardware and software orders.

Solution Bundle Bill of Materials - Solution Admin Host

Table 10: Bill of Materials - SAH

SKU	Description	Quantity
331-6781	ACES QUALITY REVIEW	1
973-0922	Commercial Sales Operations - ACES AMER Custom Support Services	3

SKU	Description	Quantity
331-3286	CLOUD COMPUTE NODE,DCS, INFOMOD,OPENSTACK	1
329-BCZI	PowerEdge R630 Motherboard MLK	1
210-ACXS	PowerEdge R630 Server	1
461-AADZ	No Trusted Platform Module	1
321-BBKM	Chassis with up to 10, 2.5" Hard Drives, 3 PCIe Slots	1
340-AKPR	PowerEdge R630 Shipping - 10/24 Drive Chassis	1
338-BJDV	Intel Xeon E5-2650 v4 2.2GHz,30M Cache,9.60GT/s QPI,Turbo,HT,12C/24T (105W) Max Mem 2400MHz	1
338-BJDW	Intel Xeon E5-2650 v4 2.2GHz,30M Cache,9.60GT/s QPI,Turbo,HT,12C/24T (105W) Max Mem 2400MHz	1
412-AAEE	120W Heatsink for PowerEdge R630	2
370-ABWE	DIMM Blanks for System with 2 Processors	1
370-ACPH	2400MT/s RDIMMs	1
370-AAIP	Performance Optimized	1
370-ACNX	16GB RDIMM, 2400MT/s, Dual Rank, x8 Data Width	4
780-BBJN	RAID 10 for H330/H730/H730P (4-24 HDDs or SSDs in pairs)	1
405-AAEG	PERC H730 Integrated RAID Controller, 1GB Cache	1
400-AJOW	600GB 10K RPM SAS 2.5in Hot-plug Hard Drive	8
540-BBBB	Intel X520 DP 10Gb DA/SFP+, + I350 DP 1Gb Ethernet, Network Daughter Card	1
540-BBHY	Intel X520 DP 10Gb DA/SFP+ Server Adapter, Low Profile	1
634-BBWU	OpenManage Essentials, Server Configuration Management	1
385-BBHO	iDRAC8 Enterprise, integrated Dell Remote Access Controller, Enterprise	1
429-AAIQ	No Internal Optical Drive	1
325-BBIL	Quick Sync Bezel 10/24 DriveChassis	1
770-BBBC	ReadyRails Sliding Rails Without Cable Management Arm	1
384-BBBL	Performance BIOS Settings	1
450-ADWQ	Dual, Hot-plug, Redundant Power Supply (1+1), 495W	1
492-BBDI	C13 to C14, PDU Style, 12 AMP, 6.5 Feet (2m) Power Cord, North America	2
631-AACK	No Systems Documentation, NoOpenManage DVD Kit	1
619-ABVR	No Operating System	1
421-5736	No Media Required	1
800-BBDM	UEFI BIOS	1
332-1286	US Order	1

SKU	Description	Quantity
951-2015	Thank you for choosing Dell ProSupport Plus. For tech support, visit http://www.dell.com/contactdell	1
976-7761	ProSupport Plus: 7x24 Next Business Day Onsite Service, 3 Year	1
976-7768	ProSupport Plus: 7x24 HW/SW Tech Support and Assistance,3 Year	1
976-7728	Dell Hardware Limited Warranty Plus On Site Service	1
900-9997	On-Site Installation Declined	2
379-BCVO	OpenStack Cloud Compute NOD	1
460-0864	SOC QUALITY REVIEW	1

Solution Bundle Bill of Materials - 3 Controller Nodes

Table 11: Bill of Materials - Controller Nodes

SKU	Description	Quantity
370-AAIP	Performance Optimized	3
405-AAEG	PH730 Intg RD CTL,1GB Cache	3
385-BBHO	iDRAC8, Enterprise	3
634-BBWU	OpenManage Essentials,Server ConfigMgmt	3
384-BBBL	Performance BIOS Settings	3
619-ABVR	No Operating System	3
421-5736	No Media Required	3
951-2015	INFO,PSP TECH SPT CONTACT,ENTERPRISE	3
976-7728	HW WRTY + SVC,PE R630,UNY	3
976-7761	PSP NBD OS,PE R630,UNY,3YR	3
976-7768	PSP TECH SPT,PE R630,3YR	3
900-9997	ONSITE INSTL DECLINED	3
332-1286	US Order	3
321-BBKM	Chas,10HD,3PCI	3
780-BBJN	R10,H330/H730/H730P	3
540-BBBB	X520 DP,10G,DA + I350 DP,1G,DC	3
540-BBHY	X520 DP 10Gb DA/SFP+,SA LP	3
770-BBBC	Slide RdyRL,No CMA	3
450-ADWQ	Dual,Redundant,Hot-plug PS,495W	3
631-AACK	No Systems Docs, No OM DVD Kit	3
800-BBDM	UEFI BIOS with GPT Partition	3
340-AKPR	PowerEdge R630 Ship-10/24 Drive Chassis	3
325-BBIL	Quick Sync Bezel 10/24 Drive Chassis	3

SKU	Description	Quantity
429-AAIQ	No Internal Optical Drive	3
492-BBDI	C13-C14,PDU,12A,6.5 ft ,2m,NA	6
900-9997	ONSITE INSTL DECLINED	3
210-ACXS	PowerEdge R630 Server	3
329-BCZI	PowerEdge R630 Motherboard MLK	3
461-AADZ	No Trusted Platform Module	3
370-ACPH	2400MT/s RDIMMs	3
370-ACNX	16GB RDIMM,2400MT/s,DR,x8	24
370-ABWE	DIMM Blanks for System with 2 Processors	3
412-AAEE	120W Heatsink for PowerEdge R630	3
412-AAEE	120W Heatsink for PowerEdge R630	3
338-BJDV	E5-2650 v4 2.2GHz,30M C,105W	3
338-BJDW	E5-2650 v4 2.2GHz,30M C,105W	3
400-AJOW	HDD,600GB 10K SAS,12G,2.5,HP	24
331-3286	DCS, INFO MOD ,OPENSTACK	3
469-3879	ESO ORDER ONLY Send PO to ACES	3
973-0922	CSTM,CSO - ACES,AMER,SPT,SRVS	9
331-6781	ACES QUALITY REVIEW	3
379-BCVO	OpenStack Cloud Compute NOD	3
460-0864	SOC QUALITY REVIEW	3

Solution Bundle Bill of Materials - 3 Compute Nodes

Note: For other Compute node server options see *Optional Compute Nodes*

Table 12: Bill of Materials - Dell EMC PowerEdge R630 Compute Nodes

331-3286	CLOUD COMPUTE NODE,DCS, INFOMOD,OPENSTACK	3
469-3879	ESO ORDER ONLY Send PO to ACES	3
973-0922	Commercial Sales Operations - ACES AMER Custom Support Services	9
331-6781	ACES QUALITY REVIEW	3
329-BCZI	PowerEdge R630 Motherboard MLK	3
210-ACXS	PowerEdge R630 Server	3
461-AADZ	No Trusted Platform Module	3
321-BBKM	Chassis with up to 10, 2.5" Hard Drives, 3 PCIe Slots	3
340-AKPR	PowerEdge R630 Shipping - 10/24 Drive Chassis	3

338-BJDV	Intel Xeon E5-2650 v4 2.2GHz,30M Cache,9.60GT/s QPI,Turbo,HT,12C/24T (105W) Max Mem 2400MHz	3
338-BJDW	Intel Xeon E5-2650 v4 2.2GHz,30M Cache,9.60GT/s QPI,Turbo,HT,12C/24T (105W) Max Mem 2400MHz	3
412-AAEE	120W Heatsink for PowerEdge R630	6
370-ABWE	DIMM Blanks for System with 2 Processors	3
370-ACPH	2400MT/s RDIMMs	3
370-AAIP	Performance Optimized	3
370-ACNX	16GB RDIMM, 2400MT/s, Dual Rank, x8 Data Width	24
780-BBJN	RAID 10 for H330/H730/H730P (4-24 HDDs or SSDs in pairs)	3
405-AAEG	PERC H730 Integrated RAID Controller, 1GB Cache	3
400-AJOW	600GB 10K RPM SAS 2.5in Hot-plug Hard Drive	24
540-BBBB	Intel X520 DP 10Gb DA/SFP+, + I350 DP 1Gb Ethernet, Network Daughter Card	3
540-BBHY	Intel X520 DP 10Gb DA/SFP+ Server Adapter, Low Profile	3
634-BBWU	OpenManage Essentials, Server Configuration Management	3
385-BBHO	iDRAC8 Enterprise, integrated Dell Remote Access Controller, Enterprise	3
429-AAIQ	No Internal Optical Drive	3
325-BBIL	Quick Sync Bezel 10/24 DriveChassis	3
770-BBBC	ReadyRails Sliding Rails Without Cable Management Arm	3
384-BBBL	Performance BIOS Settings	3
450-ADWQ	Dual, Hot-plug, Redundant Power Supply (1+1), 495W	3
492-BBDI	C13 to C14, PDU Style, 12 AMP, 6.5 Feet (2m) Power Cord, North America	6
631-AACK	No Systems Documentation, NoOpenManage DVD Kit	3
619-ABVR	No Operating System	3
421-5736	No Media Required	3
800-BBDM	UEFI BIOS	3
332-1286	US Order	3
951-2015	Thank you for choosing Dell ProSupport Plus. For tech support, visit http://www.dell.com/contactdell	3
976-7761	ProSupport Plus: 7x24 Next Business Day Onsite Service, 3 Year	3
976-7768	ProSupport Plus: 7x24 HW/SW Tech Support and Assistance,3 Year	3
976-7728	Dell Hardware Limited Warranty Plus On Site Service	3
900-9997	On-Site Installation Declined	6
379-BCVO	OpenStack Cloud Compute NOD	3
460-0864	SOC QUALITY REVIEW	3

Solution Bundle Bill of Materials - 3 Storage Nodes

Table 13: Bill of Materials - Storage Nodes

SKU	Description	Quantity
331-6781	ACES QUALITY REVIEW	3
973-0922	Commercial Sales Operations - ACES AMER Custom Support Services	9
469-3879	ESO ORDER ONLY Send PO to ACES	3
331-3286	CLOUD COMPUTE NODE,DCS, INFOMOD,OPENSTACK	3
210-ADBC	PowerEdge R730xd Server	3
329-BCZK	PE R730/xd Motherboard MLK	3
461-AADZ	No Trusted Platform Module	3
350-BBEX	Chassis with up to 12 + 4 Internal, 3.5" Hard Drives and 2, 2.5" Flex Bay Hard Drives	3
340-AKPM	PowerEdge R730xd Shipping	3
338-BJDV	Intel Xeon E5-2650 v4 2.2GHz,30M Cache,9.60GT/s QPI,Turbo,HT,12C/24T (105W) Max Mem 2400MHz	3
338-BJDW	Intel Xeon E5-2650 v4 2.2GHz,30M Cache,9.60GT/s QPI,Turbo,HT,12C/24T (105W) Max Mem 2400MHz	3
374-BBHR	Heatsink for 12 + 4 Chassis PowerEdge R730xd	6
370-ABWE	DIMM Blanks for System with 2 Processors	3
370-ACPH	2400MT/s RDIMMs	3
370-AAIP	Performance Optimized	3
370-ACOG	4GB RDIMM, 2400MT/s, Single Rank, x8 Data Width	72
780-BBLR	RAID 1+Unconfigured RAID forH330/H730/H730P (2 + 1-20 HDDs or SSDs)	3
405-AAEH	PERC H730P Integrated RAID Controller, 2GB Cache	3
400-AJRD	300GB 15K RPM SAS 2.5in FlexBay Hard Drive	6
400-ALPR	4TB 7.2K RPM NLSAS 12Gbps 512n 3.5in Internal Bay Hard Drive	9
400-ALOV	4TB 7.2K RPM NLSAS 512n 3.5in Hot-plug Hard Drive	27
400-AQHY	400GB Solid State Drive SAS Write Intensive 512n 2.5in Hot-plug Drive,3.5in HYB CARR, HUSMM	9
540-BBBB	Intel X520 DP 10Gb DA/SFP+, + I350 DP 1Gb Ethernet, Network Daughter Card	3
540-BBCT	Intel X520 DP 10Gb DA/SFP+ Server Adapter	3
385-BBHO	iDRAC8 Enterprise, integrated Dell Remote Access Controller, Enterprise	3
634-BBWU	OpenManage Essentials, Server Configuration Management	3
350-BBEJ	Bezel	3
770-BBBQ	ReadyRails Sliding Rails Without Cable Management Arm	3

SKU	Description	Quantity
384-BBBL	Performance BIOS Settings	3
450-ADWS	Dual, Hot-plug, Redundant Power Supply (1+1), 750W	3
492-BBDI	C13 to C14, PDU Style, 12 AMP, 6.5 Feet (2m) Power Cord, North America	6
631-AAJG	Electronic System Documentation and OpenManage DVD Kit, PowerEdge R730/xd	3
619-ABVR	No Operating System	3
421-5736	No Media Required	3
800-BBDM	UEFI BIOS	3
332-1286	US Order	3
374-BBHT	R730xd PCIe Riser 1 Filler Blank, Right	3
330-BBCO	R730/xd PCIe Riser 2, Center	3
976-9007	Dell Hardware Limited Warranty Plus On Site Service	3
976-9030	ProSupport Plus: 7x24 HW/SW Tech Support and Assistance,3 Year	3
951-2015	Thank you for choosing Dell ProSupport Plus. For tech support, visit http://www.dell.com/contactdell	3
976-9029	ProSupport Plus: 7x24 Next Business Day Onsite Service, 3 Year	3
900-9997	On-Site Installation Declined	6
460-0864	SOC QUALITY REVIEW	3

Bill of Materials - 2 Dell Networking S4048-ON Switches

SKU	Description	Quantity
634-BCWZ	Dell NW OS9, S4048-ON	2
634-BCWX	Doc Kit, S4000	2
332-1286	US Order	2
210-ADUZ	S4048,48P,PSU-IO,AC	2
450-AAQC	PSU, PSU/IO Air, S4048	2
450-AASX	250V,12A,2MTR,C13/C14	4
900-9997	ONSITE INSTL DECLINED	2
951-2015	INFO,PSP TECH SPT CONTACT,ENTERPRISE	2
997-6304	HW WRTY,NW S4000,EXT	2
997-6305	HW WRTY,NW S4000,INIT	2
997-6306	Info 3rd Party O/S Warranted by Vendor	2
997-6351	PSP NBD OS,NW S4000,UNY,2YR EXT	2
997-6356	PSP NBD OS,NW S4000,UNY,INIT	2
997-6363	PSP TECH SPT,NW S4000,3YR	2

Bill of Materials - Dell Networking S3048-ON Switch

Table 14: Bill of Materials - Dell Networking S3048-ON Switches

SKU	Description	Quantity
634-BCXS	Dell NW OS 9, S3048-ON	1
634-BCXR	Doc Kit, S3000-ON	1
332-1286	US Order	1
210-AEDP	S3048-ON,PSU-IO,DNOS	1
802-7389	HW WRTY,NW S3048,INIT	1
802-7392	PSP TECH SPT,NW S3048,3YR	1
802-7400	HW WRTY,NW S3048,EXT	1
802-7421	PSP NBD OS,NW S3048,UNY,INIT	1
802-7437	PSP NBD OS,NW S3048,UNY,2YR EXT	1
951-2015	INFO,PSP TECH SPT CONTACT,ENTERPRISE	1
997-6306	Info 3rd Party O/S Warranted by Vendor	1
450-AASX	250V,12A,2MTR,C13/C14	2
450-AEOQ	PSU, PSU-IO air, S3048	1
900-9997	ONSITE INSTL DECLINED	1
331-3286	DCS, INFO MOD ,OPENSTACK	1
973-0922	CSTM,CSO - ACES,AMER,SPT,SRVS	3
469-3879	ESO ORDER ONLY Send PO to ACES	1
331-6781	ACES QUALITY REVIEW	1

Bill of Materials - Cables for Solution

SKU	Description	Quantity
470-AAFF	DELL NTWK,CBL,QSFP-QSFP DAC,5M	2
470-AAIB	Dell, QSFP+ Direct Attach Cable, .5m	2
407-BBTT	Transceiver SFP, 1000BASE-T	4
470-AAGN	Dell, 1m SFP+ DAC Cable	12
470-AAGP	Dell, 3m SFP+ DAC Cable	24
470-AAGR	Dell, 5m SFP+ DAC Cable	8
A0375239	C2G Cat6 Snagless Unshielded(UTP) Network Patch Cable - patch cable - 7 ft - white	13
A7459287	C2G Cat6 Snagless Unshielded(UTP) Network Patch Cable - patch cable - 7 ft - green	13

Server Racks and Power

Both I/O to PSU SKU numbers and PSU to I/O side options areavailable for reverse air flow. Redundant *fans* (other than the minimum supplied with chassis) should also be same direction as the base switch. The airflow cannot be reversed in the field at this time

Note: The networking SKUs lists show the AC power supplies only. All switch models are available in DC as well.

All Bill of Materials do not include racks or power distribution units, as they are usually site-specific. The physical dimensions and power requirements need to be reviewed.

Optional Compute Nodes

In addition to the Compute nodes defined in *Solution Bundle Bill of Materials - 3 Compute Nodes* on page 31, the Dell EMC Ready Bundle for Red Hat OpenStack Platform supports optional Dell EMC Compute nodes configurations, as a direct replacement.

Topics discussed include:

Bill of Materials - Optional 3 Compute Node Dell EMC PowerEdge R430

Table 15: Bill of Materials - Optional Compute Dell EMC PowerEdge R430

SKU	Description	Quantity
340-AMJF	PowerEdge R430 Shipping	3
330-BBEF	Riser, 2LP, R430	3
370-AAIP	Performance Optimized	3
405-AAEG	PH730 Intg RD CTL,1GB Cache	3
330-BBDX	iDRAC Port Card	3
385-BBHO	iDRAC8, Enterprise	3
634-BBWU	OpenManage Essentials,Server ConfigMgmt	3
325-BBII	Bezel up to 8 Drive Chassis	3
384-BBBL	Performance BIOS Settings	3
450-AEGZ	Dual Hot Plug Pwr Sply 550W	3
619-ABVR	No Operating System	3
421-5736	No Media Required	3

SKU	Description	Quantity
900-9997	ONSITE INSTL DECLINED	3
332-1286	US Order	3
370-ABXP	DIMM Blanks for System w/ 2 Processors	3
370-ABXV	Cooling Fan	3
374-BBIJ	135W Heatsink	3
374-BBIJ	135W Heatsink	3
540-BBHY	X520 DP 10Gb DA/SFP+,SA LP	6
770-BBBC	Slide RdyRL,No CMA	3
492-BBDI	C13-C14,PDU,12A,6.5 ft ,2m,NA	6
631-AACK	No Systems Docs, No OM DVD Kit	3
800-BBDM	UEFI BIOS with GPT Partition	3
321-BBNK	2.5" Chas up to 8HDs,HP	3
780-BBPP	R10,H330/H730/H730P	3
429-AAQN	No Optical Drive,Int 8HD Chassis	3
951-2015	INFO,PSP TECH SPT CONTACT,ENTERPRISE	3
997-2924	HW WRTY + SVC,PE R430,UNY	3
997-2983	PSP NBD OS,PE R430,UNY,3YR	3
997-2992	PSP TECH SPT,PE R430,3YR	3
900-9997	ONSITE INSTL DECLINED	3
210-ADLO	PowerEdge R430 Server	3
384-BBMW	PowerEdge R430/R530 Motherboard MLK	3
461-AADZ	No Trusted Platform Module	3
370-ACPH	2400MT/s RDIMMs	3
370-ACNX	16GB RDIMM,2400MT/s,DR,x8	24
338-BJDV	E5-2650 v4 2.2GHz,30M C,105W	3
338-BJDW	E5-2650 v4 2.2GHz,30M C,105W	3
400-AJOW	HDD,600GB 10K SAS,12G,2.5,HP	24
973-2426	INFO Declined Remote Consulting Service	3
973-0922	CSTM,CSO - ACES,AMER,SPT,SRVS	9
331-3286	DCS, INFO MOD ,OPENSTACK	3
469-3879	ESO ORDER ONLY Send PO to ACES	3
331-6781	ACES QUALITY REVIEW	3
379-BCVO	OpenStack Cloud Compute NOD	3
460-0864	SOC QUALITY REVIEW	3

Bill of Materials - Optional 3 Compute Nodes Dell EMC PowerEdge R730

Table 16: Bill of Materials - Optional Compute Dell EMC PowerEdge R730

SKU	Description	Quantity
350-BBEN	Chassis with up to 8, 2.5 HDs	3
340-AKKB	PowerEdge R730 Shipping	3
370-AAIP	Performance Optimized	3
405-AAEG	PH730 Intg RD CTL,1GB Cache	3
350-BBEJ	Bezel	3
384-BBBL	Performance BIOS Settings	3
619-ABVR	No Operating System	3
421-5736	No Media Required	3
385-BBHO	iDRAC8, Enterprise	3
634-BBWU	OpenManage Essentials,Server ConfigMgmt	3
332-1286	US Order	3
900-9997	ONSITE INSTL DECLINED	3
780-BBJX	R10,H330/H730/H730P	3
540-BBBB	X520 DP,10G,DA + I350 DP,1G,DC	3
429-AAOJ	No Internal Optical Drive	3
770-BBBQ	Slide RdyRL,No CMA	3
450-ADWQ	Dual,Redundant,Hot-plug PS,495W	3
492-BBDI	C13-C14,PDU,12A,6.5 ft ,2m,NA	6
631-AACK	No Systems Docs, No OM DVD Kit	3
800-BBDM	UEFI BIOS with GPT Partition	3
370-ABWE	DIMM Blanks for System with 2 Processors	3
374-BBHM	Standard Heatsink for PE R730/R730xd	3
374-BBHM	Standard Heatsink for PE R730/R730xd	3
540-BBCT	X520 DP 10Gb DA/SFP+ Svr Adpt	3
330-BBCO	R730/xd PCIe Riser 2, Center	3
330-BBCQ	R730 PCIe Riser 3, Left	3
330-BBCR	R730/xd PCIe Riser 1, Right	3
951-2015	INFO,PSP TECH SPT CONTACT,ENTERPRISE	3
976-8706	HW WRTY + SVC,PE R730,UNY	3
976-8728	PSP NBD OS,PE R730,UNY,3YR	3
976-8729	PSP TECH SPT,PE R730,3YR	3
900-9997	ONSITE INSTL DECLINED	3

SKU	Description	Quantity
996-3179	EDT CNSLT 1 Yr 1 Pack RCS	3
210-ACXU	PowerEdge R730 Server	3
329-BCZK	PowerEdge R730/xd Motherboard MLK	3
461-AADZ	No Trusted Platform Module	3
370-ACPH	2400MT/s RDIMMs	3
370-ACNX	16GB RDIMM,2400MT/s,DR,x8	24
338-BJDV	E5-2650 v4 2.2GHz,30M C,105W	3
338-BJDW	E5-2650 v4 2.2GHz,30M C,105W	3
400-AJOW	HDD,600GB 10K SAS,12G,2.5,HP	24
331-6781	ACES QUALITY REVIEW	3
331-3286	DCS, INFO MOD ,OPENSTACK	3
973-0922	CSTM,CSO - ACES,AMER,SPT,SRVS	9
469-3879	ESO ORDER ONLY Send PO to ACES	3
379-BCVO	OpenStack Cloud Compute NOD	3
460-0864	SOC QUALITY REVIEW	3

Bill of Materials - Optional 3 Compute Nodes Dell EMC PowerEdge R730xd

Table 17: Bill of Materials - Optional Compute Node Dell EMC PowerEdge R730xd

SKU	Description	Quantity
210-ADBC	PowerEdge R730xd Server	3
329-BCZK	PowerEdge R730/xd Motherboard MLK	3
461-AADZ	No Trusted Platform Module	3
340-AKPM	PowerEdge R730xd Shipping	3
370-ABWE	DIMM Blanks for System with 2 Processors	3
374-BBHM	Standard Heatsink for PE R730/R730xd	3
374-BBHM	Standard Heatsink for PE R730/R730xd	3
370-ACPH	2400MT/s RDIMMs	3
370-AAIP	Performance Optimized	3
405-AAEG	PH730 Intg RD CTL,1GB Cache	3
385-BBHO	iDRAC8, Enterprise	3
634-BBWU	OpenManage Essentials,Server ConfigMgmt	3
350-BBEJ	Bezel	3
770-BBBR	Slide RdyRl, with CMA	3
384-BBBL	Performance BIOS Settings	3

SKU	Description	Quantity
450-ADWS	Dual,Redundant,Hot-plug PS,750W	3
631-AAJG	Edocs and OpenManage DVD, R730/xd	3
619-ABVR	No Operating System	3
421-5736	No Media Required	3
332-1286	US Order	3
330-BBCO	R730/xd PCIe Riser 2, Center	3
330-BBCR	R730/xd PCIe Riser 1, Right	3
951-2015	INFO,PSP TECH SPT CONTACT,ENTERPRISE	3
976-9007	HW WRTY + SVC,PE R730xd,UNY	3
976-9029	PSP NBD OS,PE R730xd,UNY,3YR	3
976-9030	PSP TECH SPT,PE R730xd,3YR	3
900-9997	ONSITE INSTL DECLINED	3
973-2426	INFO Declined Remote Consulting Service	3
400-AMUC	HDD,2TB 7.2K NLSAS,12G,512n,2.5,HP	72
540-BBHY	X520 DP 10Gb DA/SFP+,SA LP	3
540-BBBB	X520 DP,10G,DA + I350 DP,1G,DC	3
387-BBHY	Energy Star, PowerEdge R720	3
780-BBLM	R10,H330/H730/H730P	3
492-BBDH	C13-C14,PDU,12A,2 ft,0.6m,NA	6
370-ACNS	32GB RDIMM,2400MT/s,DR,x4	12
338-BJDV	E5-2650 v4 2.2GHz,30M C,105W	3
338-BJDW	E5-2650 v4 2.2GHz,30M C,105W	3
350-BBFD	Chassis with up to 24, 2.5 HD	3
800-BBDM	UEFI BIOS with GPT Partition	3
379-BCVO	OpenStack Cloud Compute NOD	3
460-0864	SOC QUALITY REVIEW	3

Optional Storage Nodes

In addition to the Storage nodes defined in *Solution Bundle Bill of Materials - 3 Storage Nodes* on page 33, the Dell EMC Ready Bundle for Red Hat OpenStack Platform supports optional Dell EMC Storage nodes configurations, as a direct replacement.

Other block storage options have been validated with the solution, Dell Storage PS Series and SC Series. These can be quoted by your Dell EMC sales representative.

Bill of Materials - Optional 3 Storage Nodes

Table 18: Bill of Materials - Optional Storage Node Configuration 24 OSDs and 0 Journals

SKU	Description	Quantity
210-ADBC	PowerEdge R730xd Server	3
329-BCZK	PowerEdge R730/xd Motherboard MLK	3
461-AADZ	No Trusted Platform Module	3
350-BBFE	Chassis up to 24, 2.5 HD and 2, 2.5 FB	3
340-AKPM	PowerEdge R730xd Shipping	3
370-ABWE	DIMM Blanks for System with 2 Processors	3
374-BBHM	Standard Heatsink for PE R730/R730xd	3
374-BBHM	Standard Heatsink for PE R730/R730xd	3
370-ACPH	2400MT/s RDIMMs	3
370-AAIP	Performance Optimized	3
405-AAEG	PH730 Intg RD CTL,1GB Cache	3
385-BBHO	iDRAC8, Enterprise	3
634-BBWU	OpenManage Essentials,Server ConfigMgmt	3
350-BBEJ	Bezel	3
384-BBBL	Performance BIOS Settings	3
450-ADWS	Dual,Redundant,Hot-plug PS,750W	3
631-AAJG	Edocs and OpenManage DVD, R730/xd	3
619-ABVR	No Operating System	3
421-5736	No Media Required	3
332-1286	US Order	3
330-BBCO	R730/xd PCIe Riser 2, Center	3
330-BBCR	R730/xd PCIe Riser 1, Right	3
951-2015	INFO,PSP TECH SPT CONTACT,ENTERPRISE	3
976-9007	HW WRTY + SVC,PE R730xd,UNY	3
976-9029	PSP NBD OS,PE R730xd,UNY,3YR	3
976-9030	PSP TECH SPT,PE R730xd,3YR	3
900-9997	ONSITE INSTL DECLINED	3
973-2426	INFO Declined Remote Consulting Service	3
338-BJDV	E5-2650 v4 2.2GHz,30M C,105W	3
338-BJDW	E5-2650 v4 2.2GHz,30M C,105W	3
370-ACNS	32GB RDIMM,2400MT/s,DR,x4	12
400-AENX	HDD,500GB 7.2K NLSAS,6G,2.5,FB,13G	6

SKU	Description	Quantity
540-BBHY	X520 DP 10Gb DA/SFP+,SA LP	3
770-BBBQ	Slide RdyRL,No CMA	3
540-BBBB	X520 DP,10G,DA + I350 DP,1G,DC	3
400-AMUC	HDD,2TB 7.2K NLSAS,12G,512n,2.5,HP	72
492-BBDH	C13-C14,PDU,12A,2 ft,0.6m,NA	6
780-BBLS	No RAID for H330/H730/H730P + Flex Bay	3
800-BBDM	UEFI BIOS with GPT Partition	3
460-0864	SOC QUALITY REVIEW	3

Software Subscriptions for All Solutions

A Dell sales representative will determine the correct software subscriptions needed for the Dell EMC Ready Bundle for Red Hat OpenStack Platform.

Appendix

A

References

Topics:

- *To Learn More*

Additional information can be obtained at *http://www.dell.com/en-us/work/learn/openstack-cloud* or by e-mailing *openstack@dell.com*.

If you need additional services or implementation help, please contact your Dell EMC sales representative.

To Learn More

For more information on the Dell EMC Ready Bundle for Red Hat OpenStack Platform visit *http://www.dell.com/learn/us/en/04/solutions/red-hat-openstack*.