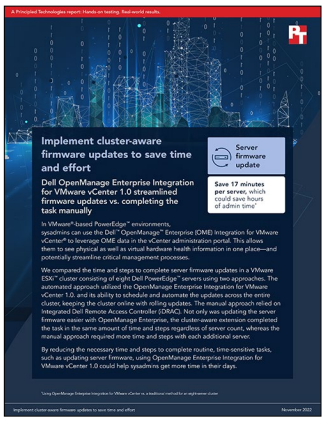

The science behind the report:

Implement cluster-aware firmware updates to save time and effort

This document describes what we tested, how we tested, and what we found. To learn how these facts translate into real-world benefits, read the report Implement cluster-aware firmware updates to save time and effort.

We concluded our hands-on testing on October 6, 2022. During testing, we determined the appropriate hardware and software configurations and applied updates as they became available. The results in this report reflect configurations that we finalized on September 28, 2022 or earlier. Unavoidably, these configurations may not represent the latest versions available when this report appears.

Our results

To learn more about how we have calculated the wins in this report, go to http://facts.pt/calculating-and-highlighting-wins. Unless we state otherwise, we have followed the rules and principles we outline in that document.

Table 1: Results of our testing.

	OpenManage Enterprise Integration for VMware vCenter 1.0	Manual on iDRAC
Updating firmware		
On four-node clusters		
Time (seconds)	22	4,280
Steps	11	48
On eight-node clusters		
Time (seconds)	22	9,640
Steps	11	96

System configuration information

Table 2: Detailed information on the systems we tested.

System configuration information	Dell™ PowerEdge™ R630	Dell PowerEdge R630	Dell PowerEdge R740	Dell PowerEdge R740
BIOS name and version	2.15.0	2.15.0	2.15.1	2.15.1
Operating system name and version/ build number	VMware® ESXi™ 7.0U3e-20036589-standard	VMware ESXi 7.0U3e-20036589-standard	VMware ESXi 7.0U3e-20036589-standard	VMware ESXi 7.0U3e-20036589-standard
Date of last OS updates/patches applied	09/15/2022	09/15/2022	09/15/2022	09/15/2022
Power management policy	Performance	Performance	Performance	Performance
Dell iDRAC				
Version	iDRAC8	iDRAC8	iDRAC9	iDRAC9
Firmware version	2.83.83.83	2.83.83.83	5.10.50.00	5.10.50.00
Processor				
Number of processors	2	2	2	2
Vendor and model	Intel® Xeon® E5-2698 v4	Intel Xeon E5-2698 v4	Intel Xeon Platinum 8168	Intel Xeon Platinum 8168
Core count (per processor)	20	20	24	24
Core frequency (GHz)	2.20	2.20	2.70	2.70
Memory module(s)				
Total memory in system (GB)	256	256	256	256
Number of memory modules	16	16	16	16
Vendor and model	Samsung® M393A2G40DB0-CPB / Hynix Semiconductor HMA42GR7AFR4N-TF	Samsung M393A2G40DB0-CPB / Hynix Semiconductor HMA42GR7AFR4N-TF	Hynix Semiconductor HMA42GR7MFR4N-TF	Micron Technology 18ASF2G72PDZ-3G2E1
Size (GB)	16	16	16	16
Type	DDR4	DDR4	DDR4	DDR4
Speed (MHz)	2,133	2,133	2,133	3,200
Speed running in the server (MHz)	2,133	2,133	2,133	2,666
Local storage (OS)				
Number of drives	1	1	1	1
Drive vendor and model	Intel SSDSC2BB24	Intel SSDSC2BB24	Intel SSDSC2BB24	Intel SSDSC2BB24
Drive size (GB)	256	256	256	256
Drive information (speed, interface, type)	6Gb, SATA, SSD	6Gb, SATA, SSD	6Gb, SATA, SSD	6Gb, SATA, SSD

System configuration information	Dell™ PowerEdge™ R630	Dell PowerEdge R630	Dell PowerEdge R740	Dell PowerEdge R740
Network adapter (a)				
Vendor and model	Broadcom® 57800S 2 x GbE + 2 x 10GbE SFP+	Broadcom 57800S 2 x GbE + 2 x 10GbE SFP+	Broadcom Gigabit Ethernet BCM5720	Broadcom Gigabit Ethernet BCM5720
Number and type of ports	4x 10GbE	4x 10GbE	4x 1GbE	4x 1GbE
Driver version	15.35.06	15.35.06	22.00.6	22.00.6
Network adapter (b)				
Vendor and model	N/A	N/A	Intel Ethernet Converged Network Adapter X710-T	N/A
Number and type of ports	N/A	N/A	4x 10Gbe	N/A
Driver version	N/A	N/A	20.5.16	N/A
Power supplies				
Vendor and model	Dell PowerEdge 0HTRH4A01 / Dell 0G6W6KX02	Dell PowerEdge 0HTRH4A01 / Dell 0G6W6KX02	Dell 0Y26KXA02	Dell 0Y26KXA02
Number of power supplies	2	2	2	2
Wattage of each (W)	750	750	1,100	1,100

Table 3: Detailed information on the systems we tested.

System configuration information	Dell PowerEdge R730	Dell PowerEdge R730	Dell PowerEdge R730	Dell PowerEdge R730
BIOS name and version	2.15.0	2.15.0	2.15.0	2.15.0
Operating system name and version/ build number	VMware ESXi 7.0U3e-20036589-standard	VMware ESXi 7.0U3e-20036589-standard	VMware ESXi 7.0U3e-20036589-standard	VMware ESXi 7.0U3e-20036589-standard
Date of last OS updates/patches applied	09/15/2022	09/15/2022	09/15/2022	09/15/2022
Power management policy	Performance	Performance	Performance	Performance
Dell iDRAC				
Version	iDRAC8	iDRAC8	iDRAC8	iDRAC8
Firmware version	2.83.83.83	2.83.83.83	2.83.83.83	2.83.83.83
Processor				
Number of processors	2	2	2	2
Vendor and model	Intel Xeon E5-2690 v3	Intel Xeon E5-2690 v3	Intel Xeon E5-2640 v4	Intel Xeon E5-2699 v4
Core count (per processor)	12	12	10	22
Core frequency (GHz)	2.60	2.60	2.40	2.20

System configuration information	Dell PowerEdge R730	Dell PowerEdge R730	Dell PowerEdge R730	Dell PowerEdge R730
Memory module(s)				
Total memory in system (GB)	256	256	256	256
Number of memory modules	8	16	16	16
Vendor and model	Samsung M386A4G40DM0-CPB	Samsung M393A2G40DB0-CPB	Hynix Semiconductor HMA42GR7MFR4N-TF	Hynix Semiconductor HMA82GR7AFR8N-VK
Size (GB)	32	16	16	16
Type	DDR4	DDR4	DDR4	DDR4
Speed (MHz)	2,133	2,133	2,133	2,133
Speed running in the server (MHz)	2,133	2,133	2,133	2,133
Local storage (OS)				
Number of drives	1	1	1	1
Drive vendor and model	Intel SSDSC2BB24	Intel SSDSC2BB24	Intel SSDSC2BB24	Intel SSDSC2BB24
Drive size (GB)	256	256	256	256
Drive information (speed, interface, type)	6Gb, SATA, SSD	6Gb, SATA, SSD	6Gb, SATA, SSD	6Gb, SATA, SSD
Network adapter (a)				
Vendor and model	Broadcom Gigabit Ethernet BCM5720	Broadcom Gigabit Ethernet BCM5720	Broadcom Gigabit Ethernet BCM5720	Broadcom Gigabit Ethernet BCM5720
Number and type of ports	4x 1GbE	4x 1GbE	4x 1GbE	4x 1GbE
Driver version	22.00.6	22.00.6	22.00.6	22.00.6
Power supplies				
Vendor and model	Dell 0TPJ2XA00/ Dell 0G6W6KX02	Dell 0TPJ2XA00/ Dell 0G6W6KX02	Dell 0TPJ2XA00/ Dell 0G6W6KX02	Dell 0TPJ2XA00/ Dell 0G6W6KX02
Number of power supplies	2	2	2	2
Wattage of each (W)	750	750	750	750

Table 4: We tested these scenarios with a realistic mix of processor and RAM configurations to mimic a real-world situation. Both the iDRAC-only scenario and the OME scenarios used the same configurations.

Software versions	
OpenManage Enterprise (OME)	Version 3.9.0 (Build 55)
OMEVV plugin (for VMware vCenter)	Version: 1.0.1.887
Power Manager Plugin (PMP)	Version: 3.0.0.190

How we tested

Updating firmware

Updating firmware using OMEVV Plugin

1. Navigate to vCenter, and sign in.
2. Navigate to OMEVV.
3. From the top menu, select Compliance & Profiles.
4. Select the Baseline profile you just created.
5. On the next page, select run Firmware Wizard.
6. On the checklist page, click Get Started.
7. Confirm the baseline profile is correct, and click Next.
8. Select the checkboxes for all units that need updating, and click Next.
9. Give the Firmware Update job a name and a brief description.
10. Leave Additional options as default, leave Update schedule on Update Now, and click Next.
11. Review the settings, and click Finish.

Updating Dell EMC firmware using Lifecycle Controller

1. From vCenter, put the Host into Maintenance mode.
2. Navigate to the iDRAC to launch remote console.
3. Reboot the system from Remote Console.
4. Upon reboot, to enter the Lifecycle Controller during POST, press F10.
5. In the left pane, under Home, select Firmware Update.
6. In the Firmware Update pane, select Launch Firmware Update.
7. On Select Update Repository, select Network Share (HTTPS).
8. From the radial options, select HTTPS.
9. Verify that the default downloads.dell.com is the address, and click Next.
10. After reading the Firmware Update Warning, click Yes.
11. On Select Updates, select the BIOS and network firmware, and click Apply. Allow the system to update and reboot itself.
12. Once the system has fully rebooted, navigate back to vCenter and take the system out of Maintenance mode.

Collecting power data with Power Manager Plugin (PMP) vs. iDRAC

Collecting the daily power report (OME)

1. Navigate to OME, and log in.
2. From the homepage, mouse over Monitor, and select Reports.
3. Scroll down, and select the double arrows to move to the second page of reports.
4. Click the checkbox next to the report being downloaded: Power Manager: Power and Thermal Report of Groups.
5. Click Run.
6. Click Download.
7. Select the desired format (in this case, XLS).
8. Click Finish.

Capturing power data manually (iDRAC)

1. Navigate and log into the iDRAC of the server.
2. Select Power/Thermal.
3. From the Jump To: menu, select Present Reading.
4. Record the Present Reading data for the day.
5. Scroll down to Cumulative Reading, and enter Total Usage into the appropriate column on the spreadsheet.
6. Scroll to Historical Trends and record Average Usage, Max Peak, and Min Peak.
7. From the top of the page, select Temperatures.
8. Under Temperature Probes, record the relevant Reading into the spreadsheet.
9. Under System Board Inlet Ambient Historical Temperature Data, select CSV, and click Export.
10. Open the downloaded spreadsheet.
11. Scroll to the current date, and copy the Peak Temperature to the main spreadsheet.
12. Copy the Average temperature to the main spreadsheet.

Capping power

Capping power with Power Manager Plugin (PMP)

1. Navigate to OME, and log in.
2. Navigate to Plugins, hover over Power Management, and select Policies.
3. Click Create.
4. Leave type as Static.
5. Enter a name and a short description.
6. Leave Enable checked, and click Next.
7. Click Select Group.
8. Check the box for the Power Management group you just created, and click Add selected.
9. Click Next.
10. Under Policy Settings, set the monitoring time period to 3 months.
11. Set the Power Cap to the desired setting (in this case, 434 Watt or 50%).
12. Click Next.
13. On the Policy Schedule page, leave the defaults, and click Next.
14. On the Summary page, review inputs, and click Finish.

Capping power manually (iDRAC)

1. Navigate to the iDRAC of the server, and log in.
2. Select Power/Thermal.
3. Select Active Power Cap Policy.
4. Click Enable.
5. Set the Power Cap to the desired value (in this case, 438).
6. Click Apply.

Installing VMware ESXi 7.0

1. Boot the VMware ESXi installation media using ISO.
2. To Continue, press Enter.
3. To Accept and Continue, press F11.
4. Under Storage Device, select the installation drive, and press Enter.
5. Select US Default for keyboard layout, and press Enter.
6. Enter the root password twice, and press Enter.
7. At the Confirm Install window, to install, press F11.
8. At the Installation Complete window, to reboot, press Enter.
9. After reboot, press F2 to configure the system.
10. Log in with root user/password, and press Enter.
11. Scroll to Configure Management Network, and press Enter.
12. Scroll to IPv4 Configuration, and press Enter.
13. Scroll to Static IPv4, and use the spacebar to select it.
14. Set the IPv4, and use the spacebar to select it.
15. To continue, press Enter.
16. Scroll to IPv6 Configuration, and press Enter.
17. Scroll to Disable IPv6, and use the spacebar to select it.
18. To continue, press Enter.
19. Scroll to DNS Configuration, and press Enter.
20. Scroll to manually configure DNS, and use the spacebar to select it.
21. Add Primary DNS Server and Alternate DNS Server, and provide the hostname for the system.
22. Scroll to Custom DNS Suffixes, and press Enter.
23. Add the suffix that is required for testing, and press Enter.
24. To accept the changes, press ESC.

Installing iDRAC VIB in ESXi

1. Download Dell EMC iDRAC Service Module (VIB) for ESXi 7.0 U3, v4.3.0.0 from https://www.dell.com/support/home/en-us/drivers/driversdetails?driverid=x497n&oscode=xi70&productcode=poweredge-r730.
2. Navigate to the ESXi page.
3. On the top right, select Actions, and select Enter Maintenance mode.
4. In the left pane,select Manage.
5. Click Services.
6. Scroll down to TSM-SHH, and right-click and click Start.
7. Transfer the VIB zipfile to the ESXi host datastore.
8. Open an SSH terminal to install with the following command:

```
esxcli software vib install -d "/vmfs/volumes/datastore1/ ISM-Dell-Web-4.3.0.0-2781.VIB-ESX7i-Live_A00.zip"
```

Licensing SUTs with OME Advanced

1. Navigate to the iDRAC of the server receiving the license.
2. Make note of the Service ID on the Overview screen.
3. Navigate to Licenses.
4. Select Import.
5. Select Browse.
6. Navigate to the folder with the licenses.
7. Select the License that matches the Service ID.
8. Click OK.
9. Click Import.

Installing OpenManage Enterprise (OME)

1. To Download the appliance, navigate to dell.com/support.
2. Enter the service tag of the SUT, and click Search.
3. Scroll down to Dell EMC OpenManage Enterprise
4. Download the .OVF for VMware.
5. Once Downloaded, extract the file.
6. Navigate to vCenter.
7. Right-click the infrastructure cluster where OME will reside, and select Deploy OVF Template.
8. Select Deploy Local File.
9. Navigate to the .OVF Location.
10. Choose all the files in the extraction directory.
11. If necessary, change the name, version number, company name, etc.
12. Select the correct data center.
13. Select Compute Resource.
14. Select Thin Provision.
15. Select the correct Datastore
16. Select a Network.
17. Power on the appliance.
18. On the EULA page, press the Tab key two times.
19. Select the relevant language.
20. Create a Password.
21. Navigate to Set Networking Parameters.
22. Enter the admin password.
23. Ensure IPv4 is enabled.
24. Tab over to Static IPv4 Address, remove, and set an IP.
25. Enter a Static Gateway.
26. Leave the Subnet Mask.
27. Set Static Preferred DNS Server.
28. Click Apply.

Additional OME configuration

1. Shut down the OME appliance.
2. Navigate to vCenter.
3. Right-click the OME Appliance, and select Edit Settings.
4. Click Add New Network Adapter.
5. Select VMXNET3 type.
6. Assign to a second network.
7. Start the OME appliance.
8. Select Network Configuration.
9. Enable IPv4.
10. Set IP Address.
11. Set 0.0.0.0 as Gateway.
12. Set correct subnet mask as 255.255.0.0.
13. Disable IPV6.
14. Click Apply.
15. Restart the appliance for changes to take effect.

Installing plugins within OME

1. Navigate to the OME address.
2. Log in with the set credentials.
3. Navigate to Application Settings
4. From the drop-down menu, select Console and Plugins.
5. Next to Last Updated, under No Updates Found, click the refresh arrow.
6. Proceed to installing each plugin.

Installing Power Manager Plugin

1. From the card listing Power Manager update details, select Install.
2. From the left-hand drop-down menu, select the appropriate version. We installed the most recent version, 3.0.0.190.
3. On the bottom right of the card, select Download Plugin.
4. When the plugin finishes downloading, a the Download button will change to Install plugin. Select Install Plugin.
5. At the EULA, select Accept.
6. After the EULA, OME will prompt for confirmation that a Snapshot of OME has been taken before allowing the install to proceed.
7. Navigate back to the vCenter holding the OME appliance.
8. Right-click the OME appliance, hover over Snapshot, and select Take Snapshot.
9. On the Take Snapshot pop-up, enter a short description, and click Create.
10. Once the Snapshot is completed, navigate back to the OME window, and select the box confirming a snapshot has been taking, and click Confirm Install.
11. The appliance will reboot once the plugin is finished installing.

Configuring Power Manager

Creating a custom group for monitoring

1. From the top menu, navigate to the Device page.
2. From All Devices, select Group Actions, and from the drop-down menu, select Create Custom Group.
3. From the pop-up menu, select Static Group, and click Create.
4. Give the Static Group a name. We used PMP Manager.
5. Enter a description.
6. From the drop-down menu, select the Parent Group Static Groups, and click Next.
7. Select the members that will be a part of this group.
8. Click Finish.

Adding devices to be managed by Power Manager

1. Navigate to Plugins, and from the drop-down menu, select Power Manager.
2. On the Overview screen, select Power Manager Devices.
3. Under Static Groups, select Add Group(s), and check the box next to the PMP Managed Group we created.
4. Click Add Selected.
5. Now, you can view power management details from Power Manager Overview or by viewing the individual units on the OME Device pages. General information in available on the OME homepage.

Configuring OMEVV

1. Once the OMEVV plugin has been installed, navigate to OME, select Plugins from the main menu, and from the drop-down menu, select OMEVV.
2. The Administration page will serve as the homepage. Select Register.
3. Enter the FQDN, a description, vCenter credentials, and opt to register with the vSphere Lifecyle Manager.
4. Click Finish.

Accessing OMEVV

1. Navigate back to vCenter, open the hamburger side menu, and select OpenManageEnterprise Plugin.
2. Create a repository profile by selecting Repository Profile, and click Create new profile.
3. On the pop-up, click Get Started.
4. Enter a name and a description. Click Next.
5. On Profile Settings, change the Protocol to HTTPS, and enter https://downloads.dell.com/catalog/Catalog.gz .
6. No username or password are required, so skip this step.
7. Under Test Settings, click Begin test.
8. Click Next.
9. Click Finish.

Discovering hosts

1. Navigate to Compliance & Profiles.
2. Navigate to Management Compliance.
3. Select Discover Host(s), and click Get Started.
4. Enter a job name and description, and from the drop-down menu, select the vCenter. Ours was vcenter.pod2.lab.
5. Enter the iDRAC credentials, and click Next.
6. Select the Cluster where the Hosts reside, and click Finish.
7. Select the hosts being added to OMEVV, and first run inventory.
8. Select all the hosts again, and click Manage.

Creating a baseline profile

1. From the left, menu, select Baseline Profile.
2. Select Create Baseline Profile, and click Get Started.
3. Enter a Profile Name and Description, in this PMP Baseline, and click Next.
4. Check the Firmware Repository Profile checkbox, select the Dell Default repository created in the previous step, and click Next.
5. If the list of clusters is empty, click Browse, and select the appropriate cluster. Click Next.
6. Select the days and time for drift detection, and click Next.
7. Click Finish.

Read the report at https://facts.pt/S8PX2Pi

This project was commissioned by Dell Technologies.

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