The science behind the report:

Improve sustainability through energy insights

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 Improve sustainability through energy insights.

We concluded our hands-on testing on April 21, 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 April 4, 2022 or earlier. Unavoidably, these configurations may not represent the latest versions available when this report appears.

Our findings

Results of our Dell™ OpenManage™ Enterprise (OME) 3.9 and OpenManage Power Manager 3.0 plug-in testing.

Sustainability features	Validated	Notes
Carbon reduction reporting and calculator	✓	Power Manager 3.0 offered several ways to tackle carbon footprint tracking.
Performance advisor	✓	There isn't a component directly named "performance advisor" within OME, but we found and explored relevant features that are part of this category.
Server component power reporting	✓	We actively monitored the power consumption and other metrics on four 14G and 15G Dell PowerEdge servers over 14 days.
Usage report for finding power zombies en masse	✓	Power Manager 3.0 automatically collected power consumption data as well as CPU, I/O, and power usage metrics—and reported "idle servers" (a.k.a. power zombies) on the main screen.
Energy consumption cost calculator	✓	We could input our local energy cost per kilowatt/hour (kWh), set a power usage effectiveness value, and enter a carbon emission conversion factor to calculate the cost per unit for devices managed and monitored through the OME console.
Staggered emergency power reduction (EPR)	✓	We were able to set policies and view EPR metrics after we manually applied a temperature-triggered EPR policy.
Virtual Machine grouping for power reporting	✓	Power Manager 3.0 automatically gathered power history for VM groups. We were able to view metrics on individual devices within that group.
Auto Placement of devices based on location	✓	Location tag + component view of the manager.

System configuration information

Table 1: Detailed information on the three Dell PowerEdge™ R740 systems we tested.

System configuration information	Dell PowerEdge R740 x3		
BIOS name and version	Dell 2.12.2		
Non-default BIOS settings	Intel® Turbo Boost enabled, Virtualization enabled		
Operating system name and version/build number	VMware® ESXi™ 7.0.2		
Date of last OS updates/patches applied	01/15/22		
Power management policy	Balanced		
Processor			
Number of processors	2		
Vendor and model	Intel Xeon® Platinum 8168		
Core count (per processor)	24		
Core frequency (GHz)	2.70		
Stepping	H0		
Memory module(s)			
Total memory in system (GB)	256		
Number of memory modules	8		
Vendor and model	Samsung M393A4K40CB2-CTD		
Size (GB)	32		
Type	PC4-21300V-R		
Speed (MHz)	2666		
Speed running in the server (MHz)	2666		
Storage controller			
Vendor and model	Dell PERC H740P		
Cache size (GB)	8		
Firmware version	50.5.0-1750		
Driver version	7.716.03.00		
Local storage (type A)			
Number of drives	2	2	4
Drive vendor and model	TOSHIBA THNSF8120CCSE	TOSHIBA PX05SVB096Y	Seagate ST91000640NS
Drive size (GB)	111.25	893.75	931
Drive information (speed, interface, type)	SATA SSD 6 Gbps	SAS SSD 12 Gbps	SATA SSD 3 Gbps

System configuration information	Dell PowerEdge R740 x3
Network adapter	
Vendor and model	Broadcom Gigabit Ethernet BCM5720
Number and type of ports	4 x 1 GbE
Cooling fans	
Vendor and model	Dell 4VXP3
Number of cooling fans	6
Power supplies	
Vendor and model	Dell 0Y26KXA02
Number of power supplies	2
Wattage of each (W)	1,100

Table 2: Detailed information on the Dell PowerEdge R7525 system we tested.

System configuration information	Dell PowerEdge R7525
BIOS name and version	Dell 2.5.6
Operating system name and version/build number	VMware® ESXi™ 7.0.2 17867351 U2
Date of last OS updates/patches applied	01/15/22
Power management policy	Balanced
Processor	
Number of processors	2
Vendor and model	AMD EPYC™ 7542 32-Core Processor
Core count (per processor)	32
Core frequency (GHz)	2.90
Memory module(s)	
Total memory in system (GB)	256
Number of memory modules	16
Vendor and model	Micron MTA18ASF2G72PDZ-3G2R1
Size (GB)	16
Type	PC4-25600
Speed (MHz)	3,200
Speed running in the server (MHz)	3,200

System configuration information	Dell PowerEdge R7525
Storage controller	
Vendor and model	Dell PCIe® SSD backplane
Firmware version	3.56
Local storage (type A)	
Number of drives	2
Drive vendor and model	Kioxia - Dell Ent NVMe™ FIPS CM6 MU 3.2TB
Drive size (TB)	3.2
Drive information (speed, interface, type)	PCIe SSD (NVMe)
Network adapter	
Vendor and model	Broadcom Gigabit Ethernet BCM5720
Number and type of ports	2 x 1 GbE
Cooling fans	
Vendor and model	Dell High Performance (Silver Grade)
Number of cooling fans	6
Power supplies	
Vendor and model	Dell 0CYHHJA01
Number of power supplies	2
Wattage of each (W)	1,400

How we tested

The following details the methods used to test the sustainability features we evaluated in OpenManage Enterprise (OME) 3.9 and OME Power Manager plug-in (version 3.0.0.118).

Installing the OME Power Manager plug-in

We installed the OME Power Manager plug-in using the offline method, rather than installing the online bundles available from Dell.

1. Open a browser window, and connect to the OME console.
2. Enter administrator credentials, and click Login.
3. Click Application Settings→Console and Plugins.
4. Under Updates, on the far-right, click Update Settings.
5. Under Update Settings, make these selections:
    a. Under How to check for updates, select Manual.
    b. Under Where to check for updates, select Network Share.
    c. Under Where your update bundle is stored, select Local Path.
        i. Where the update bundle is saved, select NFS share: nfs://[IP Address]/mnt/Pool/SysMan/services_plugins/
    d. Beside Test Connection, click Test now.
    e. When Connection Successful pops up, click Apply.
6. Click Application Settings→Console and Plugins.
7. To refresh, click the circular arrow under Updates, and check the repository
8. Under Plugins, find the new entry, and click Install.

Configuring the auto placement of devices based on location

This section assumes someone has already set the device location in the server iDRAC. These settings are found in the System→Details→System Details→Location section of a server iDRAC.

1. In the OME console, click Devices.
2. Under Plugin Groups, select Physical Hierarchy.
3. To the side of Physical Hierarchy, click the three dots, and select Automatically Create Physical Hierarchy.
4. To select all unplaced devices, check the box beside Name, and click Apply.
5. To see the automatically created hierarchy, refresh the screen.
6. To see the rack view, click Plugins→Power Management→Rack View.

Viewing server utilization metrics and server component power metrics

1. Under Devices, click a managed server.
2. On the device specific screen, click Power Management and Monitoring.
    a. The device metrics are displayed in graphs just below the Energy Consumption Costs, which also includes Carbon Emissions calculations.
    b. Scroll down to view total power, temperature, usage, and component specific power metrics.

Finding energy, cost, and carbon emissions metrics

Emission metrics can be viewed in multiple contexts, including individual server views (as shown in the preceding section), rack views, and group views.

1. To find emissions metrics from within a rack:
    a. In the OME console, select Plugins→Power Management→Rack View.
    b. Select the rack name, click the three dots, and select Group Details.
    c. You will see a roll-up of the consumption costs of everything in the rack.
    d. To change the depth of history, use the Duration pull-down menu.

2. To find emissions metrics from within a group:
    a. In the OME console, click Home.
    b. Scroll down to the Power Manager panel.
    c. To add groups for selection (maximum of 3 groups), click the pencil icon on the upper-right side of the panel.
        i. From the pulldown menu on the main page, check the box besides the groups you want to view, and click Apply.
    d. To view energy, cost, and carbon emissions metrics on a selected group, use the Group pulldown menu.

Configuring and auditing power policies

1. In the OME console, click Plugins->Power Management->Policies
2. Click Create.
3. To select either a static or temperature-triggered policy, use the pulldown menu.
    a. We used the static policy.
4. Provide a name for the policy, and click next.
5. Select either device or group.
    a. We selected device.
6. Click Select Device.
7. Select one or more devices that will fall under this policy, and click Add Selected.
8. Click Next.
9. Set the maximum power you want used when this policy is active. (Refer to the Power History (Watt) box included in the wizard to select an appropriate boundary.
    a. We set a power cap of 600 Watts.
10. Click Next.
11. Accept the defaults, and click Next.
12. Click Finish.
    a. The policy is created and applied.
    b. The maximum power available to the server is capped at 600 Watts of power (Equivalent to 20 percent of its available power).
13. To disable the policy, check the box to the far left of the policy, and click Disable.
14. In the OME console, click Alerts.
    a. When the Power Cap policy is active on the target server, this generates a warning.
15. In the OME console, click Devices.
16. In the list of devices, click the target server.
17. In the server specific screen, select Power Management and Monitoring.
18. To view any policies actively applied to an individual server, click the Policies and EPR tab.

Changing default settings values

1. In the OME console, click Plugins->Power Management->Settings
2. In the upper-left corner of the panel, click Edit.
3. Edit any value, and click Apply.
    a. All values are populated with defaults, but can be edited to your own regional or data center specific factors.
    b. The graphs and data will be updated to reflect the changes made to the values you specified.

Read the report at https://facts.pt/SZ3MhkK ▶

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