



The science behind the report:

Dell CloudIQ provides a single console for proactive monitoring and had negligible impact on network utilization in our tests

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 [Dell CloudIQ provides a single console for proactive monitoring and had negligible impact on network utilization in our tests](#).

We concluded our hands-on testing on January 26, 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 January 18, 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: Network impact for monitoring via OME and CloudIQ with a single host. Source: Principled Technologies.

Category	Enterprise license			Datacenter license		
	Max file size (bytes)	Min file size (bytes)	Average data transfer (KBps)	Max file size (bytes)	Min file size (bytes)	Average data transfer (KBps)
Telemetry	693	693		694	691	
Health	N/A	N/A		495	495	
Alerts	N/A	N/A		641	641	
Inventory	415	415		1,618	416	
Average OME transmitted over test (1-hour period)			0.067			0.071
Maximum OME transmitted (20-second interval average)			3			4
Minimum OME transmitted (20-second interval average)			0			0

Table 2: Network impact for monitoring via OME and CloudIQ with two hosts. Source: Principled Technologies.

Category	Enterprise license			Datacenter license		
	Max file size (bytes)	Min file size (bytes)	Average data transfer (KBps)	Max file size (bytes)	Min file size (bytes)	Average data transfer (KBps)
Telemetry	768	764		2,008	1,596	
Health	504	502		N/A	N/A	
Alerts	N/A	N/A		N/A	N/A	
Inventory	11,503	415		11,748	415	
Average OME transmitted over test (1-hour period)			0.056			0.078
Maximum OME transmitted (20-second interval average)			2			3
Minimum OME transmitted (20-second interval average)			0			0

Table 3: Network impact for monitoring via OME and CloudIQ with three hosts. Source: Principled Technologies.

Category	Enterprise license			Datacenter license		
	Max file size (bytes)	Min file size (bytes)	Average data transfer (KBps)	Max file size (bytes)	Min file size (bytes)	Average data transfer (KBps)
Telemetry	1,702	1,486		2,466	2,009	
Health	515	494		505	505	
Alerts	N/A	N/A		N/A	N/A	
Inventory	16,694	417		11,744	414	
Average OME transmitted over test (1-hour period)			0.206			0.089
Maximum OME transmitted (20-second interval average)			8			3
Minimum OME transmitted (20-second interval average)			0			0

System configuration information

Table 4: Detailed information on the system we tested.

System configuration information		Dell PowerEdge R740	
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)	2,666		
Speed running in the server (MHz)	2,666		
Storage controller			
Vendor and model	Dell PERC H740P		
Cache size	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 12Gbps	3 Gbps
Network adapter			
Vendor and model	Broadcom Gigabit Ethernet BCM5720		
Number and type of ports	4 x 1 GbE		

System configuration information		Dell PowerEdge R740
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	

How we tested

This methodology assumes all servers under test (SUT) are running VMware ESXi™ 7.0.2 and can host virtual machines for load testing. Each server connects to a VMware vCenter™ server that controls a separate environment where services such as Active Directory, DNS, NTP, and other management applications reside.

Installing OpenManage Enterprise (OME)

1. Download the OME appliance archive file from <https://downloads.dell.com>, and click Save.
2. Extract the archive file to a directory on your computer.
3. Open a web browser, and log into your VMware vSphere vCenter instance using administrator credentials.
4. In vCenter, select your target host in your infrastructure cluster, right-click, and select Deploy OVF Template.
5. In the Deploy OVF Template wizard, select Local File, and browse to the location of your extracted archive files.
6. Select all of the files in the extracted directory, and click Open.
7. In the Deploy OVF Template Wizard, click Next.
8. Select a location for the OME virtual machine. Provide a custom name or accept the defaults, and click Next.
9. Select a compute resource or accept the default selection, and click Next.
10. Review Details, and click Next.
11. From the drop-down menu, for the virtual disk format, select Thin Provision.
12. Select the storage location target where you want to install the appliance. Click Next.
13. Accept the network defaults, and click Next.
14. Click Finish.

Configuring OME

1. Select the newly created VM in vCenter, and power it on.
2. On the summary screen, click the link to open a console session.
3. Click the console screen, use tab to select Accept, and press Enter.
4. To select the default US keyboard, press Enter.
5. Enter a new password, and confirm it. Press the Tab key, and press Enter.
6. To confirm the password change, press Enter a second time.
7. Use the down arrow key to select Set Networking Parameters, and press Enter.
8. To select the primary network adapter, press Enter.
9. Enter the administrator password, press Tab, and press Enter.
10. To enter the IP address information block, press Tab.
11. Use the arrow keys to change the IP address information to one compatible with your network settings.
12. Press Tab to select <Apply>, and press Enter.
13. Enter the administrator password, press Tab, and press Enter.
14. To confirm the short delay while changes are applied, press Enter.
15. On the main menu, click up arrow, and select Display Current Appliance Status. Press Enter.
16. Ensure all services are marked as active, and open a new web browser tab.
17. In the new browser, enter either the IP address or the DNS name for your OME appliance, and press Enter.
18. Log into OME with the administrator credentials.
19. Click Initial settings.
20. Expand the Time Configuration menu. Use the drop-down menu to select your time zone. We selected (GMT-5:00) Eastern Time. Check the box for Use NTP. Provide the IP address for your preferred time source, and click Apply. Click Yes.
21. Click Finish.
22. Click Discover Devices.
23. For Device Type, select Server. Accept the default Dell iDRAC as the connection method, and click OK.
24. Provide the IP address or range for at least one iDRAC to discover. Provide credentials for logging onto the iDRAC. We used the default credentials for all iDRACs. Check the box for Enable trap reception from discovered iDRAC servers and MX7000 chassis. For Application Settings, check the Set Community String for trap destination checkbox. Click Finish.

Installing the CloudIQ plugin

1. On the OME menu bar, select Application Settings→Console and Plugins.
2. Click Update Settings.
3. For How to check for updates, select Manual. Click Apply.

4. In the list of available plugins that appears, locate CloudIQ, and click Install.
5. In the pop-up box that appears, click Download Plugin.
6. Close the window. The CloudIQ status will change to Downloaded. Click Install.
7. In the pop-up box that appears, click Install Plugin.
8. Review the End User License Agreement, and click Accept.
9. Review the Infrastructure Telemetry Notice, and click Accept.
10. Review and perform the recommended steps. Check the box to confirm you have completed the actions, and click Confirm Install.
11. When complete, OME will reboot, and you'll be prompted to log in. Log in with admin credentials.
12. Click Plugins→CloudIQ→Overview.
13. Click Activate Now.
14. Click Generate Access Key. This will open a new browser tab that will connect to a Dell website that requests your account credentials.
15. Enter the credentials, and click Sign In.
16. Select the site ID associated with your organization.
17. Create a 4-digit PIN, and click Generate Access Key. An email with the access key will be delivered to your email account. Click Done.
18. Navigate to your email inbox, and open the email with the access key. Copy the key from the email.
19. Switch back to the OME CloudIQ configuration screen, and paste the key from your email into the Access Key field. In the PIN field, enter the PIN you chose for this key. Click Next. This initiates a secure connection between CloudIQ and OME.
20. Provide a name for the collector, and click Next. We used OME.
21. Press Select Groups, and select the groups you want CloudIQ to monitor. Click OK.
22. Click Next.
23. Click Finish.
24. To confirm CloudIQ registration is complete, click OK.
25. Devices with the proper licenses and entitlements will automatically connect to CloudIQ via OME.

Creating a DVD Store VM for load generation

Installing Windows Server 2019

1. In vCenter, select one of the SUT. Right-click, and select New Virtual machine.
2. Click Next.
3. Provide a name for your virtual machine (we used SQL_SUT1). Select the datacenter containing your SUT hosts, and click Next.
4. Select the target server for the new VM. Click Next.
5. Select the storage target for the new VM. Click Next.
6. Click Next.
7. Accept the defaults for Windows and Server 2019, and click Next.
8. In the Customize hardware panel, change the CPUs to 8 and the memory to 32 GB. Change the New Hard Disk to utilize Thin Provision for the Disk Provisioning. Set the New CD/DVD Drive to map to Datastore ISO File.
9. Select the Windows ISO you want to install the OS from, and click OK.
10. In the New CD/DVD Drive section, check the box beside Connect..., and click Next.
11. Click Finish.
12. Power on the VM, and launch a console session through vCenter.
13. To boot from the mounted ISO file, press any key.
14. Click Next.
15. Click Install now.
16. Enter the Windows product key, and click Next.
17. Select Windows Server 2019 Datacenter (Desktop Experience), and click Next.
18. Check the I accept the license terms checkbox, and click Next.
19. Click Custom: Install Windows only (advanced).
20. Click Next.
21. After installation completes, the system will reboot and prompt you to create an administrator account password. Enter the password twice, and click Finish.
22. Log into the Windows Server VM.
23. Go back to the vCenter, right-click the newly created server, and select Edit settings.
24. Click Add New Device, and select Hard Disk. Select the New Hard disk, and change the size to 200 GB. Change the provisioning type to Thin Provision. Click Add New Device, and select Hard Disk again. Select the second New Hard disk, and change the size to 100 GB. Change the provisioning type to Thin Provision, and click OK.
25. Go back to the Windows VM. In Server Manager, select Tools→Computer Management.
26. Click Disk Management.

27. Right click on the Disk 1 entry and select online. Right click on Disk 1 and select Initialize Disk. Accept the default and click OK. Right click on the Unallocated space and select New Simple Volume...
28. Click Next.
29. Accept the default value for disk size, and click Next.
30. Accept the default value (D) for the drive letter, and click Next.
31. Change the Volume label to Data, and click Next.
32. Click Finish.
33. Right-click the Disk 2 entry, and select Online. Right-click Disk 2, and select Initialize Disk. Accept the default, and click OK. Right-click the Unallocated space, and select New Simple Volume...
34. Click Next.
35. Accept the default value for disk size, and click Next.
36. Accept the default value (E) for the drive letter, and click Next.
37. Change the Volume label to Logs, and click Next.
38. Click Finish.
39. Run Windows Update to ensure all patches have been applied and the server is up to date.

Installing SQL Server

1. In vCenter, select the newly created server, right-click, and select Edit settings.
2. Change the CD/DVD drive to point to the SQL Server 2019 iso file.
3. Go back to the VM, and double-click the D: with the SQL Setup DVD loaded.
4. In SQL Server Installation Center, click Installation.
5. Click New SQL Server stand-alone installation or add features to an existing installation.
6. Enter the product key, and click Next.
7. Check the I accept the license terms checkbox, and click Next.
8. Check the Use Microsoft Update to check for updates checkbox, and click Next.
9. After install rules have passed, click Next. If any rules fail, mitigate the failures before continuing.
10. Select Database Engine Services, Full-Text and Semantic Extractions for Search, and click Next.
11. Accept the defaults, and click Next.
12. Accept the default Server Configuration, and click Next.
13. Select Mixed Mode, and enter a password for SA. Click Add Current User, and click Next.
14. Click Install.
15. Upon completion, click Close.
16. In the SQL Server Installation Center, click Install SQL Server Management Tools.
17. Click the link to download the latest version of SQL Server Management Studio.
18. After the download completes, run the executable.
19. Click Install.
20. Click Close.

Importing the DVD Store database

1. Open Microsoft SQL Server Management Studio.
2. Using the Windows Authentication, click Connect.
3. Select New Query.
4. Enter the following text into the SQL Query tab:

```
USE [master]
GO
CREATE LOGIN [ds3user] WITH PASSWORD=N'',
Default_Database=[master],
Default_Language=[us_english],
Check_expiration=OFF,
Check_policy=OFF
GO
```

5. Click the checkbox to verify no syntax errors or issues.
6. Click Execute.

We used a previously generated 40GB database. We imported the database from backup files stored on the local server.

7. In Windows, create two folders named D:\DS3 and E:\DS3.
8. In SQL Server Management Studio, right-click Databases, and select Restore Database.
9. Select Device, and click the button beside it to add the device location.
10. Click Add.
11. Browse to the location of the backup files on your local device (ours was stored on E drive for loading). Click OK.
12. Click OK.
13. In the upper left, click File.
14. Check the Relocate all files to folder checkbox. Select D:\DS3 for the Data file folder, and select E:\DS3 for the Log file folder.
15. Click OK.
16. In SQL Server Management Studio, right-click Security→Logins→ds3user, and select Properties.
17. Click user mapping. In the top pane, check the box for DS3, and in the bottom pane check the box for db_owner. Click OK.
18. Copy the ds35-main folder to C:\ on the VM.

Repeat the steps to create a VM on each SUT.

Running the DVD Store load

We used DVD Store 3.5 as a generator for IO on each system under test, which in turn reported performance metrics that could be reported to OME and CloudIQ. We executed the following sequence for generating load on each of our SQL Server database instances running on Windows Server 2019 hosts:

1. Log into one of the VMs on the SUT with administrator credentials.
2. Open a command prompt.
3. Change the directory to the DVDStore installation directory and locate the sqlserverds35 directory. Our target directory was located at C:\ds35-main\sqlserverds35\
4. Execute the following command:

```
ds35sqlserverdriver.exe --n_threads=20 --ramp_rate=10 --run_time=60 --db_size=40GB
--think_time=.05
```

5. In Windows, open Task Manager.
6. Click the Performance tab and verify CPU, Memory, and Ethernet are active and showing utilization.
7. At the bottom of the Task Manager panel, click Open Resource Monitor to verify disk activity.
8. Repeat steps 1 through 7 on the VMs for each SUT.

Collecting data

1. Open a web browser, and log into OME with admin credentials.
2. Click Plugins→CloudIQ→Transfer Log.
3. Record any alert, health, inventory, and telemetry transfers that have occurred in the last hour while the servers were not under load.
4. Open a new web browser tab, and log onto your VMware vSphere vCenter with administrator credentials.
5. Select the VM labelled openmanage_enterprise.x86_64-0.0.1.
6. On the actions panel in the upper right, click Monitor.
7. Under Performance, click Advanced.
8. Click Chart Options.
9. Under Chart Metrics, select Network.
10. Under counters, select Data Transmit Rate.
11. Under target objects, select only openmanage_enterprise.x86_64-0.0.1.
12. Click OK.
13. Return to the OME console.
14. During the duration of the test, select any category of data that is transmitted. Record the category, time stamps, file size, and duration. These datapoints correlate traffic outbound to CloudIQ with the network transmission data reported by vCenter.
15. At the conclusion of the one-hour test, record the Maximum, Minimum, and Average displayed as reported by vCenter for the transmitted traffic. Screenshot the graph for reference.

Read the report at <https://facts.pt/bPk3zLv> ▶

This project was commissioned by Dell.



Facts matter.®

Principled Technologies is a registered trademark of Principled Technologies, Inc. All other product names are the trademarks of their respective owners.

DISCLAIMER OF WARRANTIES; LIMITATION OF LIABILITY:

Principled Technologies, Inc. has made reasonable efforts to ensure the accuracy and validity of its testing, however, Principled Technologies, Inc. specifically disclaims any warranty, expressed or implied, relating to the test results and analysis, their accuracy, completeness or quality, including any implied warranty of fitness for any particular purpose. All persons or entities relying on the results of any testing do so at their own risk, and agree that Principled Technologies, Inc., its employees and its subcontractors shall have no liability whatsoever from any claim of loss or damage on account of any alleged error or defect in any testing procedure or result.

In no event shall Principled Technologies, Inc. be liable for indirect, special, incidental, or consequential damages in connection with its testing, even if advised of the possibility of such damages. In no event shall Principled Technologies, Inc.'s liability, including for direct damages, exceed the amounts paid in connection with Principled Technologies, Inc.'s testing. Customer's sole and exclusive remedies are as set forth herein.