



## Take the guesswork out of video surveillance with pre-validated Milestone solutions from Dell EMC

### Intel Xeon processor-powered Dell EMC PowerEdge R740xd2 servers handled a 120-camera load without failure

Video surveillance is big business. In 2019 alone, research firm IHS estimated that 180 million surveillance cameras shipped worldwide.<sup>1</sup> Businesses of all sectors and sizes use surveillance to protect employees and assets and face the challenge of finding reliable solutions that can handle and store the large amounts of video data they accumulate.

This is where the Dell EMC™ Surveillance Validation Labs come in. These dedicated labs pre-validate software and hardware solutions for surveillance. To show how pre-validation can help surveillance customers, we worked with engineers at the lab in Durham, NC, to validate Dell EMC PowerEdge™ R740xd2 servers, powered by Intel® Xeon® Gold 5120 processors, and Milestone xProtect®, an open-platform video management system (VMS) that allows companies to customize their surveillance software. In two use cases, each with 120 cameras recording continuously, the Dell EMC and Milestone solution passed validation testing under normal load and during a simulated disk failure.

Choosing a validated digital surveillance infrastructure solution of Milestone xProtect and Dell EMC PowerEdge R740xd2 servers powered by Intel Xeon processors could help your organization reliably protect your valuable assets: customers, employees, inventory, and more.

Different surveillance setups met stringent verification standards

#### Efficient recording under normal load



163 MB/s average disk throughput



4% average CPU utilization

#### Reliable performance during simulated disk failure and rebuild



154 MB/s average disk throughput



7% average CPU utilization

## About the Dell EMC PowerEdge R740xd2 server

The enterprise-grade [PowerEdge R740xd2](#) server allows organizations to “bring storage closer to compute” with a “high-capacity, space-saving 2U design.”<sup>2</sup> With the PowerEdge R740xd2, organizations can store up to 364 TB of data in a 2U rack server or scale out to 7.2 PB (520 drives) in a 42U rack full of R740xd2 servers.<sup>3</sup> Learn more in the [Dell EMC PowerEdge R740xd2 server data sheet](#).

The PowerEdge R740xd2 server used in this testing had two Intel Xeon Gold 5120 processors, 28 physical cores, and 256 GB of memory, and it ran Microsoft® Windows Server® 2016 Datacenter Edition. For storage, the server had 26 8TB 3.5-inch NLSAS HDDs. We configured the storage under test using the Dell EMC PERC H730P Mini controller and created a RAID6 disk group with two dedicated hot spares for a total usable capacity of 160 TB.



## What is the Dell EMC Surveillance Validation Lab?

Not all major data center technology suppliers have their own validation lab for surveillance solutions, which is what makes Dell EMC stand out in the surveillance infrastructure marketplace. The Surveillance Validation Lab works with leading surveillance providers from the Dell EMC partner ecosystem to test their video management solutions. Dell EMC then uses those findings to help organizations choose a tested and validated solution that meets the organizations’ demands. Dell EMC believes their Surveillance Lab is the “most advanced, longest-running video surveillance validation lab in the world.”<sup>4</sup> Globally, Dell EMC runs three surveillance testing and validation labs, which are part of a network of 20 test centers total.<sup>5</sup> Dell EMC claims to be the number one global surveillance infrastructure provider.<sup>6</sup>

Engineers in the Surveillance Lab put hardware and software solutions through the paces in what Dell EMC calls extreme, real-world scenarios.<sup>7</sup> Extreme conditions include zero video frame drop over multiple failure scenarios, including drive, network, and controllers failures. The performance numbers the Dell EMC Surveillance Lab produces are not hero numbers, but worse case numbers, as the lab aims to show customers they can maintain performance without video loss under strenuous conditions.

Because the Surveillance Lab looks for worst case realistic test scenarios, their results may vary when compared to the results from other partners (i.e., integrators and VMS vendors).

Solution validations include:<sup>8</sup>

- Virtual/non-virtual
- Best practices
- Compute
- Networking
- Storage
- ISV application

Dell EMC also provides validation support that includes “solution documentation including reference architectures, white papers, technical notes, sizing guidelines, and technical presentations.”<sup>9</sup> When your business implements a VMS validated by Dell EMC, you do so knowing that Dell EMC has already tested and approved it for use.

## About the Milestone xProtect video management system

According to Milestone Systems, their company provides “industry-leading video management software”<sup>10</sup> that enables customers to add “custom, best-in-class security solutions to [their] surveillance, such as access control, cameras, and video analytics.”<sup>11</sup> Milestone Systems claims to support over 8,000 cameras and hardware devices.<sup>12</sup> Their xProtect products are designed to serve clients ranging from small businesses to large, high-security enterprises. [Learn more here.](#)

## How we tested and what we found

We worked with Dell EMC engineers to validate the Intel Xeon processor-powered PowerEdge R740xd2 server running the Milestone VMS. The Dell EMC Surveillance Lab in Durham, NC, housed the server under test and testing equipment. Our engineers installed BIOS and firmware updates, provisioned local storage, and installed Windows Server 2016. Dell EMC engineers configured the networking, deployed the software required to complete the validations, and performed the validation testing. Our engineers ensured servers performed optimally during testing. They also reviewed raw testing results as well as Dell EMC Live Optics™ storage and server performance reports captured during validation testing to ensure that Dell EMC engineers completed the validation successfully without error.

A surveillance solution can fail to receive validation by either dropping one or more frames or losing video. The Milestone solution passed the validation testing in two different use cases: 1) normal server load with 120 cameras recording continuously, and 2) the same 120 cameras recording simultaneously recording while experiencing a server disk failure and a disk rebuild.

Milestone xProtect records video using software-defined Archiver roles, which discover camera feeds, check cameras to see if they are recording, process all video and multimedia streams, and commit them to storage. The results in this report show data for one Archiver with 120 cameras.

## About Intel Xeon Scalable processors

According to Intel, their Xeon Scalable processors “support hybrid cloud infrastructures and most demanding applications—including in-memory analytics, artificial intelligence, autonomous driving, high performance computing (HPC), and network transformation.”<sup>13</sup> Intel Xeon Scalable processors are available in four feature configurations (Platinum, Gold, Silver, and Bronze) to match the needs of organizations operating at many different levels.

[Learn more about Intel Xeon Scalable processors.](#)

### Test results - Use case 1 - server under normal load

#### Camera parameters

- 4Mbps camera
- 1920x1080 resolution
- 30 frames per second
- Continuous recording enabled for all cameras

Recording results	Archiver role 1
Maximum number of cameras	120
Read/write ratio (%)	93/7
Read/write latency (ms)	1/ 2
Disk throughput (MB/s)	163
IOPS at 99%	842
Peak IOPS	910
Average CPU utilization	4%

### Test results - Use case 2 - server under simulated disk failure and disk rebuild

#### Camera parameters

- 1MBps/8Mbps camera
- 2040x1536 resolution
- 30 frames per second
- Continuous recording enabled for all cameras

Recording results	Archiver role 1
Maximum number of cameras	120
Read/write ratio (%)	72/28
Read/write latency (ms)	3/4
Disk throughput (MB/s)	154
IOPS at 99%	460
Peak IOPS	1,952
Average CPU utilization	7%

For detailed performance results, see [Appendix A](#).

As you might expect, continuous recording requires greater throughput than on-motion recording. This applies to both disk and network throughput. If surveillance infrastructure isn't validated to meet the needs of a Milestone VMS, you have no way of knowing if it can handle the necessary throughput, which could lead to video loss or missing frames from archived footage. Missing or incomplete footage might, for example, keep a retail store from delivering reliable evidence when prosecuting theft.

It's important to note that the number of cameras and the throughput results were the minimum requirements set for this validation. These results do not indicate the maximum capability of the Dell EMC and Milestone surveillance solution.

### What do these results mean for your business?

A validated Dell EMC and VMS partner surveillance infrastructure can simplify the process of implementing a surveillance solution. Choosing a pre-validated, custom-tailored solution provided by Dell EMC can help take the guesswork out of the purchasing equation, which cuts down on research, trial and error time, and more. This frees IT staff to focus on other critical tasks while ensuring your organization gets a properly sized solution. By reducing the costs associated with solution acquisition and implementation, organizations can see a higher overall return on investment for their purchase. Buying a solution that's too big or small could require additional time and effort from IT staff to get infrastructure up and running and increase the time to successful implementation.



## Conclusion

The right digital surveillance infrastructure may put your organization in a good position to handle the security issues of today and tomorrow. But you should confirm the reliability of your surveillance infrastructure—you're protecting your customers, employees, and inventory, among other vital elements. The Dell EMC Surveillance Validation Labs can help your organization choose tested and validated solutions that meet your needs. We worked with the labs to validate a Milestone xProtect VMS on a Dell EMC PowerEdge R740xd2 server. The solution proved to be reliable by meeting verification requirements in two use cases, showcasing its reliability by handling the tests with no dropped frames. This validation shows that your organization can be confident running these Milestone VMS configurations on Dell EMC PowerEdge R740xd2 servers for a dependable surveillance infrastructure.

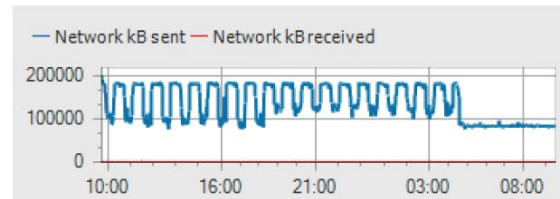
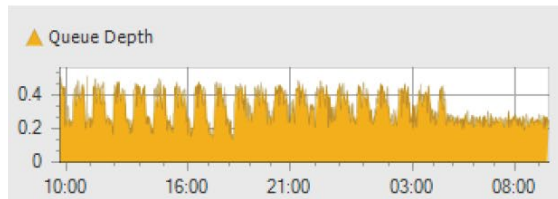
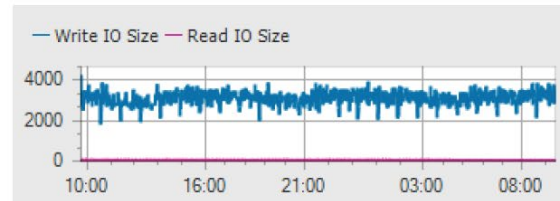
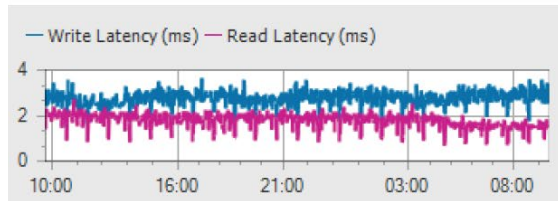
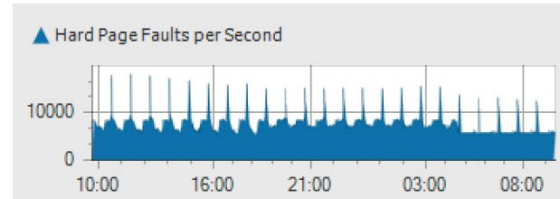
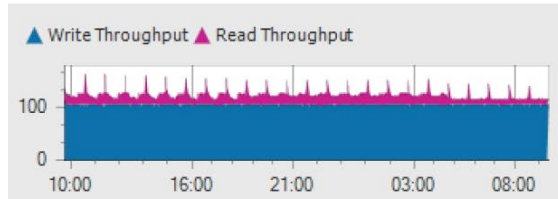
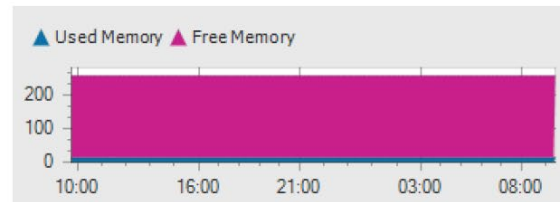
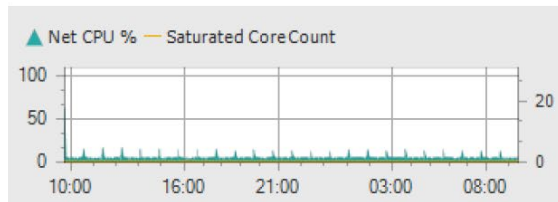
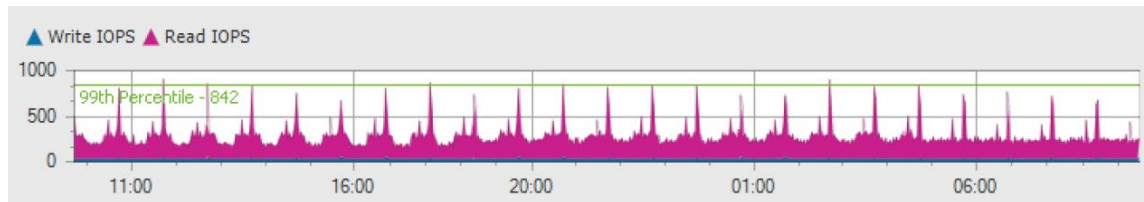
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- 1 IHS Markit, "Top Video Surveillance Trends for 2019," accessed May 3, 2019, <https://cdn.ihs.com/www/pdf/1218/IHSMarkit-Security-Technologies-Trends-2019.pdf>
  - 2 Dell EMC, "R740xd2 Spec Sheet," [https://i.dell.com/sites/csdocuments/Product\\_Docs/en/poweredge-r740xd2-spec-sheet.pdf](https://i.dell.com/sites/csdocuments/Product_Docs/en/poweredge-r740xd2-spec-sheet.pdf)
  - 3 Dell EMC, "R740xd2 Spec Sheet," [https://i.dell.com/sites/csdocuments/Product\\_Docs/en/poweredge-r740xd2-spec-sheet.pdf](https://i.dell.com/sites/csdocuments/Product_Docs/en/poweredge-r740xd2-spec-sheet.pdf)
  - 4 Dell EMC, "The Secret to a Successful Surveillance Solution," accessed October 26, 2018, <https://www.emc.com/collateral/infographic/oem-surveillance-infographic.pdf>
  - 5 Dell EMC, "The Secret to a Successful Surveillance Solution," accessed October 26, 2018, <https://www.emc.com/collateral/infographic/oem-surveillance-infographic.pdf>
  - 6 Dell EMC, "Protecting what matters to make the world safer," accessed October 26, 2018, <https://www.dellemc.com/en-us/solutions/surveillance-security.htm#scroll=off>
  - 7 Dell EMC, "Protecting what matters to make the world safer," accessed October 26, 2018, <https://www.dellemc.com/en-us/solutions/surveillance-security.htm#scroll=off>
  - 8 Dell EMC, "Dell EMC Surveillance Validation Labs: Protecting what matters to make the world safer," accessed October 26, 2018, <https://www.emc.com/collateral/hardware/solution-overview/h17004-dellemc-surveillance-sb.pdf>
  - 9 Dell EMC, "Dell EMC Surveillance Validation Labs: Protecting what matters to make the world safer," accessed October 26, 2018, <https://www.emc.com/collateral/hardware/solution-overview/h17004-dellemc-surveillance-sb.pdf>
  - 10 Milestone Systems, accessed October 30, 2018, <https://www.milestonesys.com/about-us/>
  - 11 Milestone Systems, accessed October 30, 2018, <https://www.milestonesys.com/community/become-a-partner/the-open-platform/>
  - 12 Milestone Systems, accessed October 30, 2018, <https://www.milestonesys.com/about-us/our-company/>
  - 13 Intel, accessed October 30, 2018, <https://www.intel.com/content/www/us/en/processors/xeon/scalable/xeon-scalable-platform.html>

We concluded our validation on April 8, 2019. The results in this report reflect configurations that we finalized with Dell EMC on April 8, 2019 or earlier. Unavoidably, these configurations may not represent the latest versions available when this report appears.

## Appendix A: Live Optics performance overview

### Performance of R740xd2 solution under normal load

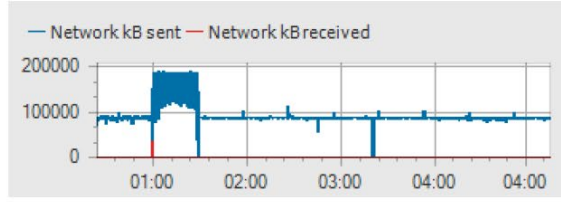
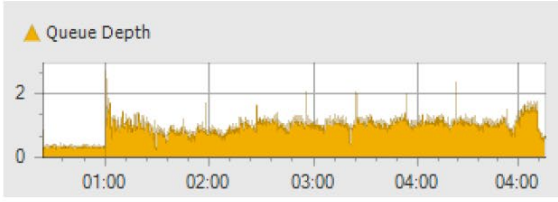
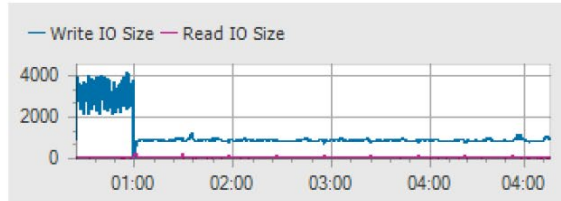
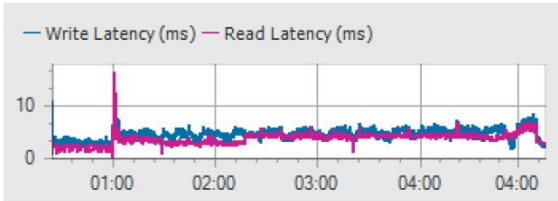
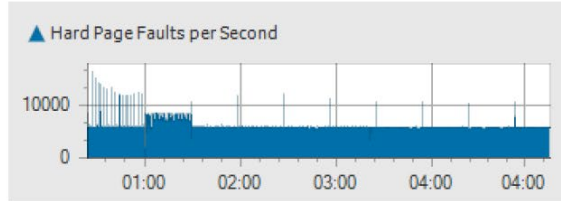
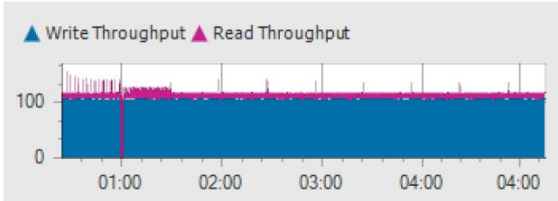
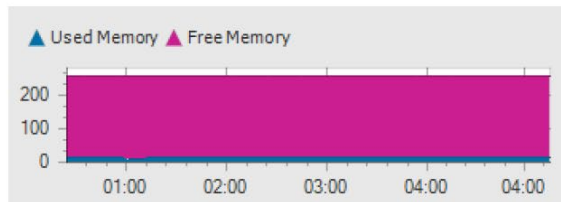
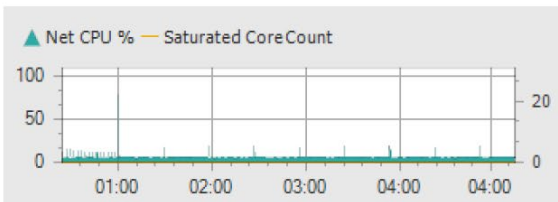
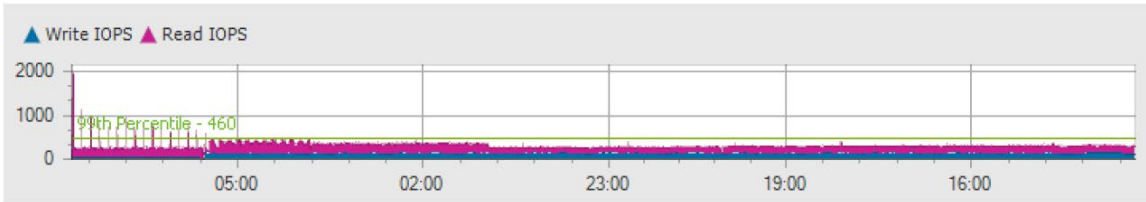
<b>Operating System</b>	Microsoft Windows Server 2016 Datacenter		
<b>Time Recorded</b>	1 Day(s), 3 Hour(s), 58 Minute(s), 3/27/2019 - 3/28/2019		
<b>Disk Throughput</b>	163.00 MB/s	<b>Average IO size</b>	Read: 59.06 KB / Write: 2.61 MB
<b>IOPS</b>	842 at 99%	<b>Average Latency</b>	1 ms Reads and 2 ms writes
<b>Read/Write Ratio</b>	93% / 7%	<b>Average Queue Depth</b>	0.32
<b>Total Local Capacity</b>	167.59 TB	<b>Peak/Min CPU</b>	64% / 3%
<b>Free Local Capacity</b>	78.46 TB (47%)	<b>Peak/Min Memory</b>	241.58 GB / 242.07 GB
<b>Used Local Capacity</b>	89.12 TB (53%)	<b>Peak/Min Memory In Use</b>	13.04 GB / 12.56 GB



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## Performance of R740xd2 solution during disk rebuild test

<b>Operating System</b>	Microsoft Windows Server 2016 Datacenter		
<b>Time Recorded</b>	5 Day(s), 4 Hour(s), 16 Minute(s), 3/28/2019 - 4/2/2019		
<b>Disk Throughput</b>	154.30 MB/s	<b>Average IO size</b>	Read: 65.31 KB / Write: 979.23 KB
<b>IOPS</b>	460 at 99%	<b>Average Latency</b>	3 ms Reads and 4 ms writes
<b>Read/Write Ratio</b>	72% / 28%	<b>Average Queue Depth</b>	0.97
<b>Total Local Capacity</b>	167.59 TB	<b>Peak/Min CPU</b>	78% / 0%
<b>Free Local Capacity</b>	78.47 TB (47%)	<b>Peak/Min Memory</b>	241.59 GB / 247.77 GB
<b>Used Local Capacity</b>	89.12 TB (53%)	<b>Peak/Min Memory In Use</b>	13.04 GB / 6.85 GB



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## Appendix B: System configuration information

Server configuration information	Dell EMC PowerEdge R740xd2
BIOS name and version	Dell 1.0.2
Non-default BIOS settings	N/A
Operating system name and version/build number	Windows Server 2016 Standard, Version 1607, Build 14393.2273
Date of last OS updates/patches applied	11/06/18
Power management policy	Performance
<b>Processor</b>	
Number of processors	2
Vendor and model	Intel Xeon Gold 5120
Core count (per processor)	14
Core frequency (GHz)	2.20
Stepping	H0
<b>Memory module(s)</b>	
Total memory in system (GB)	256
Number of memory modules	16
Vendor and model	Micron® MTA18ASF2G72PDZ-2G6E1
Size (GB)	16
Type	DDR4-2400
Speed (MHz)	2,400
Speed running in the server (MHz)	2,400
<b>Storage controller</b>	
Vendor and model	Dell PERC H730P Mini
Cache size (GB)	1
Firmware version	25.5.3.0005
Driver version	6.603.6.0
<b>Local storage (type A)</b>	
Number of drives	26
Drive vendor and model	Dell ST8000NM0185 (Seagate OEM)
Drive size (GB)	8,192
Drive information (speed, interface, type)	7.2K, 12Gbps, SAS, HDD
<b>Local storage (type B)</b>	
Number of drives	2
Drive vendor and model	Dell SSDSCKJB240G7R (Intel OEM)
Drive size (GB)	240

Server configuration information	Dell EMC PowerEdge R740xd2
Drive information (speed, interface, type)	6Gbps, SATA, M.2 SSD
Network adapter	
Vendor and model	Broadcom® BCM57412 Dual 10G SFP+ Ethernet
Number and type of ports	2 x 10GbE
Driver version	20.8.24.0
Cooling fans	
Vendor and model	Nidec® UltraFlo® 4VXP3-X30
Number of cooling fans	6
Power supplies	
Vendor and model	Dell D1600E-S0
Number of power supplies	2
Wattage of each (W)	1,100

## Appendix C: How we tested

PT engineers installed BIOS and firmware updates, provisioned local storage, and installed Windows Server 2016 on the servers. Dell EMC engineers configured the networking, deployed the software required to complete the validations, and performed the validation testing. PT engineers ensured that server performance was optimized during testing and reviewed raw testing results and Dell EMC Live Optics™ storage and server performance reports captured during validation testing. We cannot disclose Dell EMC proprietary processes related to this testing.

### Installing Windows Server 2016 on the Dell EMC PowerEdge R740xd2 server

1. Insert the installation media into the CD/DVD drive, and restart the server.
2. When the option appears, press F11 to enter the Boot Manager.
3. Select UEFI Boot Menu.
4. Select the boot media, and press Enter.
5. When prompted to boot from DVD, press any key.
6. When the installation screen appears, leave language, time/currency format, and input method as default, and click Next.
7. Click Install now.
8. When the installation prompts you, enter the product key.
9. Select Windows Server 2016 Datacenter Edition (Server with a GUI), and click Next.
10. Check I accept the license terms, and click Next.
11. Click Custom: Install Windows only (advanced).
12. Select Drive 0 Unallocated Space, and click Next. Windows will begin and restart automatically.
13. When the Settings page appears, fill in the Password and Re-enter Password fields with the same password.
14. Log in with the password you set up in the previous step.

### Installing firmware updates on the PowerEdge R740xd2 server

1. Download all firmware updates from the Dell EMC firmware repository.
2. To update the firmware on the following components, run the .exe files in this order:
  - a. Dell iDRAC
  - b. BIOS
  - c. CPLD
  - d. OS Driver Pack
  - e. Network firmware and drivers
3. Reboot the server as required between firmware updates.

This project was commissioned by Dell EMC.



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