Server Technology is Rapidly Advancing Software-Defined Storage Adoption

For those struggling to convince their leadership to adopt software-defined storage (SDS), this eBook from Dell EMC can help you make the case. We’ve gathered 5 ways server technology is advancing software-defined storage adoption, making it easier for businesses to implement SDS in the modern data center.

The biggest misconception about SDS is that the underlying hardware is not important. It’s true, many of the features and performance enhancements are now provided by software. But, if you thought the hardware provider doesn’t matter when implementing a SDS solution, think again.

We’ll show you why.

What is SDS?
It’s storage infrastructure managed and automated by software running on x86 servers as opposed to proprietary storage hardware.

1 Why Hardware Matters to the Success of Your Software-Defined Storage Deployment,” Gartner, 30 March 2017
SDS adoption is on the verge of mainstream acceptance. Don’t be left behind.

By 2019, Gartner predicts that 30% of the global storage array capacity installed in enterprise data centers will be deployed on SDS or hyperconverged integrated system (HCIS) architectures based on x86 hardware systems.\(^2\) Plus, the benefits and impacts of SDS outweigh the risks in Gartner’s Innovation Window for Software-Defined Storage. IDC confirms Gartner’s outlook, stating “SDS is one of several new technologies that are rapidly penetrating the IT infrastructure of enterprises and cloud service providers.”\(^3\) SDS is a growing technology and many enterprises have either migrated or plan to migrate their IT infrastructure to SDS.

30% of enterprise storage will use SDS or HCIS by 2019\(^2\)

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Software-defined storage is not new. But, things have changed.

Hardware and software coming together to enable pooled storage has allowed SDS to enter the mainstream of IT infrastructure architectures. In fact, most IT managers have probably evaluated the plusses and minuses of migrating to a software-defined storage solution or at least read up on the topic. For many, the question is not why, but when.

A great time to consider SDS is during a server refresh

A server refresh presents an opportunity to optimize your hardware choices for scalability and uptime, while also selecting servers that can integrate easily with your chosen SDS software. Dell EMC offers customers a spectrum of solutions for SDS, whether you want to build your own system or buy a solution that’s prepackaged for SDS. PowerEdge servers are used at every point on the spectrum. With new server technology, SDS is more achievable than ever before.

New Dell EMC PowerEdge R740 and R740xd servers are well-suited for SDS deployments.
1: Unprecedented storage flexibility (mixing drive types)

In a SDS environment, the ideal type of storage is chosen automatically via the SDS software. But, for this to work, the server hardware must be able to mix storage hardware types. SDS is able to utilize various storage hardwares (NVMe, SSD, or HDD) in combination. If you know you’re more frequently running VDI workloads, perhaps you want more NVMe SSD’s. Or for OLTP, you’d also want a higher proportion of flash storage for the benefit of lower latency and faster data transfer. The PowerEdge R740xd offers incredibly flexible storage configurations so customers can mix drive types according to their particular workload needs. It’s the ideal server for software-defined storage with the ability to mix NVMe, SSD and HDD storage types.

The speed advantages with new PowerEdge R740xd servers

<table>
<thead>
<tr>
<th>Storage Hardware</th>
<th>Definition</th>
<th>Max Performance</th>
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<tbody>
<tr>
<td>HDD</td>
<td>“Hard Disk Drive” – Traditional storage with spinning disks.</td>
<td>400 4K IOPS</td>
</tr>
<tr>
<td>SSD</td>
<td>“Solid State Drive” – Flash storage which no longer requires use of spinning disks.</td>
<td>120,000 4K IOPS</td>
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<tr>
<td>NVMe SSD</td>
<td>“Non-volatile Memory Express” – The most performance-advanced and space efficient form of flash memory.</td>
<td>750,000 4K IOPS</td>
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*Source for table: “Consolidate your data analytics servers with the Dell EMC PowerEdge R740xd,” Principled Technologies, October 2017

*varies by vendor.
2: Data segregation technology (Boot Optimized Storage Solution)

New PowerEdge servers have a feature called the Boot Optimized Storage Solution (BOSS). It comes in response to customer requests for a simpler, more economical way to segregate operating system and data on server-internal storage. Many customers, particularly those implementing SDS, prefer to separate their operating system drives from data drives, and require hardware RAID mirroring (RAID1) for their OS drives. Providing a separate, redundant disk solution for the operating system enables a more robust, optimized compute platform. PowerEdge engineers developed a simple, cost-effective way of meeting this customer need: BOSS. Both the PowerEdge R740 and R740xd come standard with this feature.

Key Facts:

- Software-defined storage solutions, such as VMware vSAN, get up to 16% more dedicated data drive space by moving the server OS to BOSS, the Boot Optimized Storage Solution.\(^7\)

\(^7\) Based on Dell EMC internal analysis, April 2017. G17000115
Networking is a key component to SDS

Software-defined storage is a cluster of servers whose DAS (Direct Attached Storage) is connected via a network and managed via software. The SDS software provisions (by pooling this DAS together) and manages the storage. The server’s networking technology connects this cluster. Even if the DAS has extremely low latency, the interconnect between the servers can become a performance bottleneck as application reads/writes data across the multiple servers in the SDS cluster. Networking technology is an essential element in delivering the full benefits of software-defined storage. With the high-speed networking available from Dell EMC on PowerEdge servers, customers are able to optimize a variety of workloads running on the SDS platform.

More bandwidth. More options.

One of the reasons why the PowerEdge R740 and R740xd servers are so well-suited for SDS deployments is because they can be configured with a wide variety of different networking options. A huge selection of Dell EMC validated Rack Network Daughter Cards (rNDC) enable you to choose the right network fabric for your SDS environment without using up a valuable PCI slot. Pick the speed, technology, and vendor, with capabilities such as RoCE* and iWARP* available which enable you to lower latency and CPU utilization.

* RDMA over Converged Ethernet (RoCE) and Internet Wide-Area RDMA Protocol (iWARP) are network protocols that allow remote direct memory access (RDMA) over an Ethernet network.
OpenManage Power Center (OMPC) is a console designed to perform power monitoring, alerting, reporting, and capping for data center administrators. The OMPC console can be used anywhere heat or power is a concern, but most of its users are data center operators. OMPC provides accurate, real-time power and thermal monitoring and management for an individual server, a group of servers, or entire server racks.

What is OpenManage Power Center?

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4: OpenManage™ Power Center enables cost allocation for VM’s

Dell EMC customers tell us one of the most common workloads run on an SDS platform is virtual desktop infrastructure (VDI), whereby virtual machines (VM’s) are created and delivered to end-users. VDI can reduce the need for new personal hardware and can also increase the level of cybersecurity on employee workstations. It requires a deep and scalable storage platform, which SDS delivers. For a business running VDI, compute resources are centralized within the data center instead of running on individual workstations, which makes it difficult to assign them to a particular business unit for accounting purposes. Dell EMC OpenManage Power Center allows IT managers to facilitate energy optimization and cost allocation across VM’s – another hindrance to adopting SDS (for a VDI workload) removed.
Cost-related fears are often a top deterrent for business decision-makers as they consider implementing new technology like SDS during a server refresh. In fact, refreshing your servers on a 3-year refresh cycle is estimated to reduce maintenance costs by 61% and results in 59% lower cost of operations over the next three years. But there are additional ways to alleviate the budget pressures. Improved energy efficiency, available on the latest generation of PowerEdge servers, can lower the TCO of your data center. Dell EMC developed breakthrough system designs to improve the energy efficiency of its latest generation of PowerEdge servers, and OpenManage Power Center facilitates automated management of the system. It's designed to maximize performance-per-watt through a combination of energy-efficient technologies, optimized thermal designs, and intelligent fan algorithms.

Using the energy-saving tools available on PowerEdge servers, customers can reduce costs beyond lower energy usage. A more efficient data center can reduce costs by slowing the need for additional data center space. Some customers even enjoy the benefit of a smaller carbon footprint due to refreshed server technology. As you make the case for refreshed servers and software-defined storage, don’t neglect to include the energy efficiency and cost savings that accompany an upgrade to the latest generation of PowerEdge servers. The energy-saving tools and technologies in the graphic are available on the PowerEdge R740 and R740xd.

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Dell EMC has a portfolio of SDS solutions that can be deployed with ease in your data center, from the hardware to the software level. VMware vSAN provides software-defined storage software that can integrate simply on a 14th generation PowerEdge server. The PowerEdge R740 and R740xd are the chosen hardware solutions in several Dell EMC SDS pre-packaged hyper-converged infrastructure (HCI) offerings available on VxRail or as a validated configuration known as a Ready Node. IT leaders are able to streamline the purchase, deployment, and ongoing management of an SDS platform by working with a single vendor, Dell EMC, who is able to provide both hardware and software for a software-defined data center.

**Benefits of VMware vSAN and PowerEdge R740xd**:

- **8 times more DB OPM in a vSAN Cluster**
  
  **Detail:** PowerEdge R740xd servers with new NVMe technology in a VMware vSAN environment processed up to 8.1 times more database operations per minute than 12th generation PowerEdge R720 servers that used traditional, shared HDD storage.

- **12 times more DB IOPS in a vSAN Cluster**
  
  **Detail:** PowerEdge R740xd servers with new NVMe technology in a VMware vSAN environment processed 12 times the input/output operations per second than 12th generation PowerEdge R720 servers that used traditional, shared HDD storage.

- **98% less DB latency in a vSAN Cluster**
  
  **Detail:** PowerEdge R740xd servers with new NVMe technology in a VMware vSAN environment had 98.4% lower storage latency than 12th generation PowerEdge R720 servers that used traditional, shared HDD storage.

* Claim #G1700154, PT Report “Faster, more powerful handling of database workloads,” June 2017, Full report: facts.pt/7PjXq2
The **PowerEdge R740** and **R740xd**: High performance meets award-winning design.

Discover more about the R740 and R740xd in the next few pages.
Awards and Reviews

PowerEdge R740:

Red Dot Award 2017 Winner: Product Design
“The Dell EMC PowerEdge R740 proves to be an innovative server that complies with modern demands for stable and reliable connectivity with the cloud.”

CRN’s The 10 Coolest Servers of 2017
“It’s the workhorse of Dell EMC’s venerable PowerEdge line and is at home in environments that require flexibility, storage and I/O performance.”

PowerEdge R740xd:

IT Pro Product of the Year Awards, “Best 2U Server” award
“Its sheer processing power is hard to beat. Blue-chip vendors, take note: this is how it’s done.”

IT Pro “Editor’s Choice” award, 5/5 review
“Designed to support a wide range of business applications including VDI and software defined storage, the PowerEdge R740xd allows you to mix and match any type of drive in its chassis. With support for HDD, SSD, boot-optimized M.2 SSDs, and up to 24 NVMe SSDs, it allows businesses to tailor storage precisely to their capacity and performance requirements.”

CRN’s The 10 Coolest Servers of 2017
“The R740XD is geared toward storage performance and density for applications like software-defined storage and customers like cloud service providers and big data users.”

StorageReview “Editor’s Choice” award
“The new PowerEdge servers have support for software-defined storage (SDS) built in from the start, lending them to use cases such as hyperconverged infrastructure.”

“Both [the R740 and R740xd] are good for SDS, service providers, and VDI, with total storage and NVMe being the key difference.”
Customer Spotlight

Capital Area Human Services

*Baton Rouge, Louisiana*

Healthcare Provider

Capital Area Human Services is a healthcare agency that provides essential services across 80 Baton Rouge area locations with greater workforce agility and scalable IT infrastructure from Dell EMC.

**Business Needs**

For staff at the Capital Area Human Services agency — doctors, nurses, social workers, admins and others — technology had become an obstacle to productivity and collaboration, undermining their mission to provide health and social services to the people of Baton Rouge.

**Business Results**

With VMware vSAN ReadyNodes backed by PowerEdge R740 servers, Capital Area Human Services transformed service delivery via better employee mobility, productivity and collaboration, while lowering five-year TCO by 35%.

**Customer Quote**

“By installing VMware vSAN ReadyNodes, we were able to utilize HCI. The PowerEdge servers were ready to go out of the box for hosting our storage requirements. We saved 30 percent compared to a standalone SAN.” – Bruce Salisbury, IT Director

Read the entire case study.
The Dell EMC PowerEdge R740 and R740xd are the server platforms of choice for SDS, thanks to the newest server technology, flexible storage configuration options, unrivaled energy efficiency, and the comprehensive Dell EMC portfolio of SDS solutions. The PowerEdge R740 and R740xd are Dell EMC’s latest two socket, 2U rack servers designed to run complex workloads using highly scalable memory, I/O capacity and network options.

The R740 and R740xd feature up to 24 DIMMs, PCI Express (PCIe) 3.0 enabled expansion slots, and a choice of network interface technologies to cover NIC and rNDC. The PowerEdge R740 and R740xd are the ideal platforms for SDS, with highly expandable memory (up to 3TB) and impressive I/O capability to match.

**PowerEdge R740**
- Up to 16 x 2.5” or 8 x 3.5” drives
- Internal M.2 boot optimized storage subsystem

**PowerEdge R740xd**
- Up to 32 x 2.5” or 18 x 3.5” drives
- Up to 24 NVMe drives
- Internal M.2 boot optimized storage subsystem

For more information on the R740 and R740xd, please visit [Dell.com/PowerEdge](http://Dell.com/PowerEdge).