

Combined report



Maximize time savings for your IT admins with the Dell EMC PowerEdge MX platform and OpenManage Enterprise

The Dell EMC PowerEdge MX solution, with OpenManage Enterprise, performed typical management tasks faster and with fewer steps than solutions from HPE and Cisco

With the right servers and management software, IT admins can reduce the time and effort they spend on routine management tasks. We tested the Dell EMC™ PowerEdge™ MX platform, with OpenManage Enterprise, against solutions from Cisco® and HPE. The Dell EMC solution enabled our admin to implement VMware vSAN™ in 86.8 percent less admin time and save 19 steps updating firmware on a single system versus Cisco UCS. The PowerEdge MX solution also allowed our admin to spend 89.5 percent less admin time deploying multiple server nodes and reduced the number of steps needed to update firmware on multiple servers by two-thirds versus HPE Synergy. With the Dell EMC PowerEdge MX platform and OpenManage Enterprise, IT admins can stop wasting time on repetitive management tasks and focus on initiatives that grow your business.

See the full results in our reports:

Save IT admin time with the Dell EMC PowerEdge MX platform and OpenManage Enterprise

The Dell EMC PowerEdge MX solution required 86.8 percent less admin time to implement VMware vSAN and 19 fewer steps to update firmware on a single system versus a Cisco UCS solution.

Your business is dynamic—why isn't your data center management? Outdated services and legacy management tools can monopolize your IT team's time and add admin time responding to business needs as they arise. The Dell EMC™ PowerEdge™ MX platform offers a solution. Its flexible infrastructure, paired with OpenManage™ Enterprise, can help IT admins carry out common management tasks quickly and easily, leaving them free for more strategic IT work.

We tested the Dell EMC PowerEdge MX against a Cisco UCS solution, measuring the admin time and steps required to carry typical management tasks. The Dell EMC solution enabled our admin to implement VMware vSAN™ in 86.8 percent less admin time and save 19 steps (and spend 73.7 percent less admin time) updating firmware on a single system. The PowerEdge MX also took under two minutes of admin time to provision storage internally. The Cisco UCS solution, meanwhile, required two minutes, including storage models, leaving admin managing storage on multiple or multiple servers—a process that could increase management complexity and hardware costs.

With the Dell EMC PowerEdge MX platform and OpenManage Enterprise, IT admins can stop wasting time on repetitive management tasks and focus on initiatives that grow your business.

Save IT admin time with the Dell EMC PowerEdge MX platform and OpenManage Enterprise

Dell EMC PowerEdge MX vs. Cisco UCS

Dell EMC PowerEdge MX streamlined routine tasks including deployment, firmware updates, server migration, and storage provisioning as compared to HPE Synergy

The Dell EMC PowerEdge MX solution required 89.4 percent less admin time to deploy multiple server nodes and 15 fewer steps to update firmware on multiple systems.

For IT administrators, spending time managing servers with the legacy. However, the right platform and associated tools can dramatically reduce the time and effort routine management tasks require, which can in turn free those professionals to focus on initiatives that drive the proper business forward, such as increasing more quality to customers and bringing in new projects.

We tested the Dell EMC PowerEdge MX against HPE Synergy, measuring the admin time and steps required to carry typical management tasks. The Dell EMC solution enabled our admin to implement VMware vSAN™ in 86.8 percent less admin time and save 19 steps (and spend 73.7 percent less admin time) updating firmware on a single system. The PowerEdge MX also took under two minutes of admin time to provision storage internally. The Cisco UCS solution, meanwhile, required two minutes, including storage models, leaving admin managing storage on multiple or multiple servers—a process that could increase management complexity and hardware costs.

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Dell EMC PowerEdge MX streamlined routine tasks including deployment, firmware updates, server migration, and storage provisioning as compared to HPE Synergy

Dell EMC PowerEdge MX vs. HPE Synergy



Dell EMC™ PowerEdge™ MX platform
powered by Intel® Xeon® Scalable processors

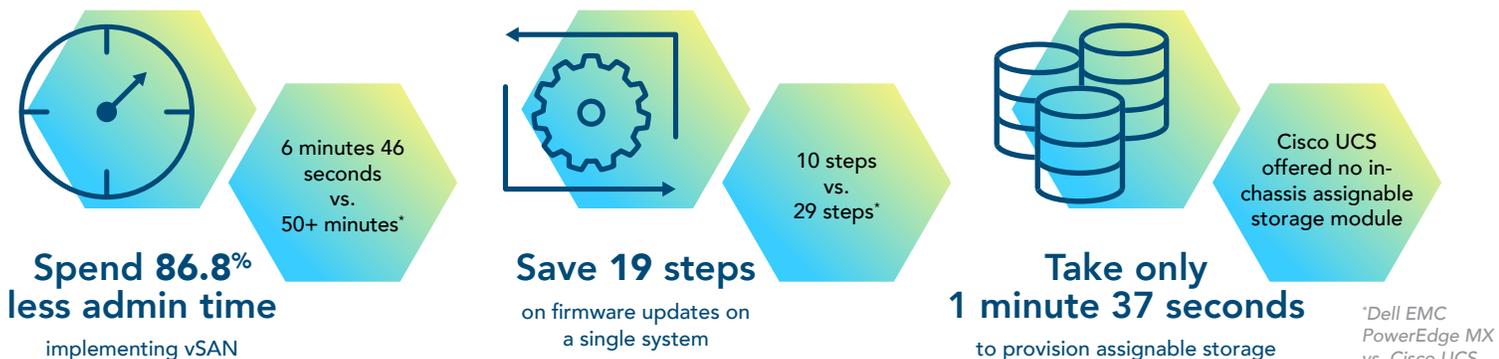
Save IT admin time with the Dell EMC PowerEdge MX platform and OpenManage Enterprise

The Dell EMC PowerEdge MX solution required 86.8 percent less admin time to implement VMware vSAN and 19 fewer steps to update firmware on a single system versus a Cisco UCS solution

Your business is dynamic—why isn't your data center management? Outdated servers and unwieldy management tools can monopolize your IT team's time and inhibit admins from responding to business needs as they arise. The Dell EMC™ PowerEdge™ MX platform offers a solution: its flexible infrastructure, paired with OpenManage™ Enterprise, can help IT admins carry out common management tasks quickly and easily, freeing them for more strategic IT work.

We tested the Dell EMC PowerEdge MX against a Cisco UCS® solution, measuring the admin time and steps required for some typical management tasks. The Dell EMC solution enabled our admin to implement VMware vSAN™ in 86.8 percent less admin time and save 19 steps (and spend 73.9 percent less admin time) updating firmware on a single system. The PowerEdge MX also took under two minutes of admin time to provision storage internally. The Cisco UCS solution, meanwhile, offered no in-chassis assignable storage module, forcing admins needing storage to redeploy to standalone servers—a process that could increase management complexity and hardware costs.

With the Dell EMC PowerEdge MX platform and OpenManage Enterprise, IT admins can stop wasting time on repetitive management tasks and focus on initiatives that grow your business.



Inside the Dell EMC PowerEdge MX

The Dell EMC PowerEdge MX platform combines storage and compute into a single modular chassis. Its eight front bays enable admins to add or remove servers and storage as business needs change and grow. According to Dell EMC, their solution “is designed for enterprise data center density with easy deployment, agile management and maximum longevity.”¹

The Dell EMC PowerEdge MX solution can leverage software-defined data and storage networking for increased automation and faster deployment. By contrast, the Cisco UCS solution we tested offers no in-chassis assignable storage module option; admins wanting to assign additional storage would need to add and manage it externally, which could lead to more management effort and increase room for error.



The Dell EMC PowerEdge MX, powered by Intel Xeon Scalable processors and managed with OpenManage Enterprise

The Dell EMC PowerEdge MX platform offers diverse management features

OpenManage Enterprise is a one-to-many systems management console for the data center. The console offers a modern HTML5 GUI and deploys as a virtual appliance for VMware ESXi™, Microsoft® Hyper-V, and KVM environments. In our experience, it was easy to use the OVF format for deployment in the VMware ESXi environment. It can discover and inventory on IPv4 and IPv6 networks for up to 8,000 devices, including Dell EMC rack servers, Dell EMC tower servers, and Dell EMC blades and chassis.³

Learn more about OpenManage Enterprise: www.dell.com/OMEnterprise

OpenManage Enterprise – Modular Edition is an embedded systems management solution for the Dell EMC PowerEdge MX chassis. It delivers the primary abilities of OpenManage Enterprise within the server chassis, and can manage servers across several PowerEdge MX chassis. A web/RESTful API interface manages all nodes, including compute, storage, and networking.⁴

Learn more about OpenManage Enterprise – Modular Edition: www.dell.com/OME-Modular



Kinetic infrastructure: Offering flexibility for the modern data center

Organizations are increasingly using compute and storage as services, enhancing flexibility. According to Dell EMC, kinetic infrastructure takes this process one step further by extending “the flexibility of configuration down to the individual storage device and, in the future, all the way to memory centric devices.”⁵ By equipping IT decision-makers with the ability to assign the right resources for the right workload, kinetic infrastructure can enable dynamic changes as business needs evolve.⁶

How we tested

To see which solution offered simpler, speedier management, we set up two environments: a Dell EMC PowerEdge MX7000 chassis with a PowerEdge MX740c compute sled, and a Cisco UCS 5108 chassis with Cisco UCS B200 M4 and M5 servers. We tested the two platforms' manageability using four common deployment and management scenarios: deploying a server, provisioning assignable storage, updating firmware, and implementing VMware vSAN.

We found that the Dell EMC PowerEdge MX implemented vSAN in 86.8 percent less admin time, required 19 fewer steps when updating firmware on a single system, and deployed a server node in 45.2 percent less admin time. In addition, the PowerEdge MX solution allowed for dynamic storage expansion in just one minute 37 seconds, something that the Cisco UCS solution couldn't do without redeploying to standalone servers outside the chassis.

The Dell EMC system we tested included:

- The 7U modular Dell EMC PowerEdge MX7000 chassis, with two distinct redundant PowerEdge MX Scalable Fabrics, a third redundant storage fabric, and a fault-tolerant interlinked Management Services module to manage compute, storage, and networking fabrics
- The Dell EMC PowerEdge MX740c compute sled, which packs two Intel Xeon Scalable processors, up to 24 DDR4 DIMM slots, 3 TB of memory, and up to six 2.5" drives into one single-width sled



The Dell EMC PowerEdge MX solution can benefit your business by:

Freeing IT staff for more essential data center work.

With the automated processes of the Dell EMC PowerEdge MX solution and OpenManage Enterprise, IT staff could spend less time on routine maintenance and maximize their productivity by turning to more strategic IT tasks.

Creating a more flexible, future-proof data center.

Every organization tries to make investments that will allow them to maximize their IT resources—now and in the future. The kinetic infrastructure of the Dell EMC PowerEdge MX solution could help IT decision-makers develop a platform for next-generation infrastructure while offering the ability to allocate resources differently as organizational needs shift.

Use case 1: Deploying a server node

For IT admins, deploying a server may seem like a straightforward task. But setting up and configuring a server requires time and labor on the part of your IT staff. And if you're deploying multiple servers at once, the risk of user error increases. An intuitive graphical user interface (GUI) and management system can help your IT admins deploy servers faster and more efficiently.

The PowerEdge MX solution enabled us to leverage its embedded management solution (OpenManage Enterprise – Modular Edition) and its centralized management software (OpenManage Enterprise). The Cisco UCS system, meanwhile, uses the embedded management tool Cisco UCS Manager, which can't deploy operating systems or control storage.

To see how the Dell EMC and Cisco systems compared, we deployed a server node on each solution and measured the admin time and steps required to finish the deployment. The Dell EMC PowerEdge MX solution handled the deployment in 45.2 percent less admin time, taking two minutes and 18 seconds versus the Cisco UCS solution's four minutes and 12 seconds.

Admins don't just need a system that can deploy one server: they need a solution that can handle bulk server node deployments with minimal time and effort. While the Dell EMC solution allows admins to select multiple devices and deploy to them all at once, Cisco UCS Manager only allows for linear deployments. Admins wanting to deploy multiple server nodes on the Cisco UCS solution would need to do so one by one, greatly increasing admin time and steps.



Deploying a server node (first single instance)

Dell EMC PowerEdge MX solution



*Less time and fewer steps are better
minutes:seconds*

Cisco UCS solution



Dell EMC PowerEdge MX solution



Cisco UCS solution



We tested each solution's ability to deploy multiple servers by first deploying one additional server node. Whereas our first test also included the amount of time needed to build a profile template on each solution, this second test measured only deployment time. The Dell EMC solution increased its advantage over the Cisco UCS system, completing the task in just 43 seconds of admin time—76.6 percent less time than the Cisco UCS system, which took over three minutes of admin time to finish the deployment.

We then performed three more server deployments. Here, the Dell EMC platform drew even further ahead, taking less than a minute of our admin's time compared to the Cisco UCS solution's over nine minutes of admin time. It also took just nine steps, in contrast to the Cisco UCS solution's 30. The Dell EMC solution's steady progress—from taking up 45.2 percent less admin time with the first deployment, to 76.6 percent with the second, to 91.3 percent with the subsequent three deployments—indicates that the Dell EMC advantage over the Cisco UCS solution would only continue to grow. Whether your admins needed to deploy 10 servers or 1,000, they would benefit from the time savings offered by the Dell EMC PowerEdge MX platform. Additionally, the steps required on the Dell EMC solution would remain the same, while on the Cisco UCS solution they would continue to grow, increasing opportunities for error and hassle for IT staff.

Deploying a server node (subsequent single instance)

Dell EMC PowerEdge MX solution



Less time and fewer steps are better minutes:seconds

Cisco UCS solution



Dell EMC PowerEdge MX solution



Cisco UCS solution



Deploying 3x server nodes (subsequent multiple instances)

Dell EMC PowerEdge MX solution



Less time and fewer steps are better minutes:seconds

Cisco UCS solution



Dell EMC PowerEdge MX solution



Cisco UCS solution



Use case 2: Provisioning assignable storage

The Dell EMC PowerEdge MX presents a modular approach to data provisioning. Its chassis supports an SAS drive sled from which admins can add and assign more disks, dynamically adding or removing storage as they need. In our testing, this process took just one minute and 37 seconds of admin time and only five steps.

The Cisco UCS solution has no drive sled from which to assign additional storage; admins could only add storage by expanding to SAN, a process that would take more planning and time to implement, in addition to requiring more hardware. This lack of dynamism could restrict the ability of admins to respond quickly to storage needs as they arise.

Provisioning assignable storage

Dell EMC PowerEdge MX solution



*Less time and fewer steps are better
minutes:seconds*

Cisco UCS solution

Option not available

Dell EMC PowerEdge MX solution



Cisco UCS solution

Option not available

Use case 3: Updating firmware

Any IT team needs to periodically update their firmware to enhance security and fix bugs. Ideally, admin time is minimal and updates are automated. With the Dell EMC PowerEdge MX solution, firmware updates on a single system took just one minute 42 seconds of admin time. That's 73.9 percent less admin time and 19 fewer steps than the over six and a half minutes of admin time and 29 steps that the Cisco UCS solution required. This additional complexity not only robs IT admins of time they could be spending more productively—it also introduces more room for error.

With the Dell EMC solution's automated processes, firmware updates would take up about the same amount of admin time regardless of how many systems a user was updating. After a user has created a firmware baseline on the PowerEdge MX solution, management software alerts them to when firmware is out of compliance. To complete the updates, the user simply runs a consistency check, selects the servers they want to update, and schedules the deployment. This feature can be especially crucial for IT teams who don't have night shifts, because no one has to supervise the process.

Updating firmware (first single instance)

Dell EMC PowerEdge MX solution



*Less time and fewer steps are better
minutes:seconds*

Cisco UCS solution



Dell EMC PowerEdge MX solution



Cisco UCS solution



When we ran subsequent firmware updates on first one PowerEdge MX system and then three, the admin time and steps needed to run a consistency check stayed consistent, at around one and a half minutes and six steps. Even if a user dramatically increased the number of systems they were applying updates to, our testing indicates that the admin time and steps required would continue to hold steady. In the space of under two minutes, a user could run a consistency check on hundreds of systems, see which systems were out of compliance, and schedule the update.

The Cisco UCS solution, by contrast, applies firmware updates sequentially, meaning admin time and steps would only grow for each additional system. The Cisco UCS system took 18 seconds of admin time to apply a subsequent firmware update. But when we applied three more updates, this number tripled to 54 seconds. The steps required also grew in proportion to each new system: from six steps for one system to 18 for three. (Meanwhile, steps on the Dell EMC solution remained static at six.) An IT department needing to apply firmware updates across a large environment—say, 1,000 servers—would face steeply climbing time and steps requirements for their admins, creating more work and more room for error.

Additionally, Cisco UCS Manager does not alert the user when new firmware becomes available. Instead, the user must search for the firmware, download it to their system, upload it to the Cisco UCS solution, and then make the firmware available to each host. The user would need to repeat this process every time Cisco released a new firmware update, creating more time and hassle for IT staff.

Use case 4: Implementing VMware vSAN

Often, IT admins will leverage available storage in hypervisor hosts for use in VMware vSAN. This enables vSAN members to share their local storage across the entire cluster. On the Dell EMC PowerEdge MX solution, this process took 36 steps and six minutes and 46 seconds of admin time. The Cisco UCS solution required 59 additional steps (95 in total) and over 51 minutes of admin time—taking 86.8 percent more admin time than the PowerEdge MX.

Our vSAN use case, which utilized multiple disk groups per node for better performance, meant that we had to migrate from UCS blade servers to UCS standalone servers. UCS blade servers contain only two drive bays—even if VMware ESXi™ was installed on an internal SD card, the vSAN would contain only a single drive group per node, potentially limiting performance. By contrast, the PowerEdge MX offers dynamic expansion drives and options for compute, integrated networking, and storage. These features can enable IT admins to respond more dynamically to storage needs.

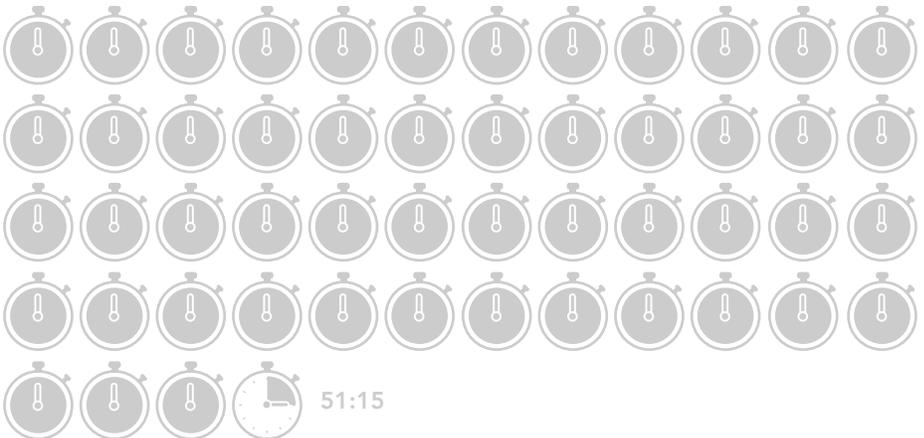
Implementing VMware vSAN

Dell EMC PowerEdge MX solution



Less time and fewer steps are better minutes:seconds

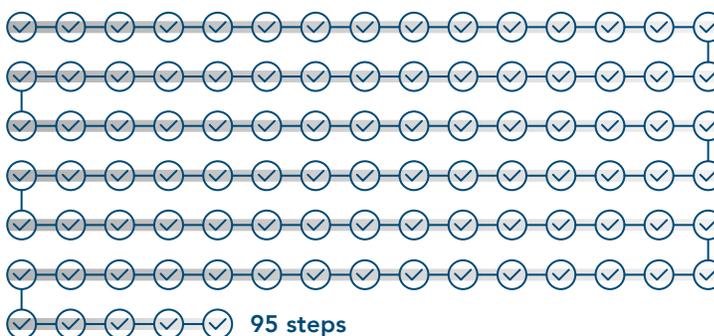
Cisco UCS solution



Dell EMC PowerEdge MX solution



Cisco UCS solution





Conclusion

Our testing found that using the kinetic infrastructure of the Dell EMC PowerEdge MX could help IT admins spend 86.8 percent less admin time implementing vSAN and 19 fewer steps updating firmware, compared to a Cisco UCS solution. The modular nature of the PowerEdge MX solution also enables IT teams to respond to shifting storage needs by provisioning storage dynamically—the Cisco UCS solution, by contrast, would require admins to provision additional storage on standalone servers outside the chassis. With the Dell EMC PowerEdge MX, your IT admins could focus on ensuring that the capabilities of your data center keep up with the growth of your business.

To find out more about Dell EMC PowerEdge MX, visit <https://www.dell.com/en-us/servers/modular-infrastructure.htm>.

- 1 Dell EMC, accessed November 16, 2018, <https://www.dell.com/en-us/servers/modular-infrastructure.htm#compare0=0>
- 2 Dell EMC, “OpenManage Enterprise,” accessed January 9, 2019, <https://www.dell.com/en-us/work/learn/openmanage-enterprise>
- 3 Dell EMC, “OpenManage Enterprise,” accessed January 9, 2019, <https://www.dell.com/en-us/work/learn/openmanage-enterprise>
- 4 Dell EMC, “OpenManage Enterprise,” accessed January 9, 2019, <https://www.dell.com/en-us/work/learn/openmanage-enterprise>
- 5 Hormuth, Robert, “Kinetic Infrastructure is the Path to Full Composability,” accessed January 9, 2019, <https://blog.dell.com/en-us/making-composability-kinetic/>
- 6 Hormuth, Robert, “Kinetic Infrastructure is the Path to Full Composability,” accessed January 9, 2019, <https://blog.dell.com/en-us/making-composability-kinetic/>



Dell EMC™ PowerEdge™ MX7000

Dell EMC PowerEdge MX streamlined routine tasks including deployment, firmware updates, server migration, and storage provisioning as compared to HPE Synergy

The Dell EMC PowerEdge MX solution required 89.4 percent less admin time to deploy multiple server nodes and 15 fewer steps to update firmware on multiple systems

For IT administrators, spending time maintaining servers comes with the territory. However, the right platform and associated tools can dramatically reduce the time and effort routine management tasks require, which can in turn free these professionals to pursue endeavors that propel business forward, such as responding more quickly to customers and focusing on special projects.

The new Dell EMC PowerEdge MX blade server platform includes Intel® Xeon® Scalable processors, Intel NVMe solid-state drives, and the Intel Ethernet Network Adapter XXV710. For management, it leverages OpenManage™ Enterprise - Modular Edition, an embedded application providing hardware management and software-defining capabilities. When integrated with a full version of OpenManage Enterprise, this powerful tool can allow admins to carry out a management task on dozens or hundreds of servers in little more time than they'd need to perform the task once.

At Principled Technologies, we executed a series of tasks in both a Dell EMC PowerEdge MX environment with OpenManage Enterprise and an HPE Synergy environment with OneView for Synergy. The management tools embedded in the Dell EMC solution let us complete the tasks—which involved server and storage provisioning along with server deployment and component maintenance—in less time and often with fewer steps. This efficiency can grow exponentially in large-scale operations, returning an enormous amount of time to your IT admins.



Spend 89.4% less time on admin tasks

48 seconds vs. 7 minutes 36 seconds



Reduce the number of steps by 2/3

6 steps vs. 21 steps



Provision assignable storage with zero downtime

HPE Synergy requires powering off the system

A next-generation modular chassis with a unified management interface

The new Dell EMC PowerEdge MX brings modular servers and storage together in a single chassis with fast networking powered by 25Gbps Intel Ethernet Network Adapter XXV710 controllers. Software-defined storage makes in-chassis, distributable storage available to all server nodes, greatly increasing the flexibility and efficiency of your data center.

Another advantage of the PowerEdge MX platform is OpenManage Enterprise - Modular Edition, an embedded management system that integrates with the Dell EMC management solution OpenManage Enterprise. OpenManage Enterprise gives you the ability to deploy and manage your modular servers the same way you'd manage all your other Dell EMC systems. OpenManage Enterprise - Modular Edition includes enhancements for hardware-specific tasks such as in-chassis storage provisioning and advanced networking configuration.

How we tested

To measure the speed of several common management tasks on both solutions, we set up two environments: a Dell EMC PowerEdge MX7000 chassis with a PowerEdge MX740c compute sleds, and an HPE Synergy 12000 chassis with HPE Synergy 480 Gen10 compute modules.

The Dell EMC PowerEdge MX system we tested included:

- The 7U modular Dell EMC PowerEdge MX7000 chassis, with two distinct redundant PowerEdge MX Scalable Fabrics, a third redundant storage fabric, and a fault-tolerant interlinked Management Services module to manage compute, storage, and networking fabrics
- The Dell EMC PowerEdge MX740c compute sleds, which pack two Intel Xeon Scalable processors, up to 24 DDR4 DIMM slots, 3 TB of memory, and up to six 2.5-inch drives into one single-width sled

We tested the two platforms' manageability using four common deployment and management scenarios: deploying a server, updating firmware, migrating a server from a heterogeneous platform, and provisioning assignable storage.

What we discovered

The Dell EMC PowerEdge MX solution allowed us to deploy multiple servers in 89 percent less admin time, update firmware on multiple systems using less than one-third the number of steps, and provision new storage in half as many steps with zero downtime. In addition, the PowerEdge MX solution allowed us to migrate a server profile from a traditional 2U rack server into the PowerEdge MX compute nodes, something that the HPE Synergy solution couldn't do. Read on for the details.



Kinetic infrastructure: Providing organizations with the flexibility that modern business demands

Being able to use compute and storage resources effectively as business needs shift is an essential part of a successful data center. To address this need, Dell EMC has developed kinetic infrastructure, which it says, "delivers the benefits of a modular data center solution while leveraging configuration flexibility at the storage-drive level."

Use case 1: Deploying a server node

The routine task of deploying new servers can burden your IT staff to varying degrees, depending on the system you choose. When you perform this task on the Dell EMC PowerEdge MX solution, its centralized management software, OpenManage Enterprise, can save a great deal of time. Though both OpenManage Enterprise and HPE OneView for Synergy support the deployment of server nodes, deployment through OpenManage Enterprise requires less administrative time and effort, which can reduce the risk of human error, especially with large numbers of servers.

To quantify the savings of using the PowerEdge MX management tools to deploy new server nodes, we began by noting the administrative time and number of steps required to deploy a single server node on each solution. As we show below, the Dell EMC PowerEdge MX solution handled the deployment in 33.9 percent less admin time, taking 2 minutes and 18 seconds versus the HPE Synergy solution's 3 minutes and 29 seconds. It also required two fewer steps. Note: The time and steps include building a profile template on each solution.

Time and steps to deploy a server (first single instance)

Time in min:sec

Dell EMC PowerEdge MX7000 with OpenManage Enterprise

02:18

12 steps

HPE Synergy with OneView for Synergy

03:29

14 steps



To understand the experience of deploying multiple servers using each solution, we started by deploying a single additional server node. The results from this second test exclude the time and steps needed to build a profile template on each solution and cover only deployment. As we show below, the Dell EMC PowerEdge MX solution required more steps to deploy this instance, but used 71.7 percent less admin time, taking only 43 seconds versus the HPE Synergy solution's 2 minutes and 32 seconds. That's because an HPE OneView for Synergy profile can't be applied while a system is powered on, so the administrator must manually power off a system, wait for the profile deployment, and then manually power the server back on.

Time and steps to deploy a server (subsequent single instance)

Time in min:sec

Dell EMC PowerEdge MX7000 with OpenManage Enterprise



HPE Synergy with OneView for Synergy



Meet the management tools that help the Dell EMC PowerEdge MX platform give time back to IT admins

OpenManage Enterprise is a one-to-many systems management console for the data center. The console offers a modern HTML5 GUI and deploys as a virtual appliance for VMware ESXi™, Microsoft® Hyper-V, and KVM environments. In our experience, it was easy to use the OVF format for deployment in the VMware ESXi environment. It can discover and inventory on IPV4 and IPV6 networks for up to 8,000 devices, including Dell EMC rack servers, Dell EMC tower servers, and Dell EMC blades and chassis.²

Learn more about
OpenManage Enterprise:
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OpenManage Enterprise – Modular Edition is an embedded systems management solution for the Dell EMC PowerEdge MX chassis. It delivers the primary abilities of OpenManage Enterprise within the server chassis, and can manage servers across several PowerEdge MX chassis. A web/RESTful API interface manages all nodes, including compute, storage, and networking.³

Learn more about OpenManage
Enterprise – Modular Edition:
www.dell.com/OME-Modular.

We then performed three more server deployments. On the Dell EMC PowerEdge MX platform, this took less than a minute of admin time, 89.4 percent less than the 7 minutes 36 seconds needed on the Synergy solution. It also required the same nine steps necessary to deploy a single server because the management tools deployed the servers simultaneously. In contrast, because the process on the HPE Synergy platform requires manual intervention and is therefore sequential, deploying three servers required three times the time and steps needed to deploy a single server. With Synergy, admins use Server Profile Templates to create server profiles that they then deploy individually to servers. This contrasts with OpenManage Enterprise, which can directly deploy, straight from a template, to multiple servers at once, with no additional administrative time or intervention required.

Time and steps to deploy a server (three subsequent instances)

Time in min:sec

Dell EMC PowerEdge MX7000 with OpenManage Enterprise



HPE Synergy with OneView for Synergy



The more servers you maintain, the more time the **Dell EMC PowerEdge MX7000** with OpenManage Enterprise saves you

Each solution can deploy operating systems along with a server profile. For HPE Synergy, we used an add-on component within the Synergy frame called Image Streamer. With Image Streamer, you can capture an operating system you have previously deployed, and then use predefined bundles of scripts available from an HPE GitHub repository to package and redeploy the OS to other systems within the Synergy platform. The process creates an answer file that enables zero-touch deployments, but there's a significant caveat: The deployment will fail if there is any deviation in hardware between the original system and subsequent systems. For example, if you capture an image on a system with a single processor, you can't redeploy the image to a system with two processors. Even minor discrepancies, such as the mezzanine cards being located in different slots than on the original system, will cause the deployment job to fail.

For the Dell EMC PowerEdge MX platform, we used the Boot to Network ISO feature in the deployment of a template through OpenManage Enterprise. This enables users to customize an OS with all drivers already integrated, and perform an unattended installation that is hardware agnostic. We deployed our unattended Microsoft Windows 2016 Standard image to both PowerEdge MX740c servers and standalone PowerEdge R730 servers that used OpenManage Enterprise. Each deployment resulted in a completely configured, ready-to-use deployment despite the differences in hardware.

What happens when you use each solution's tools to deploy a profile and server operating system to a server with different hardware than the source?

Original system and target system hardware configured **identically**

OpenManage Enterprise with Boot to Network ISO

✓ **Deployment succeeds**

OneView for Synergy with Image Streamer

✓ **Deployment succeeds**

Original system and target system hardware configured **differently**

✓ **Deployment succeeds**

✗ **Deployment fails**

The economy of scale that the Dell EMC PowerEdge MX platform offers would yield increasing savings as the number of servers deployed increased. Regardless of the number of servers or different hardware configurations your admins deployed—dozens or hundreds—the number of steps required on the Dell EMC PowerEdge MX platform would remain constant, and the time would increase relatively modestly, while the administrative burden of performing these tasks on the HPE platform would expand quickly.

Use case 2: Updating firmware

Like deploying new servers, updating firmware is a routine task that can vary considerably, depending on the management tool your solution uses. On the Dell EMC PowerEdge MX solution, once a user has created a firmware baseline, management software alerts them when it detects that firmware is out of compliance. To complete the updates, the user need only run a consistency check, select the servers they want to update, and schedule the deployment. IT teams that work only day shifts benefit enormously from the ability to schedule updates because no one needs to rearrange their schedule to supervise the update process.

The process is different on the HPE Synergy platform. First, unless you install additional software in each target system—and in the case of ESXi servers, leverage a Linux[®] proxy server—you must power down each target system to apply the firmware updates through the OneView for Synergy console because they're applied through the profile. This makes the process somewhat serialized, so the more servers you need to update, the more time and steps the process requires. (Note: In our test results, the administrator time includes the period of waiting before the admin can power on the server.)

To quantify the savings of using the PowerEdge MX management tools to update firmware, we began by deploying a single server node on each solution. As we show below, performing the update on the Dell EMC PowerEdge MX solution required 40.9 percent less admin time: 2 minutes and 30 seconds versus the HPE Synergy solution's 4 minutes and 14 seconds. It also required three fewer steps.

Time and steps to update firmware (first single instance)

Time in min:sec

Dell EMC PowerEdge MX with OpenManage Enterprise



HPE Synergy with OneView for Synergy



Dell EMC PowerEdge MX with OpenManage Enterprise



HPE Synergy with OneView for Synergy



To understand the experience of updating firmware across multiple servers using each solution, we started by updating a single additional server node. This allows us to leverage an existing firmware baseline for OpenManage Enterprise, and an already updated server profile template within OneView for Synergy. As we show, performing the update on the Dell EMC PowerEdge MX solution required 60.8 percent less admin time: 1 minute and 28 seconds versus the HPE Synergy solution's 3 minutes and 45 seconds. It also required one less step.

However, the real advantage of using the embedded management tools of the Dell EMC PowerEdge MX solution came to light when we performed three more firmware updates. On the Dell EMC platform, this took only 1 minute and 30 seconds of admin time—just two more seconds than it took to update a single server and the same six steps. Even if a user dramatically increased the number of systems they were updating, our testing indicates that the admin time and steps required would continue to hold steady. In less than two minutes, a user could run a consistency check on hundreds of systems, learn which systems were out of compliance, and schedule the update.

Time and steps to update firmware (subsequent single instance)

Time in min:sec

Dell EMC PowerEdge MX with OpenManage Enterprise



Dell EMC PowerEdge MX with OpenManage Enterprise



HPE Synergy with OneView for Synergy



HPE Synergy with OneView for Synergy



In contrast, because the process on the HPE Synergy platform is manual and therefore serialized, updating firmware on three servers required 3 times the time and steps needed to deploy a single server: 11 minutes and 15 seconds of admin time and 21 steps. Compared to this time, the minute and a half the Dell EMC PowerEdge MX solution needed represents a savings of 86.6 percent.

Additionally, HPE OneView for Synergy does not alert the user when new firmware becomes available. Instead, the user must search for the firmware, download it to their system, upload it to the Synergy solution, and then make the firmware available to each host through either a one-off installation, or through changing the baseline of the server profile template. The user would need to repeat this process every time HPE released a new firmware update, creating more time and hassle for IT staff.

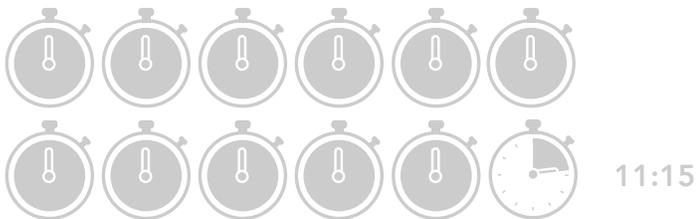
Time and steps to update firmware (three subsequent instances)

Time in min:sec

Dell EMC PowerEdge MX with OpenManage Enterprise



HPE Synergy with OneView for Synergy



Dell EMC PowerEdge MX with OpenManage Enterprise



HPE Synergy with OneView for Synergy



Use case 3: Migrating a server profile from a traditional rack server into the PowerEdge MX compute nodes

Dell EMC OpenManage Enterprise supports the MX platform, but isn't strictly bound to it. This makes it possible to add servers from across the entire Dell EMC server portfolio. In contrast, some HPE management tools are more closely tethered to their hardware. For example, HPE OneView for Synergy is dedicated to only the Synergy platform. The more general HPE OneView tool can provide a view of HPE OneView for Synergy, but can't directly interact with it. This means you can't import servers from outside the Synergy chassis and manage them through OneView for Synergy.

Time and steps to migrate a server from a heterogeneous platform

Time in min:sec

Dell EMC PowerEdge MX with OpenManage Enterprise



HPE Synergy with OneView for Synergy

Option not available

Dell EMC PowerEdge MX with OpenManage Enterprise



HPE Synergy with OneView for Synergy

Option not available

The charts above shows the time and steps we needed to migrate a profile from a standalone server to the Dell EMC PowerEdge MX blade environment: 1 minute and 53 seconds and 18 steps. We could not complete this task on the HPE Synergy platform using its native tools.

Use case 4: Provisioning assignable storage

The Dell EMC PowerEdge MX uses a modular approach to data provisioning. Its chassis supports a SAS drive sled from which admins can add and assign more disks, dynamically adding or removing storage as they need.

As we show below, provisioning storage on the Dell EMC PowerEdge MX solution required 15.6 percent less admin time: 1 minute and 37 seconds versus the HPE Synergy solution's 1 minute and 55 seconds. It also required six fewer steps.

Most importantly, the MX embedded OpenManage Enterprise - Modular Edition platform allowed us to perform the disk additions without downtime. Adding the disks and rescanning within the OS were the only steps necessary to expand the storage. HPE OneView for Synergy provisions the assignable storage through changes to the server profile, which requires a powered-off state to apply the changes. That means the simple task of provisioning additional storage incurs additional downtime.

Time and steps to provision assignable storage

Time in min:sec

Dell EMC PowerEdge MX with OpenManage Enterprise - Modular Edition



HPE Synergy with OneView for Synergy



Dell EMC PowerEdge MX with OpenManage Enterprise - Modular Edition



HPE Synergy with OneView for Synergy





Conclusion

Moving to a modular software-defined blade chassis solution such as the Dell EMC PowerEdge MX, powered by Intel Xeon Scalable processors, Intel NVMe solid-state drives, and the Intel Ethernet Network Adapter XXV710, can be a winning proposition for many reasons. In this study, we focused on the management advantages of making this shift and found that the powerful tools embedded in this platform, OpenManage Enterprise - Modular Edition, in tandem with centralized OpenManage Enterprise, streamlined tasks in a way that could translate to enormous time savings over an HPE Synergy solution, especially in large-scale enterprises.

Few jobs are completely free of routine tasks. However, smart organizations invest in solutions and tools that let their employees minimize the resources they must devote to them. Give your administrators more time to innovate and add business value by selecting the Dell EMC PowerEdge MX platform with OpenManage Enterprise - Modular Edition and OpenManage Enterprise.

To find out more about Dell EMC PowerEdge MX, visit <https://www.dell.com/en-us/servers/modular-infrastructure.htm>.

- 1 Hormuth, Robert, "Kinetic Infrastructure is the Path to Full Composability," accessed February 7, 2019, <https://blog.dell.com/en-us/making-composability-kinetic/>
- 2 Dell EMC, "OpenManage Enterprise," accessed February 9, 2019, www.dell.com/OMEnterprise
- 3 Dell EMC, "OpenManage Enterprise – Modular Edition," accessed February 9, 2019, www.dell.com/OME-Modular

Appendix A: The science behind the story— Dell EMC PowerEdge MX vs. Cisco UCS

We concluded our hands-on testing on December 19, 2018. 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 December 19, 2018 or earlier. Unavoidably, these configurations may not represent the latest versions available when this report appears.

Our results

The table below presents our findings in detail.

Use case	Admin time (min:sec)		Dell EMC win	Steps		Dell EMC win
	Dell EMC PowerEdge MX	Cisco UCS	% Less time	Dell EMC PowerEdge MX	Cisco UCS	Fewer steps
Deploying a server node (first single instance)	0:02:18	0:04:12	45.24	12	17	5
Deploying a server node (subsequent single instance)	0:00:43	0:03:04	76.63	9	10	1
Deploying a server node (subsequent multiple instances (x3))	0:00:48	0:09:12	91.30	9	30	21
Provisioning assignable storage	0:01:37	N/A - Cisco UCS did not provide in-chassis storage	N/A	5	N/A	N/A
Updating firmware (first single instance)	0:01:42	0:06:32	73.98	10	29	19
Updating firmware (subsequent single instance)	0:01:28	0:00:18	N/A	6	6	0
Updating firmware (subsequent multiple instances (x3))	0:01:30	0:00:54	N/A	6	18	12
Implementing VMware vSAN™	0:06:46	0:51:15	86.80	36	96	59

System configuration information

The table below presents detailed information on the systems we tested.

Server enclosure configuration information	Dell EMC PowerEdge MX7000
Power supplies	
Number of power supplies	6
Vendor and model number	Dell EMC
Wattage of each (W)	3,000
Cooling fans	
Vendor and model	Dell EMC
Number of cooling fans	9
I/O modules	
Model	Dell EMC Networking MX7116n Fabric Expander Module, MX9116n Fabric Engine
Occupied bay	1, 2

Server configuration information	Dell EMC PowerEdge MX740c
BIOS name and version	Dell 1.0.2
Non-default BIOS settings	None
Operating system name and version/build	Dell EMC-VMware ESXi™ 6.7 build-8169922(A01)
Date of last OS updates and patches applied	12/12/18
Power management	Default
General	
Number of processor packages	2
Number of cores per processor	26
Number of hardware threads per core	52
System power management policy	Default
Processor	
Vendor and model	Intel Xeon Platinum 8164 Processor
Stepping	H0 (QMS8, SR3BB)
Socket type	FCLGA3647
Core frequency (GHz)	2.0
Bus speed	10.4 GT/s UPI
L1 cache	26 x 32 KB 8-way set associative instruction caches 26 x 32 KB 8-way set associative data caches
L2 cache	26 x 1 MB 16-way set associative caches
L3 cache	35.75 MB non-inclusive shared cache

Server configuration information		Dell EMC PowerEdge MX740c
Platform		
Vendor and model number	PowerEdge MX740c	
Motherboard model number	0177V9X30	
Memory module(s)		
Total RAM in system (GB)	384	
Vendor and model number	Hynix HMA84GR7AFR4N-VK	
Type	DDR4	
Speed (MHz)	2,666	
Speed running in the system (MHz)	2,666	
Size (GB)	32	
Number of RAM module(s)	12	
RAID controller		
Vendor and model number	Dell PERC H730P MX	
Firmware version	25.5.3.0005	
Cluster storage		
Number of drives	6	
Drive vendor and model	Samsung Express Flash PM1725a	
Drive size (TB)	3.2	
Drive information (speed, interface, type)	PCIe SSD	
NIC		
Vendor and model number	QLogic 2x16Gb QME2692 FC HBA	
Server enclosure configuration information		Cisco UCS 5108 blade server chassis
Power supplies		
Number of power supplies	4	
Vendor and model number	Cisco Systems Inc N20-PAC5-2500W	
Wattage of each (W)	2,500	
Cooling fans		
Total number of fan modules	8	
Vendor and model number	Cisco Systems Inc N20-FAN5	
I/O modules		
Model	Cisco UCS 2304	
Occupied bay	1, 2	

Server configuration information	Cisco UCS B200 M5
BIOS name and version	Cisco B200 M5.4.0.1b.0.0911180940
Non-default BIOS settings	None
Operating system name and version/build	Vmware ESXi 6.7 build-8169922
Date of last OS updates and patches applied	12/6/18
Power management	Default
General	
Number of processor packages	2
Number of cores per processor	26
Number of hardware threads per core	52
System power management policy	Default
Processor	
Vendor	Intel Xeon Platinum 8164
Stepping	H0 (QMS8, SR3BB)
Socket type	FCLGA3647
Core frequency (GHz)	2.0
Bus speed	10.4 GT/s UPI
L1 cache	26 x 32 KB 8-way set associative instruction caches 26 x 32 KB 8-way set associative data caches
L2 cache	26 x 256 KB 16-way set associative caches
L3 cache	35.75 MB non-inclusive shared cache
Platform	
Vendor and model number	Cisco UCS B200 M5
Motherboard model number	UCSB-B200-M5
Memory module(s)	
Total RAM in system (GB)	384
Vendor and model number	UCS-MR-X32G2RS-H
Type	DDR4
Speed (MHz)	2,666
Speed running in the system (MHz)	2,666
Size (GB)	32
Number of RAM module(s)	12

Server configuration information	Cisco UCS B200 M5
RAID controller	
Vendor and model number	Cisco UCSB-LSTOR-PT
Firmware version	3.2(3)B
Cluster storage	
Number of drives	2
Drive vendor and model	HGST HUSMR7632BDP301 / HUSMR7680BDP301
Drive size (GB)	3200/800
Drive information (speed, interface, type)	Intel NVMe™ SSD

Server configuration information	Cisco UCS B200 M4
BIOS name and version	Cisco B200 M4.3.2.3c.0.0522181723
Non-default BIOS settings	None
Operating system name and version/build	Vmware ESXi 6.7 build-8169922
Date of last OS updates and patches applied	12/6/18
Power management	Default
General	
Number of processor packages	2
Number of cores per processor	14
Number of hardware threads per core	28
System power management policy	Default
Processor	
Vendor and model	Intel Xeon E5-2690 v4
Stepping	M0 (QK8X, SR2N2)
Socket type	FCLGA2011-3
Core frequency (GHz)	2.60
Bus speed	9.6 GT/s QPI
L1 cache	14 x 32 KB 8-way set associative instruction caches 14 x 32 KB 8-way set associative data caches
L2 cache	14 x 256 KB 16-way set associative caches
L3 cache	35 MB 20-way set associative shared cache
Platform	
Vendor and model number	Cisco UCS B200 M4
Motherboard model number	UCSB-B200-M4

Server configuration information		Cisco UCS B200 M4
Memory module(s)		
Total RAM in system (GB)	128	
Vendor and model number	UCS-MR-1X162RU-A	
Type	DDR4	
Speed (MHz)	2,133	
Speed running in the system (MHz)	2,133	
Size (GB)	16	
Number of RAM module(s)	8	
RAID controller		
Vendor and model number	Cisco UCSB-MRAID12G	
Firmware version	24.5.0-0041	
Cluster storage		
Number of drives	2	
Drive vendor and model	Intel SSDSC2BA40	
Drive size (GB)	400	
Drive information (speed, interface, type)	SSD	

Server configuration information		Cisco UCS C240 M4SX
BIOS name and version	Cisco C240M4.4.0.1c.0.0711181612	
Non-default BIOS settings	None	
Operating system name and version/build	Vmware ESXi 6.7 buid-8169922	
Date of last OS updates and patches applied	12/6/18	
Power management	Default	
General		
Number of processor packages	2	
Number of cores per processor	10	
Number of hardware threads per core	20	
System power management policy	Default	

Server configuration information	Cisco UCS C240 M4SX
Processor	
Vendor and model	Intel Xeon E5-2640 v4
Stepping	R
Socket type	FCLGA2011-3
Core frequency (GHz)	2.40
Bus speed	8 GT/s QPI
L1 cache	10 x 32 KB 8-way set associative instruction caches 10 x 32 KB 8-way set associative data caches
L2 cache	10 x 256 KB 8-way set associative caches
L3 cache	25 MB 20-way set associative shared caches
Platform	
Vendor and model number	Cisco UCS C240 M4SX
Motherboard model number	UCSC-C240-M4SX
Memory module(s)	
Total RAM in system (GB)	128
Vendor and model number	Hynix HMA42GR7AFR4N-TF
Type	DDR4
Speed (MHz)	2,133
Speed running in the system (MHz)	2,133
Size (GB)	16
Number of RAM module(s)	8
RAID controller	
Vendor and model number	Cisco UCSB-MRAID12G
Firmware version	24.5.0-0041
Cluster storage	
Number of drives	5
Drive vendor and model	Seagate ST300MM0006 / Samsung MZ7GE960 / Intel SSDSC2BA20
Drive size (GB)	300/960/200
Drive information (speed, interface, type)	HDD/SDD/SSD

How we tested

Dell EMC PowerEdge MX

Use case 1a: Deploying an MX740c server node using OpenManage Enterprise (first single instance)

1. From the home screen, select Configuration→Deploy.
2. Click Create template drop-down, and select From Reference Device.
3. Name the Template Name, verify the Clone Reference Server radio button is selected, and click Next.
4. On the reference device, select the server to clone, leave all elements selected, and click Finish.
5. Select the template you created, and click Edit Network.
6. In the Identity Pool drop-down menu, select the desired identity pool, and click Finish.
7. Return to the Configuration screen, and select Deploy template.
8. On the target option, select the device, and click OK.
9. Click Next.
10. Check the Boot to Network ISO. Input the ISO path and the IP Address where the file is located. Click Next.
11. In iDRAC Management IP, click Next.
12. In NIC configuration, click Assigned identity. Click Finish.

Total steps: 12

Use case 1b: Deploying an MX740c server node using OpenManage Enterprise (subsequent single instance)

1. From the home screen, select Configuration→Deploy.
2. Select the template you created, and click Edit Network.
3. In the Identity Pool drop-down menu, select the desired identity pool, and click Finish.
4. Return to the Configuration screen, and select Deploy template.
5. On the target option, select the device, and click OK.
6. Click Next.
7. Check the Boot to Network ISO. Input the ISO path and the IP Address where the file is located. Click Next.
8. In iDRAC Management IP, click Next.
9. In NIC configuration, click Assigned identity. Click Finish.

Total steps: 9

Use case 1c: Deploying multiple MX740c server nodes using OpenManage Enterprise (subsequent multiple instances (x3))

1. From the home screen, select Configuration→Deploy.
2. Select the template you created, and click Edit Network.
3. In the Identity Pool drop-down menu, select the desired identity pool, and click Finish.
4. Return to the Configuration screen, and select Deploy template.
5. On the target option, select the device, and click OK.
6. Click Next.
7. Check the Boot to Network ISO. Input the ISO path and the IP Address where the file is located. Click Next.
8. In iDRAC Management IP, click Next.
9. In NIC configuration, click Assigned identity. Click Finish.

Total steps: 9

Use case 2: Provisioning assignable storage

1. From the OpenManage Enterprise Modular homepage, select Devices→Storage.
2. Check the box beside the entry for Storage Sled 5, and click View Details.
3. Click Edit Assignments.
4. If not selected, click Drive - Assigned radio button. In the list of hard drives, check the desired hard drive and click Assign to Drive Slot.
5. Select the desired slot and server to assign the drive to, and click Assign.

Total steps: 5

Use case 3a: Updating firmware in OpenManage Enterprise (first single instance)

1. From the OpenManage Enterprise homepage, click Configuration→Firmware.
2. On the Firmware tab, select Create Baseline.
3. In the Baseline Information dialog box, enter a name for the baseline, and click Add.
4. In the Add Firmware catalog, enter a name, select Latest component firmware versions on Dell.com, and click Finish.
5. On the Create Firmware Baseline dialog box, click Next.
6. On Select Devices, click the Select Groups radio button, and click Select Groups.
7. On the Select Groups page, click Servers, and click Finish.
8. When the compliance check has completed, click View Report.
9. Check the box beside any non-compliant node(s). Click Update Firmware.
10. Select Update Now. Click Update.

Total steps: 10

Use case 3b: Updating firmware in OpenManage Enterprise (subsequent single instance)

1. From the OpenManage Enterprise homepage, click Configuration→Firmware.
2. On the Firmware tab, select the previously created baseline.
3. Click Check Compliance.
4. When the compliance check has completed, click View Report.
5. Check the box beside any non-compliant node(s). Click Update Firmware.
6. Select Update Now. Click Update.

Total steps: 6

Use case 3c: Updating firmware in OpenManage Enterprise (subsequent multiple instances)

1. From the OpenManage Enterprise homepage, click Configuration→Firmware.
2. On the Firmware tab, select the previously created baseline.
3. Click Check Compliance.
4. When the compliance check has completed, click View Report.
5. Check the box beside any non-compliant node(s). Click Update Firmware.
6. Select Update Now. Click Update.

Total steps: 6

Use case 4: Implementing VMware vSAN

Setting up VMware vSAN

1. In vCenter, right-click the VMware datacenter, and select New Cluster.
2. In the Name text box, type a name for the cluster.
3. Turn on DRS, and keep vSphere HA and EVC in the default settings.
4. Click OK. The cluster will appear in the inventory.
5. To add a host to the vSAN cluster, click and drag it into the newly created cluster.
6. Right-click the host in the vSAN cluster, and select Add Networking
7. On Select connection type, select VMkernel Network Adapter, and click Next.
8. On Select target device, select an existing standard switch, and click Browse. On Select Switch, select the vSwitch, and click OK.
9. Click Next.
10. On Port properties, enable vMotion, Fault Tolerance logging, and vSAN for services, and click Next.
11. On IPv4 settings, keep default settings, and click Next.
12. On the Ready to complete page, review the information, and click finish.

Repeat steps 5 through 12 for the next two hosts (16 steps).

13. In the vSphere Client, navigate to the vSAN cluster.
14. Click the Configure tab.
15. Under vSAN, select Services, and click the Configure button.
16. Select the configuration type, and keep the default settings.
17. On the Services page, keep the default vSAN services, and click Next.
18. On the Claim disks page, select the disks for use by the cluster, and click Next.
19. On the Fault domains page, click Next.
20. On the Ready to complete page, review settings, and click Finish.

Total steps: 36

Cisco UCS

Use case 1a: Deploying a Cisco UCS B200 M4 server node (first single instance)

Creating a template

1. In the Navigation pane, click Servers.
2. Expand Servers→Service Profile Templates→root node.
3. Right-click the organization, and choose Create Service Profile Template.
4. In the Identify Service Profile Template panel, specify the service profile Name, Type, and UUID Assignment, and click Next.
5. In the Storage Provisioning panel, click the Local Disk Configuration Policy tab, and click Create Local Disk Configuration Policy.
6. Set a name for the Local Disk Configuration Policy. Select Any Configuration for the mode, and click OK.
7. Click finish on the Create Service Profile Template.

Creating a profile

8. In UCS Manager, right-click the Service profile template you just created, and click Create service profiles from template.
9. Once the Create service profiles from template window opens, enter the following values, and click OK:
 - a. Name Prefix = node
 - b. Name Suffix starting = 1
 - c. Number of instances = 1
10. Under Servers→Service Profiles, select the newly created service profile named node1, right-click, and select Change service profile association.
11. In the Associate service profile dialog box, click the drop-down menu, select the existing server, click the appropriate blade, and click OK.
12. To confirm the profile association, click OK.
13. To confirm the pending reboot, click OK.
14. At the top of the left-hand icon menu, click the Equipment icon.
15. Expand Chassis→Servers and right-click on the target server. Open a KVM session by clicking KVM Console.
16. Click the Mount Virtual Media, select Activate virtual media, and accept the session warnings.
17. Select CD/DVD, browse to the location of the vSphere install media, and click Map device.

Total steps: 17

Use case 1b: Deploying a Cisco UCS B200 M4 server node (subsequent single instance)

Creating a profile

1. In UCS Manager, right-click the Service profile template you just created, and click Create service profiles from template.
2. Once the Create service profiles from template window opens, enter the following values, and click OK:
 - a. NamePrefix = node
 - b. Name Suffix starting = 1
 - c. Number of instances = 1
3. Under Servers→Service Profiles, select the newly created service profile named node1, right-click, and select Change service profile association.
4. In the Associate service profile dialog box, click the drop-down menu, select the existing server, click the appropriate blade, and click OK.
5. To confirm the profile association, click OK.
6. To confirm the pending reboot, click OK.
7. At the top of the left-hand icon menu, click the Equipment icon.
8. Expand Chassis→Servers and right-click on the target server. Open a KVM session by clicking KVM Console.
9. Click the Mount Virtual Media, select Activate virtual media, and accept the session warnings.
10. Select CD/DVD, browse to the location of the vSphere install media, and click Map device.

Total steps: 10

Use case 1c: Deploying a Cisco UCS B200 M4 server node (subsequent multiple instances (x3))

Creating a profile

1. In UCS Manager, right-click the Service profile template you just created, and click Create service profiles from template.
2. Once the Create service profiles from template window opens, enter the following values, and click OK:
 - a. NamePrefix = node
 - b. Name Suffix starting = 1
 - c. Number of instances = 1
3. Under Servers→Service Profiles, select the newly created service profile named node1, right-click, and select Change service profile association.
4. In the Associate service profile dialog box, click the drop-down menu, select the existing server, click the appropriate blade, and click OK.
5. To confirm the profile association, click OK.
6. To confirm the pending reboot, click OK.
7. At the top of the left-hand icon menu, click the Equipment icon.
8. Expand Chassis→Servers and right-click on the target server. Open a KVM session by clicking KVM Console.
9. Click the Mount Virtual Media, select Activate virtual media, and accept the session warnings.
10. Select CD/DVD, browse to the location of the vSphere install media, and click Map device.

Repeat steps 1 through 10 two more times.

Total steps: 30

Use case 3a: Updating firmware (first single instance)

1. In a web browser, navigate to Cisco.com.
2. Under Support, click All Downloads.
3. In the center pane, click Servers - Unified Computing.
4. If prompted, enter your Cisco.com username and password to log in (this is free to acquire).
5. In the right-hand pane, click the link for the Cisco UCS B-Series Blade Server Software Bundle.
6. On the first page from which you download a software bundle, to download the latest version of the Release notes, click the Release Notes link.
7. For each software bundle, do the following:
 - a. Click the link for the latest software bundle for the release you want to download.
 - b. Click Download now to download the software bundle immediately.
 - c. Follow the prompts to complete your download of the software bundles.
8. Read the Release Notes before upgrading your Cisco UCS domain.

Uploading firmware to UCS Manager

9. In the Navigation pane, click Equipment, and select the Equipment menu item.
10. In the Work pane, click the Firmware Management tab.
11. Click the Installed Firmware tab.
12. Click Download Firmware.
13. In the Download Firmware dialog box, in the Location of the Image Files field, click the Local File system radio button.
14. In the Filename field, type the full path and name of image file, or click Browse and navigate to the file. Click OK.

Creating a host firmware package

15. In the Navigation pane, click Servers.
16. Expand Servers→Policies.
17. Expand the root node.
18. Select Host Firmware Packages, right-click, and choose Create Host Firmware Package.
19. Provide the following information:
 - a. Enter unique name and description.
 - b. In the How would you like to configure the Host Firmware Package field, select the Simple radio button.
 - c. Select the firmware package from the Blade Package drop-down list.
 - d. In the Excluded Components area, check the check boxes corresponding to the components that you want to exclude from the host firmware package.
 - e. Click OK.

Assigning a backup package

20. In the Navigation pane, expand Servers→Policies→root→Host Firmware Packages, and choose the policy you want to update.
21. In the Work pane, to select a backup package, click Modify Backup Package Versions.
22. In the Blade Package drop-down list, select the package and click OK.
23. To confirm success, click OK.

Adding firmware packages to an existing service profile

24. In the Navigation pane, expand Servers→Service Profiles→root.
25. Click the service profile to which you want to add the firmware packages.
26. In the Work pane, click the Policies tab.
27. To expand the Firmware Policies section, click the plus sign.
28. To add a host firmware package, select the desired policy from the Host Firmware drop-down list.
29. Click Save Changes.

Total steps: 29

Use case 3b: Updating firmware (subsequent single instance)

Adding firmware packages to an existing service profile

1. In the Navigation pane, expand Servers→Service Profiles→root.
2. Click the service profile to which you want to add the firmware packages.
3. In the Work pane, click the Policies tab.
4. To expand the Firmware Policies section, click the plus sign.
5. To add a host firmware package, select the desired policy from the Host Firmware drop-down list.
6. Click Save Changes.

Total steps: 6

Use case 3c: Updating firmware (subsequent multiple instances (x3))

Adding firmware packages to an existing service profile

1. In the Navigation pane, expand Servers→Service Profiles→root.
2. Click the service profile to which you want to add the firmware packages.
3. In the Work pane, click the Policies tab.
4. To expand the Firmware Policies section, click the plus sign.
5. To add a host firmware package, select the desired policy from the Host Firmware drop-down list.
6. Click Save Changes.

Repeat steps 1-6 two more times.

Total steps: 18

Use case 4: Implementing vSAN

Setting up vSAN

1. Click equipment→Server1, and select Change service profile association.
2. At the Associate Service Profile dialog box for each server, click Existing server, and select the appropriate rack server.
3. Click equipment→Server2, and select Change service profile association.
4. At the Associate Service Profile dialog box for each server, click Existing server, and select the appropriate rack server.
5. Click equipment→Server3, and select Change service profile association.
6. At the Associate Service Profile dialog box for each server, click Existing server, and select the appropriate rack server.
7. In UCS Manager, click Servers→server(x). Open KVM and Virtual media, and map/mount the ESXi media.
8. To begin installation, press Enter.
9. Once the welcome screen appears, press Enter.
10. At the EULA screen, to accept, press F11.
11. To install vSphere OS, select a disk, and press Enter.
12. For the keyboard layout, select US Default, and press Enter.
13. Enter a root password, confirm it, and press Enter.
14. To confirm the installation, press F11.
15. Select Remove the installation disk before rebooting. To reboot when complete, press Enter.
16. In vCenter, select the datacenter, right-click, and select Add host.

17. For Name and location, input the IP address of the host, and click Next.
 18. For Connection settings, enter the login credentials for the host, and click Next.
 19. For the Security Alert pop-up, click Yes.
 20. On the Host summary screen, verify the info, and click Next.
 21. At the Assign License screen, select the appropriate license, and click Next.
 22. For Lockdown mode, keep the default option of Disabled, and click Next.
 23. For Resource Pool, keep the default settings, and click Next.
 24. At the Ready to complete screen, review and click Finish.
 25. Right-click the host and select Add Networking
 26. At Select connection type, select VMkernel Network Adapter, and click Next.
 27. At Select target device, select an existing standard switch, and click Browse.
 28. At Select switch, select the vSwitch, and click OK.
 29. Click Next.
 30. On Port properties, enable vMotion, Fault Tolerance logging, Management, and vSAN for services, and click Next.
 31. On IPv4 settings, keep default settings, and click Next.
 32. On the Ready to complete page, review the info, and click Finish.
- Repeat steps 7 through 32 for the other two hosts (50 steps).
33. In vCenter, right-click the VMware datacenter, and select New Cluster.
 34. In the Name text box, type a name for the cluster.
 35. Turn on DRS, and keep vSphere HA and EVC in the default settings.
 36. Click OK. The cluster will appear in the inventory.
 37. To add each host to the vSAN cluster, click and drag it into the newly created cluster.
 38. In the vSphere Client, navigate to the vSAN cluster.
 39. Click the Configure tab.
 40. Under vSAN, select Services, and click Configure.
 41. Select the configuration type, and keep the default settings
 42. On the Services page, keep the default vSAN services, and click Next.
 43. On the Claim disks page, select the disks for use by the cluster, and click Next.
 44. On the Fault domains page, click Next.
 45. On the Ready to complete page, review settings, and click Finish

Total steps: 95

This project was commissioned by Dell EMC.



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Appendix B: The science behind the story— Dell EMC PowerEdge MX vs. HPE Synergy

We concluded our hands-on testing on February 7, 2019. 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 15, 2019 or earlier. Unavoidably, these configurations may not represent the latest versions available when this report appears.

Our results

The table below presents our findings in detail.

Use case	Admin time (min:sec)		Dell EMC win	Steps		Dell EMC win
	Dell EMC PowerEdge MX	HPE Synergy	% Less time	Dell EMC PowerEdge MX	HPE Synergy	Fewer steps
1a: Deploying a server node (first single instance)	0:02:18	0:03:29	33.97	12	14	2
1b: Deploying a server node (subsequent single instance)	0:00:43	0:02:32	71.71	9	5	-4
1c: Deploying a server node (three subsequent instances)	0:00:48	0:07:36	89.47	9	15	6
2a: Updating firmware (first single instance)	0:02:30	0:04:14	40.94	10	13	3
2b: Updating firmware (subsequent single instance)	0:01:28	0:03:45	60.89	6	7	1
2c: Updating firmware (three subsequent instances)	0:01:30	0:11:15	86.67	6	21	15
3: Provisioning assignable storage	0:01:37	0:01:55	15.65	5	11	6
4: Migrating a server from traditional rack server	0:01:53	N/A	N/A	18	N/A	N/A

Note: HPE provides both a general management tool, HPE OneView, and a tool dedicated to the Synergy platform. It is not possible to perform the management tasks in our study on Synergy using HPE OneView. Therefore, in our testing, we used OneView for Synergy.

System configuration information

The table below presents detailed information on the systems we tested.

Server enclosure configuration information	HPE Synergy 12000
Power supplies	
Number of power supplies	18
Vendor and model number	HPE 798095-B21
Wattage of each (W)	2650
Cooling fans	
Total number of fan modules	30
Vendor and model number	HPE 809097-001
I/O modules	
Model	6 x Synergy 12Gb SAS Connection Module
Model	6 x Synergy 20Gb Interconnect Link Module
Model	6 x Frame link module
Model	2 x Synergy Composer
Model	2 x Synergy Image Streamer
Model	3 x Synergy D3940 Storage Module

Server configuration information	HPE Synergy 480 Gen10 v1
General	
Number of processor packages	2
Number of cores per processor	14
Number of hardware threads per core	28
System power management policy	Default
BIOS	I42 v1.46
Date of BIOS update	10/05/2018
Operating System name and build	Windows Server 2016

Server configuration information	HPE Synergy 480 Gen10 v1
Processor	
Vendor and model	Intel Xeon Gold 5120 CPU
Stepping	H0 (QMS8, SR3BB)
Socket type	FCLGA3647
Core frequency (GHz)	2.2
Bus speed	10.4 GT/s UPI
L1 cache	14 x 32 KB 8-way set associative instruction caches 14 x 32 KB 8-way set associative data caches
L2 cache	14 x 1 MB 16-way set associative caches
L3 cache	19.25 MB non-inclusive shared caches
Platform	
Vendor and model number	HPE SY480 Gen10 - 1
Motherboard model number	871942-B21
Memory module(s)	
Total RAM in system (GB)	192
Vendor and model number	HP 840757-091
Type	DDR4
Speed (MHz)	2,666
Speed running in the system (MHz)	2,666
Size (GB)	16
Number of RAM module(s)	12
RAID controller	
Vendor and model number	HPE Smart Array P416ie-m SR G10
Firmware version	1.65
Cluster storage	
Number of drives	2
Drive vendor and model	HPE VK000480GWCFE
Drive size (GB)	480
Drive information (speed, interface, type)	6Gbps SATA SSD
NIC	
Vendor and model number	Synergy 3820C 10/20Gb CNA
Firmware version	7.17.19

Server configuration information	HPE Synergy 480 Gen10 v1
General	
Number of processor packages	2
Number of cores per processor	14
Number of hardware threads per core	28
System power management policy	Default
BIOS	I42 v1.46
Date of BIOS update	10/05/2018
Operating System name and build	Windows Server 2016
Processor	
Vendor	Intel
Name	Xeon
Model number	Gold 5120 CPU
Socket type	FCLGA3647
Core frequency (GHz)	2.2
Bus speed	10.4 GT/s UPI
L1 cache	14 x 32 KB 8-way set associative instruction caches 14 x 32 KB 8-way set associative data caches
L2 cache	14 x 1 MB 16-way set associative caches
L3 cache	19.25 MB non-inclusive shared caches
Platform	
Vendor and model number	HPE SY480 Gen10 - 1
Motherboard model number	871942-B21
Memory module(s)	
Total RAM in system (GB)	384
Vendor and model number	HP 840757-091
Type	DDR4
Speed (MHz)	2,666
Speed running in the system (MHz)	2,666
Size (GB)	16
Number of RAM module(s)	24
RAID controller	
Vendor and model number	HPE Smart Array P416ie-m SR G10
Firmware version	1.65

Server configuration information	HPE Synergy 480 Gen10 v1
Cluster storage	
Number of drives	2
Drive vendor and model	HPE VK000480GWCFE
Drive size (GB)	480
Drive information (speed, interface, type)	6Gbps SATA SSD
NIC	
Vendor and model number	Synergy 3820C 10/20Gb CNA
Firmware version	7.17.19

Server configuration information	HPE Synergy 480 Gen10 v2
General	
Number of processor packages	2
Number of cores per processor	14
Number of hardware threads per core	28
System power management policy	Default
BIOS	I42 v1.46
Date of BIOS update	10/05/2018
Operating System name and build	Windows Server 2016
Processor	
Vendor	Intel
Name	Xeon
Model number	Gold 5120 CPU
Socket type	FCLGA3647
Core frequency (GHz)	2.2
Bus speed	10.4 GT/s UPI
L1 cache	14 x 32 KB 8-way set associative instruction caches 14 x 32 KB 8-way set associative data caches
L2 cache	14 x 1 MB 16-way set associative caches
L3 cache	19.25 MB non-inclusive shared caches
Platform	
Vendor and model number	HPE SY480 Gen10 - 2
Motherboard model number	871942-B21

Server configuration information	HPE Synergy 480 Gen10 v2
Memory module(s)	
Total RAM in system (GB)	384
Vendor and model number	HP 840757-091
Type	DDR4
Speed (MHz)	2,666
Speed running in the system (MHz)	2,666
Size (GB)	16
Number of RAM module(s)	24
RAID controller	
Vendor and model number	HPE Smart Array P416ie-m SR G10
Firmware version	1.65
Cluster storage	
Number of drives	2
Drive vendor and model	HPE VK000480GWCFE
Drive size (GB)	480
Drive information (speed, interface, type)	6Gbps SATA SSD
NIC	
Vendor and model number	Synergy 3820C 10/20Gb CNA
Firmware version	7.17.19

How we tested

Dell EMC PowerEdge MX

Use case 1a: Deploying MX740c server node using OpenManage Enterprise (first single instance)

1. From the home screen, select Configuration→Deploy.
2. Click the Create template drop-down menu, and select From Reference Device.
3. Create the Template Name, verify the Clone Reference Server radio button is selected, and click Next.
4. On the reference device, select the server to clone, leave all elements selected, and click Finish.
5. Select the template you created, and click Edit Network.
6. In the Identity Pool drop-down menu, select the desired identity pool, and click Finish.
7. Return to the Configuration screen, and select Deploy template.
8. On the target option, select the device, and click OK.
9. Click Next.
10. Check the Boot to Network ISO. Input the ISO path and the IP Address where the file is located. Click Next.
11. In iDRAC Management IP, click Next.
12. In NIC configuration, click Assigned identity. Click Finish.

Total steps: 12

Use case 1b: Deploying an MX740c server node using OpenManage Enterprise (subsequent single instance)

1. From the home screen, select Configuration→Deploy.
2. Select the template you created, and click Edit Network
3. In the Identity Pool drop-down menu, select the desired identity pool, and click Finish.
4. Returning to the Configuration screen, select Deploy template.
5. On the target option, click Select to choose the target device, and click OK.
6. Click Next.
7. Check the Boot to Network ISO. Input the ISO path and the IP address where the file is located. Click Next.
8. In iDRAC Management IP, click Next.
9. In NIC configuration, click Assigned identity. Click Finish.

Total steps: 9

Use case 1c: Deploying multiple MX740c server nodes using OpenManage Enterprise (three subsequent instances)

1. From the home screen, select Configuration→Deploy.
2. Select the template you created, and click Edit Network.
3. In the Identity Pool drop-down menu, select the desired identity pool, and click Finish.
4. Return to the Configuration screen, and select Deploy template.
5. On the target option, select the device, and click OK.
6. Click Next.
7. Check the Boot to Network ISO. Input the ISO path and the IP address where the file is located. Click Next.
8. In iDRAC Management IP, click Next.
9. In NIC configuration, click Assigned identity. Click Finish.

Total steps: 9

Use case 2a: Updating firmware in OpenManage Enterprise (first single instance)

1. From the OpenManage Enterprise homepage, click Configuration→Firmware.
2. On the Firmware tab, select Create Baseline.
3. In the Baseline Information dialog box, enter a name for the baseline, and click Add.
4. In the Add Firmware catalog, enter a name, select Latest component firmware versions on Dell.com, and click Finish.
5. On the Create Firmware Baseline dialog box, click Next.
6. On the Select Devices screen, click the Select Groups radio button, and click Select Groups.
7. On the Select Groups screen, click Servers, and click Finish.
8. When the compliance check has completed, click View Report.
9. Check the box beside any non-compliant node(s). Click Update Firmware.
10. Select Update Now. Click Update.

Total steps: 10

Use case 2b: Updating firmware in OpenManage Enterprise (subsequent single instance)

1. From the OpenManage Enterprise homepage, click Configuration→Firmware.
2. On the Firmware tab, select the previously created baseline.
3. Click Check Compliance.
4. When the compliance check has completed, click View Report.
5. Check the box beside any non-compliant node(s). Click Update Firmware.
6. Select Update Now. Click Update.

Total steps: 6

Use case 2c: Updating firmware in OpenManage Enterprise (three subsequent instances)

1. From the OpenManage Enterprise homepage, click Configuration→Firmware.
2. On the Firmware tab, select the previously created baseline.
3. Click Check Compliance.
4. When the compliance check has completed, click View Report.
5. Check the box beside any non-compliant node(s). Click Update Firmware.
6. Select Update Now. Click Update.

Total steps: 6

Use case 3: Migrating a server from a traditional rack server

Adding standalone server to OpenManage Enterprise

1. From the Home Menu screen, click Monitor→Discovery.
2. On the Monitor Screen, click Create.
3. Under Devices to discover, select Server for Device Type.
4. After a pop-up screen appears asking how would you like to connect to server(s), select iDRAC, and click OK.
5. In the IP/Hostname/Range box, enter the iDRAC IP address of the server and put the credentials in the username and password boxes, and click Finish.

Creating a template of the standalone

6. From the Home Menu screen, click Configuration→Deploy.
7. On the Configuration screen, click the Create template drop-down menu, and select From Reference Device.
8. After a pop-up screen appears, enter name and description of template, make sure the Clone Reference Server radio button is selected, and click Next.
9. In the Device Selection, click select Device button, choose the standalone server in the choices, and click OK.
10. In the Configuration elements, select the elements you wish to clone, and click Finish.
11. Click Edit Network, assign the identity pool and the VLAN network, and click Finish.

Deploying the template

12. From the Configuration menu, select the template, and click the Deploy Template button.
13. On the pop-up screen that appears, click Yes.
14. Under Select devices, click Select.
15. Select the device to target, click OK, and click Next.
16. On Boot to Network ISO, click Next.
17. On iDRAC Management IP, click Next
18. On NIC configurations, select assign identities, and click Finish.

Total steps: 18

Use case 4: Provisioning assignable storage

1. From the OpenManage Enterprise Modular homepage, select Devices→Storage.
2. Check the box beside the entry for Storage Sled 5, and click View Details.
3. Click Edit Assignments.
4. If not selected, the click Drive-Assigned radio button. In the list of hard drives, check the desired hard drive, and click Assign to Drive Slot.
5. Select the desired slot and server to assign the drive to it, and click Assign.

Total steps: 5

HPE Synergy

Use case 1a: Deploying an HPE Synergy server node (first single instance)

Creating Server Profile Template

1. From the home screen, select the OneView drop-down menu, and select Server Profile Template.
2. Click Create Server Profile Template.
3. Provide the Name and description for the Template. (We included a brief description of the target hardware suitable for the template.) Under Server profile, use the pull-down menus to select the hardware type and enclosure groups.
4. Select the pre-built OS deployment plan.
5. Verify or modify the unattend entries displayed. Note the currently empty management NIC.
6. Scroll down to the Connections sections, and click Add Connection.
7. Name the NIC, and select a pre-defined network to attach. Click Add.
8. Scroll back up to the OS Deployment section, and select the newly created connection from the Management NIC pull-down menu.
9. Click Create.

Creating Server Profile and deploying OS

10. In the upper-right portion of the screen, click Actions, and select Create server profile.
11. Provide the name and description of the server profile. Use the drop-down menu to select the appropriate server for deployment.

Note: The selected hardware must exactly match the source hardware for the golden image capture. This includes ensuring the same number of processors, and identical placement for each adapter type. Any hardware deviation will result in a failed deployment.

12. Scroll down to verify or modify all settings inherited from the template.
13. Click Create.
14. Upon profile completion, click Actions, and select Power On to complete the OS deployment. To watch the progress and verify completion, click Actions and select Launch console.

Total steps: 14

Use case 1b: Deploying an HPE Synergy server node (subsequent single instance)

Repeat steps 10 through 14 from the **Creating Server Profile and deploying OS** section above one time.

Total steps: 5

Use case 1c: Deploying an HPE Synergy server node (three subsequent instances)

Repeat steps 10 through 14 from the **Creating Server Profile and deploying OS** section above three times.

Total steps: 15

Use case 2: Updating firmware

Modifying the template

1. In the OneView console, select Server profile templates.
2. Select the template you want to update.
3. Click Actions→Edit.
4. Scroll down to the firmware section, and use the pull-down menu to select the firmware baseline you want to apply.
5. Select the Firmware only option.

Note: Updates can be applied through the use of SUT, but that requires individual installation on to each machine you want to manage, and in the cases of ESX, an external Linux proxy server.

6. Click OK.

Applying the update to a server

7. In the OneView console, select Server profiles.
8. Select a server indicating "The server profile is inconsistent with its server profile template".
9. Click Actions→Power off.
10. Select the yellow alert, and expand it.
11. To apply the new baseline to the powered down server, click Update from Template.
12. Click Yes, update.
13. When the update is complete, click Actions→Power on.

Total steps: 13

Use case 2b: Updating firmware (subsequent single instance)

Repeat steps 7 through 13 from the **Applying the update to a server** section above one time.

Total steps: 7

Use case 2c: Updating firmware (three subsequent instances)

Repeat steps 10 through 14 from the **Applying the update to a server** section above three times.

Total steps: 21

Use case 3: Migrating a server from a traditional rack server

HPE OneView for Synergy is dedicated to the Synergy platform, and cannot natively copy profiles or templates from external sources, including c7000 blade servers or ProLiant standalone servers.

Use case 4: Provisioning in-chassis storage

1. In the OneView console, select Server Profiles.
2. Highlight the server profile of the server targeted for storage expansion.
3. Click Power off.
4. Click Momentary press, and wait for the server status to indicate Power off.
5. When the power is off, click Actions→Edit.
6. Scroll down to the Local Storage section, and click the pencil icon beside SAS Mezz 1 Storage Controller.
7. Click Add Logical JBOD.
8. Provide a name for the JBOD set, and select the number of disks and type of drives you want to provision from the in-chassis storage drawer. Select Erase on Delete. Click Add.
9. Click OK.
10. Click OK to complete the profile changes that will add the storage.
11. When the profile status shows Update Completed, click Actions→Power on.

Total steps: 11

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