HPE Synergy: advantages versus Dell FX

Customer benefits of migrating to HPE Synergy from Dell FX infrastructure

Contents

Introduction

In today's idea economy, businesses need to turn ideas into services faster. It has never been more crucial to turn ideas into new products, services, or applications—and quickly drive them to market. Until now, IT has been evolving from traditional approaches to converged systems to hyperconverged. This evolution has delivered an incremental improvement in operational efficiency, but a new, more complete architecture is now needed. Today's IT needs an infrastructure that enables them to partner with their business to speed the delivery of services. Such an infrastructure should empower innovation and value creation for the new breed of applications while at the same time run traditional workloads more efficiently. In a word, IT infrastructure needs to be composable.

HPE Synergy is the first platform purpose built for composable infrastructure that empowers IT to create and deliver new value instantly and continuously. As the infrastructure with a single built-in user interface, HPE Synergy reduces operational complexity by composing physical and virtual compute, storage, and fabric pools into any configuration for any application. As an extensible platform, it easily enables a broad range of applications and operational models such as virtualization, hybrid cloud, and DevOps. With HPE Synergy, IT can become not just an internal service provider but also a true business partner to rapidly launch new applications that become the business. This paper identifies the advantages of HPE Synergy and describes the benefits of deploying HPE Synergy over Dell FX.

One infrastructure for any workload

IT infrastructure should be a solution with the ability to provide any application with the specific system resources it needs—an infrastructure that can provision and run any workload across virtual machines, bare-metal deployment, containers, and cloud-native applications.

As indicated in Figure 1, key design principles of a composable infrastructure include:

- Fluid resource pools: Disaggregated infrastructure with compute, storage, and fabric resources that are always available and instantly configurable according to the specific needs of each application.

- Software-defined intelligence: Internal intelligence that abstracts the hardware identity, so it can be provisioned with precise repeatability from a software template.

- Unified API: Programming interface that increases productivity and control across the data center by integrating and automating infrastructure operations and applications, eliminating time-consuming scripting of multiple varied low-level tools and interfaces. A Unified API enables a single line of code to abstract every element of infrastructure for full programmability of bare metal.
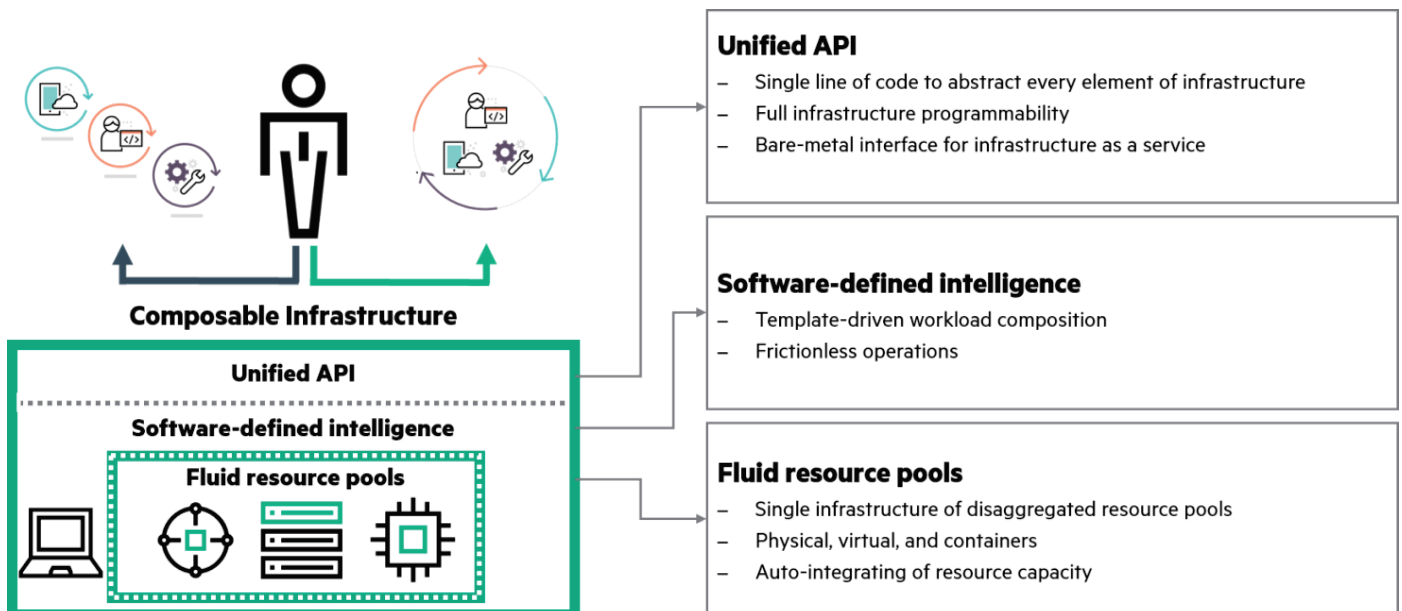

Figure 1. Design principles of composable infrastructure

By simple definition, a composable infrastructure should be able to run everything and store anything.

Run everything

Deploying and maintaining an IT infrastructure is all about resource management, which should be seamless. As indicated in Figure 2, HPE Synergy provides automated discovery of physical resources. Everything in the management network fabric is automatically discovered upon insertion or upon being linked. All linked frames in a domain are discovered automatically and resources are created for them in the HPE Synergy Composer, which puts them into a monitored state. New resources are self-assimilated into the managed environment. This means that HPE Synergy compute, fabric, and storage resources are disaggregated and thus composable—and recomposable—according to workload.
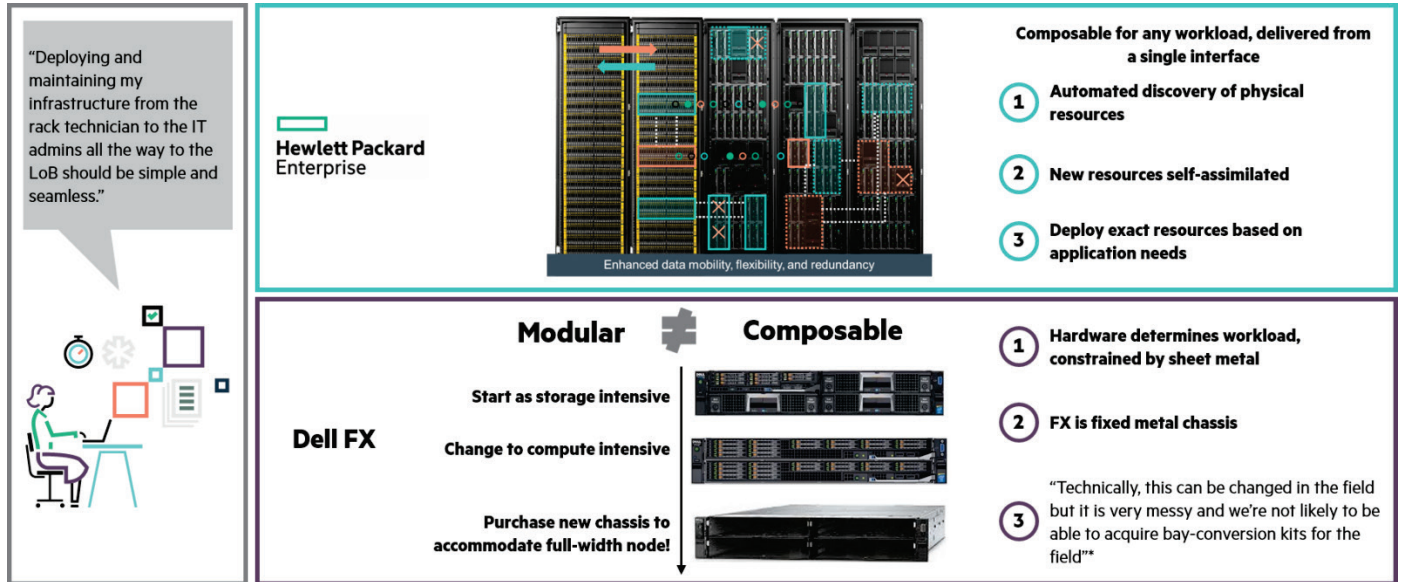
* i.dell.com/sites/doccontent/shared-content/data-sheets/en/Documents/DEI-ESR-E47451_FXArchitecture_ChannelizedTalkingPoints_UK_EN_1-0.pdf

Figure 2. Platform and infrastructure resource management comparison: HPE Synergy to Dell FX

Dell FX is modular, but not composable. As a fixed metal chassis, Dell FX hardware determines the workload. For example, suppose you set up a Dell FX system for a storage-intensive workload using three Dell PowerEdge FD332 Storage Blocks, and then decide later to change to a compute-intensive workload requiring full-width Dell PowerEdge FC380s. You would have a problem because there are interposers for the half-width blocks that would need to be removed to accommodate the PowerEdge FC380. Dell requires you to configure new chassis to accommodate the full-width nodes.[1]

HPE Synergy is flexible enough for both compute and storage-intensive applications to run in a single form factor that can be composed, and recomposed based on the needs of the application.
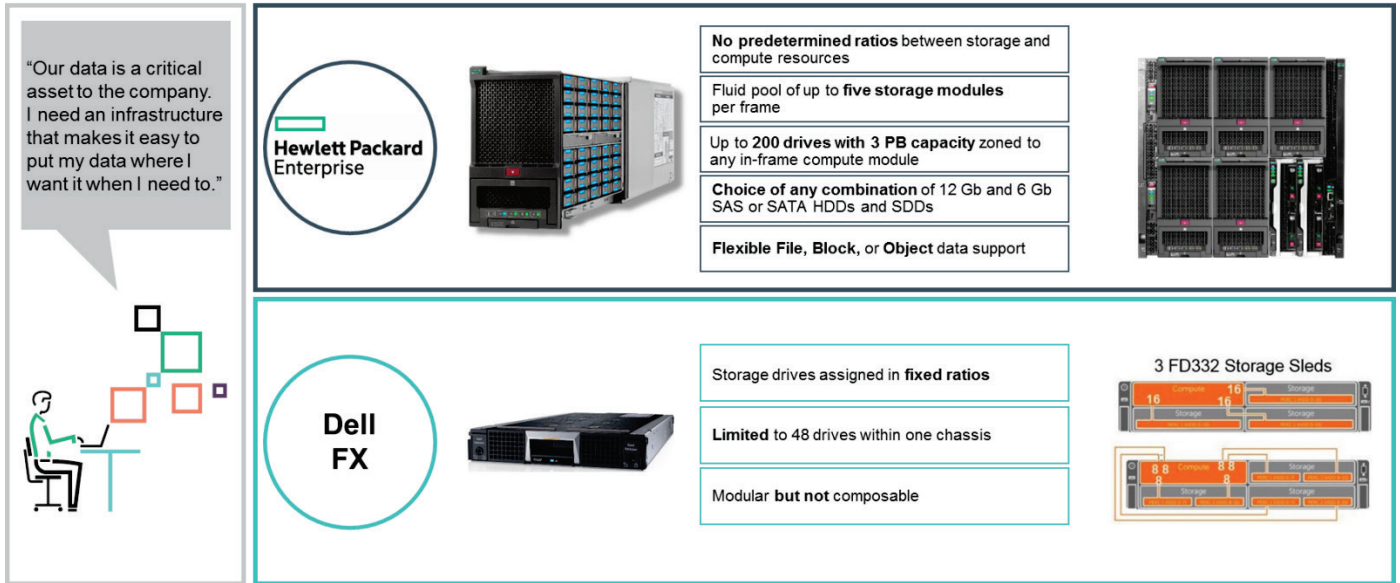
[1] "Dell PowerEdge FX2 and FX2s Enclosure Owner's Manual," Dell Inc., Rev. A06, April 2018

Store anything

Data is a critical asset for any company. To achieve the ultimate goal of having data where you want it and when you need, it requires a highly flexible storage strategy. HPE Synergy D3940 Storage Module (Figure 3) connects to compute modules within a frame through HPE Synergy 12Gb SAS Connection Module. These high-density storage modules[2] each accommodate up to 40 drives (SSDs or HDDs) that can be multi-tiered, divided, or otherwise assigned in any combination to compute modules within the same frame for efficient utilization. With up to five storage modules per frame, up to 200 drives can be available in-frame. No predetermined ratios are involved—just large and fluid pools of storage resources that can be carved up according to need. And since the Smart Array controllers for these drives are on the compute modules, you can mix file, block, and object storage all within the same module for even greater flexibility.

HPE Synergy: No predetermined ratios: storage resources pooled for composition with compute

"Our data is a critical asset to the company. I need an infrastructure that makes it easy to put my data where I want it when I need to."

Hewlett Packard Enterprise

No predetermined ratios between storage and compute resources

Fluid pool of up to **five storage modules** per frame

Up to **200 drives with 3 PB capacity** zoned to any in-frame compute module

Choice of any combination of 12 Gb and 6 Gb SAS or SATA HDDs and SDDs

Flexible **File, Block,** or **Object** data support

Dell FX

Storage drives assigned in **fixed ratios**

Limited to 48 drives within one chassis

Modular **but not** composable

3 FD332 Storage Sleds

Based on HPE analysis as of November 2018; A Closer Look at the Dell FD332 for FX Architecture

Figure 3. Storage flexibility comparison: HPE Synergy to Dell FX

Dell's storage sled, the Dell PowerEdge FD332, has 16 storage drives but can only be assigned in fixed ratios of 8 or 16. Also, only three Dell PowerEdge FD332s can fit into an FX chassis, which limits the number of drives in each chassis to 48. While storage drives for the FX can be carved up along storage controllers (8 and 8), it is not composable like the HPE Synergy D3940.

Incidentally, Figure 3 implies that five HPE Synergy Storage Modules (200 drives) are divided up equally among two compute modules. In reality, they can be easily divided in completely different proportions, such as one compute module with 120 drives and the other with 80 drives. The permutations are endless and reconfigurable whereas a Dell configuration is restricted.

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[2] "HPE Synergy D3940 Storage Module QuickSpecs," Hewlett Packard Enterprise, December 2018

One experience for the administrator

Many IT administrators feel that infrastructure should be easy, like services they get from the cloud. They want a clean, intuitive, easy-to-use web interface that lets them get their job done. In a world where time is the new currency, simplicity is a must-have characteristic for every IT solution.

Organizations are struggling to deliver and manage their IT using outdated management tools that were designed for a past era. For instance, depending on your needs, managing the Dell FX physical infrastructure can require as many as three separate tools: Dell Active System Manager, Chassis Management Controller (CMC), and Dell OpenManage Essentials (Figure 4). The HPE Synergy Composer, but then, is built with HPE OneView embedded—a single user interface that improves the productivity of IT administrators.
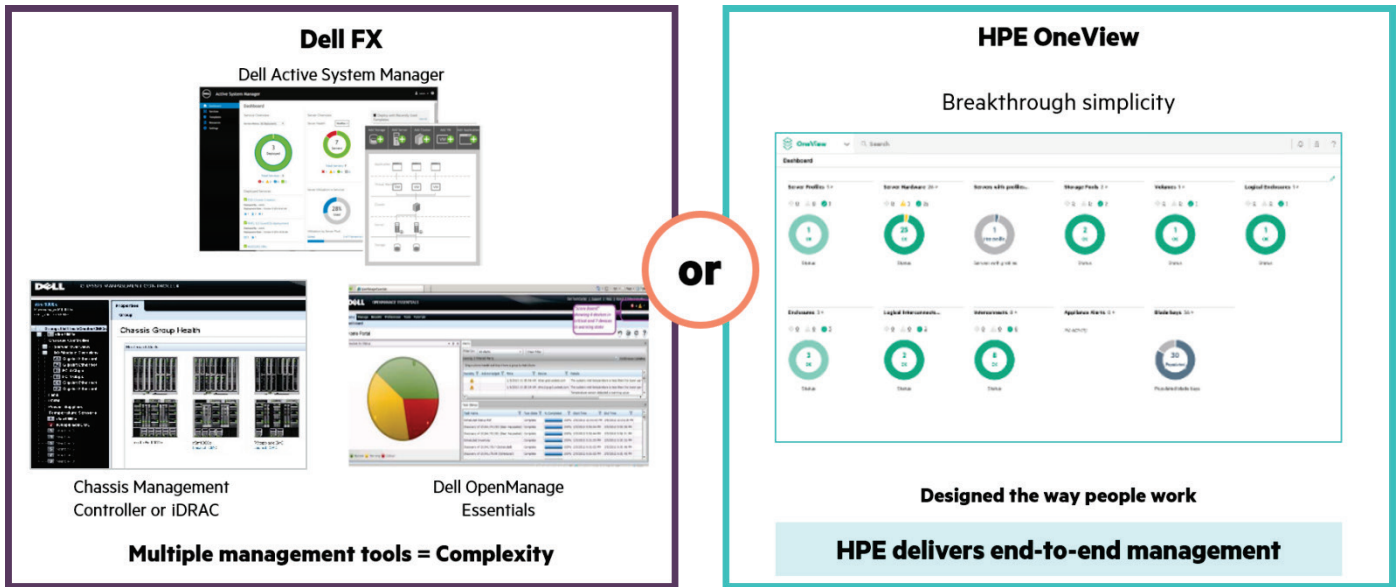

Figure 4. Infrastructure management comparison: Dell management tools to HPE OneView

HPE OneView is architected to work the same way people do. A key differentiator of HPE OneView is its native automated lifecycle management via server profile templates. The use of templates adds inheritance to the provisioning process and significantly reduces the chance of errors. Updates for BIOS settings, firmware, and drivers need to be made only once in the template and then propagated to all profiles created from that template.
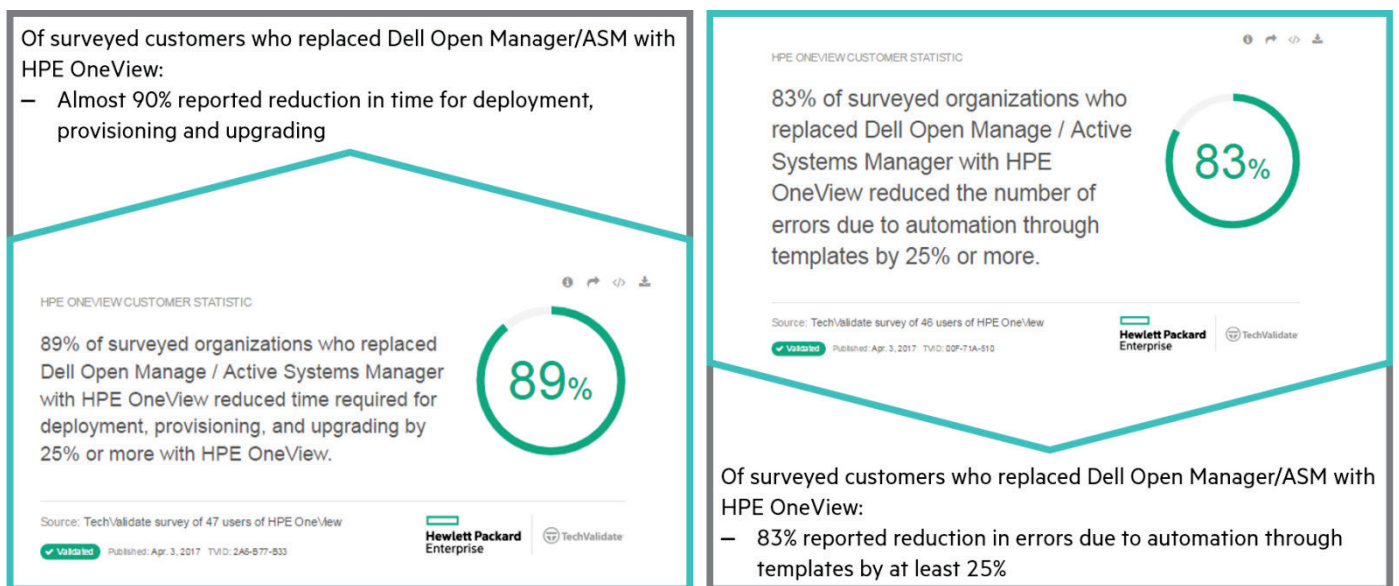

Figure 5. HPE OneView automated lifecycle management benefits

With a Dell FX infrastructure, template-based provisioning requires running Dell Active System Manager in addition to Dell OpenManage Essentials and Dell CMC (blades) or iDRAC. This results in a complex arrangement of fragmented or loosely connected management applications. HPE OneView delivers a single, collaborative management platform built for speed. It allows IT teams to work and collaborate in a more natural and automated way.

Simpler operations

A bill of rights for a composable infrastructure should state **the right to a single infrastructure for all applications**. In a truly composable infrastructure, software provisions and manages the compute, network, and storage resources. As the application environment changes, resources are reprovisioned. Adding capacity or growing the management domain should not add complexity to the infrastructure—it should remain as simple as before.

Simplified management at scale

HPE Synergy performs automated discovery of physical resources (Figure 6) at power-up. Additional devices inserted into the management domain or linked into the fabric are self-assimilated into the infrastructure so that HPE Synergy compute, fabric, and storage resources are always up to date. A single management domain for HPE Synergy scales up to 21 frames and 252 compute modules.

HPE Synergy Frame Link Modules link single or multiple frames to form a management network and present appropriate device information that enables management by HPE Synergy Composer. This dedicated network enables automatic discovery and change detection. The management network is redundant within the frame (and across many frames) for network fault tolerance. The traffic will continue to traverse the network even in the presence of a single failure (for example, if one module fails or if a cable is disconnected).
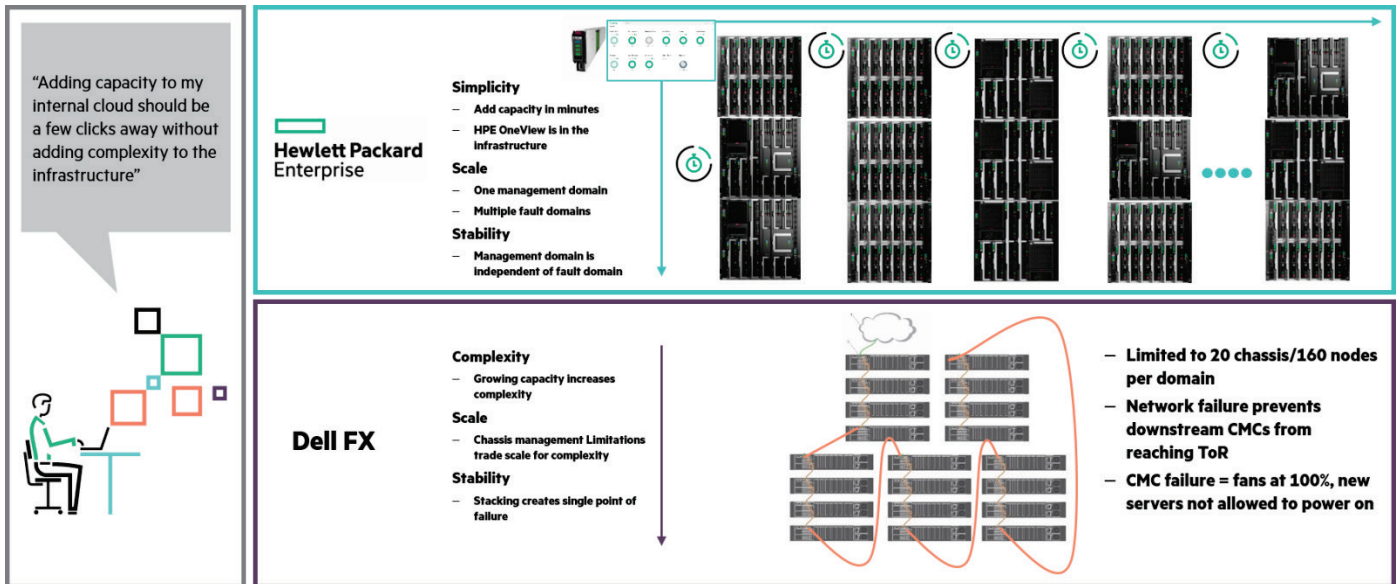

**Figure 6.** Infrastructure scalability comparison: HPE Synergy to Dell FX

To maximize scalability in a Dell FX system, a customer must stack up to 20 Dell FX chassis (Figure 6), in effect, daisy chaining one chassis to another. Stacking trades off redundancy for scalability by introducing a single point of failure—CMCs downstream from that failure cannot reach top-of-rack (ToR) management. Another result from a CMC failure is that all fans go to 100% and no new servers can power on.[3]

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[3] "Dell FX2 Chassis Management Controller (CMC) Deployment Guide," section 2.2, January 2015
i.dell.com/sites/doccontent/shared-content/data-sheets/en/Documents/DEI-ESR-E47451_FXArchitecture_FAQs_UK_EN_3-0.pdf (posted on Dell website as of June 2017)
"Dell PowerEdge FX2 and FX2s Enclosure," Dell Inc., Rev. A03, August 2015

Manage bare-metal servers as easy as virtual machines in the cloud

HPE Synergy Image Streamer enables true stateless operations using software-defined profiles with both the physical state and operating system images for rapid implementation (Figure 7). HPE Synergy Image Streamer works in conjunction with HPE Synergy Composer to enhance server profiles with the deployed software state to deliver infrastructure as code. Powered by HPE OneView, the HPE Synergy Composer captures the physical state of the server in the server profile. The HPE Synergy Image Streamer enhances this profile and its desired configuration by capturing a golden image as the deployed software state in the form of bootable image volumes. These bootable OS images are stored on the HPE Synergy Image Streamer appliance. Note that the enhanced server profile and bootable OS images are software-abstracted templates—no compute module hardware is required for these operations. When the compute module boots, it will boot from the bootable image volumes residing on the HPE Synergy Image Streamer directly into its running configuration.
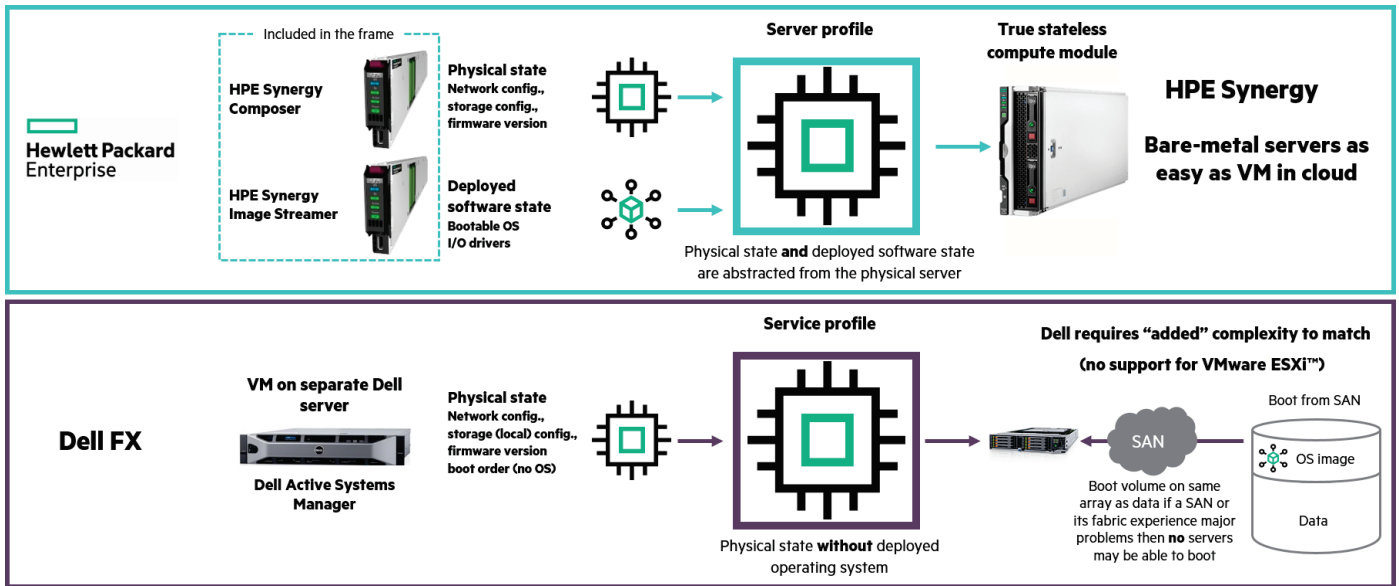
Based on HPE analysis as of March 2017

Figure 7. Stateless server provisioning: HPE Synergy to Dell FX

Dell's version of stateless computing falls short of what HPE Synergy delivers. To match Hewlett Packard Enterprise, Dell has to use a SAN boot where the operating system resides on an external storage array. This approach is more complex than HPE, as a SAN boot requires a SAN network. If a SAN or its fabric experience major problems then no servers may be able to boot. In addition, the boot volume is located on the same array as customer data, and if there is a problem with the boot volume, the customer may be precluded from making corrections. Note also that this is not supported for VMware ESXi.[4]

With HPE Synergy Image Streamer, the boot volume is stored independently of the data, so a new datastore can be established to restore service, independent of problem resolution. The HPE OneView design increases both uptime and return on investment (ROI). HPE Synergy Image Streamer provides a high-availability (HA) configuration of two physical management appliances. These redundant physical appliances install into HPE Synergy frame appliance bays and are automatically set up as a repository to manage and deploy your images on remote storage volumes. HPE Synergy Image Streamer pairs are configured in a Network RAID 10 configuration, which provides Active-Active HA for volume storage. This provides a highly available boot and run environment for your compute modules.[5]

[4] "Active System Manager Release 8.3.1," Dell Inc., Rev. A01, 2017

[5] "HPE Synergy Image Streamer QuickSpecs," Hewlett Packard Enterprise, 2018

Protecting your investment

For businesses already invested in HPE IT solutions, HPE Synergy represents minimal impact. The HPE BladeSystem c7000 has the same 10U footprint as HPE Synergy, so it is not necessary to rearrange the rack (Figure 8). Those using HPE OneView to manage HPE c7000 or HPE ProLiant systems can simply add HPE Synergy—the HPE OneView Global Dashboard provides a single-pane-of-glass view of the entire infrastructure.

Meeting the performance service levels for applications is directly related to I/O and midplane architecture bandwidth. A new generation of workloads is requiring higher bandwidth and lower latency I/O than ever before. HPE Synergy is future-proofed to meet this need. The I/O has been designed to carry the frame for the next decade and allows you to support several generations of new technology. The HPE Synergy midplane has more than double the bandwidth of today's HPE c7000 to 16 Tbps with copper. The HPE Synergy midplane is also predesigned to accommodate photonics, allowing you to upgrade when that technology becomes available.
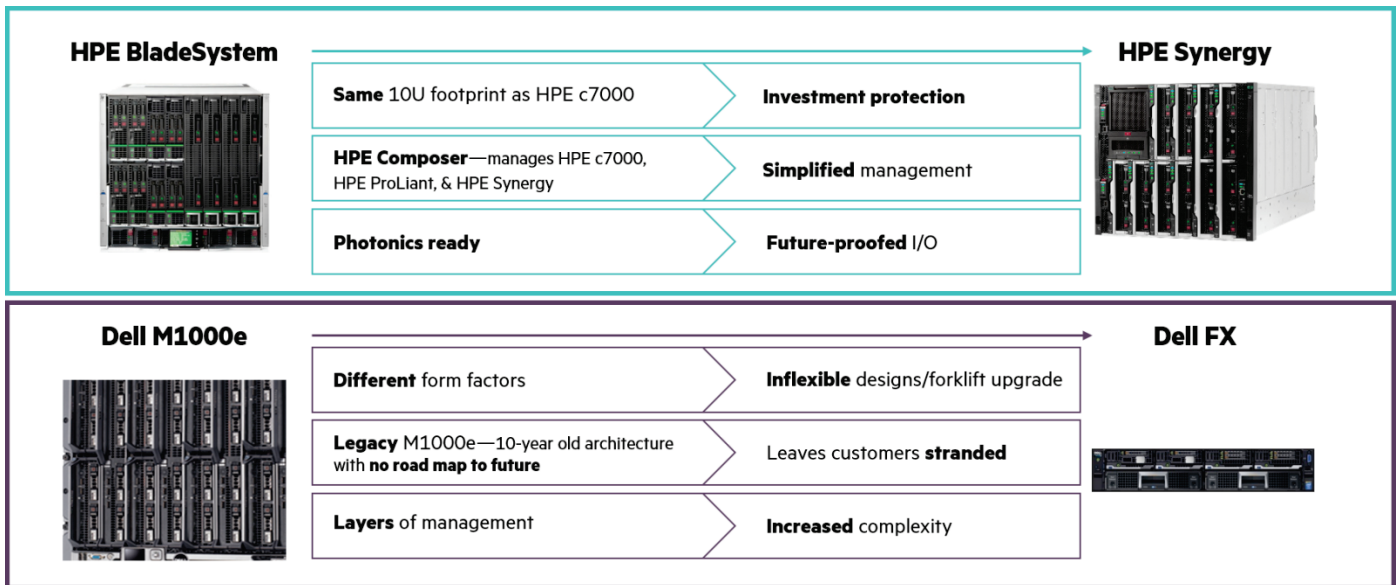

Figure 8. Fabric comparison: Dell FX to HPE Synergy

With an architecture that is over 10 years old, customers may not want to bet the future of their data center on the Dell M1000e. The Dell M1000e and Dell FX are different form factors resulting in inflexible designs, so migrating from Dell M1000e to Dell FX involves possible forklift upgrades. Even then, Dell FX doesn't offer the benefits of HPE Synergy and requires layers of management tools to get close to what HPE OneView alone can do. With HPE Synergy, your investment is protected and you are ready for the future.

Conclusion

The right to a single infrastructure for all applications—this is the whole point of composable infrastructure. A solution should offer the ability to provide the application with the exact optimized footprint it needs—one that provisions and runs a workload across virtual machines, bare-metal deployment, containers, and cloud-native applications. HPE Synergy is the solution that brings full composability to your IT infrastructure. The redundancy and high availability of fluid resource pools provided by HPE Synergy and the simplified management capabilities offered by HPE OneView are unmatched by current Dell offerings.

One infrastructure to run any workload
More fluid pools of compute, storage, and fabric

End-to-end infrastructure experience
Unified management interface into your infrastructure

Simpler operations
Software-defined intelligence advances

Designed for the future
With investment protection in mind

Figure 9. HPE Synergy strengths over Dell FX

Resources

HPE Synergy

HPE OneView surpasses Cisco UCS Manager

HPE Synergy: The first platform architected for composability to bridge Traditional and Cloud Native apps

HPE Synergy Composer QuickSpecs

HPE Synergy Image Streamer QuickSpecs

Five steps to building a composable infrastructure with HPE Synergy
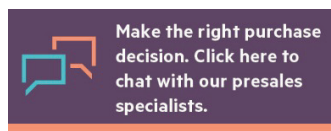
HPE Pointnext for HPE Synergy

SSD Selector Tool

HPE NVMe 2.5" SSDs and Enablement Kits

HPE technical white papers

Moor Insights & Strategy white paper: HPE bridges traditional and new IT with composable infrastructure

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