



Why VMware Cloud Foundation on PowerEdge MX? A Technical Overview

Commissioned by Dell Technologies

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Introduction

Today, most organizations have a collection of disconnected IT infrastructures. On the one hand, they have public cloud or clouds, small or large deployments, compute, storage, networking, development tools, etc. And on the other hand, they have on-premise virtualization, built up over years, mainly compute virtualization, perhaps with some software defined networking. And there hasn't been a clear path for many organizations to bring the two together – public cloud and on-premise virtualization – into a cohesive whole, a hybrid cloud.

2020 is rapidly becoming the year of the hybrid cloud. At Zettabyte Content, we're seeing announcement after announcement about hybrid cloud and the advantages it offers. As a Tier 1 data center vendor, Dell EMC aims to accelerate the shift toward hybrid cloud. And it, working with VMware, is making a compelling case for leveraging the latest approach to hybrid cloud—VMware Cloud Foundation—on Dell EMC's modular infrastructure product family, the PowerEdge MX, to power hybrid cloud for VMware-friendly organizations.

The PowerEdge MX, Dell EMC's kinetic infrastructure, aims toward a future of full composability, or infrastructure as code, that offers the ideal mix of agility, efficiency, and

resilience for building on-premise cloud. And with direct integration into VMware Cloud on AWS, VMware Cloud Foundation lets organizations of all sizes bring public cloud and on-premise virtualization together into a cohesive whole.

In this paper, we're going to explore the technologies behind the Dell EMC approach. We will evaluate the PowerEdge MX, using a lens of what a software defined data center (SDDC) requires for optimum value. We'll also look into the capabilities of VMware Cloud Foundation from the perspective of customer value. After you've read this paper, you'll have a deeper appreciation of the technical capabilities both platforms deliver and the capabilities they can provide for IT and business transformation.

Dell EMC's objective with PowerEdge MX is to create a powerful foundation for on-premise cloud.





PowerEdge MX: Kinetic Infrastructure

PowerEdge MX is Dell EMC's latest foray into modular infrastructure, building on a long-established track record of blade servers and converged infrastructure that dates back to the mid-2000s. Unlike rack servers that are deployed, used for a few years, and decommissioned, modular infrastructure offers a different value proposition. It's intended to showcase leading-edge technologies over multiple server and storage generations, giving organizations a better way to upgrade capabilities while minimizing disruptive rip and replace.

Like all the best organizations, Dell EMC product innovation ties back to customer input. Every year, Dell EMC talks with tens of thousands of organizations, of all sizes, in all verticals. Dell EMC has worked to build a deep understanding of customer requirements, and their creation of the PowerEdge MX is aimed to address basic needs other approaches can't resolve. Dell EMC's vision for PowerEdge MX is called kinetic infrastructure, and it's intended to give customers a platform for emerging technologies. They describe it as a path to fully composed and disaggregated infrastructure that offers:

- Cloud-like velocity and serviceability
- On-premise speed, reliability and security
- Support for physical, virtual, and containerized services
- A multi-year roadmap for emerging technologies.

Why do these characteristics matter?

Cloud-like velocity and serviceability. We all know that organizations are forced to compete faster than ever. It's become impossible to serve customers well if IT service deployment takes days or weeks. That need for velocity underlies the explosive growth of public cloud, and it's not going away. Organizations can't tolerate on-premise infrastructure that takes too much time to deploy, monitor, maintain, expand and improve. They're looking for infrastructure that accelerates time to value, just as the public cloud does.

On-premise speed, reliability and security. But at the same time, public cloud hasn't lived up to every promise. Sure, any organization can get leading-edge processors and storage in the public cloud, but as more and more services

need proximity to the end-user (reducing latency, improving responsiveness), public cloud performance struggles to compensate for the delays caused by hundreds or thousands of miles of cable. Emerging services like augmented reality, self-driving cars, and Smart Cities will, underpinned by 5G connectivity, demand on-premise speed and responsiveness with top-grade reliability and security. We'll see a future of modular infrastructure—something like the PowerEdge MX – that will live in every cell tower, be scattered around every city, and even be deployed on vehicles—because the right services, with the right performance, can't be built without it.

Support for physical, virtual, and containerized services. But the advantages of a modular infrastructure go beyond the edge as it can also disrupt long-established data center strategies. For example, bimodal IT—one infrastructure for legacy, one infrastructure for leading-edge—is failing by the wayside because it's just not cost effective, but traditionally existed because an infrastructure for legacy application had to be different than an infrastructure for emerging services. Organizations want a single infrastructure that does everything. Though that desire isn't always easy to achieve, it's still a desirable goal. Today's organizations have legacy applications on bare metal servers, thousands of virtual machines running on virtualized infrastructure or in the cloud, and even leading-edge, containerized microservices. Being able to run and manage all these on one infrastructure, even migrating from one type to the other as needed, would unlock unprecedented value.

A multi-year roadmap for emerging technologies. All too often, as organizations evolve their infrastructure, they're forced to cobble together a way to incorporate emerging technologies like NVMe drives, storage class memory, new networking capabilities, and even lookaside accelerators such as FPGAs or GPUs. Inevitably, those technologies end up on a sideline because the costs of widespread rip and replace are too high and the technologies can't be disaggregated, pooled, or made accessible to every workload. Capability and capability ends up stranded, organizations are forced to overprovision, and costs go up.

PowerEdge MX aims to address these needs.

The core of PowerEdge MX is that it's built for an unpredictable future that needs more agility, flexibility, efficiency, and performance than ever before.

The design begins with a 7U enclosure.

Figure 1: Dell EMC PowerEdge MX



Compute: The enclosure allows for up to 8 single-width 2-socket sleds with up to 6 local SAS/SATA/NVMe drive bays or up to 4 double-wide 4-socket sleds with 8 drive bays.

Networking: Two redundant general-purpose fabrics, built on the MX Scalable Fabric Architecture for multi-chassis networking, and supports open networking that supports third-party OSes.

Storage: The chassis has room for up to 7 single-width 12Gbs SAS sleds with up to 16 direct-attached HDD/ SDD devices, supporting up to 118 drives per chassis. It also supports redundant, highly available Fibre Channel or SAS storage fabric for high availability and/or SAS extensions for optimal storage scalability.

These capabilities don't necessarily surprise anyone, as blade servers included compute, storage, and networking for more than a dozen years. But the PowerEdge MX is different in several critical ways.

The first, and most important difference is that kinetic infrastructure offers a path toward full composability. It's designed for a memory-centric, or data-centric composable world. It's a platform where any resource – array, network capability, NVMe, GPU – is disaggregated, assignable to any workload, and ultimately available on-demand through a programmable, service-centric set of APIs, built on Project Redfish, to make resource allocation accelerated, automated, and always available.

The second difference is that its design incorporates a better mindset underpinning the management capabilities. A unified RESTful API interface manages all nodes, compute, storage, and networking that can manage up to 160 servers across 20 chassis. The built-in PowerEdge redundant management modules run OpenManage Enterprise – Modular System Management, delivering the key capabilities of Dell EMC's OpenManage Enterprise systems management to the PowerEdge MX platform with no additional software to install.

It offers:

- At-the-box management front control panel options include optional wireless Quick Sync 2 and/or Touchscreen LCD and traditional crash cart.
- Customizable profiles and personalities, automatic expansion from one to multiple chassis with zero-click discovery of components helps increase IT effectiveness.
- Ease of integration with the full OpenManage Enterprise suite, scaling management across thousands of PowerEdge MX and rack servers. Organizations can manage a chassis, many chassis, or implementations at many sites – without additional cost or complexity.

And the third difference is that the PowerEdge MX is designed for an unpredictable future. Dell EMC learned so much from their experiences building multiple generations of blade chassis that they incorporated distinctive discoveries into the new design. With the PowerEdge MX, organizations have:

1. A streamlined transition to new fabric generations and architectures. There's no mid-plane and no single point of failure for connectivity.
2. A future forward design for emerging processors and storage. They've committed to supporting at least three generations of processors and bleeding-edge capabilities like storage class memory.
3. Superior power and cooling. Improved airflow and control algorithms intended for unpredictable requirements.
4. Cyber Resilient Architecture. End-to-end protection, detection, and recovery that's updateable as threats evolve over time.

In other words, the PowerEdge MX provides the investment protection organizations demand for a decade that will be filled with unprecedented demands on infrastructure, technology innovation, and possibilities organizations haven't even imagined.



VMware Cloud Foundation: Solving the Hybrid Cloud Gap

The PowerEdge MX, as a holistically managed infrastructure, is built to make on-premise infrastructure behave more like cloud. That's why Dell EMC thinks it's the perfect foundation for VMware Cloud Foundation™ (VCF), the latest approach to cloud that leverages VMware's industry-leading, mature compute, storage, and networking virtualization in new ways that deliver new value.

VMware Cloud Foundation is an integrated software stack that bundles compute virtualization (VMware vSphere), storage virtualization (VMware vSAN), network virtualization (VMware NSX), and management (SDDC Manager and vRealize offerings) into a single platform.

With integrated cloud management, it gives organizations a consistent operational model based on VMware tools and processes anywhere without the complexity of app re-writing. Organizations using VCF can build both management and workload clusters for their hybrid cloud, creating domains for specific services and/or users, improving consistency from a technology, administrative, and service delivery perspective. All components work together while accelerates time to value by eliminating complex processes around deployment, enables faster app provisioning, and provides quick, repeatable, secure deployments when a validated VMware cloud design is used.

A validated cloud design for VMware Cloud Foundation is based on a stringent validation process with a detailed set of requirements to ensure compatibility. These requirements¹ can be summarized as:

Servers must be certified for VMware Ready Nodes. A minimum of 4 servers are needed to power a Cloud Foundation management domain, but 8 servers are recommended, where 4 are configured as management domain and 4 for the workload domain.

Enterprise grade switching as certified in the vSAN compatibility guide.

The problem is that compatibility guides offer limited guidance on which hardware to choose. That's where Dell Technologies Validated Cloud Designs come in. Choosing "the best hybrid cloud platform on Earth" gives organizations a dramatically shortened path to a hybrid cloudⁱⁱ. Their designs aim to increase admin productivity while reducing overall TCO. These designs address the risks of both do-it-yourself approaches and traditional reference architectures by being completely prescriptive, helping organizations accelerate time to value. VCF deployment can be automated using VMware Cloud Builder, an appliance distributed as an Open Virtualization Appliance (OVA) package. It ensures that a VCF platform adheres to the blueprint set out by VMware Validated Designs. Cloud Builder orchestrates the bring-up process of a VMware Cloud Foundation management.

The PowerEdge MX is an excellent fit for VMware Cloud Foundation. Supporting eight server sleds per chassis, a single chassis can support both a management and a workload cluster, then support additional workload clusters on additional PowerEdge MX chassis. PowerEdge MX scalable fabric networking options provide the high throughput, low latency profile needed for on-premise cloud clusters at scale. And Dell's latest Deployment Guide walks architects through all aspects of designing, deploying, and delivering VMware Cloud Foundations on PowerEdge MX. Simply put, it's the right hardware for a valuable, relevant, on-premise cloud.

¹ www.vmware.com/content/dam/digitalmarketing/vmware/en/pdf/solutions/vmware-validated-designs-sddc-datasheet-data-sheet.pdf

ⁱⁱ <https://www.crn.com/news/data-center/dell-technologies-cloud-the-best-hybrid-cloud-platform-on-earth->



Conclusion

The combination of Dell EMC PowerEdge MX and VMware Cloud Foundation looks to be a strong fit for the needs of many organizations. Whether the aim is to cut costs, minimize silos, support a shift toward a software defined data center, or simply leverage the advantages of leading-edge technology, Dell Technologies and VMware appear to have built a combination that should serve an organization well for years to come. We believe this platform can deliver:



Better Agility

with automation and cloud-scale economics.



Maximized Efficiency

by extending the same operations, tools, and processes everywhere.



Game-changing Performance

with seamless resource pools in every environment.

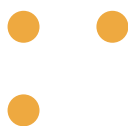


Enhanced Security

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