Now in this section, we will focus on the Dell EMC converged infrastructure product families. Click training to navigate directly to the first topic. Or click assessment to attempt to by-pass the training by taking and passing the assessment for this section.
Learning Objectives

Upon completion of this training you will be able to identify each of the Vblock and VxBlock families. Distinguish between the technologies of each of the Dell EMC converged infrastructure solutions. You will be able to identify typical use cases for each of the Vblock and VxBlock families. And identify the components and basic connectivity of the compute, storage, network, and virtualization of the Vblock and VxBlock families.
Positioning Dell EMC Converged Solutions

In this section, we will focus on Dell EMC converged infrastructure solutions for mid-market as well as enterprise and service provider operations.

The Vblock 300 and VxBlock 300 families are enterprise and service provider level systems well suited for some very large mid-market needs, as well as enterprise and service provider organizations. They are equipped with Dell EMC Unity Storage products and offer a single UCS domain for compute.

The Vblock 500 and VxBlock 500 families are engineered with the latest in compute, networking, and storage with EMC XtremIO arrays. The XtremIO is an all-flash system, using building blocks, called X-Bricks, which can be clustered together to grow performance and capacity as required. Vblock 500 family systems can have a maximum of 4 Cisco UCS domains.

The largest capacity Dell EMC converged infrastructure solutions are the Vblock 700 and the VxBlock 700 families. These represent the industry’s most advanced, intelligent converged infrastructure for large enterprise and service provider mission-critical applications. The storage components in these systems are the EMC VMAX series storage arrays which are high-end storage systems built for the virtual data center. The Vblock 700 and VxBlock 700 offer a maximum of 4 Cisco UCS domains.

We'll introduce details including what makes each of these product families unique before you complete this section.
Converged infrastructure is a bringing together, or convergence, of distinct IT infrastructure components. In Dell EMC converged infrastructure solutions, these components include compute, networking, and storage technologies. Vblock and VxBlock solutions result from the convergence of these distinct components engineered, assembled, tested, optimized, and delivered to customers as a single converged product. Each of the Dell EMC converged infrastructure families have unique characteristics based on their components.

For compute, all Dell EMC converged infrastructure solutions have blade servers for production work loads. While previous some previous Vblock systems used rack mount servers, blade servers are found in all converged infrastructure solutions. While rack mount servers are generally more affordable to purchase, the installation and maintenance of blade servers is much less labor intensive, which makes them more desirable.

Networking components used for production workloads form segregated networks in all Dell EMC converged infrastructures. Dell EMC no longer offers a unified network alternative for converged infrastructures. A pair of LAN switches providing Ethernet ports, and two SAN switches with Fibre Channel ports are employed together to form segregated networks. While unified networking can be more economical for some, Dell EMC converged infrastructure systems deploy segregated network which provide a greater total number of network ports and therefore greater network capacity.
Dell EMC also matches distinct storage products to each converged infrastructure families. The flexible and scalable EMC Unity products are utilized in the latest Vblock and VxBlock 300 families. EMC XtremIO, with all flash arrays, is used in Vblock and VxBlock 500 families. And EMC VMAX high-end storage systems built for the virtualized data center is engineered into the Vblock and VxBlock 700 families.

At the time this training was created, Vblock and VxBlock systems contained Cisco compute and networking components, and Dell EMC storage components. Remember that while Vblock System solutions will always contain these, in the future, alternative technologies maybe available in VxBlock families.
Introduction to Dell EMC Converged Infrastructure Product Families

These are the topics that we will discuss in this section. Now, let's talk about the Vblock 300 family and the VxBlock 300 family. These products are similar enough that we can cover them together. Remember, the Vblock 300 and VxBlock 300 families are enterprise and service provider level systems well suited for some very large mid-market needs, as well as enterprise and service provider organizations.
Vblock 300 and VxBlock 300 Basics

The Vblock 300 and VxBlock 300 families, like all Dell EMC converged infrastructure systems, are optimized for fast delivery, and are designed to address core data center services.

While previous models contained EMC VNX, the latest Vblock and VxBlock 300 family systems feature Dell EMC Unity storage arrays as well as Cisco UCS blade server technologies. Unity offers both block and file provisioning in the same enclosure. Unlike the EMC VNX which requires buying and adding data movers or X-blades to enable file level storage, Unity disks are provisioned into Pools that can be used to host both block and file data. Connectivity is offered for both block and file protocols without adding hardware and software.

For networking Vblock and VxBlock 300 families provide segregated networking utilizing SAN and LAN switches for maximum network capacity.

There is a high degree of consistency in the physical layout and connectivity of system components throughout all Vblock System cabinets, which eliminates cable tray nightmares and is a significant benefit for anyone in the IT organization responsible for managing connectivity between system components.
As you learned earlier, at the time of the VxBlock launch, the difference between the two systems is the choice of software defined networking. Note that software defined networking is not a requirement when purchasing a Vblock or VxBlock 300 system. The Vblock 300 family offers only the option for Cisco Application Centric Infrastructure or ACI. While the VxBlock 300 family offers either Cisco ACI or VMware NSX Platform for Network Virtualization.
Let's take a look at the component connectivity within the Vblock 300 and VxBlock 300 families. The Vblock 300 and VxBlock 300 families use Cisco B-Series Blade servers secured in Cisco UCS Blade Server chassis. In addition, the system compute includes a pair of Cisco Fabric Interconnects which provide connectivity from blade chassis to the system network and storage components.

The UCS Manager used to manage blade servers is installed on the Fabric Interconnects. IT staff can manage all the blade servers in a chassis from a single instance of the UCS Manager.

These systems offer segregated networking, using distinct switches for Fibre Channel ports and for Ethernet ports. These networks have two Cisco MDS SAN switches which connect directly to both storage processor. And two Cisco Nexus LAN switches that each connect to the customer's site network.

Fibre Channel switches connect directly to the Storage Processors in Dell EMC Unity All-Flash or Hybrid arrays. These connections provide the data path through which compute servers boot from files stored in block level storage. Note that Dell EMC Unity models in these systems utilize a disk processor enclosure. Recall that DPEs are enclosures that contain both the storage processors and some storage drives. DAEs with additional storage drives are not required but can be included at the time of system purchase or can be added after deployment.
Remember, Unity offers both block and file provisioning in the same enclosure. Connectivity is offered for both block and file protocols without adding additional hardware and software like X-blades.

Click on any of the components in this illustration to learn more about them. Click the Next button when you’re ready to continue.
Cisco Nexus 1000V – Virtual Switch

The Cisco Nexus 1000V is the virtual network switch included in the Vblock and VxBlock 300 families. It is the only virtual switch that is covered by Dell EMC core support. Customers can use a different virtual switch, but the Cisco Nexus 1000V is the only virtual switch supported directly.

The Nexus 1000V provides physical network connectivity for virtual machines created and running on ESXi hosts in Vblock and VxBlock family systems. The Virtual Supervisor Module or VSM, is the control software of the Nexus 1000V virtual switch. It runs on a virtual machine (VM) and is based on Cisco NX-OS software. Virtual Ethernet module or VEM is the part of Cisco Nexus 1000V that switches data traffic. This switch is the standard virtual switch in the Vblock and VxBlock Systems replacing the switch that comes with vSphere.
We’ve finished talking about the Vblock 300 and VxBlock 300 families. Next, we’ll discuss the Vblock 500 and VxBlock 500 families. There are important differences between the Vblock 500 and VxBlock 500 families compared to the systems previously discussed. But we’ll avoid spending much time discussing the technologies and components that are similar and we will focus on the differences. When done we’ll move on and discuss the Vblock 700 family and the VxBlock 700 family.
Vblock 500 and VxBlock 500 Basics

The Vblock and VxBlock 500 families are the industry's first 'all-flash' based converged infrastructure systems for high-performance mixed workloads and emerging 3rd platform applications. It is based on the industry’s leading Dell EMC XtremIO all-flash array, delivering up to 900,000 IOPS with consistent sub-millisecond application response times.

Using all flash drives is a key attribute of an XtremIO system but it is not its sole defining factor. XtremIO uses solid state disks, or Flash drives as well as proprietary intelligent software to deliver unparalleled levels of performance. Achievable performance ranges from hundreds of thousands to millions of IOPS, and consistently low latency of under one millisecond. The system is designed with a very simple user interface that makes provisioning and managing the array easy.

Some of the key XtremIO product features are listed here. The hardware components that comprise an XtremIO storage array are also listed. We are introducing each of these in this section.
There's not much that you haven't already learned about the compute and network technology in the Vblock 500 and VxBlock 500 families. Compute uses Cisco UCS blade servers, blade server chassis, and Fabric Interconnect. Note these systems can have as many as four UCS domains. We'll share more details on this in a moment. A segregated network with pairs of LAN switches, and SAN switches is the only networking option.

The unique features of these systems is in the storage. The storage technology used in the Vblock 500 and VxBlock 500 families is the EMC XtremIO all flash arrays. This targets applications requiring high I/O operations per second (or IOPS) and very quick response time. This technology produces the best IOPS and latency of any other Dell EMC converged infrastructure solution.

This technology is implemented in self contained units called EMC X-Bricks. Each X-Brick contains two storage processors called X-Brick Controllers as well as a DAE containing 25 flash storage drives. Also, but not represented in this illustration, each contains battery backup units to ensure no data is lost in the event of a power failure.
The Vblock 500 and VxBlock 500 families can contain a single X-Brick, or multiple X-Bricks. Specifically, these systems can contain one, two, four, or six X-Bricks. In systems with more than one X-Brick, the Controllers across all X-Bricks are connected using an InfiniBand switch, to in effect cluster the X-Bricks to form a single high capacity storage system. These switches provide a highly available back-end network that enables high speed, ultra-low latency communications across all Controllers across multiple X-Bricks. Note that neither unified networking nor unified storage configurations are available in the Vblock 500 and VxBlock 500 families.
The compute technology used in Vblock and VxBlock families offers something that we haven't discussed yet. These systems can have multiple UCS compute domains.

A single UCS compute domain consist of a pair of fabric interconnects (or FIs for short) with multiple blade chassis containing multiple blade servers. All Dell EMC converged infrastructure products have at least one UCS domain.

This illustration represents the compute capacity of a single compute domain. At maximum compute capacity, will contain two FIs, 16 blade server chassis, and 128 blade servers.
Vblock and VxBlock families can all have multiple UCS domains. These systems can be purchased with just a single UCS domain, but the compute capacity can be doubled by adding a second UCS domain. And in fact, these systems can contain as many as four UCS domains, in effect, quadrupling the compute power of a Vblock or VxBlock system with just a single UCS domain.

So, while all Dell EMC converged infrastructure systems provide significant compute power, those with multiple UCS domains can provide tremendous compute capacity over systems with a single UCS domain.
**X-Brick Storage Controller**

The Storage Controller is an Intel server and runs the XtremIO Operating System (XIOS). The Storage Controller needs 1U of rack space. Each Storage Controller has two InfiniBand ports for the internal XtremIO array communication. There are two 8 Gb/s Fibre Channel ports. There are two 6 Gb/s SAS ports used to connect to the X-Brick DAE. The storage controller also has 2 redundant Power Supply Units (PSUs), and a RJ45 COM port for the Battery Backup Unit (BBU) serial connection.
Disk Array Enclosure (DAE)

The disk array enclosure (DAE) comes fully-populated with 25 Flash drives. The drives are Enterprise Flash drives with a capacity of either 400GB or 800GB. Sizes can not be mixed in a DAE or cluster. The drive slots are numbered from 0 to 24 and all drives in Vblock 500 and VxBlock 500 configurations are encryption capable. These DAEs have redundant Power Supply Units.
Intra X-Brick InfiniBand Communication

Vblock 500 and VxBlock 500 systems with two or more X-Bricks are clustered to form a single system providing linear scalability of both performance and capacity. In a single X-Brick cluster, the storage controllers are directly connected to one another without the need of InfiniBand switches. With two or more X-Bricks, two 18-port InfiniBand 40 Gbps switches are provided. The switches provide a highly available back-end network that enables high speed, ultra-low latency communication between all Storage Controllers in the cluster.

The InfiniBand switch is an unmanaged switch, so there is no configuration or management by Dell EMC or the customer other than connecting the cables.
In this the last topic is this section we will discuss the Vblock 700 family and the VxBlock 700 family. Click Next to continue.
**Vblock 700 and VxBlock 700 Basics**

The Vblock 700 and VxBlock 700 families are Dell EMC’s highest capacity converged infrastructure products. While they are similar in some ways to other Vblock and VxBlock families, there are important differences to understand. We will review the similarities and differences.

The Vblock and VxBlock 700 families are designed to address core data center services. They offer the same UCS blade server technology, block level storage, and segregated networking as other Vblock and VxBlock family systems. As an option, customers can add software defined network technology to these systems. The Vblock 700 family offers Cisco Application Centric Infrastructure (or ACI), and the VxBlock offers a choice of ACI or VMware VNX.

In terms of differences, the Vblock 700 and VxBlock 700 families offer dramatically greater IT capacity. The Vblock and VxBlock 700 families are the only Dell EMC system that uses the Dell EMC VMAX storage products. These can contain two to eight storage processors for greater storage capacity. For compute, the Vblock and VxBlock 700 families can have multiple UCS domains. And depending on the configuration, higher capacity network switches are available.
We will not spend a lot of time reviewing the connectivity of the Vblock and VxBlock 700 families, because the components and connectivity are very similar to what you have already learned.

The compute technology uses the same Cisco UCS blade server, blade server chassis, and fabric interconnects you have reviewed already. Note that these systems can also have as many as four UCS compute domains.

Networking is a segregated network with two LAN and two SAN switches. In this segregated network two Cisco Nexus LAN switches connect to the compute Fabric Interconnects and to the customer’s site network. The two Cisco MDS SAN switches connect directly to both storage processor, which are called engines in EMC VMAX products.

A significant difference is the storage technology. The Vblock and VxBlock 700 families use the EMC VMAX products. These storage arrays are high-end, storage systems built for the virtual data center. They offer only block level storage.

Note that these storage arrays can contain up to eight storage processes.
EMC VMAX Storage Basics

The Dell EMC VMAX Family offers high-end storage systems built for the virtualized data center, with consistent and predictable performance, and consolidated workloads. The VMAX Family can provide several peta-bytes (PB) of storage utilizing tens to thousands of physical storage drives, and as you learned earlier can contain from 2 to 8 storage processors or engines. Within Vblock and VxBlock systems they connect to the compute via Fibre channel SAN.

EMC VMAX products provide tiered storage using enterprise flash drives, Fibre channel, and SATA storage drives.
Cisco Nexus 1000V – Virtual Switch

Like other Dell EMC converged infrastructure systems, the Vblock and VxBlock 700 families have the Nexus 1000V virtual network switch. These details were addressed earlier, but are available here for your review.
Summary – Comparison of Vblock and VxBlock Families

We’ve covered a lot of information about the Vblock and VxBlock converged infrastructure families. Now before we finish, this screen is an opportunity to review the differences between these systems and to explore the details of their components.

Use the slider on the screen to review the connectivity of each of these systems by clicking on and move the red disc along the continuum to access information about each product family. Also, click on any of the components on any of these screens for additional details. When you’re done click the next button.
Vblock and VxBlock 500 Families
Vblock and VxBlock 700 Families

Summary – Comparison of Vblock and VxBlock Families

- Dell EMC VMAX
- Cisco MDS SAN Switch
- Cisco Nexus LAN Switch
- Fabric Interconnect
- Cisco UCS Blade Server Chassis
- Cisco B-Series Blade Server
- Cisco B-Series Blade Server
- Cisco B-Series Blade Server
- Fabric Interconnect
- Engine (Storage Processor)
- Engine (Storage Processor)
- Disk Array Enclosure (DAE)

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