Now we will turn our attention to the Dell EMC hyper-converged infrastructure products. 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.
Upon completion of this training you will be able to identify both Dell EMC hyper-converged solutions. Distinguish between the technologies used in Dell EMC converged and hyper-converged solutions. Identify typical use cases for Dell EMC hyper-converged solutions. And identify the components and basic connectivity of the compute, storage, networking, and virtualization used in Dell EMC hyper-converged solutions.
In this section, our focus is Dell EMC’s two hyper-converged infrastructure solutions. The first, VxRail Appliance, targets the enterprise edge where customers have need for local IT capacity at remote sites or for individual groups that need isolated resources. The VxRail Appliance offers hyper-converged technology as an easy to implement solution which offers only limited scalability. Unlike other converged and hyper-converged infrastructures, it is delivered as an appliance. It is not delivered within an advanced cabinet and comes with no network switches and fabric.

The VxRack System is a Dell EMC solution engineered to handle the demands of enterprise and service provider organizations. But converged infrastructure products, the VxRack does so using hyper-converged infrastructure. Not all IT workloads are the same. Some are very stable and predictable so there’s little risk in investing in solutions like Vblock and VxBlock systems. Other business opportunities require workloads running applications with less predictable IT demands. Some are risky and demand cautious investment in IT capacity. Others can produce huge rewards to those that can quickly scale IT capacity to seize a business opportunity. Opportunities that require managing risk by starting small, or requiring lightning fast scaling, are both well suited for Dell EMC VxRack systems. These systems are great matches for third platform applications.
In contrast to traditional converged infrastructure solutions, hyper-converged infrastructure (HCI) is a software-defined architecture. You learned earlier that virtualization is a technology that allows a physical resource (like a computer) to be divided into a number of virtual devices that can behave like and do the same things as a physical device. Applied to compute, virtualization is the process of dividing the physical resources of a computer, things like its memory and processor, into separate virtual computers that can perform tasks just like a real physical computer can. Other technologies can also be virtualized. Physical network switches can be abstracted into virtual switches and used to create virtual LAN or SAN networks. And physical storage can be abstracted into virtual storage arrays.

A software defined architecture enables compute, storage, and networking functions to be decoupled from the underlying infrastructure to create virtual pools of compute, network, and storage resources. And remember, virtual pools of IT resources cost less and are easier to implement and manage.
Remember, in the converged infrastructure families, the compute, network, and storage technologies are distinct and separate technologies within each system.

Dell EMC hyper-converged infrastructures do not contain a physical storage array.  The separate storage layer is replaced with direct attached storage that consolidates compute and storage resources into a single-layer architecture where applications reside and run on the same servers containing direct attached storage drives.  These are networked to form a scale-out cluster, or infrastructure built for rapid elasticity.
These systems utilize software defined storage that creates a virtual storage pool from physical storage drives that are directly attached to compute servers. Self-contained units of servers and networking, like the VxRack 1000 series, are well suited for use cases that require a highly scalable infrastructure. The VxRack 1000 series provides flexibility in the choice of software-defined storage technologies, a choice of hypervisors, and is capable of running bare-metal workloads.
These are the topics that we will discuss in this section. We will begin with the VxRack System 1000 Series.
The Dell EMC VxRack System 1000 Series is a new hyper-converged offering that complements Dell EMC’s converged infrastructure systems. These self-contained units of servers and networking are well-suited for the rapid growth in next-generation applications-enabling you to support a growing number of use cases with built-in resiliency and less stringent availability and performance requirements on infrastructure. The VxRack System 1000 Series can incorporate alternate software-defined storage technologies, a choice of hypervisors, and bare metal workloads.
VxRack System 1000 Series Components

Unlike some hyper-converged infrastructure products, VxRack Systems come in its own cabinet. A minimum of three VxRack enclosures, which house servers and storage drives, are contained in these cabinets. And depending on the system configuration, it can contain a maximum of 24 nodes in a single VxRack cabinet.

Each of these enclosures contain between one server or node, and up to 24 storage drives. We'll talk about specific configurations in a few minutes.

For network connectivity within the cabinet and to the customer network, Cisco Nexus 3000 Series switches are used. For configurations involving multiple VxRack cabinets, Cisco Nexus 9000 series switches are used for connectivity between cabinets. Note that in the future these systems could be offered with other non-Cisco switches.

The last component is a management server. Management applications and tools are installed and run on this server.
Let's talk about the VxRack System 1000 connectivity. Each VxRack enclosure contains one node, or server, and depending on the VxRail model, it will be a 1 RU or 2 RU enclosure. This illustration shows a single node VxRack enclosure configuration. These contain compute components like you learned about earlier. Things like CPUs, memory, and VICs. However, unlike the compute in converged infrastructure systems, these servers also contain direct attached storage or DAS. Depending on the system model, these can contain a maximum of 24 direct attached storage drives.

Remember that each VxRack cabinet contains two top of rack network switches that provide connectivity to the customer's network. These also provide the network connectivity between the nodes within the same VxRack cabinet.

These nodes also leverage software-defined storage technology to virtualize the server’s direct-attached storage into a shared network-based storage pool that is similar to SAN storage.
The VxRack 1000 is offered in two software personas. The first is the VxRack FLEX. It is based on EMC ScaleIO software-defined storage technology.

The second, is the VxRack SDDC. It is based on the VMware EVO software defined data center (SDDC).

In a nutshell, the core difference between the two is that FLEX provides a foundation for delivering IaaS using EMC ScaleIO, whereas the SDDC persona includes a more comprehensive software stack to deliver a turnkey VMware-based private cloud solution. Let's spend some time talking about each of these.
VxRack FLEX

VxRack System 1000 FLEX Leverages Dell EMC ScaleIO, an industry-leading software-defined storage technology for virtualizing direct-attached storage into a shared network-based storage pool that is similar to SAN storage.

This system offers a flexible foundation for delivering infrastructure as a service to support a wide range of use cases. The VxRack System 1000 FLEX makes it easy to achieve extreme scale upwards of 1000+ nodes. This system will support multiple hypervisor including vSphere at product launch, and the availability to alternative hypervisors later.

In addition, software-defined networking is optional.
VxRack Software Defined Data Center (SDDC)

VxRack System 1000 SDDC leverages VMware EVO SDDC to deliver not just virtualized storage, but also virtualized compute and networking too using the VMware vSphere hypervisor.

VSAN storage virtualization technology enables scale-out storage optimized for a vSphere virtual infrastructure. This system creates a simplified, fully optimized VMware private cloud solution, enabling infrastructure as a service (IaaS) as well as platform as a services (PaaS) for a range of use cases.

Simplified deployment, configuration and ongoing operations management with the EVO SDDC Manager, resulting in greater simplicity and faster time-to-value. Enhanced network and security capabilities are made available with VMware NSX software defined networking technology.
In this the last topic of this section, we’ll address the Dell EMC VxRail hyper-converged infrastructure appliance. Then you’ll be ready for the section assessment. Click next to continue.
The VxRail is the exclusive hyper-converged infrastructure produced by Dell EMC and VMware. It is the easiest and fastest way to stand up a fully virtualized Software-Defined Data Center (SDDC) environment.

It provides a simple, cost-effective hyper-converged solution that is an easy to implement appliance, delivering compute, network, storage, virtualization, and management for a wide variety of applications and workloads.

Built on the foundation of VMware Hyper-Converged software it is managed through vCenter, providing existing VMware customers an experience they are already familiar with. Including seamless integration with existing VMware tools, such as vCops and vRealize, which let customers leverage and extend their existing IT tools and processes.

Also, the VxRail is discoverable and visible in Dell EMC Vision Intelligent Operations Software, which provides a comprehensive IT management ecosystem.

The VxRail Appliance is fully loaded with integrated mission-critical data services. This includes replication, backup, and cloud tiering. The VxRail Appliance incorporates data protection technology, including Dell EMC RecoverPoint for VMs and VMware vSphere Data Protection. Integrated Dell EMC CloudArray seamlessly extends the VxRail Appliance to public and private clouds for securely expanding storage capacity without limits, providing an additional 10 TB of on-demand cloud storage per appliance.
The architecture of the VxRail Appliance is a distributed system consisting of common modular building blocks that scale linearly from 1 to 32 appliances, offering up to 64 nodes in a cluster. But now let's pull apart the components and get specific about the individual hardware and software technologies found in the VxRail appliance.
The VxRail appliance has up to four nodes within each enclosure. Each node contains compute, storage, and networking technology. But don't forget, this isn't the same technology found in other Dell EMC converged systems. For example, all of this technology is contained in a single 2RU appliance with no storage array and no network switches.

When we look inside, the hardware includes storage. Each node comes with six storage drives. At product launch these were hybrid drives which combine solid-state drive (SSD) hard disk drive (HDD) technologies. Soon after, all solid state or flash drives were available for customers needing maximum performance and scaling for mission critical workloads and applications that demand low latency.

These nodes also contain compute components. Each has two Intel Xeon Processor for CPUs and as much as 512 Giga Bytes of memory or RAM. You'll also find a couple of network interface cards, or NICs, which provide connectivity to network switches which are supplied by the customer.
Full configured, the VxRail Appliance’s four nodes can contain 24 storage drives, eight CPUs, and over 2,000 GB of RAM. And for additional IT capacity, these systems can be clustered with as many as 16 appliances in a single cluster. We'll discuss this in more detail in a moment.
In addition to these hardware components, the VxRail Appliance utilizes important software components. To start with, it uses VMware vSphere Enterprise Plus for managing the virtualization environment. This incorporates the ESXi hypervisor and vCenter Server which is used to manage virtual machines, multiple ESXi hosts, templates, and VM clones.

VMware Virtual SAN is Software-defined storage which is embedded in vSphere. It is used to aggregate locally attached storage from each ESXi host in a cluster creating storage pools. This in effect produces the power of a whole SAN in a two-rack unit appliance, providing a hyper-converged solution for a wide variety of applications and workloads.

Dell EMC Vision Intelligence Operations Software is optional for VxRail systems, which as you know is software designed to manage version management and the life cycle of Dell EMC systems.
The final component we'll discuss here, the Dell EMC VxRail Manager, coordinates storage, network, and compute resources to help customers more quickly configure, administer, and speed the deployment of virtual machines. It provides deeper hardware awareness than is available from component element managers and is the vehicle by which alerts and notifications are displayed to the user in a simple and easy-to-understand interface. The VxRail Manager leverages the underlying VMware vRealize Log Insight software to capture events and provide real-time holistic notifications about the state of virtual applications, virtual machines, and appliance hardware. VxRail Manager also provides one-click access to Dell EMC support and online chat from within the appliance. And in addition, it provides access to Dell EMC knowledge base articles, to the VxRail Community for online and real-time information, and to VxRail best practices.
VxRail Appliance Families

VxRail Appliance models are available to meet the requirements of a variety of use cases. All models have a wide range of available CPU, memory, SSD cache, and capacity storage configuration options. Let’s discuss some of these.

The G Series is designed general purpose needs. It offers the most dense compute configuration with up to four nodes per appliance. This model uses a 2U 4-node design, and powerful Intel Broadwell processors with up to 512 GB of memory. Hybrid storage drives are available with up to 10 TB, and all flash drives with up to 19.2 TB are also available.

Next is the E Series or entry-level system which is ideally suited for remote office and back office operations (ROBO). This is a 1U single node system with Intel Broadwell processors offering a maximum of 1536 GB of memory. It offers up to 16 TB of storage using hybrid drives, and up to 30.7 TB in all flash configurations.

The V Series is optimized for VDI environments that require high-end 2D and 3D graphic processing, it supports one or two Graphic Processing Units (GPUs) per node. In a 2U single node design, it also utilizes Intel Broadwell processors offering a maximum of 1536 GB of memory. In addition, it offers up to 24 TB of storage using hybrid drives, and up to 46 TB in all flash configurations.

The P Series, another 2U single node system, is performance optimized with more powerful processor options, offers memory configurations up to 1536GB, with storage capacity up to 24 TB in hybrid drives and 46 TB in all flash configurations.
And finally, the S Series is a storage dense system. These are well suited for use cases requiring even greater storage as it uses larger capacity 3.5-inch storage drives. This 2U single node system offer up to 1536 GB memory, and comes with hybrid storage drives only and up to 48 TB.