What is virtual infrastructure?

Virtual infrastructure is a collection of software-defined components that make up an enterprise IT environment. A virtual infrastructure provides the same IT capabilities as physical resources, but with software, so that IT teams can allocate these virtual resources quickly and across multiple systems, based on the varying needs of the enterprise.

By decoupling physical hardware from an operating system, a virtual infrastructure can help organizations achieve greater IT resource utilization, flexibility, scalability and cost savings. These benefits are especially helpful to small businesses that require reliable infrastructure but can't afford to invest in costly physical hardware.

Benefits of virtual infrastructure

The benefits of virtualization touch every aspect of an IT infrastructure, from storage and server systems to networking tools. Here are some key benefits of a virtual infrastructure:

- **Cost savings:** By consolidating servers, virtualization reduces capital and operating costs associated with variables such as electrical power, physical security, hosting and server development.
- **Scalability:** A virtual infrastructure allows organizations to react quickly to changing customer demands and market trends by ramping up on CPU utilization or scaling back accordingly.
- **Increased productivity:** Faster provisioning of applications and resources allows IT teams to respond more quickly to employee demands for new tools and technologies. The result: increased productivity, efficiency and agility for IT teams, and an enhanced employee experience and increased talent retention rates without hardware procurement delays.
- **Simplified server management:** From seasonal spikes in consumer demand to unexpected economic downturns, organizations need to respond quickly. Simplified server management makes sure IT teams can spin up, or down, virtual machines when required and re-provision resources based on real-time needs. Furthermore, many management consoles offer dashboards, automated alerts and reports so that IT teams can respond immediately to server performance issues.

Virtual infrastructure components

By separating physical hardware from operating systems, virtualization can provision compute, memory, storage and networking resources across multiple virtual machines (VMs) for greater application performance, increased cost savings and easier management. Despite variances in design and functionality, a virtual infrastructure typically consists of these key components:

- **Virtualized compute:** This component offers the same capabilities as physical servers, but with the ability to be more efficient. Through virtualization, many operating systems and applications can run on a single physical server, whereas in traditional infrastructure servers were often underutilized. Virtual compute also makes newer technologies like cloud computing and containers possible.
- **Virtualized storage:** This component frees organizations from the constraints and limitations of hardware by combining pools of physical storage capacity into a single, more manageable repository. By connecting storage arrays to multiple servers using storage area networks, organizations can bolster their storage resources and gain more flexibility in provisioning them to virtual machines. Widely used storage solutions include fiber channel SAN arrays, iSCSI SAN arrays, and NAS arrays.
- **Virtualized networking and security:** This component decouples networking services from the underlying hardware and allows users to access network resources from a centralized management system. Key security features ensure a protected environment for virtual machines, including restricted access, virtual machine isolation and user provisioning measures.
- **Management solution:** This component provides a user-friendly console for configuring, managing and provisioning virtualized IT infrastructure, as well automating processes. A management solution allows IT teams to migrate virtual machines from one physical server to another without delays or downtime, while enabling high availability for applications running in virtual machines, disaster recovery and back-up administration.

Virtual infrastructure requirements

From design to disaster recovery, there are certain virtual infrastructure requirements organizations must meet to reap long-term value from their investment.

- **Plan ahead:** When designing a virtual infrastructure, IT teams should consider how business growth, market fluctuations and advancements in technology might impact their hardware requirements and reliance on compute, networking and storage resources.
- **Look for ways to cut costs:** IT infrastructure costs can become unwieldly if IT teams don't take the time to continuously examine a virtual infrastructure and its deliverables. Cost-cutting initiatives may range from replacing old servers and renegotiating vendor agreements to automating time-consuming server management tasks.
- **Prepare for failure:** Despite its failover hardware and high availability, even the most resilient virtual infrastructure can experience downtime. IT teams should prepare for worst-case scenarios by taking advantage of monitoring tools, purchasing extra hardware and relying on clusters to better manage host resources.

Virtual infrastructure architecture

A virtual infrastructure architecture can help organizations transform and manage their IT system infrastructure through virtualization. But it requires the right building blocks to deliver results. These include:

- **Host:** A virtualization layer that manages resources and other services for virtual machines. Virtual machines run on these individual hosts, which continuously perform monitoring and management activities in the background. Multiple hosts can be grouped together to work on the same network and storage subsystems, culminating in combined computing and memory resources to form a cluster. Machines can be dynamically added or removed from a cluster.
- **Hypervisor:** A software layer that enables one host computer to simultaneously support multiple virtual operating systems, also known as virtual machines. By sharing the same physical computing resources, such as memory, processing and storage, the hypervisor stretches available resources and improves IT flexibility.
- **Virtual machine:** These software-defined computers encompass operating systems, software programs and documents. Managed by a virtual infrastructure, each virtual machine has its own operating system called a guest operating system.
  The key advantage of virtual machines is that IT teams can provision them faster and more easily than physical machines without the need for hardware procurement. Better yet, IT teams can easily deploy and suspend a virtual machine, and control access privileges, for greater security. These privileges are based on policies set by a system administrator.
- **User interface:** This front-end element means administrators can view and manage virtual infrastructure components by connecting directly to the server host or through a browser-based interface.

Virtual infrastructure requirements

Your virtual infrastructure must meet minimum requirements before you can begin deployment.

Memory page swapping negatively impacts performance of the virtual appliance and the management application. Competing for CPU resources that are unavailable due to overall host utilization can degrade performance. Reserving the listed values for memory and CPU resources for the virtual appliance guarantees that the required minimum amount is always available to the virtual machine, and is required for running this virtual appliance.

The following table displays the minimum values required for memory and CPU resources in the default configuration. These values have been qualified for the virtual appliance to meet minimum acceptable performance levels.

Default hardware configuration	Minimum Requirement
Disk space needed for thin provisioning	5 GB
Disk space needed for thick provisioning Note: If deploying an NFS datastore on a storage system running clustered Data ONTAP, without the NetApp NFS Plug-in for VMware VAAI, you cannot use the thick provisioning option.	300 GB
Memory needed for the Performance Manager virtual appliance	12 GB and Reservation 12 GB
Processors needed for the Performance Manager virtual appliance	4 virtual CPUs
Process cycles (CPU speed) needed for the Performance Manager virtual appliance	9572 MHz and Reservation 9572 MHz

VMware High Availability for the Performance Manager virtual appliance is not supported. The virtual appliance can be deployed on a VMware server that is a member of a VMware High Availability environment, but utilizing the VMware High Availability functionality is not supported.