Dell EMC Ready Architectures for VDI

Designs for VMware Horizon on XC Family

November 2018

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Design Guide

Abstract

This design guide describes technical considerations and best practices for integrating VMware Horizon brokering software with Dell EMC XC Family devices to create virtual application and desktop environments in a VMware vSphere environment.

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Content

Executive summary

Business challenge

In the past, moving from traditional PCs to a virtual desktop infrastructure (VDI) solution was challenging. A classic VDI implementation of 100 applications and 1,000 users could take 250 days or more, and the final cost was often unpredictable. Organizations today require end-to-end desktop and application virtualization infrastructure solutions that are flexible, reliable, scalable, and easy to deploy.

Desktop virtualization helps improve service delivery and competitiveness by simplifying how IT works on systems, dramatically reducing the complexity of the system and making it more flexible. The IT team can then move from being a largely reactive technical group to playing a proactive role in the strategic organization. Dell EMC can assist IT teams in this journey while improving user experience with the Dell EMC Ready Architectures for VDI.

Some challenges that organizations face today include:

- **Workforce empowerment**— Personal technology is driving newer and higher expectations. People want the same benefits at work as they have on their personal devices. They want faster, easier-to-use devices and applications that fit their specific needs. Technology itself has become a way to attract and retain the best talent. It has become a differentiator and a job perk.

- **Optimized IT resources**—Organizations that manage a large number of traditional PCs find that the task is becoming increasingly complex. With desktop virtualization, you move applications, data, and the OS (the desktop) to the data center. IT can centrally manage the virtual desktop from the data center and save time and money by troubleshooting PCs remotely instead of physically visiting each PC.

- **Improved security**—Organizations require the ability to control data, recover from disasters, apply policies, comply with regulations, and monitor risk. Maintaining data and application security, as well as compliance, are the leading IT concerns in organizations of all sizes. Mobile office trends and bring-your-own device initiatives mean that more devices and sensitive data are out of direct IT control, increasing the risk for data theft, viruses, malware, and ransomware attacks. In addition, traditional antivirus solutions cannot keep up with the amount of new malware that is created daily. Non-security IT specialists also tend to find security and compliance complex.

- **Cost management**—Organizations must monitor and optimize the total cost of ownership (TCO), achieve greater utilization from infrastructure assets, and reduce energy use.

Technology solution

Dell EMC Ready Architectures for VDI on XC Family devices provide a quick and easy way to simplify and extend your VDI environment. Since Ready Architectures for VDI combine compute, storage, virtualization, and management, these solutions are ideal for VDI.

The Ready Architectures for VDI are built on industry-leading Dell EMC XC Family devices. These true hyper-converged infrastructure (HCI) platforms provide performance, flexibility, and scale for VDI environments.

Dell EMC recommends XC Family devices for customers who require a VMware Horizon broker with a Nutanix-based hyper-converged infrastructure (HCI) solution. In this case, the Dell EMC XC Family provides a complete VDI solution. VMware Horizon 7 VDI technology is enhanced with a HCI environment that is built on 14th Generation Dell EMC PowerEdge servers. The solution is further optimized by Dell EMC software and services in the areas of deployment, recovery, management, and automation.

The XC Family includes the following choices. The hardware and software are the same. The difference is in the licensing and service providers.

- **Dell EMC XC Core systems**—Purchase Nutanix licenses through the Nutanix partner ecosystem. Nutanix provides support for Nutanix software.

- **Dell EMC XC Series appliances**—Purchase Nutanix licenses as part of the appliance purchase from Dell EMC or the Dell EMC partner ecosystem. Dell EMC is the initial support contact point for Dell EMC XC Series appliances.

Installing VMware Horizon 7 with its VDI components on XC Family devices enables organizations to quickly deliver Microsoft Windows virtual desktops or server-based hosted shared sessions on a wide variety of endpoint devices.

Key benefits

Dell EMC offers comprehensive, flexible, and efficient VDI solutions that are designed and optimized for your organization's needs. These VDI solutions are easy to plan, easy to deploy, and easy to run.

- **XC Family lifecycle management (LCM)**—Automates software and firmware updates for XC Family clusters, providing inventory and cluster-aware update capability.

- **Simplified Dell EMC networking solutions**—Reference architectures, deployment guides, and best practices ensure that the networking component on an XC Family solution can support an accelerated time-to-value.

- **ProDeploy**—Provides on-site implementation, including planning, installation, and configuration.

- **Support Flexibility**—Choose Dell EMC XC Series appliances with a single point-of-contact for hardware and HCI software or select XC Core systems for hardware support from Dell EMC and software support for HCI from Nutanix.

Document purpose

This document introduces the architecture, components, design options, best practices, and configuration details for successful VDI deployments for XC Family devices with VMware Horizon 7.

Audience

This guide is for decision makers, managers, architects, developers, and technical administrators of IT environments who want an in-depth understanding of the value of the Ready Architectures for VDI that deliver Microsoft Windows virtual desktops to users using VMware Horizon 7 VDI components on XC Family devices.

We value your feedback

Dell EMC and the authors of this document welcome your feedback on the solution and the solution documentation. Contact Dell EMC Solutions team with your comments.

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The following page on the Dell EMC Communities website provides links to additional documentation for VDI Ready Solutions: VDI Info Hub for Ready Solutions.

Solution architecture

This section provides an architecture overview and guidance on managing and scaling a VMware Horizon 7 environment on Dell EMC XC Family devices.

Architecture overview

The following figure depicts the architecture of the validated solution, including the network, compute, management, and storage layers. This architecture aligns with the VMware Horizon Block/Pod design. A pod is divided into multiple blocks. Each block is made up of one or more vSphere clusters, a Virtual Center, and, for linked clones, a composer server.

Figure 1 XC Family devices with VMware Horizon
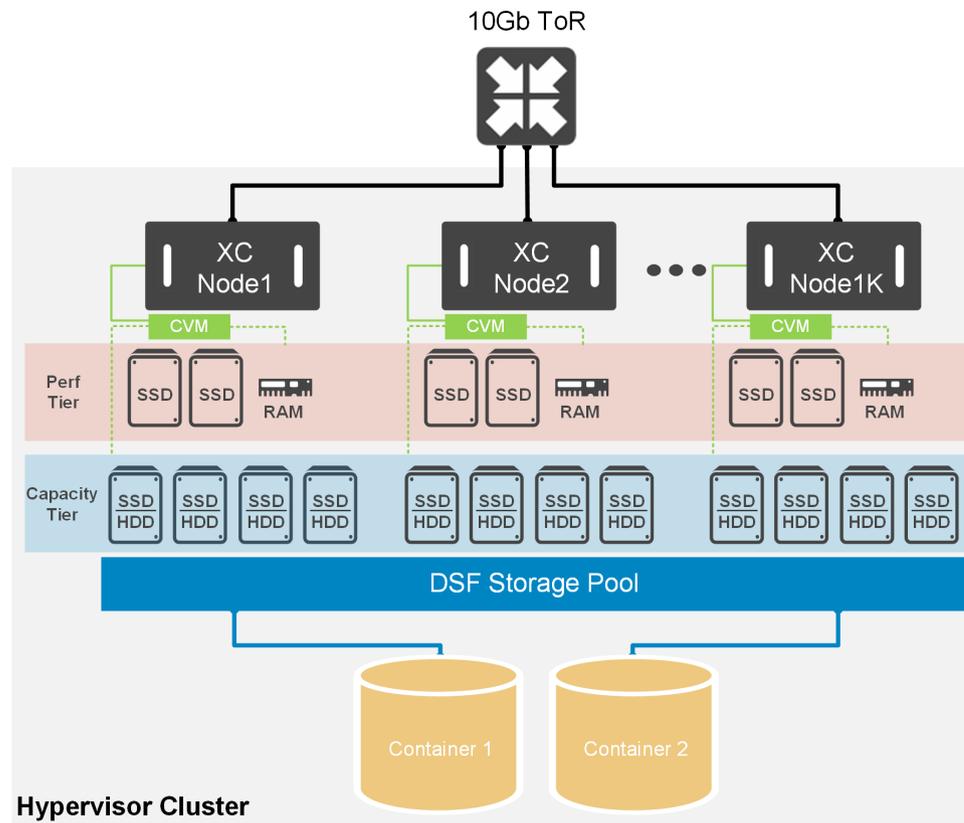
You can use any of the Horizon supported cloning techniques—full, linked, and instant—to deploy this Dell EMC Ready Architecture for VDI.

A vSphere Cluster can have a maximum of 64 nodes and 8,000 VMs per cluster. To expand from this limit, you can add clusters and balance the VMs and nodes across the new clusters.

The Horizon 7 Enterprise Edition Reference Architecture provides more information about Horizon pods and blocks.

Scaling the solution

Solutions based on XC Family devices provide flexibility as you scale, reducing the initial and future cost of ownership. Add additional physical and virtual servers to the server pools to scale horizontally. Add resources to the infrastructure, for example, SSD drives, to scale vertically.

Scaling out

Each component of the solution architecture scales independently depending on the required number of supported users. You can add XC Family nodes at any time to expand the SDS pool in a modular fashion.

The boundary for a Horizon block is the vCenter. The number of virtual machines a vCenter (and therefore a block) can host depends on the type of Horizon 7 VMs being used. The recommendation limits for a Horizon block are as follows:

- 5,000 instant-clone VMs (without App Volumes)
- 4,000 linked-clone or full-clone VMs (without App Volumes)
- 2,000 VMs (all clone types) if App Volumes or AppStacks are attached

This Ready Architecture for VDI uses instant clones, as shown in the following figures.

VMware recommends a limit of 5,000 instant-clone VMs per block. With these limits in mind, 25 compute nodes with 200 Task-User VMs per Node would reach the maximum number of VMs for the block.
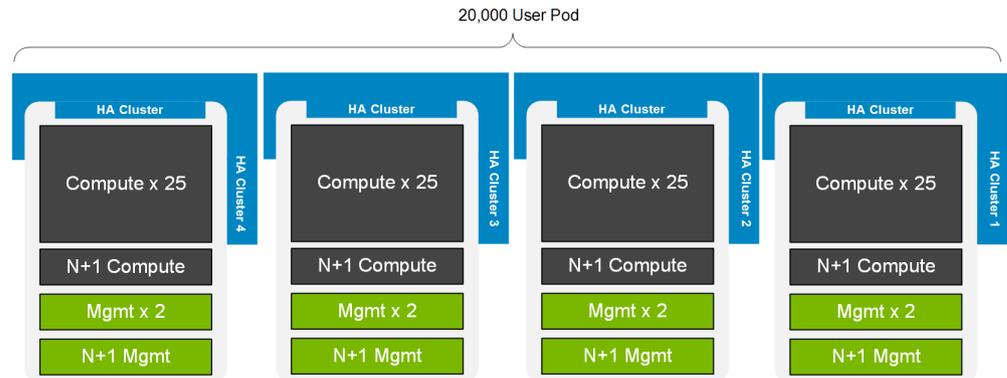
The following figure shows a 5,000-user Horizon block based on a 200-user per node density.

Figure 2 Single 5,000-user block
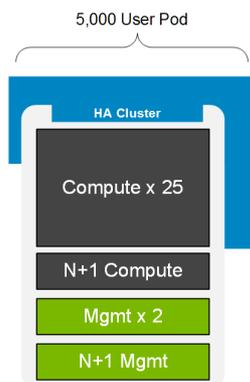
The following figure shows a scale-out to a 20,000-user Horizon pod with 5,000 user blocks. Each block contains its own vCenter Server instance and VDI components.

Figure 3 Scaleout for 20,000 users

Scaling up

Dell EMC recommends a validated disk configuration for general purpose VDI. These configurations leave drive slots available for future vertical expansion and ensure that you protect your investment as new technology transforms your organization.

Note

These configurations can accept additional or faster processors or memory than the guidance provided here.

The VMware Workspace ONE and VMware Horizon 7 Enterprise Edition On-premises Reference Architecture provides more information about Horizon pod/block architecture and scaling.

Management and multi-site considerations

Dell EMC recommends that the VDI management infrastructure nodes be separated from the compute resources. Because our test environment was small, both management and compute are in the same vSphere HA cluster. Optionally, the management node can also be used for VDI VMs with an expected reduction of 30 percent of host resources for these nodes only. The 30 percent accounts for management VM resource reservations and should be factored in when sizing.

Compute hosts can be used interchangeably for Horizon Apps hosted applications and desktops, as required.

This design guide describes a single-site or single data center design. For multi-site or disaster recovery (DR) configurations, refer to the Horizon 7 Enterprise Edition Multi-Site Reference Architecture.

Key components

This section describes the key hardware and software components of the solution.

XC Family

The Dell EMC XC Family is a powerful hyper-converged infrastructure (HCI) environment that is available in 1U or 2U environments. The XC Family is built on Nutanix software and the proven Dell EMC PowerEdge 14th generation server platform. These devices incorporate many of the advanced software technologies that power leading web-scale and cloud infrastructures.

The following figure shows the components and benefits of XC Family devices.

Figure 4 Dell EMC XC Family device overview
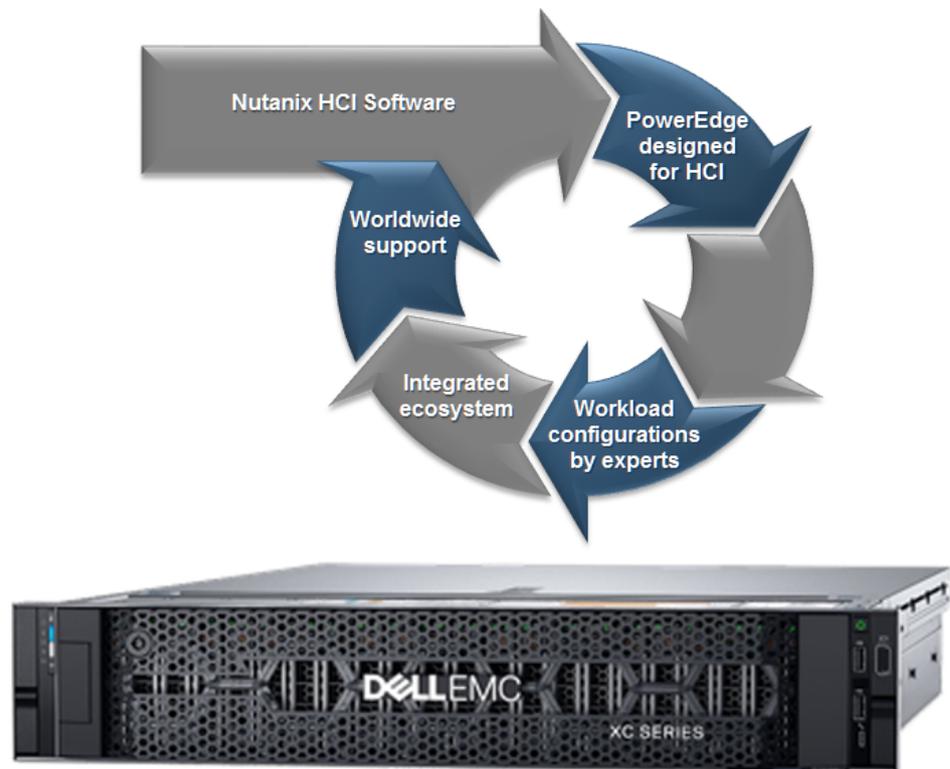
For VDI-optimized configurations, you can deploy a cluster with as few as three nodes, providing an ideal environment for small deployments. To achieve full XC high availability, the recommended starting cluster size is four nodes. The XC Family can support storage-heavy workloads with storage-dense nodes, graphics-heavy VDI workloads with GPU hardware, and entry-level nodes for remote and branch office environments.

The following XC Family devices are recommended for VDI:

• **Dell EMC XC640**—A 10-disk 1U platform with a broad range of configuration options. Each appliance comes equipped with dual CPUs, 10 to 28 cores, and up to 1.5 TB of high-performance RAM.
  For the hybrid disk configuration, a minimum of six disks is required in each host: two SSDs for the performance tier (Tier1) and four HDDs for the capacity tier

(Tier2), which can be expanded up to eight HDDs as required. For the all-flash disk configuration, the chassis must be populated with a minimum of four SSDs.

The M.2-based BOSS module boots the hypervisor and Nutanix Controller VM, while the PERC HBA330 connects the CVM to the SSDs and HDDs. 64 GB is consumed on each of the first two SSDs for the Nutanix home directory.

All HDD/SSD disks are presented to the Nutanix CVM running locally on each host, which contributes to the clustered DSF storage pool. Each platform can be outfitted with SFP+ or BaseT NICs.

- **Dell EMC XC740xd**—A 2U platform that can be configured with 24 x 2.5" disks or 12 x 3.5" disks to serve a broad range of capacity requirements. Each appliance comes equipped with dual CPUs, 10 to 28 cores, and up to 1.5 TB of high-performance RAM.
  A minimum of six disks is required in each host: two SSDs for the performance tier (Tier1) and four HDDs for the capacity tier (Tier2), which can be expanded as required up to 45 TB per node raw. The M.2-based BOSS module boots the hypervisor and Nutanix Controller VM, while the PERC HBA330 connects the CVM to the SSDs and HDDs. 64 GB is consumed on each of the first two SSDs for Nutanix Home.

All HDD and SSD disks are presented to the Nutanix CVM running locally on each host, which contributes to the clustered DSF pool. Each platform can be outfitted with SFP+ or BaseT NICs. The 24-disk XC740xd can support up to three NVIDIA M60 or two M10 GPU cards. Higher wattage power supplies (up to 2,000 W per PSU) are required when GPUs are in use.

The following table shows the full range of configurations that are available for XC640 and XC740xd devices. More specific recommendations are presented in the next section.

Table 1 Available Dell EMC XC Family 640 and 740xd configurations

XC640-4 & -4i	XC640-10	XC740xd-24	XC740-xd12	XC740xd-12C	XC740xd-12R
• 4x 3.5" Drives • 64GB - 1.5 TB • Hybrid, all flash • XC640-4: 3+ node mission critical • XC640-4i: 1 or 2 node non-mission critical	• 10x 2.5" Drives • 4x 3.5" Drives • Hybrid, all flash, NVME +SSD • NVME • 128 GB - 1.5 TB memory	• 24x 2.5" Drives • 64 GB - 1.5 TB memory • Hybrid, all flash, NVME +SSD • Nvidia M10 and M60 GPUs	• 12x 3.5" Drives • 128 GB - 1.5 TB memory • Hybrid, all flash	• 12x 3.5" Drives • 64 GB - 768 GB memory • Hybrid, all flash	• 12x 3.5" Drives • 64 GB - 768 GB memory • Hybrid, all flash

Dell EMC Ready Architectures VDI-optimized configurations

The Ready Architectures for VDI team recommends the VDI-optimized 2U XC740xd devices that support GPU hardware for graphics-intensive desktop deployments.

The XC740xd can be configured with or without GPUs. Dell EMC also offers similar configurations in a 1U XC640 device, although graphics configurations are not available on these platforms.

For convenience, we have designated common configurations as *A3*, *B5*, and *C7*. These designations are referenced throughout the document.

Configuration	CPU	RAM	Disk	GPU (optional)	Description
A3	2 x 10-core	192 GB (12x 16 GB @ 2,400 MHz)	4 TB + (Capacity)	Up to 3 x full length, dual width (FLDW)	For small-scale, proof of concept (POC), or low-density, cost-conscience environments
B5	2 x 14-core	384 GB (12x 32 GB @ 2,400 MHz)	6 TB + (Capacity)	Up to 3 x FLDW	Geared toward larger-scale general-purpose workloads; balances performance and cost-effectiveness
C7	2 x 20-core	768 GB (24 x 32 GB @ 2,667 MHz)	8 TB + (Capacity)	Up to 3 x FLDW	Offers an abundance of high-performance features and tiered capacity that maximizes user density

NVIDIA GPU

NVIDIA GPU accelerators provide high performance for demanding enterprise data center workloads.

In applications ranging from energy exploration to deep learning, scientists can now process petabytes of data up to ten times faster than with CPUs. NVIDIA accelerators deliver the horsepower needed to run large simulations faster than ever before. For enterprises deploying VDI, NVIDIA accelerators are perfect for accelerating virtual desktops. GPUs can be used in configurations based on XC740xd devices.

Physical network components

Ready Architectures for VDI for appliances allow for flexibility in networking selections. VDI validations have been successfully performed with the following hardware, although several other choices are available.

- **Dell EMC Networking S3048 (1 GbE ToR switch)**—The S3048 switch accelerates applications in high-performance environments with a low-latency top-of-rack (ToR) switch that features 48 x 1 GbE and 4 x 10 GbE ports, a dense 1U design, and up to 260 Gbps performance. The S3048-ON also supports Open Network Installation Environment (ONIE) for zero-touch installation of alternate network operating systems.

- **Dell EMC Networking S4048 (10 GbE ToR switch)**—The S4048 switch optimizes your network for virtualization with a high-density, ultra-low-latency ToR switch that features 48 x 10 GbE SFP+ and 6 x 40 GbE ports (or 72 x 10 GbE ports in breakout mode) and up to 720 Gbps performance. The S4048-ON also supports ONIE for zero-touch installation of alternate network operating systems.

Dell EMC Networking S-Series 10GbE switches on the Dell EMC website provides more information about these switches.

Note

Ensure that you follow the deployment and best practices provided in the Dell EMC XC Series Networking Deployment and Best Practices Guide.

Networking

Designed for true linear scaling, XC Family devices use a leaf-spine network architecture, which consists of two network tiers: an L2 Leaf and an L3 Spine based on 40 GbE and non-blocking switches. This architecture maintains consistent performance without any throughput reduction.

VMware vSphere

VMware vSphere provides a powerful, flexible, and secure foundation for business agility that accelerates the digital transformation to cloud computing and promotes success in the digital economy.

vSphere provides the following benefits for VDI applications:

- **Improved Appliance Management**—The vCenter Server Appliance Management interface provides CPU and memory statistics, network and database statistics, disk space usage, and health data. These features reduce reliance on a command-line interface for simple monitoring and operational tasks.

- **VMware vCenter Server native high availability**—This solution for vCenter Server Appliance consists of active, passive, and witness nodes that are cloned from the existing vCenter Server instance. The vCenter HA cluster can be enabled, disabled, or destroyed at any time. Maintenance mode prevents planned maintenance from causing an unwanted failover. The vCenter Server database uses Native PostgreSQL synchronous replication, while key data outside the database uses a separate asynchronous file system replication.

- **Backup and Restore**—Native backup and restore for the vCenter Server Appliance enables users to back up vCenter Server and Platform Services Controller appliances directly from the VAMI or API. The backup consists of a set of files that is streamed to a selected storage device using SCP, HTTP(S), or FTP(S) protocols. This backup fully supports VCSA instances with both embedded and external Platform Services Controller instances.

- **VMware vSphere HA Support for NVIDIA GRID vGPU-configured VMs**—vSphere HA protects VMs with the NVIDIA GRID vGPU shared pass-through device. In the event of a failure, vSphere HA attempts to restart the VMs on another host that has an identical NVIDIA GRID vGPU profile. If no available healthy host meets this criterion, the VM fails to power on.

- **VMware Log Insight**—Provides log management, actionable dashboards, and refined analytics, which enable deep operational visibility and faster troubleshooting.

Note

vSphere Enterprise Edition (or vSphere Desktop) is required to support NVIDIA graphics cards.

VMware Horizon

The architecture that this guide describes is based on VMware Horizon 7, which provides a complete end-to-end solution delivering Microsoft Windows virtual desktops to users on a wide variety of endpoint devices. Virtual desktops are dynamically assembled on demand, providing users with pristine, yet personalized, desktops each time they log on.

VMware Horizon 7 provides a complete virtual desktop delivery system by integrating several distributed components with advanced configuration tools that simplify the creation and real-time management of the virtual desktop infrastructure.

The Horizon resources page on the VMware product resources website provides more information. Also see the Horizon License FAQ.

The core Horizon components include:

- **Horizon Connection Server (HCS)**—Installed on servers in the data center. The HCS brokers client connections, authenticates users, entitles users by mapping them to desktops and/or pools, establishes secure connections from clients to desktops, supports single sign-on, sets and applies policies, acts as a DMZ security server for outside corporate firewall connections, and more.

- **Horizon Client**—Installed on endpoints for creating connections to Horizon desktops that can be run from tablets, Windows, Linux, or Mac PCs or laptops, thin clients, and other devices.

- **Horizon Portal**—Provides access to links for downloading full Horizon clients. Enable the HTML access feature to run a Horizon desktop inside a supported browser.

- **Horizon Agent**—Installed on all VMs, physical machines, and Terminal Service servers that are used as a source for Horizon desktops. On VMs, the agent is used to communicate with the Horizon client to provide services such as USB redirection, printer support, and more.

- **Horizon Administrator**—Provides administrator functions such as deployment and management of Horizon desktops and pools, setting and controling user authentication, and more.

- **vCenter Server**—Provides centralized management and configuration to the entire virtual desktop and host infrastructure. It facilitates configuration, provisioning, and management services. It is installed on a Windows Server host, which can be a VM.

Horizon clone technology

VMware Horizon 7 offers the following methods for cloning desktops:

- **Full clones**—Full clones are typically used for testing purposes or to create management VMs. Full clones are not ideal for VDI because full copies have no connection to the original VM. Updates must be performed on each VM with this approach.

- **Linked clones**—Linked clones require less storage resources than full clones. This technology is appropriate for many VDI use cases. Differences between the master VM and the clone are maintained in a delta file. Updates can effectively be rolled out, although multiple VM rebuilds are required to properly deploy a patch at the operating system level.

- **Instant clones**—Instant clones are available only with Horizon 7 Enterprise licenses. This technology provisions a VM the instant a user requests one. This results in a far easier approach to operating system updates and patch management, because the VM is created near to the time of login. You can use the combination of JMP features such as App Volumes and User Environment Manager to emulate persistence.

The VMware Horizon 7 Instant-clone Desktops and RDSH Servers White Paper provides more information.

Client components

End users can use a variety of client components to access the virtual desktops.

The following table lists the client components that Dell EMC recommends.

Table 2 Recommended clients

Component	Description	Recommended use	More information
Dell Wyse 3040 thin client	Dell's lightest, smallest, and most power-efficient thin client	Task and basic productivity	http://www.dell.com/us/business/p/wyse-3040-thin-client/pd
Dell Wyse 5070 thin client	Can be monitored, maintained, and serviced remotely	Knowledge workers who need powerful virtual desktop performance and support for unified communications solutions like Skype for Business	https://thinclientbenefits.com/products/wyse-5070
Dell Wyse 5070 Extended thin client	Offers an on-board graphics card for offloading and supporting up to four 4 K monitors plus two 2 K monitors (total of 6)	Knowledge workers who need powerful virtual desktop performance and support for several monitors	https://thinclientbenefits.com/products/wyse-5070
Dell Wyse 7020 thin client	Powerful endpoint platform for virtual desktop environments	Power workers or Virtual Workstation solutions	http://www.dell.com/us/business/p/wyse-z-class/pd?ref=PD_OC

Design sizing and guidelines

This section provides recommendations and guidelines for designing your VDI environment.

Platform configurations

With several options to choose from, consider these basic differences.

- Select the base B5 configuration when designing smaller deployments to meet minimum node requirements. B5 configurations scale well and can also effectively serve the maximum number of VMs for a block.
- C7 configurations are denser configurations intended for a higher scale and to reduce the number of nodes to maintain.

Note

In the event of a node outage, the C7 configuration impacts more users.

CPU

User density and graphics considerations:

- Dell EMC Ready Architectures for VDI validation test results suggest that you can use CPU oversubscription to effectively size VDI user density. To use a CPU configuration other than those validated, consider the following guidance to achieve comparable results in a VMware ESXi environment:
  - **Knowledge workers**—3.75 users per core. For example, 60 knowledge users with dual eight-core processors.
  - **Power workers**—3 users per core. For example, 48 power users with dual eight-core processors.
- For graphics configurations consider the following:
  - For high-end graphics configurations with NVIDIA Quadro Virtual Data Center Workstation graphics enabled, consider choosing higher clock speeds rather than higher core counts. Many applications that benefit from high-end graphics are engineered with single-threaded CPU components. Higher clock speeds benefit users more in these workloads.
  - For NVIDIA Virtual PC configurations, consider higher core counts rather than faster clock speeds to reduce oversubscription.
  - Most graphics configurations will not have high CPU oversubscription, since vGPU resources are likely to be the resource constraint in the appliance.

Memory

Best practices for memory allocation and configuration:

- Do not overcommit memory when sizing, because memory is often not the constraining resource. Overcommitting memory increases the possibility of performance degradation if contention for memory resources occurs (for example, swapping and ballooning of memory). Overcommitted memory can also impact storage performance when swap-files are created.
- Memory must be populated in units of six per CPU to yield highest performance. Dell EMC 14th generation servers using Intel Skylake Processors have six memory

channels per CPU, which are controlled by two internal memory controllers, each handling three memory channels. To ensure that your environment has the optimal memory configuration, use a balanced configuration, where each CPU supports a maximum of 12 DIMMs (or 24 DIMMs for a dual-CPU server). The most effective configuration is 12 DIMMs (6 DIMMs per CPU) or 24 DIMMs (12 DIMMs per CPU).

GPU

Consider these options when choosing GPU cards:

- Dell EMC strongly recommends NVIDIA M10 graphics options only for Virtual PC workloads. Quadro Virtual Data Center Workstation licenses do support the M10 card, but the card performance is less aligned with the features available in that license.

- For graphically intense workloads like CAD or for desktops running mixed workloads (including both graphics and significant computation), a P40 card is the optimal choice.

Sizing considerations

This section provides various general best practices for sizing your deployment.

- **User density**—If concurrency is a concern, be sure to calculate how many users will be using the environment at the peak of utilization. If only 80 percent are using the environment at a given time, for example, the environment only needs to support that number of users (plus a failure capacity).

- **Disaster recovery**—When planning for DR, Dell EMC recommends implementing a dual/multi-site solution. The aim is to keep the customer's environment online and, if there is an outage, to perform an environment recovery with minimum disruption to the business.

- **Management and compute clusters**—For our small test environment, we used a combined management and compute cluster. For environments deployed at a larger scale, we recommend that you separate the management and compute layers. When creating a management cluster for a large scale deployment, consider using the XC640 platform to reduce the data center footprint.

- **Network isolation**—The network configuration for Dell EMC XC devices uses a 10 Gb converged infrastructure model. All required VLANs traverse two 10 Gb NICs configured in an active/active team. For larger scaling we recommend that you separate the infrastructure management VMs from the compute VMs to aid in predictable compute host scaling.

Density recommendations

We tested all configurations with Microsoft Windows 10 and Microsoft Office 2016. Test results provide recommended user densities, as shown in the following table.

Table 3 User density recommendations for VMware vSphere ESXi 6.5 U1 with VMware Horizon 7.

Server configuration	Workload	User density
B5 + 3 x P40	Multimedia (virtual PC: P40-2B)	36
C7	Task worker	190
C7	Knowledge worker	160
C7	Power worker	130
C7 + 3 x M60	Power worker (virtual workstation: M60-1Q)	48
C7 + 3 x P40	Multimedia (virtual PC: P40-1B)	72

Table 4 User density recommendations for Microsoft Hyper-V

Server configuration	Workload	User density
C7 - Hyper-V 2016 (Shared Desktop)	Task worker	342
C7 - Hyper-V 2016	Knowledge worker	185
C7 - Hyper-V 2012 R2	Task worker	210
C7 - Hyper-V 2012 R2	Knowledge worker	185
C7 - Hyper-V 2012 R2	Power worker	145

Design assessment

Prior to deployment, be sure to perform an assessment of your environment to validate design considerations and ensure that you are designing your architecture to meet or exceed the performance of your current environment. Dell EMC Professional Services offers an assessment service for all VDI needs.

Design enhancements

File workload guidance

The increased growth in the amount of data that is stored in file shares and user home directories across corporate IT environments in recent years has resulted in an increased focus on the need to better manage this unstructured data. As a result, many organizations are choosing to deploy dedicated file workload solutions with capabilities such as cloud file tiering and single file system namespaces across their IT infrastructure, including for file workloads in a VDI environment.

Dell EMC provides a number of file workload solutions for different types of file workloads.
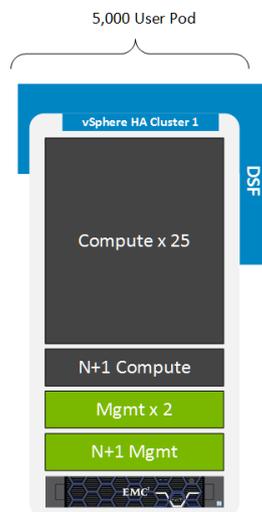
Dell EMC Unity

Dell EMC Unity storage is simple, unified all-flash and hybrid storage with hybrid cloud capabilities.

Unity is ideal for general purpose NAS/SAN mixed workload consolidation, smaller file workloads (including small to mid-sized VDI environments), and transactional databases.

The following figure shown an example of a 5,000-user VDI deployment using Unity storage for file shares.

Figure 5 5,000-user pod on Unity

When deploying Dell EMC Unity in a VDI environment, Dell EMC recommends that you deploy a separate Dell EMC Unity storage system with a vSphere HA cluster or Block. This structure provides the greatest scalability, resiliency, and flexibility when deploying and maintaining file services for the overall user pod. As unstructured data storage needs grow over time, the capacity of each Dell EMC Unity storage system can be scaled up independently with minimal user impact. You have the choice to deploy alternative architectures to the one suggested here, but you should carefully consider the tradeoffs.

The Dell EMC Unity All-Flash Unified Storage web page provides guidance about selecting an appropriate Dell EMC Unity storage solution for your file workload requirements.
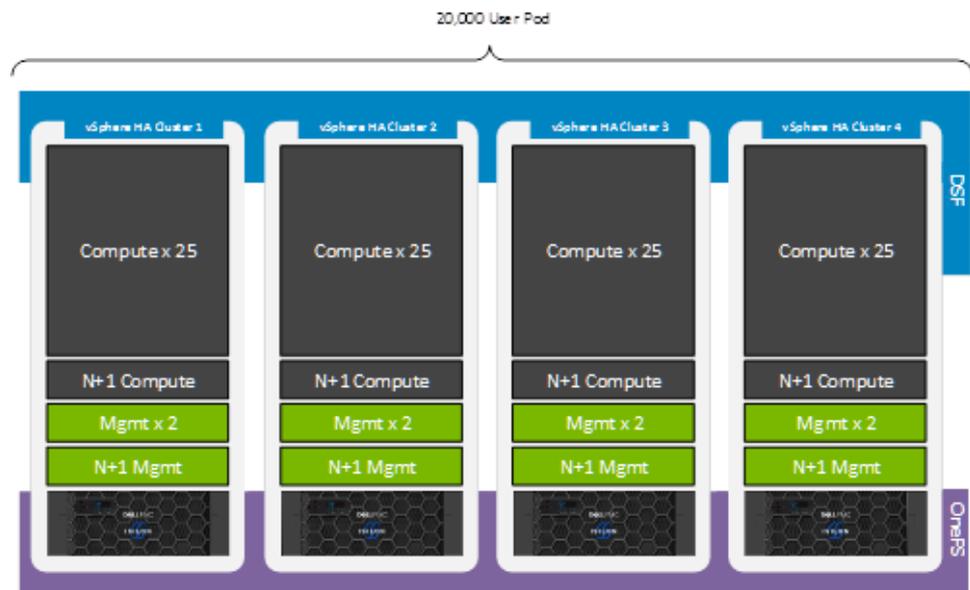
Dell EMC Isilon file storage

Dell EMC Isilon storage is the industry's number one scale-out NAS solution for any file workload.

Isilon is ideal for a wide range of file workloads (including large-scale enterprise VDI environments requiring a single file system namespace), high performance computing (HPC), archiving, and infrastructure consolidation.

The following figure shows an example of a 20,000-user VDI deployment using Dell EMC Isilon scale-out storage with a single namespace.

Figure 6 20,000-user pod on Isilon

When deploying Dell EMC Isilon in a VDI environment, Dell EMC recommends that you deploy a separate Dell EMC Isilon storage system with a vSphere HA cluster or Block. This structure provides the greatest scalability, resiliency, and flexibility when deploying and maintaining file services for the overall user pod. As unstructured data storage needs grow over time, the capacity of each Dell EMC Isilon storage system can be scaled up independently with minimal user impact. In addition to scaling up each Isilon chassis, Isilon can also be scaled out using the OneFS operating system. This ability means that additional Isilon systems can be added to provide a single volume and namespace that all user pods in a datacenter can access. As shown in the previous figure, both Nutanix DFS and Isilon OneFS can be scaled out in unison as the VDI environment grows. You can choose to deploy alternative architectures to the one suggested here, but you should carefully consider the tradeoffs.

The Dell EMC Isilon web page provides guidance about selecting an appropriate Dell EMC Isilon storage solution for your file workload requirements.

Conclusion

Summary

This design guide has described the integration of XC Family devices from Dell EMC and VMware Horizon 7 brokering software to create virtual application and desktop environments. This architecture provides exceptional scalability and an excellent user experience and empowers IT teams to play a proactive strategic role in the organization.

Dell EMC offers comprehensive, flexible, and efficient VDI solutions that are designed and optimized for the organization's needs. These VDI solutions are easy to plan, deploy, and run.

Dell EMC Ready Architectures for VDI offer several key benefits to clients:

- Predictable costs, performance, and scalability to support a growing workforce
- Rapid deployments
- Rapid scaling, ready to serve enterprises of any size
- Dell EMC support

All the Dell EMC Ready architectures for VDI are configured to produce similar results. You can be sure that whichever XC Family devices you choose has been designed and optimized for your organization's needs.

Next steps

Dell EMC has a configuration to fit the needs of any size organization:

- XC640—Select this if graphics are not required or where high computer power per unit of rack space is required.
- XC740xd—Select this if graphics are required or where there are significant storage capacity and I/O requirements.

To explore more about this solution, its design, and testing, see the Validation Guide for this architecture. Your Dell EMC solutions representative can assist with further information and resources.

For additional resources and other VDI designs to help make IT groups a strategic asset, visit www.dellemc.com/vdi.

References

The documentation in this section provides additional information.

Dell EMC documentation

The following Dell EMC documentation provides additional and relevant information. Access to these documents depends on your login credentials. If you do not have access to a document, contact your Dell EMC representative. Also see the Dell EMC VDI Information Hub for a complete list of VDI resources.

- Dell EMC Virtual Desktop Infrastructure
- Dell EMC XC Series and XC Core Technical Resource Center

This document is part of the documentation set for this architecture, which includes the following:

- Dell EMC Ready Architectures for VDI: Designs for VMware Horizon on XC Family Design Guide
- Dell EMC Ready Architectures for VDI: Designs for VMware Horizon on XC Family Deployment Guide
- Dell EMC Ready Architectures for VDI: Designs for VMware Horizon on XC Family Validation Guide

VMware documentation

The following VMware documentation provides additional and relevant information:

- VMware vSphere documentation
- VMware Horizon 7 documentation
- Best Practices for Published Application and Desktops in VMware Horizon Apps and VMware Horizon 7
- VMware Compatibility Guide
- Horizon 7 Enterprise Edition Reference Architecture
- Horizon 7 Enterprise Edition Multi-Site Reference Architecture

NVIDIA documentation

The following NVIDIA documentation provides additional and relevant information:

- NVIDIA Virtual GPU Software Quick Start Guide