Desktop infrastructure challenges

In January of 2020, Microsoft will stop supporting the Windows 7 operating system. For many companies, this will force a migration to graphics-rich Microsoft Windows 10. Not only does the Windows 10 user interface use more graphics, but associated applications and browsers do too (Figure 1). Users want to run multiple applications, use collaboration tools, and stream videos. To maintain a high-quality user experience, you may be considering rather costly desktop hardware upgrades as well as migrating the software. What if you could easily support your users’ graphic requirements?

According to a survey conducted by Adaptiva, it can take between two and four hours to upgrade each desktop from Microsoft Windows 7 to 10. If we assume your team is very efficient and only takes two hours per desktop, and you have 1000 desktops, it would take 2000 administrator hours to migrate to Windows 10. If you have a team of four working on the migration working 40-hour weeks, it will take that team roughly 12 and a half weeks to update all 1000 desktops (assuming a smooth transition).

What you will learn

This white paper will give an overview of Cisco® solutions for virtual desktop infrastructure (VDI) with VMware Horizon software, with your choice of hyperconverged infrastructure (HCI) and graphics acceleration using NVIDIA virtual GPU technology. We support two HCI architectures: Cisco HyperFlex™ systems and Cisco UCS® vSAN Ready Node solutions. This document introduces the benefits of being able to meet the needs of any users, wherever they reside, and how VMware Horizon software enables virtualization while NVIDIA virtual GPUs facilitate a superior user experience. These solutions involving Cisco, NVIDIA, and VMware result in virtual desktop solutions you can easily deploy at large scale, from the data center to edge locations. This paper discusses the overall architecture of the solution, provides an illustration of the range of solutions that are supported by Cisco Validated Designs (CVDs), and discusses the scaling advantage with HCI solutions from Cisco.
transition). What if you could shrink the time it takes to migrate to Windows 10 (and further updates) down to minutes per desktop?

Now consider professional graphics users with their specialized graphics workstations. These users require dedicated graphics power to be efficient in their work. In the past, these specialized graphic workstations have meant increased administrative complexity and inconsistent data management. What if you could deliver to all of your users the graphics acceleration they need while reducing the capital costs of purchasing new desktops for each user and radically simplifying the management of, and securing, your entire desktop and graphics workstation environment?

A perfect storm

You can stay out of this storm by adopting a virtual desktop infrastructure to consolidate and simplify desktop and data management and increase security. More companies are adopting HCI to deploy their virtual desktops and applications, and more companies are moving to Microsoft Windows 10 (Figure 2). With the increased graphics demands, Cisco hyperconverged solutions with NVIDIA virtual GPU technology and VMware Horizon will help deliver an outstanding user experience.

Figure 1. When migrating from Microsoft Windows 7 to Windows 10, modern applications will require more graphics processing

Figure 2. Windows 7 and Windows 10 market share according to http://netmarketshare.com on 7/26/2019
Empower your users and IT staff

Simplicity and capabilities of VMware Horizon 7

VMware Horizon 7 simplifies the delivery, protection, and management of virtual desktops and applications; this includes migration to Windows 10 and its associated applications. It helps you contain costs and ensure that your end users can work anytime, anywhere, on any device. It helps you centrally manage software images to simplify management and maintain compliance. With Horizon 7, both virtualized and hosted desktops and applications can be delivered through a single platform to end users. This capability helps facilitate migrating to Microsoft Windows 10 and transforms delivery of end-user applications and desktops.

Graphics acceleration to meet a range of user needs

Our solutions support a range of shared and dedicated GPU options to help meet the specific needs of your users. Typical classes of users include:

- **Task workers** typically repeat the same set of tasks within a small set of applications and often those applications run on a shared server. In the past these applications had very low graphic requirements, but that is changing. For example, today’s task workers may watch online training videos or complete online education classes. Examples of task workers include call center personnel, warehouse staff, and retail employees.

- **Knowledge workers** are your professional staff that thinks for a living. These workers handle and manipulate information. Knowledge workers typically have their own laptop computer and use back-office applications, collect information from the Internet, and stream videos. These employees have a greater need for responsive graphics and applications to get their jobs done.

- **Power users** are your highly specialized staff that uses applications that require powerful graphics processors to provide acceptable response times. Power users typically use expensive graphics workstations that now can be centralized and their data secured in your enterprise data center. Often these users are split into two types: designers and renderers. Designers are artists and engineers that use high-powered design tools. Renderers use applications to render multidimensional graphics and video.

Each of these user needs can be met with virtual desktop infrastructure that allocates GPU resources to user virtual machines differently. Figure 3 shows the architecture of these three solutions. NVIDIA has four virtual GPU (vGPU) software editions:

- **NVIDIA GRID Virtual Applications (GRID vApps):** For organizations deploying RDSH or other application-streaming or session-based solutions. Designed for PC-level applications and server-based desktops

- **NVIDIA GRID Virtual PC (GRID vPC):** For users who want a virtual desktop but need great user experience for Microsoft Windows applications, including Windows 10, browsers, and high-definition video

Virtualization is the only solution

“Virtualization is not very common in the agency industry, primarily due to the graphics-intensive tools that we use on a regular basis. But one of the main reasons we adopted it initially was collaboration, to strengthen the concept we maintain firm-wide of SFMO (Single Firm Multi-Office). We wanted a single project team—which is likely comprised of people from multiple offices to be able to work together in the same files at the same time.”

Andrew Schilling
Chief Infrastructure Officer, CannonDesign

Read the [CannonDesign case study](#)
DENSO automotive supplier delivers innovation

“Since adding NVIDIA Quadro vDWS, we have seen a 250% uptick in usage. That is quadrupled usage for the VDI environment since adding the virtual GPU.”

Wesley Struble
CAD System Administrator, North American Information Technology Services, at DENSO International America

Read the DENSO case study

- **NVIDIA Quadro Virtual Data Center Workstation (Quadro vDWS):**
  For users who want to be able to use remote professional graphics applications with full performance on any device, anywhere

- **NVIDIA Virtual Compute Server (vComputeServer):**
  For compute-intensive server workloads such as artificial intelligence (AI), deep learning, or high-performance computing (HPC)

![Figure 3](image)

**Simplify with hyperconverged infrastructure at the foundation**

Using HCI as the foundation for your virtual desktop environment speeds installation and eases management, simplifying administration for your IT staff and helping deliver more responsive applications to your users. As Figure 4 illustrates, the infrastructure can be configured and managed by Cisco Intersight™ software as a service, and can be deployed in enterprise data centers, remote offices, branch offices, and at the network edge. Our solutions scale quickly so that you can add resources as you need to support more users or changing user requirements.

With Cisco solutions, you can choose the foundation that best suits your needs: Cisco HyperFlex systems or Cisco UCS vSAN Ready Nodes. Configuration choices are illustrated in Table 1.

**Cisco HyperFlex Systems**

Cisco HyperFlex Systems, powered by 2nd Gen Intel® Xeon® Scalable processors, combine computing, storage, and networking resources in a simplified, easy-to-use platform. These systems bring the pay-as-you-grow economics of the cloud to on-premises virtual infrastructure, so you can gain new levels of agility, efficiency, and adaptability. With an integrated network fabric, powerful data optimization, and unified Cisco Intersight management, Cisco HyperFlex systems bring the full potential of hyperconvergence to
your desktop virtualization deployments. This solution is fast to deploy, simple to manage, secure, and easy to scale. And the systems arrive ready to provide you with a unified pool of infrastructure resources to power virtual desktops and applications as your business needs dictate.

- **Secure:** Although virtual desktops are inherently more secure than their physical predecessors, they introduce new security challenges. Inter-virtual machine traffic now poses an important security consideration that needs to be addressed, especially in dynamic environments in which virtual machines, using VMware vMotion, move across the server infrastructure. Cisco HyperFlex systems and Cisco Nexus® Family solutions for desktop virtualization provide strong data center, network, and desktop security, with comprehensive security from the desktop to the hypervisor. Security is enhanced with segmentation of virtual desktops, virtual machine-aware policies and administration, and network security across the LAN and WAN infrastructure.

- **Scalable:** Almost inevitably, your desktop virtualization needs will grow, so a solution must be able to scale predictably with that growth. Cisco Intersight allows you to deploy and upgrade your cluster hardware, firmware, and hyperconvergence layer wherever it is from a single user interface. You also can scale this solution for storage to balance CPU and GPU resources independently. If you need more user storage, add a storage node. If you need more CPU or GPU power, add a compute-only node without the added cost associated with additional storage. This solution supports high virtual-desktop density (desktops per server), with additional servers scaling with near-linear performance. Cisco HyperFlex systems, with high-performance, low-latency, unified fabric networking architecture, supports high volumes of virtual desktop traffic, including high-resolution video and communications.
The Polyclinic increases user density

“Right now, I can put 30 users on the system without any GRID software.

If I give them all two virtual CPUs—so they get two cores of power and 4 GB of RAM—their VMs perform fine. Compare that with the NVIDIA Tesla M10 card: I can run 50 to 60 desktops per server. I assign each user a 1 GB profile on the Tesla M10 GPU across the board. If I’ve got someone who’s watching a video and it’s cranking two whole cores of their profile, I don’t have anything to worry about. This is especially important, as video and multimedia has become more and more prevalent. For example, we post a lot of videos for patients and staff to view. I won’t take the hit on the CPU because the NVIDIA GPU loads that for me. It doesn’t affect the whole server.”

Aaron Hagman
Senior Systems Engineer, The Polyclinic

Read The Polyclinic case study.

Traffic. In addition, Cisco HyperFlex systems help maintain data availability and optimal performance during boot and login storms as part of the solution. Cisco HyperFlex solutions have demonstrated scalability and performance with VMware Horizon, with support for up to 4400 hosted virtual desktops and hosted shared desktops that were deployed in about 10 minutes, per the Cisco Validated Design.

Cisco UCS vSAN Ready Nodes

Cisco UCS vSAN Ready Nodes implement VMware vSAN software-defined storage and hyperconverged infrastructure. These solutions are based on Cisco UCS C220 M5 and Cisco UCS C240 M5 rack mount servers and Cisco UCS B200 M5 Blade Servers, with tightly integrated VMware vSphere and vSAN, as your software-defined infrastructure solution. With Cisco UCS and Cisco Nexus switches, these solutions deliver enterprise-grade security, scale, and performance.

- **Manage** your Cisco UCS vSAN Ready Node hardware with Cisco UCS Manager or Cisco UCS Director, where role- and policy-driven management can help you deploy multiple nodes without tedious, manual processes that can lead to errors. Manage your rack server-based ready-nodes with the Cisco Intersight platform and enjoy automated deployment and the Cisco Technical Assistance Center (TAC) for rapid response to issues and proactive configuration recommendations. Your virtualization and VDI layers are managed with a single pane of glass. VMware vSAN natively integrates with the user interface of the VMware Software-Defined Data Center (SDDC) stack, removing the need for training and operating specialized storage interfaces. VMware vRealize Operations within VMware vCenter enable rapid visibility into a vSAN deployment with broad monitoring and deep analytics—all viewable from vCenter.

- **Secure** your data with native encryption to provide data-at-rest security within the cluster. Cisco UCS and Cisco Nexus switches deliver comprehensive security from the desktop to the hypervisor. Security is enhanced with segmentation of virtual desktops, virtual machine-aware policies and administration, and network security across the LAN and WAN infrastructure.

- **Scale** your Cisco UCS vSAN Ready Node beyond the minimum definitions to meet your needs. Simply add a node to the cluster, and it will be automatically discovered and added to the resource pool.
VMware vSAN Ready Nodes are specified in Table 1 by the type and amount of storage the node can support. The sizing guide uses profiles such as AF-4 and HY-6. AF specifies all-flash nodes and HY specifies hybrid nodes. The numeric values specify whether the configuration is small (2), medium (4 and 6), or large (8). Visit the VMware site for more information on VMware vSAN ReadyNodes sizing.

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<tr>
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<th>Typical applications</th>
<th>Cisco HyperFlex solution(s)</th>
<th>Cisco UCS vSAN Ready Node solution(s)</th>
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<tbody>
<tr>
<td><strong>Task worker</strong></td>
<td>Microsoft Windows Server 2016</td>
<td>Cisco HyperFlex HX240c M5 All-Flash Node with 2x NVIDIA M10 GPUs per node</td>
<td>AF-4: Cisco UCS B200 M5 with 1x NVIDIA P6 GPUs per node</td>
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<td></td>
<td>RDSH</td>
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<td>AF-6: Cisco UCS C240 M5 with 2x NVIDIA M10 or 2x NVIDIA P40 or up to 6x NVIDIA T4 GPUs per node</td>
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<td>Published applications</td>
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<td>Session-based user experience</td>
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<td><strong>Knowledge worker</strong></td>
<td>Microsoft Windows 10</td>
<td>Cisco HyperFlex HX240c M5 All-Flash Node with 2x NVIDIA M10 GPUs per node</td>
<td>AF-4: Cisco UCS B200 M5 with 1x NVIDIA P6 GPUs per node</td>
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<td>Office 2016</td>
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<td>AF-6 or HY-6: Cisco UCS C240 M5 with 2x NVIDIA M10 or 2x NVIDIA P40 or up to 6x NVIDIA T4 GPUs per node</td>
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<td>Web-based applications</td>
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<td>Web-based training</td>
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<td><strong>Designer power user</strong></td>
<td>ArcGIS Pro</td>
<td>Cisco HyperFlex HX240c M5 All-Flash Node with up to 6 NVIDIA T4 GPUs per node</td>
<td>AF-4: Cisco UCS B200 M5 with 1x NVIDIA P6 GPUs per node</td>
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<td>AutoCAD</td>
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<td>AF-6: Cisco UCS C240 M5 with up to 6 NVIDIA T4 GPUs per node</td>
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<td>Adobe Creative Cloud applications, including Photoshop and Illustrator</td>
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<td><strong>Renderer and power users</strong></td>
<td>Schlumberger</td>
<td>Cisco HyperFlex HX240c M5 All-Flash Node with 2x NVIDIA V100s GPUs per node</td>
<td>AF-4: Cisco UCS B200 M5 with 1x NVIDIA P6 GPUs per node</td>
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<td>Halliburton</td>
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<td>AF-6: Cisco UCS C240 M5 with 2x NVIDIA V100 GPUs per node</td>
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<td>DELTAGEN</td>
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Table 1: A selection of Cisco HCI solutions for virtual applications, desktops, and workstations.
Microsoft Windows 10 is here and bringing with it greater graphics requirements for all applications. Millions of creative and technical professionals require access to the most graphically demanding applications on any device, from anywhere, all while meeting the need for greater data security. Now is the time to start thinking about and exploring desktop and workstation virtualization as an efficient way to meet these challenges. With Cisco hyperconverged solutions for virtual desktop infrastructure, we combine the computing, networking, and management power of Cisco, the graphics power of NVIDIA, and the industry-leading VMware Horizon and vSAN software to give you your choice of powerful, efficient, and simplified solutions for desktop and workstation virtualization.

**Conclusion**

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