Hewlett Packard Enterprise | CITRIX®

Performance evaluation of mobile application delivery

HPE Moonshot for Citrix XenApp

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Executive summary

This white paper evaluates a new and revolutionary architecture built on the HPE Moonshot System and industry-leading Citrix® XenApp. This exciting architecture is the first of its kind to deliver medium and rich graphic-intensive applications to end users on the HPE ProLiant m710p Server Cartridge, powered by the Intel® Xeon® E3 chipset with integrated Intel® Iris Pro Graphics P6300. This architecture employs accelerated processing units for both compute and graphics for hosted application delivery. Economic efficiencies in power, user capacity, and data center footprint result in a more cost-effective solution with a lower total cost of ownership (TCO), while also providing a rich and reliable end-user experience with Citrix HDX.

Target audience: This paper is intended for application delivery, virtual desktop infrastructure (VDI), and physical hosted desktop infrastructure (HDI) enthusiasts; chief information officers (CIOs); chief technology officers (CTOs); data center managers; data center administrators; and others wanting to learn more about this architecture from Hewlett Packard Enterprise and Citrix. This paper is also intended for technical buyers, technical presales representatives, and HPE channel partners. Hewlett Packard Enterprise recommends readers have a working knowledge of server architecture, networking architecture, and storage design.

Document purpose: The purpose of this document is to describe a recommended architecture and solution, highlighting recognizable benefits to technical audiences.

This white paper describes joint testing performed by HP (now Hewlett Packard Enterprise) and Citrix in September 2015.

Introduction

This paper compares and contrasts the targeted application delivery solution running on HPE Moonshot System with the new HPE ProLiant m710p Server Cartridge and Citrix XenApp vs. a traditional solution running on two-socket Xeon-based servers. This paper demonstrates the cost-effectiveness of the HPE and Citrix solution, after considering comprehensive factors including and not limited to the costs for a SAN, hypervisor software, operating system software, application delivery software, hosting services, backup, the time required for implementation and deployment, and scalability.

The HPE ProLiant m710p is a revolutionary new server architecture designed to support at-scale applications, and built for energy-optimized processors. HPE ProLiant m710p is a workload-optimized server engineered for the New Style of IT to reduce complexity, cut costs, occupy less space, and consume less energy, as compared to a traditional enterprise server. The HPE Moonshot 1500 Chassis can include up to 45 individually serviceable HPE ProLiant m710p hot-plug cartridges.

Overview

Citrix XenApp is a key component of an application delivery solution built on the HPE Moonshot System with HPE ProLiant m710p Server Cartridges. XenApp is the industry-leading solution for virtual application delivery, providing Windows® apps to works on any device, anywhere.

Citrix XenApp delivers Microsoft® Windows apps as secure mobile services. With XenApp, IT can mobilize the business, while reducing costs by centralizing control and security for sensitive data and intellectual property. Users can self-select apps from an easy-to-use app store that is accessible from smartphones, tablets, PCs, Macs, and thin clients. Citrix HDX technology enables XenApp to deliver a native touch-enabled look-and-feel that is optimized for the type of device, as well as network conditions. Furthermore, Citrix introduced a new architecture for app and desktop delivery that combines the functionality of XenApp and XenDesktop® into a single platform known as the FlexCast Management Architecture (FMA) offering simple, powerful configuration and operations management and cloud-style automation and scalability.

XenApp leverages session virtualization, which enables delivery of applications from servers in the data center. XenApp then connects the user to the server where the application is hosted. The application then executes entirely on the server. The user interacts with the application remotely by sending mouse-clicks and keystrokes to the server. The server then responds by sending screen updates back to the user's device. XenApp enables Windows, Mac, Linux®, iOS, and Android devices to run any applications using session virtualization through Citrix Receiver. Furthermore, session virtualization leverages server-side processing power, which liberates IT from the endless cycle of PC hardware refreshes typically needed to support application upgrades when using traditional application deployment methods.

In session virtualization, user interaction with the application is seamless. Printers, drives, peripherals, and even the clipboard work in the exact same manner as if the application were installed on the endpoint device. As a result, XenApp reduces the cost of application management and related costs by up to 50 percent and enables a better-than-installed experience for users when compared to traditional application deployment models.[1]

The following section describes the reference architecture or recommended configuration for an application delivery solution using XenApp and HPE Moonshot with HPE ProLiant m710p Server Cartridges. The components create a building block that can be repeated to scale the infrastructure, yielding much larger implementations with minimal alterations to the overall infrastructure.

Figure 1 illustrates the network stack for the HPE Moonshot for Citrix XenApp application delivery solution.

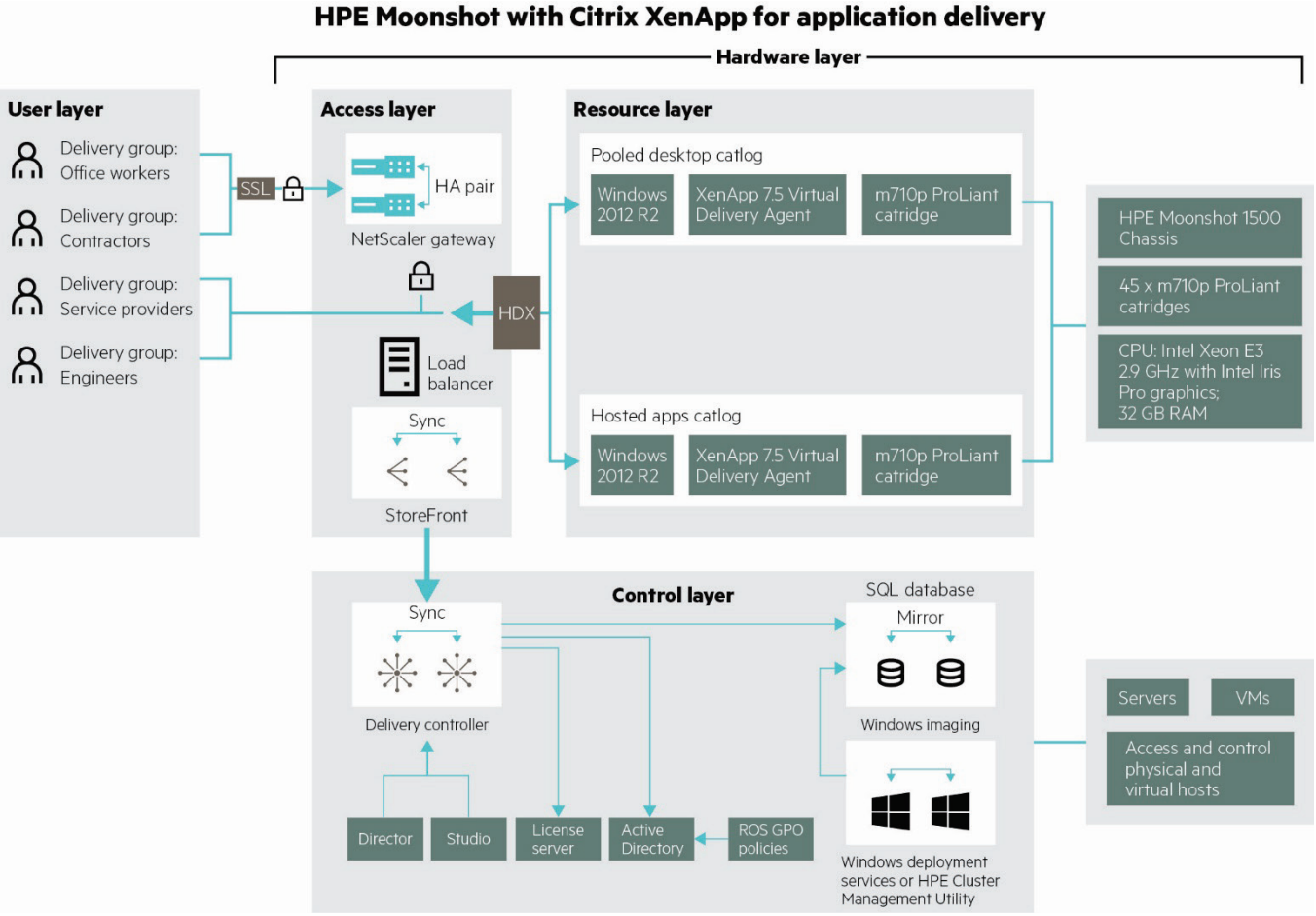

Figure 1. Network stack for application delivery using an HPE Moonshot System with 45 HPE ProLiant m710p Server Cartridges and Citrix XenApp

In the tested architecture and configuration shown in figure 1, the Citrix infrastructure components were installed on Hyper-V running on HPE ProLiant DL380p Gen9 Servers; however, these components can be hosted in many different ways.

The configuration shown in figure 2 hosts Active Directory, DNS, DHCP, XenApp and PVS infrastructure, and SQL Server 2012 on HPE ProLiant DL380p Gen9 servers, and shows Virtual Delivery Agent (VDA) installed on the target HPE ProLiant m710p Server Cartridges. One of the network interface cards (NICs) on each server is dedicated to application delivery traffic and domain traffic.

[1] According to Citrix estimates

To deploy Windows Server® on bare-metal Moonshot cartridges, a PXE-based solution is required to deliver the Windows Server WIM bits to the cartridges. HPE supports a number of tested and certified deployment platforms, including Microsoft Windows Deployment Services (WDS). For more information regarding persistent Moonshot server deployment, reference the HPE Moonshot for Citrix Integration Guide.

Many customers leverage Citrix Provisioning Services (PVS) to achieve a common golden Windows image for XenApp servers, which simplifies Windows OS management. The Provisioning Services infrastructure is based on software-streaming technology. This technology allows computers to be provisioned and re-provisioned in real time from a single shared-disk image. In doing so, administrators can completely eliminate the need to manage and patch individual systems. Instead, all image management is done on the master image. The local hard disk drive of each system may be used for runtime data caching.

Using Provisioning Services, administrators prepare a device (master target device) for imaging by installing any required software on that device. A vDisk image is then created from the master target device's hard drive and saved to the network (on a Provisioning Server or storage device). Once the vDisk is available from the network, the target device no longer needs its local hard drive to operate; it boots directly across the network. The Provisioning Server streams the contents of the vDisk to the target device on demand, in real time. The target device behaves as if it is running from its local drive. Unlike thin-client technology, processing takes place on the target device.

Figure 2 illustrates the recommended Citrix XenApp deployment with its associated infrastructure on an HPE Moonshot System with 45 HPE ProLiant m710p Server Cartridges.

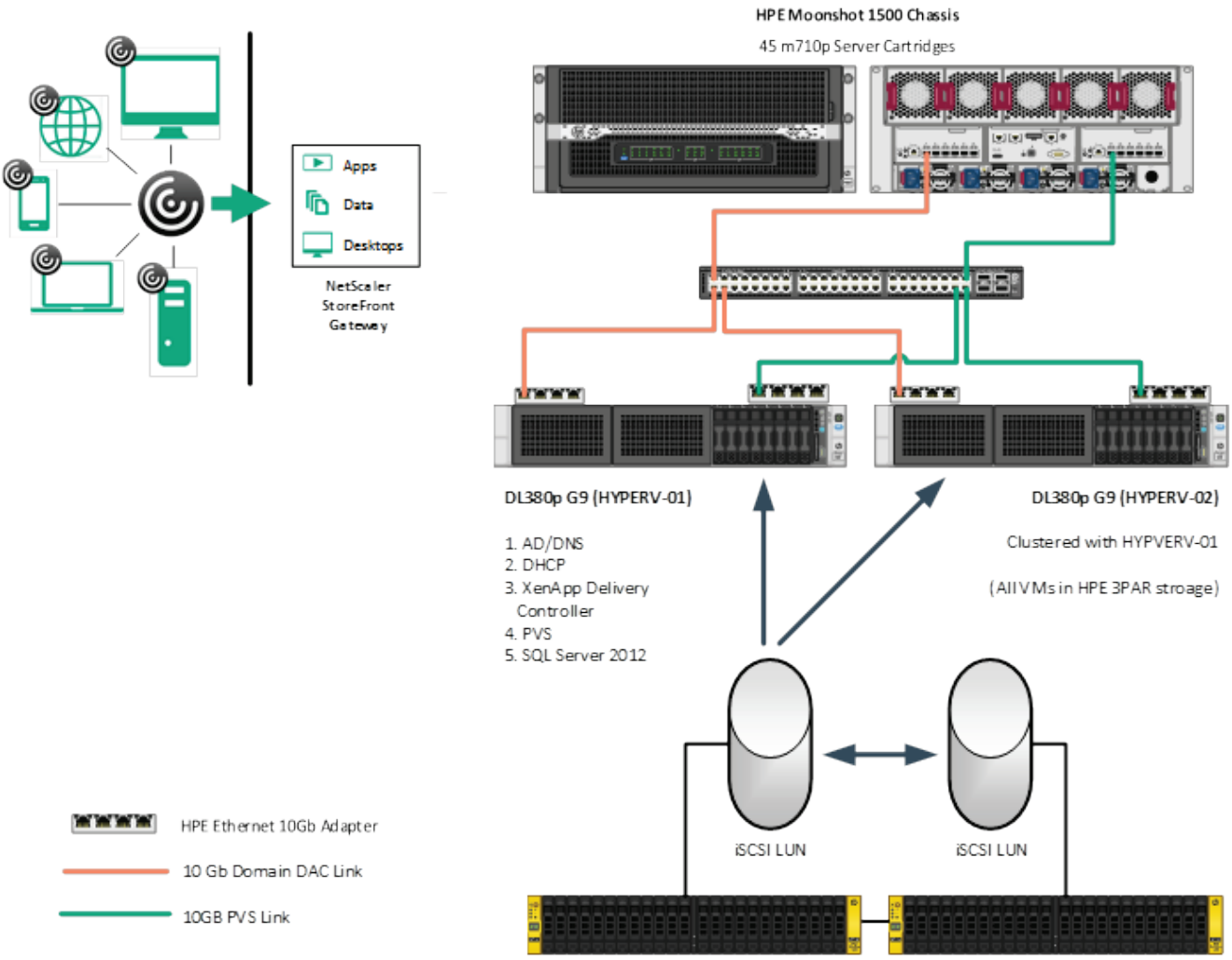

Figure 2. Reference architecture and recommended configuration showing HPE Moonshot System with 45 ProLiant m710p Server Cartridges

To further explain figure 2:

- End users on mobile phones, tablets, notebooks, or desktops can access published applications, desktops, and data by logging into XenApp StoreFront servers via Citrix Receiver.
- The Delivery Controller installed on one of the virtual machines on DL380p Gen9 Server authenticates users, manages the desktop environment running on individual HPE ProLiant m710p Server Cartridges, and brokers connections between the client and the desktop or applications running on individual HPE ProLiant m710p Server Cartridges.
- The XenApp Virtual Delivery Agent installed on an HPE ProLiant m710p Server Cartridge enables a direct connection between the client and desktop or applications running on individual ProLiant m710p Server Cartridges.
- An Active Directory and Domain Naming Services (DNS) Server is installed on one of the virtual machines on HPE ProLiant DL380p Gen9 Servers to manage the group policies and domain users and groups, as well as oversee computer management on the domain.

Solution components

The following sections describe the mix of the hardware and software used to design this configuration. These hardware and software components create a building block that can be repeated to scale the infrastructure, yielding much larger implementations with minimal alterations to the overall infrastructure. This solution assumes that Active Directory, Domain Naming Services, Delivery Controller, and other supporting infrastructure for Citrix XenApp already exist.

The following tables are segmented based on the respective hardware or software category.

Hardware

Table 1 describes the configuration of the HPE ProLiant m710p Citrix XenApp node.

Table 1. HPE ProLiant m710p Server Cartridge supporting Citrix XenApp

COMPONENT	DESCRIPTION
CPU	Intel Xeon E3-1284L v4 (4 core, 2.9 GHz, 3.8GHz Turbo) Integrated Intel Iris Pro Graphics P6300 with 128 MB embedded DRAM
Memory	32 GB of ECC-protected memory, dual memory channels (4) 8 GB DDR3 1,600 MHz LV DIMMs
Network	Dual 10GbE Mellanox ConnectX-3 Pro NICs
Storage	120 GB, 240 GB, 480 GB, or 960 GB M.2 SSD
Power	Cartridge: < 83 W
OS	Windows Server 2008 R2, 2012, 2012 R2 Windows 7, 8.1 Ubuntu, CentOS, SLES

Figure 3. HPE ProLiant m710p Server Cartridge

Table 2 describes the HPE 5900 Switch model used during testing.

Table 2. HPE 5900AF-48XG-4QSFP+ Switch

COMPONENT	DESCRIPTION
I/O ports and slots	48 fixed 1,000/10,000 SFP+ ports 4QSFP+ 40GbE ports
Additional ports and slots	1 RJ-45 serial console port 1 RJ-45 out-of-band management port 1 USB 2.0 port
Power supplies	2 power supply slots 1 minimum power supply required (ordered separately)
Fan tray	2 fan tray slots

Table 3 describes the configuration of the pre-existing Delivery Controller, which is part of Citrix XenApp's supporting infrastructure.

Table 3. HPE ProLiant DL380p Gen9 Server configuration for the pre-existing domain infrastructure and Delivery Controller, which are part of Citrix XenApp's supporting infrastructure

COMPONENT	DESCRIPTION	NOTES
CPU	Intel Xeon E5 2630 v3 (2.40 GHz/16-core) Processor Kit	2 per server
Memory	128 GB (16 x 8 GB) up to 1,600 MHz	16 per server (128 GB total)
Network	HPE Ethernet 1Gb 4-port 331i Adapter HPE Ethernet 10Gb 2-port 560SFP+ Adapter	1 per server 1 per server
Local disk	Hot Plug SFF 2 TB SATA	2 x 1 TB (with optional SFF drive cage)
Storage controller	HPE Dynamic Smart Array B140I	

Table 4. HPE ProLiant DL380p Gen9 Server virtual machine configuration for the domain infrastructure and Delivery Controller, which are part of Citrix XenApp's supporting infrastructure

COMPONENT	DESCRIPTION
CPU	2 virtual CPU
Memory	4,196 MB
Network adapters	2 virtual network adapters
Storage	500 GB

The components listed in tables 1–4 illustrate that existing Citrix XenApp supporting infrastructure can continue to be utilized with the new HPE Moonshot infrastructure without comprising the user experience or system performance.

Software

All the m710p servers in this recommended configuration are physical servers installed with Microsoft Windows Server 2012 R2 with all important Windows updates installed. HPE ProLiant m710p Server Cartridges can be provisioned using several different methods, including WDS.

Citrix software components

Citrix XenApp 7.6 can deliver hosted shared applications or hosted shared Windows Server desktop sessions to a private or public cloud infrastructure alongside traditional virtual infrastructure deployments. In addition, XenApp supports an "any cloud" strategy that does not lock customers into a proprietary cloud with limited geographical distribution. Instead, XenApp allows customers to leverage any of the large public clouds available today. XenApp offers an easy deployment process and it is the only solution available today that includes built-in monitoring.

Table 5 highlights the specific versions of Citrix XenApp software installed in this configuration. To ensure continuity, no updates or patches were applied during testing.

Table 5. Citrix XenApp software versions

SOFTWARE	VERSION
XenApp Controller	7.6.0.5026
Virtual Desktop Agent	7.6.0.5026
StoreFront	2.5.0.29
Citrix Receiver	4.1.200.13

When compared to building the infrastructure from scratch, HPE Moonshot with HPE ProLiant m710p Server Cartridges creates a more efficient and cost-effective XenApp deployment model. For example, HPE Moonshot with HPE ProLiant m710p Server Cartridges makes it fast and easy to replace existing XenApp Virtual Delivery Agents or add more user seats to the existing XenApp deployment.

With this HPE and Citrix application delivery solution, customers can benefit from several key advantages:

- Scaling with the proposed solution is simple; adding one HPE ProLiant m710p Server Cartridge creates over 50 more seats for office workers.
- As compared to traditional rack server deployments, this solution provides significant TCO benefits by supporting more end users in significantly less floor space with lower energy consumption.[2]
- Featuring low-wattage processors, HPE Moonshot System with 45 ProLiant m710p Cartridges requires a maximum of 3,400 watts of power.
- Reduced timeline for XenApp deployment because the proposed solution utilizes the existing support infrastructure for Citrix XenApp.
- Easy to implement a proof-of-concept because the existing XenApp support infrastructure can be utilized, instead of building the infrastructure from scratch.
- Existing backup strategy can be used to back up changes.
- No additional security-related costs, when compared with traditional application delivery solutions.
- Significant cost savings because there is no hypervisor software, and there are no licensing costs associated with virtualization.
- Citrix XenApp licensing costs for this application delivery solution remain the same as a traditional application delivery solution.
- Rich application delivery is more robust because the HPE ProLiant m710p Server Cartridge has an extremely powerful integrated graphical processing unit (GPU; Intel Iris Pro P6300), delivered in a remarkably small package; integrated graphics means customers do not have to purchase additional graphic cards.
- Disk read and writes are faster because the HPE ProLiant m710p includes low-latency M.2-based solid-state drives (SSDs).

Capacity and sizing

This section provides an overview of the scalability testing process and the results for the proposed application delivery solution. Login VSI, a well-known scalability assessment tool, is used to compare HPE Moonshot with HPE ProLiant m710p Server Cartridges to two-socket Intel Xeon-based solutions, as well as to determine the HPE ProLiant m710p Server Cartridge's TCO in an application delivery environment. Login VSI is representative of today's application delivery workloads. In addition, Login VSI is an appropriate benchmark for measuring and projecting the number of concurrent users for typical application delivery workloads in use today. Login VSI attempts to calibrate the response time of a lightly loaded system under test, and then apply per-client workloads to multiple concurrent systems under test until saturation is reached (i.e., directly measured latency significantly increases).

[2] Preliminary figures, based on HP (now Hewlett Packard Enterprise) and Citrix internal testing, September 2015

To evaluate the HPE and Citrix solution using an office worker workload profile, this paper focuses on six different criteria:

- Number of users per server cartridge
- Response time
- Processor utilization
- Power consumption
- Memory utilization
- Network utilization

The Login VSI test infrastructure typically includes VSI Share, where the workload profile, logs, configuration details, results, reports, and licensing information are stored. The test infrastructure also includes one to thousands of launchers, with the capability of launching a maximum of 50 sessions per launcher (Launchers are usually virtual machines [VMs]).

The Login VSI Management Console is the application where all the settings required for a successful test are configured. In the test setup, an HPE BladeSystem with BL460c Gen9 Blades functions as both a VSI Share and a Login VSI Management Console. In the test setup, each Login VSI Launcher VM can launch a maximum of 15 user sessions.

Table 6 describes the Login VSI software versions used to test the HPE and Citrix application delivery solution.

Table 6. Login VSI software versions used to test the proposed solution

SOFTWARE	VERSION
Login VSI Management Console	4.1.3
Login VSI Analyzer	4.1.3
Login VSI Launcher Agent	4.1.3

Table 7 describes the server configuration used for the Login VSI management test infrastructure.

Table 7. HPE ProLiant BL460c Gen9 Server, used for the Login VSI management test infrastructure

COMPONENT	DESCRIPTION
CPU	(2) Intel Xeon E5-2690 v3 (12 core, 2.6 GHz, 3.5 GHz Turbo)
Memory	128 GB (4 x 32 GB) up to 2,133 MHz
Network	HPE FlexFabric 10Gb 2P 536FLB Adapter
Local disk	HPE 240GB 6G SATA SSD

Table 8 describes the configuration of the Login VSI Launcher (client) servers used for testing.

Table 8. HPE ProLiant BL460c Gen9 Server used for the Login VSI Launcher (client) servers

COMPONENT	DESCRIPTION
CPU	(2) Intel Xeon E5-2690 v3 (12 core, 2.6 GHz, 3.5 GHz Turbo)
Memory	128 GB (4 x 32 GB) up to 2,133 MHz
Network	HPE FlexFabric 10Gb 2P 536FLB Adapter
Local disk	HPE 240GB 6G SATA SSD

Virtual machine components

Launchers are Microsoft Windows 2012 R2 VMs created with virtualization techniques. A launcher machine consists of 10 VMs per HPE ProLiant BL460c Gen9 Blade.

Table 9. Virtual machine components

COMPONENT	DESCRIPTION
CPU	2 virtual CPU
Memory	4,096 MB
Network adapters	2 virtual network adapters
Storage	External, 40 GB

Login VSI clients run on a separate infrastructure isolated from the production stack. Table 10 describes the configuration of each launcher (client) from a software point of view.

Table 10. Client configuration

SOFTWARE	VERSION
Operating system	Microsoft Windows 7 SP1
Citrix Receiver updater	4.1.0.56461
Citrix Receiver plug-in	14.1.0.0
Login VSI Launcher Agent	4.1.3
Adobe® Flash Player	14.0.0.125

HPE ProLiant m710p Server Cartridges are installed with the Citrix XenApp Virtual Delivery Agent (VDA). Table 11 describes the configuration of each VDA from a software point of view.

Table 11. HPE ProLiant m710p VDA configuration

SOFTWARE	VERSION
Operating system	Microsoft Windows 2012 R2 Server Standard
Adobe Reader XI	11.0.00
Citrix Virtual Delivery Agent	7.6.0.5026
Doro PDF Printer	1.82
Microsoft Office Professional Plus 2013	15.0.4569.1506

The HPE ProLiant m710p Server Cartridge has the advantage of a powerful built-in Intel Iris Pro GPU. This enables the cartridge to handle the workload of a large variety of applications, including those with 3D content. Table 12 is an incomplete list of applications that have been tested and verified with this configuration.

Table 12. List of applications tested with the configuration

COMPANY	APPLICATION	VERSION	INDUSTRY
Adobe	Acrobat® Reader	XI	General
Adobe	Photoshop®	CC 2014	Graphics
The SZ Development	Doro PDF Writer	1.8	General
Google™	Earth	7	General
Microsoft	Office	Professional Plus 2010, 2013	General
National Instruments	DIAdem, DataFinder	2014	Big Analog Data
Open Source	7-Zip	9.2	General
Open Source	FreeMind	1.0.1	General
SOLIDWORKS	eDrawings Viewer	2014	3D Graphics
Thomson Reuters	Eikon	4	Financial

Workload description

Office worker workload

This section describes the office worker workload profile used to evaluate XenApp performance on HPE Moonshot with HPE ProLiant m710p Server Cartridges. The office worker workload is one of the default workloads in Login VSI 4.1.3. This workload emulates an office worker using Microsoft Office, Microsoft Internet Explorer, PDFs, and more.

- Once a session starts, the workload repeats (loops) every 48 minutes.
- The loop has four segments. Each consecutive Login VSI user logon starts a different segment. This method ensures that all elements in the workload get equal use throughout the test.
- During each segment, the response time is measured three times.
- Approximately two minutes of idle time is included in between each segment to simulate real-world users.

Each loop will open and use:

- Microsoft Outlook
- Microsoft Internet Explorer
- Microsoft Word
- Adobe Reader
- Microsoft PowerPoint
- Microsoft Excel
- Login VSI photo viewer
- Doro PDF Writer

A more detailed view of each Login VSI workload can be found in the Login VSI 4.1 Workloads pdf.

Workload data and results

Office worker workload

Login VSI office worker workload tests were performed on HPE ProLiant m710p Cartridges. The tests were conducted in as close to a real-world environment as possible. The tests were repeated multiple times to enable greater accuracy. Repeatability is the key principle in arriving at the data points. For all tests, benchmark mode is enabled in Login VSI. Benchmark mode is a restricted test mode that makes certain settings unavailable to create a default test environment in which results are more comparable.

Figure 4 shows the baseline response time vs. the number of user sessions for an HPE ProLiant m710p Server Cartridge in the XenApp delivery group. This was one of multiple tests run.

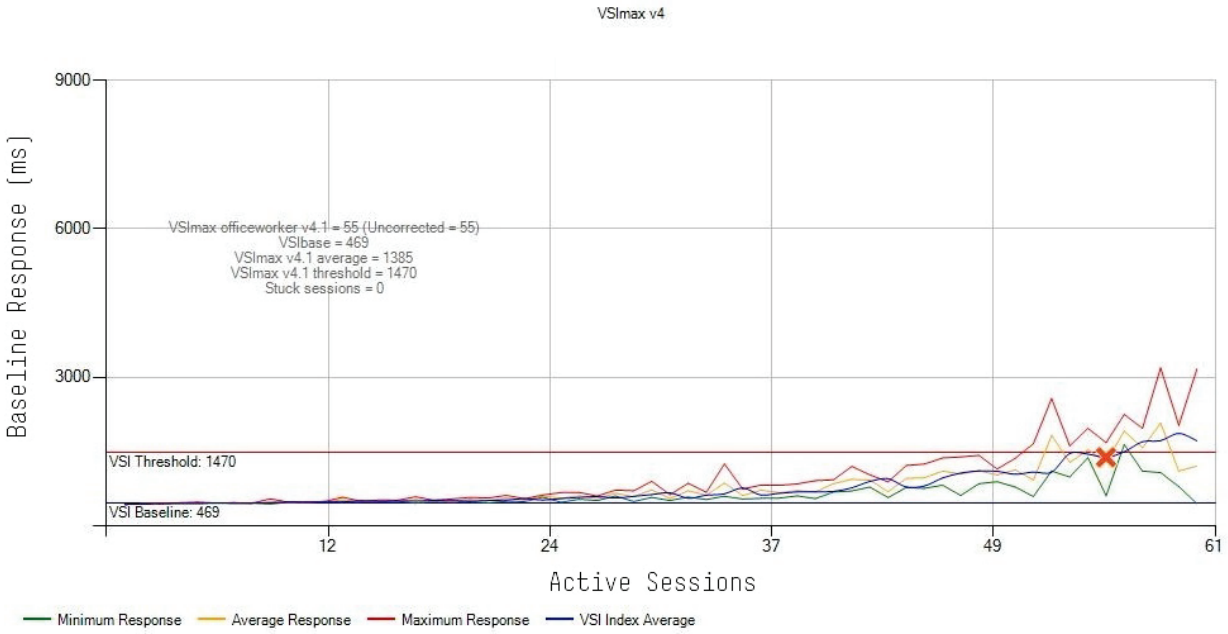

Figure 4. Login VSI office worker workload executed with an HPE ProLiant m710p Server Cartridge in the XenApp delivery group

Figure 5 projects the linear scaling of the average single cartridge VSImax to a full chassis. This projection is valid since Moonshot cartridges are independent computing resources, and none of the shared resources (power, cooling, network) are at risk of being exhausted.

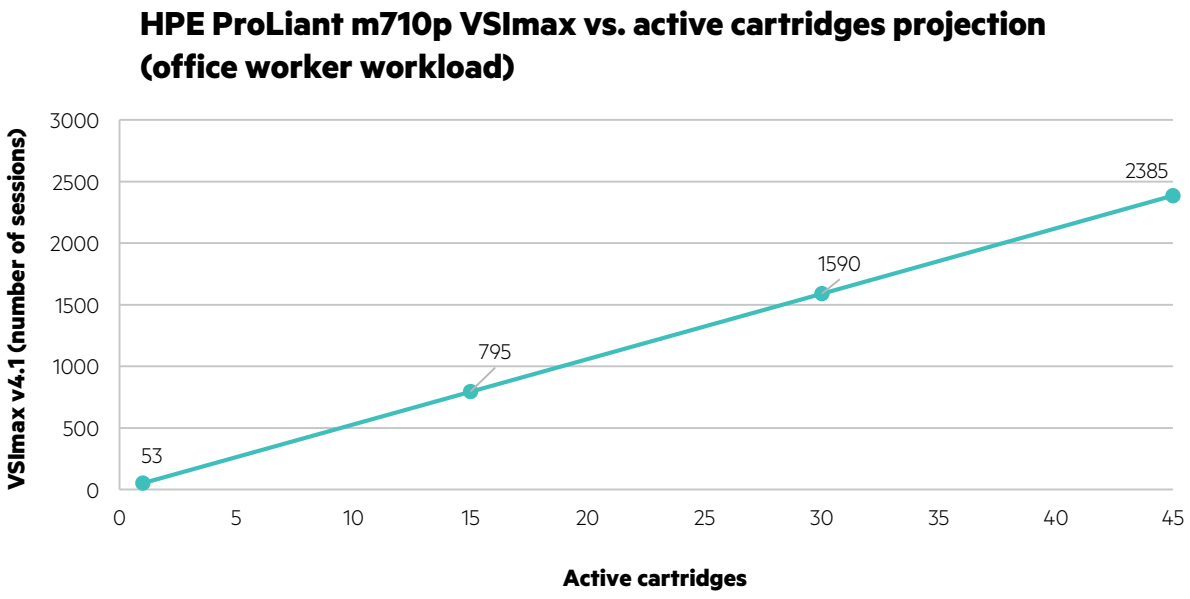

Figure 5. Login VSI office worker workload on HPE ProLiant m710p Server Cartridges linearly scaled to full chassis sizing

Figure 6 characterizes processor utilization of the HPE ProLiant m710p Server Cartridge. CPU utilization looks somewhat different from previous Login VSI versions, as the pre-4.1 workloads could stick a CPU at a constant 100 percent utilization. The new 4.1 workloads are more stringent on VSImax, and therefore the generated results translate better into real-world sizing. When the number of sessions passes 50, CPU utilization continually spikes above 90 percent. When the test is finished and user sessions start to log off, CPU utilization begins to decrease.

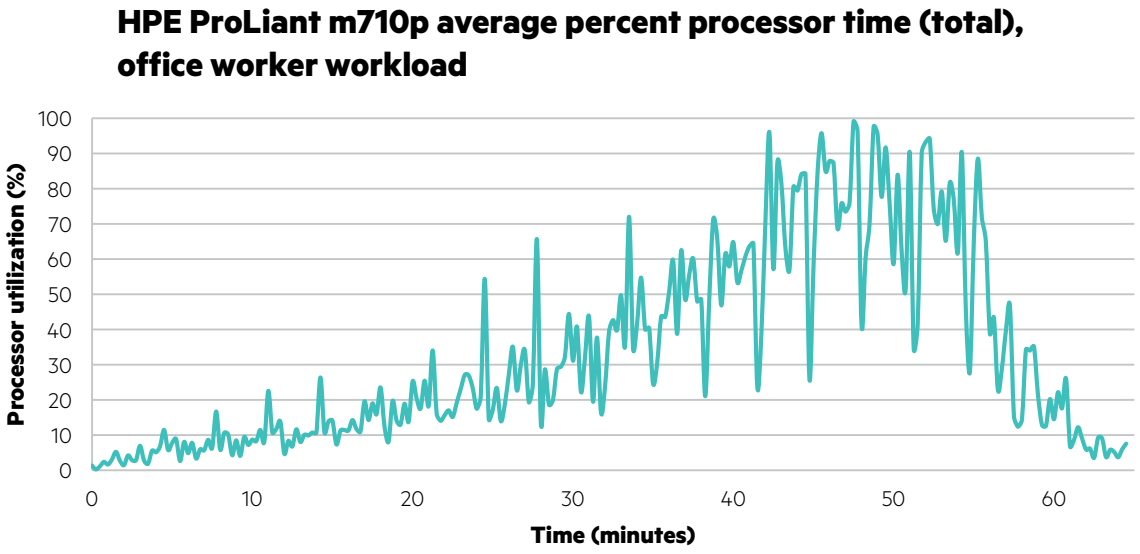

Figure 6. Processor utilization characterization for the office worker workload on HPE ProLiant m710p Server Cartridges

Figure 7 characterizes power utilization of the HPE ProLiant m710p Server Cartridge. The maximum power rating on each cartridge is less than 83 watts at peak load. However, with the Login VSI office worker workload, which does not stress the GPU to 100 percent utilization, the power utilization is below 70 watts per cartridge at peak load.

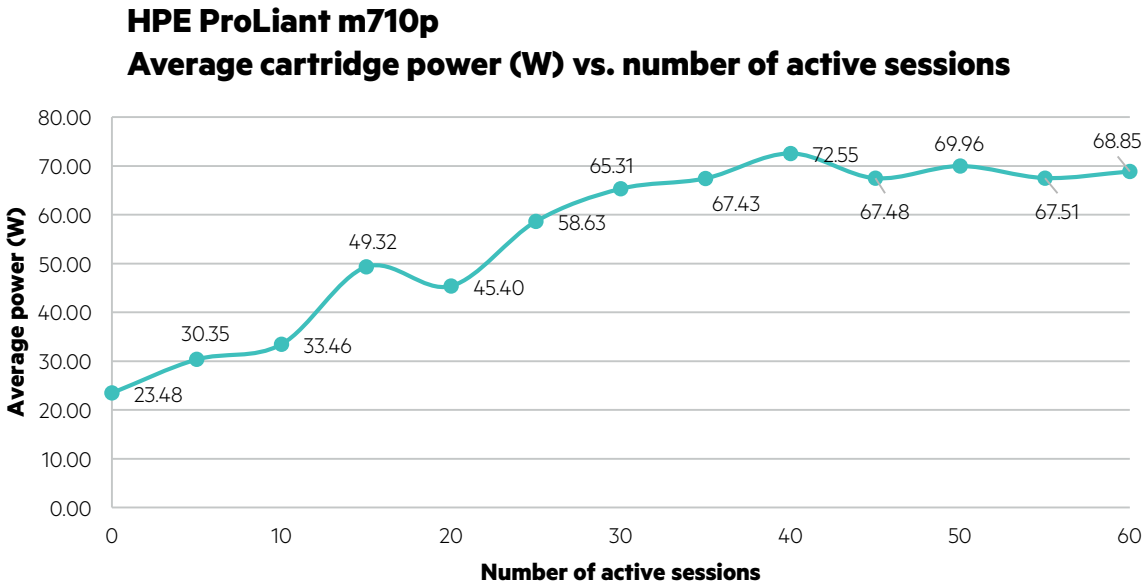

Figure 7. Power utilization characterization for the office worker workload on HPE ProLiant m710p Server Cartridges

Figure 8 characterizes main memory utilization of the HPE ProLiant m710p Server Cartridge. Notice that 32 GB of memory is never fully saturated, even at peak workload (when the maximum number of user sessions is running). Note that Login VSI 4.1 workloads are more memory intensive than previous Login VSI version workloads.

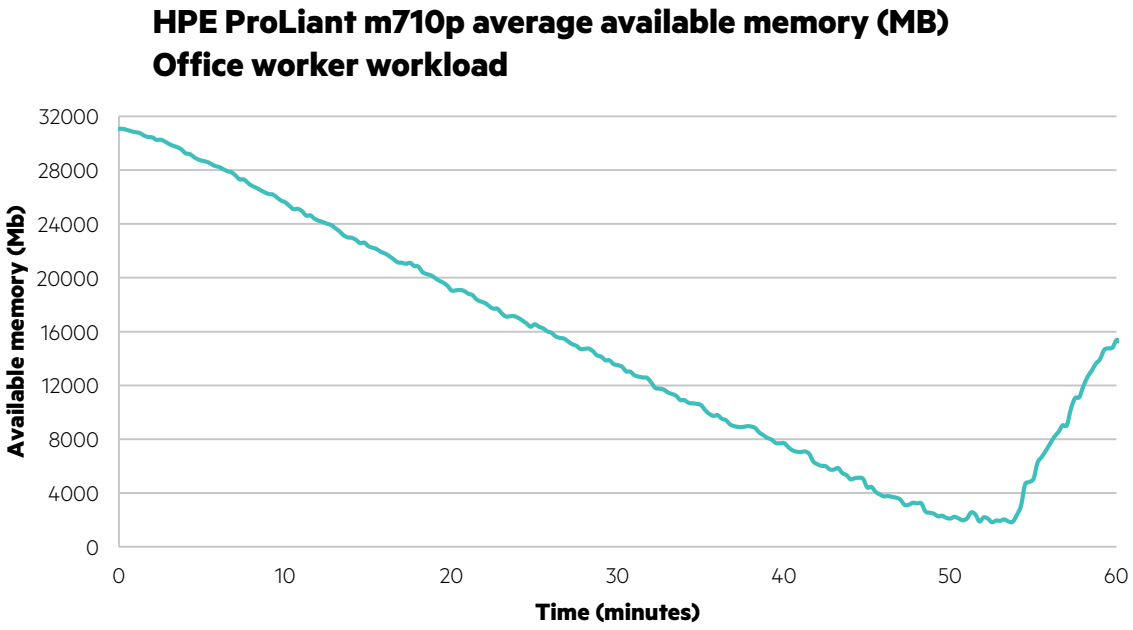

Figure 8. Memory utilization characterization of the office worker workload on HPE ProLiant m710p Server Cartridges

Figure 9 characterizes network utilization of the HPE ProLiant m710p Server Cartridge. Notice that the network does not create a bottleneck. Even at the peak workload (when the maximum number of user sessions is running), the network utilization remains below 100 Mbps. The ProLiant m710p Server Cartridge has dual 10 Gbps NICs.

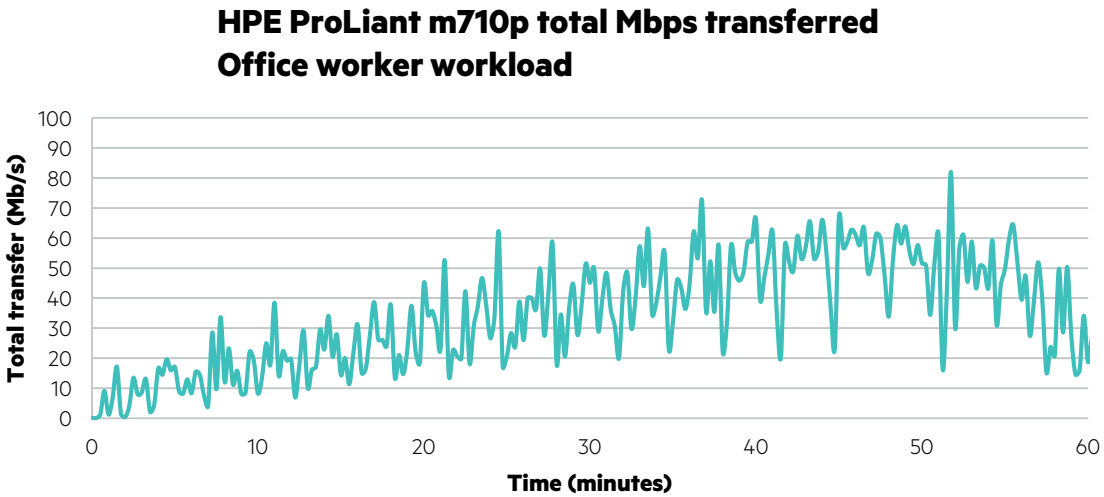

Figure 9. Network utilization characterization for the office worker workload running on the HPE ProLiant m710p Server Cartridge

Further, office worker workload tests were performed on single m710p Cartridge, which was streamed from single shared-disk image (vDisk) which had all the applications installed as mentioned in table 11 using Provisioning Services (PVS version 7.6). Since vDisk is stored on PVS Server and is available over the network, single m710p Cartridge network boots directly via preboot execution environment (PXE) service, network activity on PVS Server is important.

Figure 10a characterizes network utilization of the PVS Server, when a single HPE ProLiant m710p Server Cartridge is booted using Provisioning Services. Figure 9 indicates the amount of data that is transferred between single HPE ProLiant m710p Server Cartridge and PVS Server during cartridge booting phase. It should be noted that once the cartridge is completely booted, the amount of data transferred between them reduces drastically.

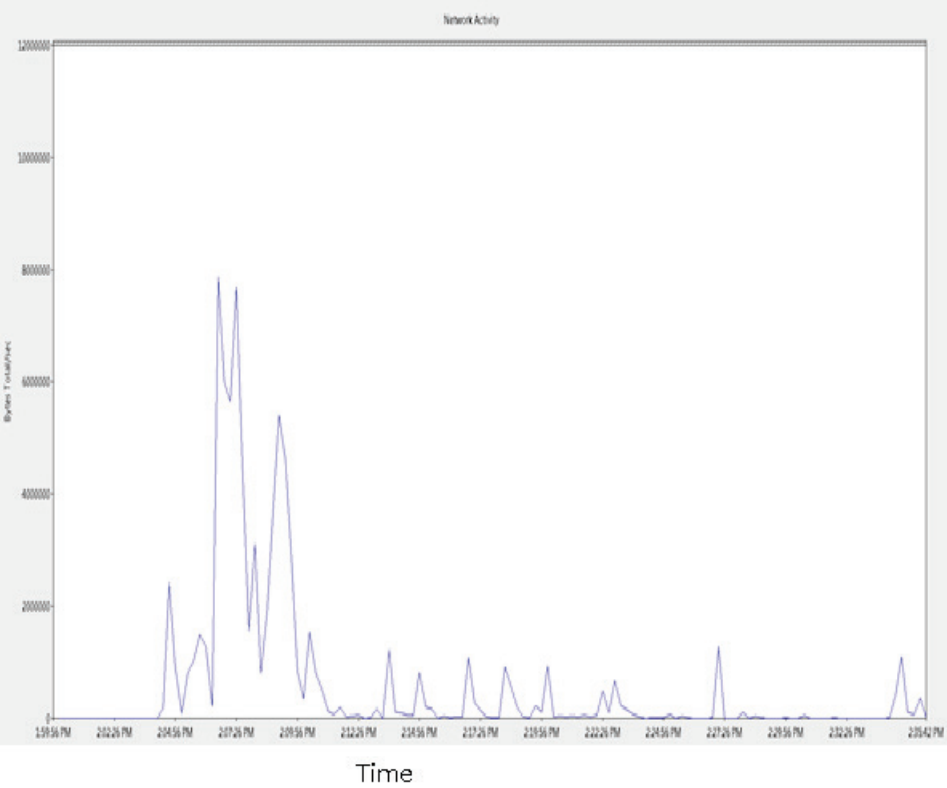

Figure 10a. Network activity on PVS Server when a single HPE ProLiant m710p Server Cartridges is booting

Figure 10b characterizes network utilization of the PVS Server, when five HPE ProLiant m710p Server Cartridge is booted using Provisioning Services.

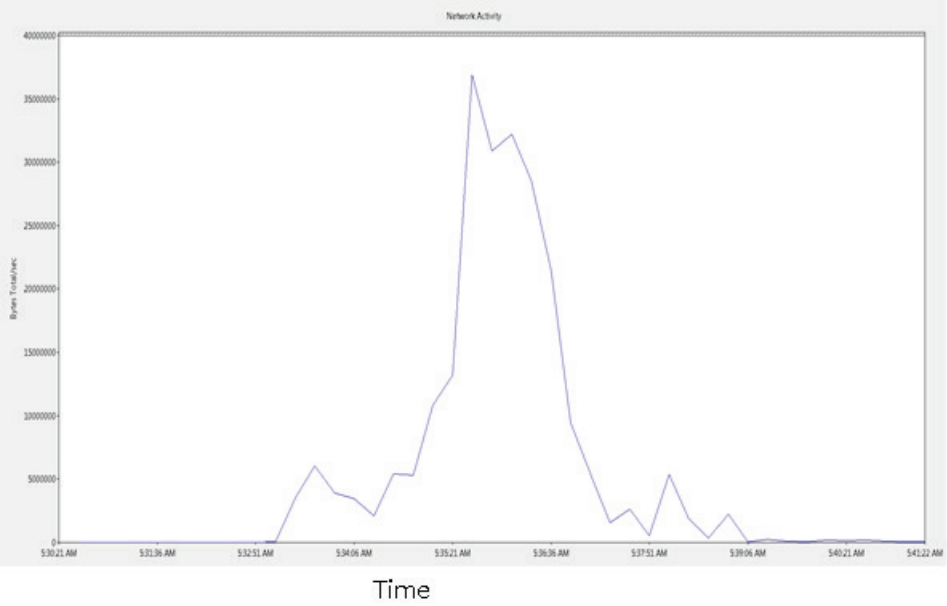

Figure 10b. Network activity on PVS Server when five HPE ProLiant m710p Server Cartridges are booting

Testing revealed less than two percent difference in Login VSI results from a bare-metal provisioned m710p to a PVS-provisioned m710p.

Analysis and recommendations

The HPE ProLiant m710p Server Cartridge was proven to support 53 office worker users per cartridge before seeing a major performance degradation (reaching VSImax). On further analysis of the system-level parameters, tests showed that CPU and memory both approach their limits at similar times causing Login VSI to reach VSImax. At peak workload, network bandwidth remains barely used. Power is also well within constraints of the chassis. Since only CPU and memory, both resources that are independent to each cartridge, are close to saturation at VSImax, we can reasonably expect linear scaling by adding additional cartridges. Shared resources such as network and power are well within available limits, with plenty of room to expand.

As every deployment and environment is different, it is important to plan user scalability properly. There are some further considerations that play an integral role in sizing XenApp deployments on the m710p. First, while Login VSI is a workload test that attempts to approximate real-world usage as close as possible, it is still a synthetic test. Sizing may vary somewhat in actual deployments due to additional background software, such as antivirus, more or less active users, and other differences. Most importantly, sizing is extremely dependent on the applications that are actually used, and some testing in your environment is recommended to accurately size any XenApp deployment. Note that each of these users are delivered a XenApp shared desktop running multiple applications at once, and therefore depending on application, even more application-only XenApp users could be supported on a single cartridge.

HPE recommends setting HPE ProLiant m710p Server Cartridges power profile mode to the maximum performance power setting. This setting enables Intel Turbo Boost Technology to adjust the processor to run above its base operating frequency via dynamic control of the CPU's clock rate. By default, HPE ProLiant m710p Server Cartridge firmware disables the BIOS settings, and the power regulator mode is controlled directly by the operating system.

The proposed solution in this white paper is a basic building block that can be repeated to scale up the infrastructure, yielding much larger implementations with minimal alterations to the overall infrastructure.

Configuration guidance

Deploying the proposed application delivery solution into an existing Citrix XenApp environment is similar in many ways to adding any new server resource. Specific Moonshot configuration details are covered in depth in the HPE Moonshot for Citrix Integration Guide.

For best results, Hewlett Packard Enterprise recommends that a separate virtual local area network be created for domain and application delivery network traffic.

Bill of materials

Table 13 provides a simple tabular bill of materials (BOM) for the key components of this reference architecture and recommended configuration. The actual BOM might contain electronic licenses to use (E-LTU) parts. Electronic software license delivery is now available in most countries. Hewlett Packard Enterprise recommends purchasing electronic products rather than physical products (when available) because they offer faster delivery and greater convenience (i.e., no tracking and managing of confidential paper licenses). For more information, please contact your HPE representative or reseller.

Note
The part numbers in table 13 are valid at the time of this publication but are subject to change. The BOM does not include complete support options or other rack and power requirements. If you have questions regarding ordering, please consult with your HPE reseller or HPE sales representative.

Table 13. Bill of materials

QUANTITY	PART NUMBER	DESCRIPTION
45	808915-B21	HPE ProLiant m710p Server Cartridge
45	765479-B21*	HPE Moonshot 120GB M.2 2280 Solid State Device
1	755371-B21	HPE Moonshot 1500 Chassis
1	704654-B21	HPE Moonshot-45P 1/10 Gb Switch Kit
1	704652-B21	HPE Moonshot 4QSFP Uplink Kit
1	681254-B21	HPE 4.3U Rail Kit
1	681260-B21	HPE 0.66U Spacer Blank Kit
4	684532-B21	HPE 1,500 W CS Plat PL Hot Plug Power Supply Kit

* 240, 480, and 960 GB options are also available

Summary

The detailed data presented in this white paper—including system-level parameters—illustrates that application delivery using Citrix XenApp running on HPE Moonshot with HPE ProLiant m710p Server Cartridges offers a cost-effective and datacenter-space saving solution that does not compromise performance or end-user experience. The proposed solution is energy efficient as is demonstrated through the graphs that present detailed power consumption data.

The proposed application delivery solution using HPE Moonshot with HPE ProLiant m710p Server Cartridges running Citrix XenApp delivers excellent performance and user experience in all cases (both low- and high-volume seat designs), ranging from low-end applications to rich applications, as compared to traditional application delivery solutions.

Implementing a proof of concept

As a best practice for all deployments, Hewlett Packard Enterprise recommends implementing a proof of concept (POC) using a test environment that closely matches the planned production environment. This way, the appropriate performance and scalability characterizations can be obtained. For help with a POC, contact your HPE Services representative (hpe.com/us/en/services/consulting.html) or your HPE partner.

Appendix

The following appendix describes the PowerShell script used to launch a XenApp HDX session to a published resource through Citrix StoreFront. Login VSI is a load-testing framework, which can run scripts. Hewlett Packard Enterprise created PowerShell scripts customized for HPE Moonshot and Citrix XenApp; this script is executed from the Login VSI framework, as shown in figure 11.

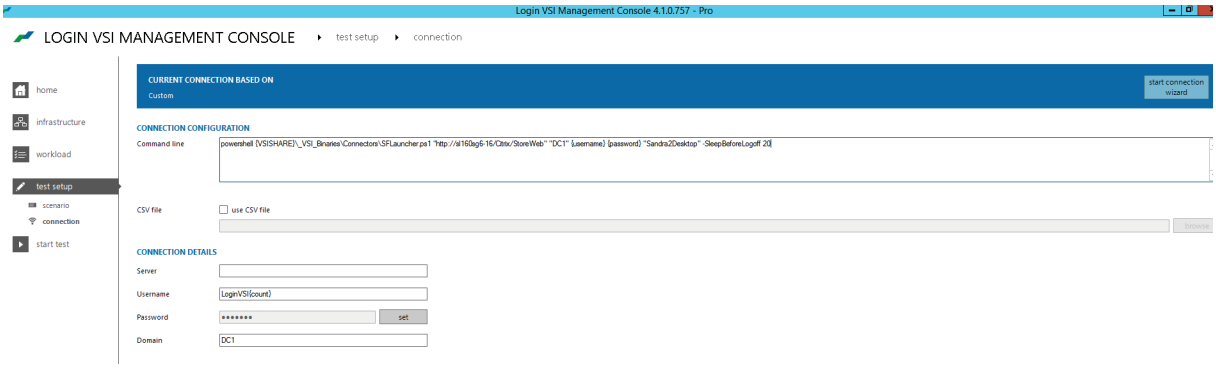

Figure 11. Login VSI connection configuration using the command "powershell {VSISHARE}_VSI_Binaries\Connectors\SFLauncher.ps1 <Storefront url> {Domain} {username} {password} <Published Desktop> -SleepBeforeLogoff 20"

Citrix provides the SFLauncher.ps1 script at: blogs.citrix.com/2013/11/27/scripting-automating-the-launch-of-hdx-sessions-through-storefront-and-netscaler-gateway-integrated-with-storefront.

Glossary

Apps	Applications
BOM	Bill of materials
CMU	Cluster Management Utility
CPU	Central processing unit
GPU	Graphical processing unit
HDI	Hosted desktop infrastructure
Login VSI	Login Virtual Session Indexer
ROI	Return on investment
SAN	Storage area network
SSD	Solid-state drives
SUM	Smart Update Manager
TCO	Total cost of ownership
VDI	Virtual desktop infrastructure

Resources

HPE Moonshot for Citrix Integration Guide

Login VSI 4.1 Workloads

Citrix Application Virtualization

Intel Turbo Boost

LoginVSI Documentation

To help us improve our documents, please provide feedback at hp.com/solutions/feedback

Learn more at

hpe.com/us/en/servers/moonshot.html

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