SIMPLIFIED VDI: DELL POWEREDGE VRTX & CITRIX XENDESKTOP 7.5

Dell™ PowerEdge™ VRTX & Citrix® XenDesktop®

ENTERPRISE VDI WITHOUT THE DATA CENTER

Implementing and deploying a VDI environment can seem like a daunting task. Often, virtual environments require multiple components, such as shared storage, network switches, and compute nodes. Purchasing and implementing these components separately can be costly and time-consuming. The Dell PowerEdge VRTX offers shared storage (without a supporting infrastructure), integrated networking, identical compute nodes for easy clustering, and a single management interface. The Dell PowerEdge VRTX and Citrix XenDesktop 7.5 can provide enterprise-grade VDI capabilities as a unified, converged solution, allowing for simplified deployment of a range of VDI users for your business.

Here in the labs at Principled Technologies, we set up a Dell PowerEdge VRTX and deployed Citrix XenDesktop. What did we find? The solution provided simple and convenient VDI deployment for end users. This document will show you how to set up and configure the VRTX and how to install and configure a Citrix XenDesktop 7.5 environment. The benefits of this solution rely on its enterprise value without the enterprise data center. Due to its all-in-one design, the ideal location for this unified solution is any place where data center space is a concern, but the solution is not limited to that scenario. The shared infrastructure of the VRTX—servers, storage, and networking—can simplify the deployment of virtualized desktops for various environments.

UNIFIED SOLUTION: DELL POWEREDGE VRTX & CITRIX XENDESKTOP 7.5

In addition to the office-friendly benefits of a compact chassis, potential low level of noise output, and locking-front-bezel security, the Dell PowerEdge VRTX offers features that make a centralized VDI deployment simple. In addition to not requiring a supporting infrastructure, the VRTX has a shared PowerEdge RAID Controller (PERC) and no adaptors to configure. Integrated networking allows for traffic isolation and flexibility in managing multiple networks. With identical compute nodes, there are no hardware interoperability concerns, and with multiple nodes built into the VRTX design, clustering options are available. Finally, the Dell Chassis Management Controller (CMC) interface provides a single pane of glass for hardware management for the entire VRTX system.

The VRTX system integrated well with Citrix XenDesktop 7.5 as a holistic solution; we did not need to rack additional servers, configure external shared storage and zone WWPNs to attach hosts to external storage, or configure KVM/out-of-band security IDs. The VRTX contains configurable integrated storage in a variety of RAID levels. Our configured internal storage provided separate large volumes for VDI guest virtual machines (VMs) and for infrastructure server VMs, with shared access by all the VMware ESXi™ nodes. This allows for routine maintenance on a node without causing interruptions in the environment. The VRTX integrated switch provided the flexibility to accommodate multiple networks, allowing us to isolate the various types of traffic required within our host cluster. Within the integrated switch, we defined networks for management traffic, VM migration (vMotion®), production LAN access, and NFS for access to ISO repositories.

We set up ESXi on each of the VRTX M620 nodes and selected one of them to use as our infrastructure node. We created infrastructure VMs—such as Microsoft® Active Directory®, DNS, DHCP, and SQL servers—and deployed all XenDesktop Server roles on an infrastructure node VM. Then we used the Citrix XenDesktop deployment wizard to deploy Microsoft Windows® 7 virtual desktops.

Once the deployment completed, we connected easily to a Citrix virtual desktop with the Dell Wyse™ Xenith Pro 2 zero client. We connected the Wyse client to a monitor, keyboard, mouse, and physical network, and powered on the unit. The Wyse terminal immediately presented us with a Citrix Receiver login prompt. After we completed the authentication process, we quickly connected to our Microsoft Windows 7 desktop. Our Wyse thin client, connected to Citrix XenDesktop, provided a rich multimedia experience via the Citrix HDX™ protocol —all from a device no larger than some desktop external storage devices.

A word about Dell Wyse

Wyse thin and zero clients accessing VDI-based desktops means refreshing those environments on an operating systems refresh cycle rather than a PC lifecycle. With no moving parts, Wyse devices can offer a lower cost, smaller footprint, and longer lasting alternative to traditional PCs.

The VRTX XenDesktop 7.5 solution can support 500 users in a single self-contained logical unit that grows as your organization dictates.[1] With VRTX, future capacity planning and scaling requirements are of little concern—VRTX units are flexible and can allow your organization to keep up with demand as your business grows.

We show you how

The VRTX brings simplicity to the setup and management of the various components that make up a well-functioning VDI environment. Using a consolidated management interface within the Chassis Management Controller (CMC), the VRTX provides easy access for administrators to their infrastructure components. We utilized the Web interface of CMC, shown in Figure 1, to perform all of our infrastructure setup tasks.
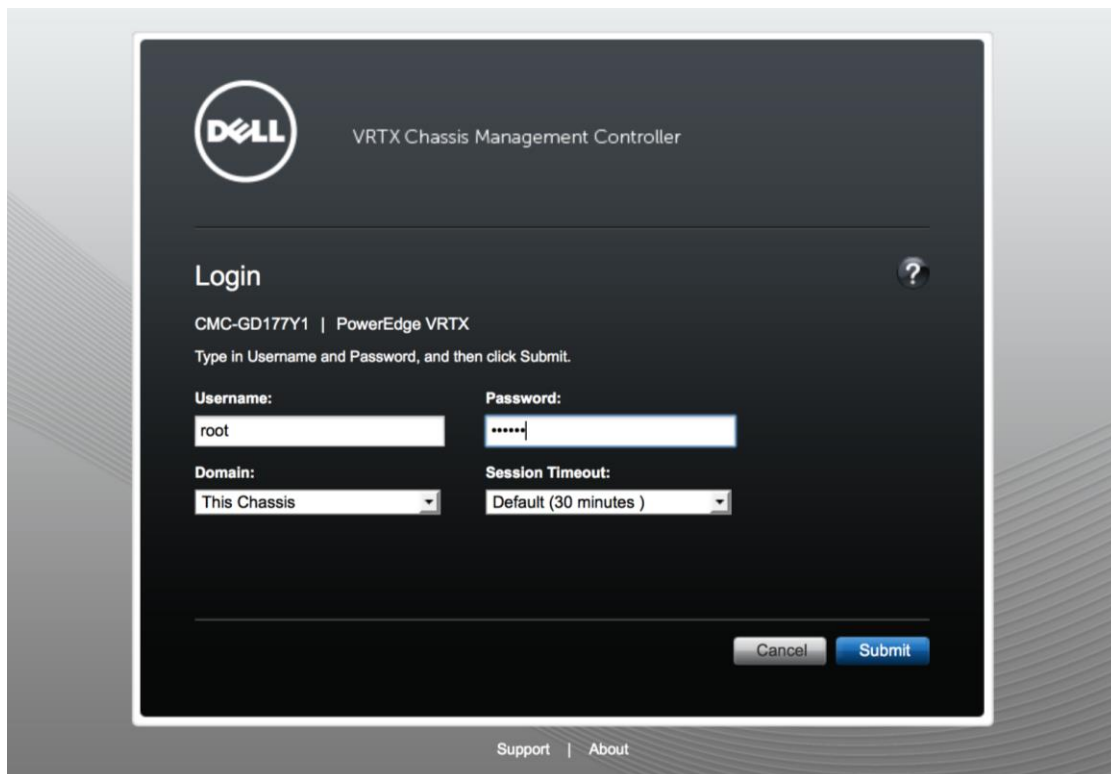
Figure 1: The Dell PowerEdge VRTX contains Chassis Management Controller, used to access the entire infrastructure contained within the VRTX unit.

Setting up VRTX integrated networking

Our implementation utilized multiple networks that provided access to a variety of services. We separated this traffic using VLANs. We used VLAN 10 for out-of-band management traffic, VLAN 100 for our private data network, VLAN 200 for access to our file-based storage (NFS) ISO repository, and VLAN 300 for moving VMs among the Dell

---

[1] en.community.dell.com/techcenter/extras/m/mediagallery/20438144/download.aspx

PowerEdge M620 nodes contained within our VRTX unit. We defined three external
interfaces to provide access to each of the external networks:

1. External interface 1 – mapped to VLAN 10
2. External interface 4 – mapped to VLAN 100
3. External interface 8 – mapped to VLAN 200

Our vMotion network existed within the VRTX chassis and did not require any
additional external connections. Figure 2 shows the interfaces we used for uplinks.
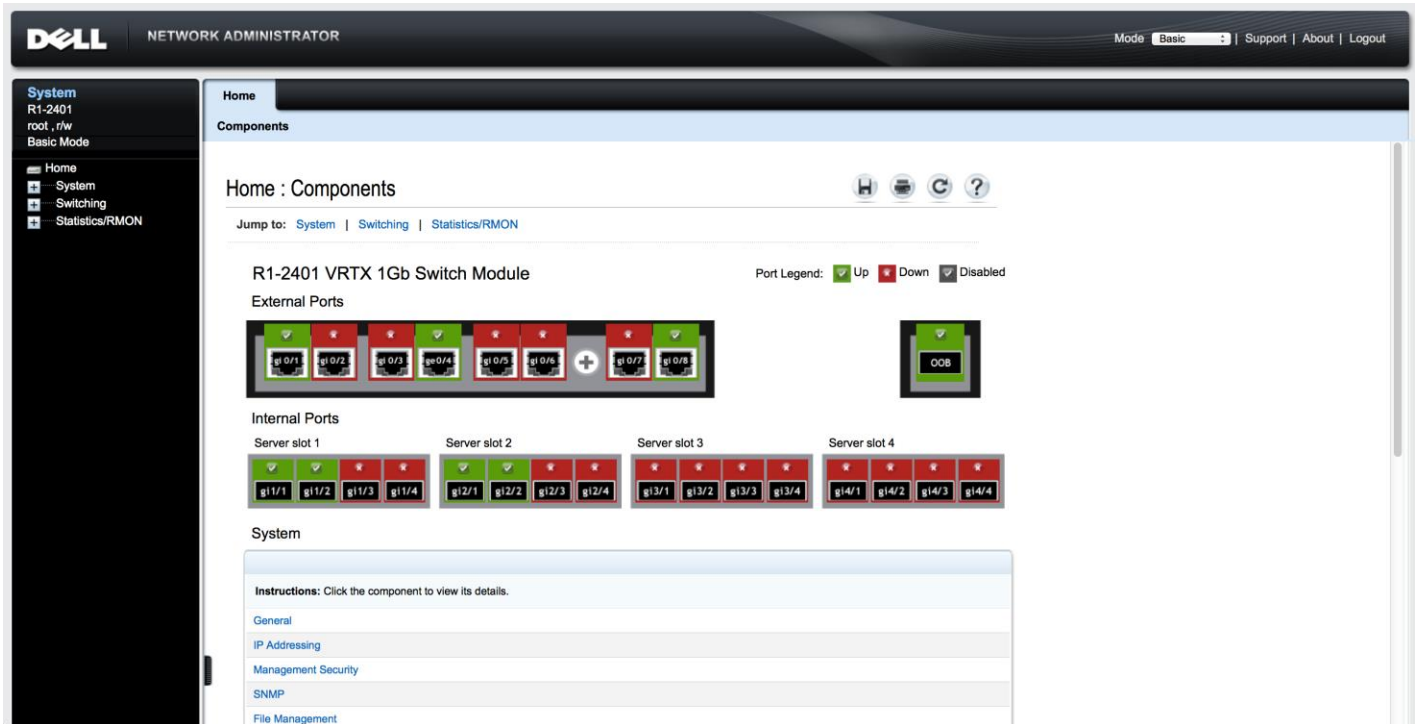
**Figure 2: The Dell PowerEdge VRTX integrated switch can accommodate multiple networks for isolating network traffic to
dedicated interfaces.**

As shown in Figure 3, we defined a trunk on each of the two interfaces for each
node, which allowed multiple networks to traverse a single connection:

1. Node interface 1 – trunked and tagged with VLANs 10 and 100
2. Node interface 2 – trunked and tagged with VLANs 200 and 300

Figure 3: The Dell PowerEdge VRTX integrated switch supports VLANs and Trunking.

This method prevented VM migration traffic from affecting performance of the management and LAN networks due to saturation, and provided all the connections for typically encountered traffic.

See Appendix B for detailed instructions on how to setup your Dell PowerEdge VRTX integrated switch.

Setting up VMware ESXi 5.1

We used a version of ESXi 5.1 U1 provided by Dell that included Dell drivers. Using this version enabled the ESXi instances to utilize the shared PERC 8 controller on the Dell PowerEdge VRTX and access shared volumes. We obtained the version of ESXI from www.dell.com/support/drivers/in/en/19/driverdetails?driverid=V1P4T.

As seen in Figure 4, we used the Remote Console connection for each node, attached virtual media, and used an ISO file to deploy ESXi.
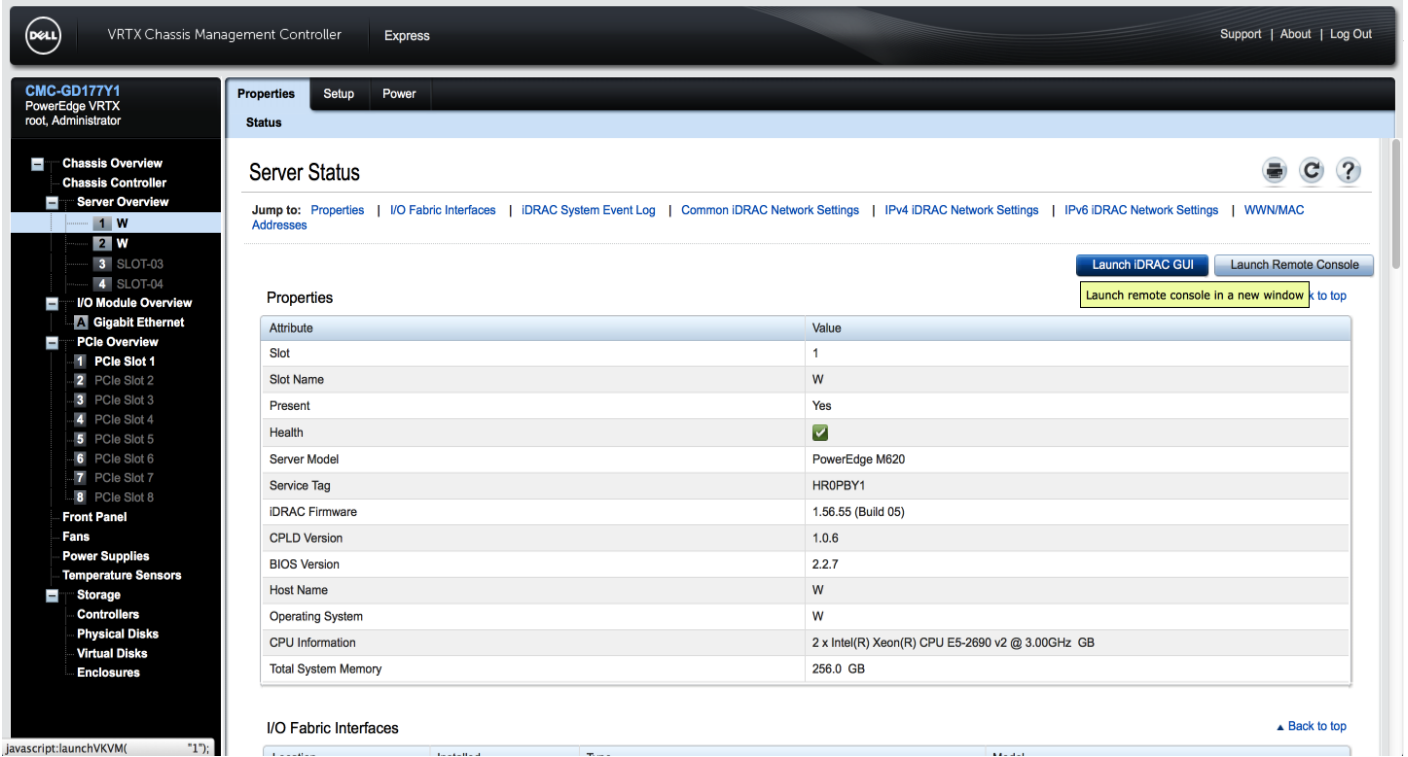
Figure 4: The Dell PowerEdge VRTX provides an out-of-band remote console to access the server nodes.

We installed ESXi on removable media located in the internal SD card slots on each of the VRTX M620 nodes, which allowed us to utilize the internal arrays as local datastores.

See Appendix B for systematic instructions on how we set up ESXi nodes.

Configuring the VRTX integrated shared storage

The Dell PowerEdge VRTX has several disk options with two different bay configurations. Our VRTX contained 25 2.5-inch drive bays and a mix of 1TB and 300GB drives. We created two virtual disks consisting of different RAID levels using the shared storage contained within the VRTX.

First, we configured a RAID 6 virtual disk using five 1TB drives, which hosted our infrastructure VMs. Then we created a RAID 10 virtual disk consisting of 20 300GB drives for VDI provisioning. Figure 5 shows the configuration screen for the virtual disks.
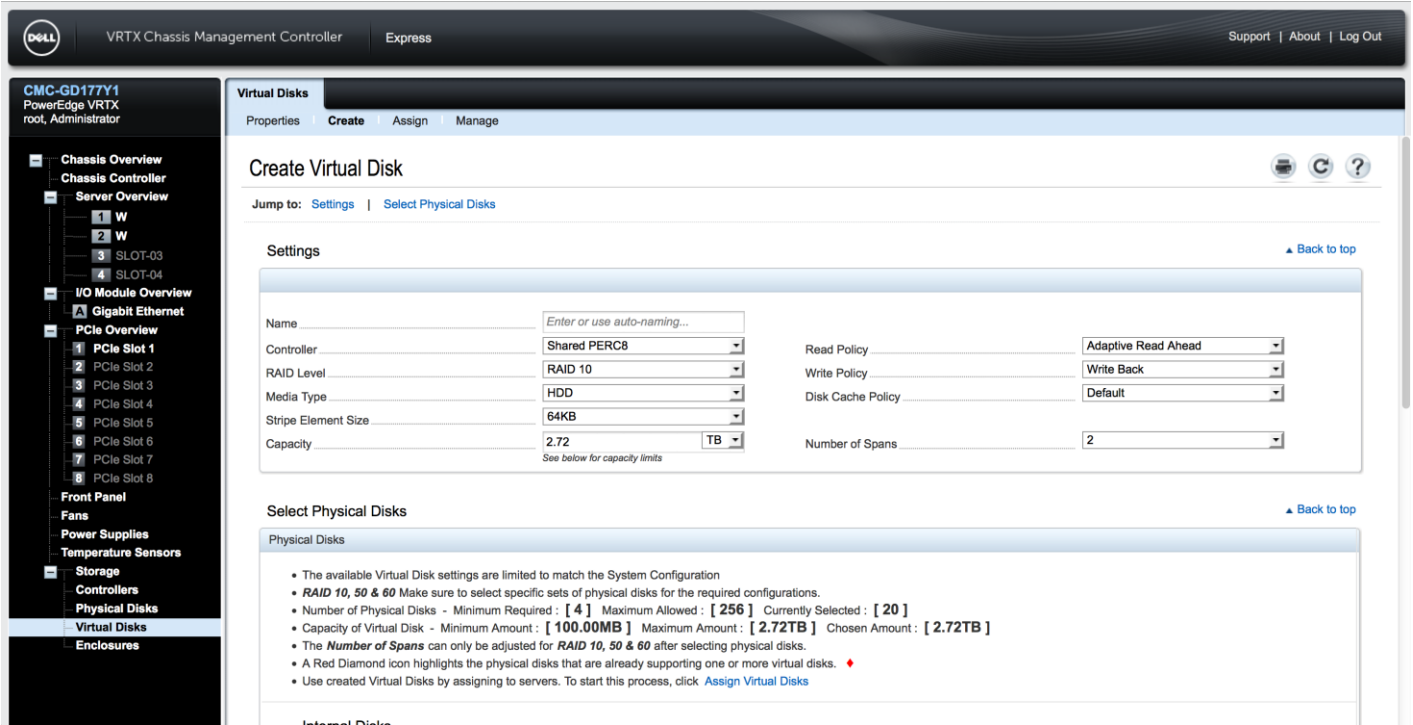
Figure 5: The Dell PowerEdge VRTX integrated shared storage provides multiple levels of RAID for performance and reliability.

Finally, as shown in Figure 6, we assigned shared access of our virtual disks to each of the VRTX M620 nodes.
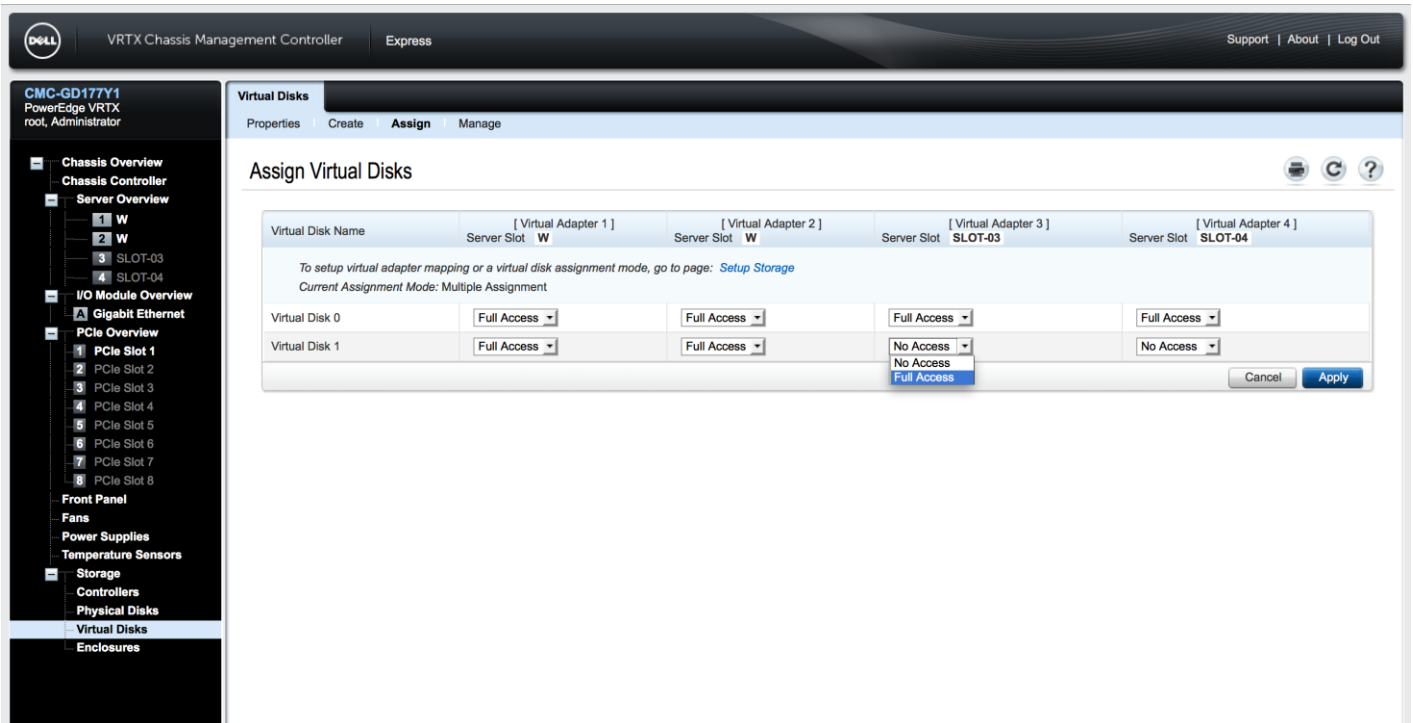

Figure 6: With the Dell PowerEdge VRTX shared storage, you can assign virtual disks to as many nodes as needed.

See [Appendix B](#) for details on how we setup the Dell PowerEdge VRTX integrated shared storage and virtual disks.

Setting up infrastructure servers

The Citrix XenDesktop Service requires other infrastructure components, namely AD/DNS/CA and SQL server. We installed these infrastructure servers in VMs on a dedicated infrastructure node. Infrastructure servers included an active directory server, which provided DNS, DHCP, and the Enterprise Certificate Authority (Enterprise CA); a vCenter server, which contained an instance of SQL server; and the XenDesktop server, which contained all of the roles required to deploy and provide access to virtual desktops. Figure 7 shows the virtual server configurations and their roles.

Server	vCore (vCPU count)	RAM (GB)	Roles
VRTX-AD	1	4	Active Directory, DNS, DHCP, Enterprise CA
vCenter	4	16	VMware vCenter server, SQL
VRTX-XD	1	4	Citrix XenDesktop 7.5, Citrix StoreFront

Figure 7: Infrastructure servers and roles.

See [Appendix B](#) for details on how we set up the infrastructure VMs.

Creating desktop templates

We built a Windows 7 VM with one virtual CPU (vCPU) and 1.5 GB of RAM. We then patched that server and installed basic applications common among all of our virtual desktops. We converted that "gold" virtual server into a template for use by Citrix XenDesktop 7 to deploy as many virtual desktops as required.

See [Appendix B](#) for instructions on how to create desktop templates and deploy them using Citrix XenDesktop 7.

Although we deployed Citrix XenDesktop 7 on vSphere® 5.1, which is a common supported configuration, it is important to note that Citrix XenDesktop 7.5 offers flexibility to deploy on other hypervisors including Citrix XenServer and Microsoft Hyper-V®. With this in mind, Dell and Citrix developed the Citrix XenDesktop System Center Virtual Machine Manager Service Template to assist in automated, repeatable deployments of Citrix XenDesktop on Microsoft Hyper-V. The Dell Service Template takes advantage of Microsoft SCVMM to deploy and provision XenDesktop server roles, and execute an initial configuration for a new XenDesktop site.[2]

Deploying Wyse terminals for thin client access

Thin client technology provides a quality desktop user experience without the need for client-side data processing. The server handles all data processing and only the presentation and user interface inputs pass between the client and server. The ability to

---

[2] www.citrix.com/downloads/xendesktop/betas-and-tech-previews/system-center-service-template-tech-preview.html

strip away data processing from the client means very little processing power is required for the end-user, enabling organizations to deploy low-power devices with very small footprints due to insufficient computing resources.

We deployed Wyse Xenith Pro 2 zero clients, which are purpose-built for Citrix XenDesktop and contain Wyse ThinOS, a Linux-type operating system. ThinOS can make the configuration and network changes necessary to connect to your Citrix XenDesktop service. The terminals we tested contained four USB ports and DVI and DisplayPort connections, enabling end-users to connect to their accustomed displays, input devices, and storage media.

The Wyse endpoints required little additional configuration because we connected to our host network using DHCP. We imported the SSL certificate of our Enterprise CA and added it to the list of trusted root authorities. We then entered the Citrix XenDesktop Storefront address, authenticated, and immediately logged on to our hosted virtual desktop where we performed Web browsing, text editing, and streamed video, as a workstation user would do.

See Appendix B for information on how we set up Wyse client connections to our XenDesktop environment.

In conclusion

The Dell PowerEdge VRTX is an all-inclusive platform, suitable for rapid deployment of a virtual environment, such as Citrix XenDesktop 7.5. The integrated components of the VRTX means your business has a centralized management console for the necessary data center components that support VDI environments. We found that the Dell PowerEdge VRTX and XenDesktop set up, configured, and deployed VDI users easily. The addition of Dell Wyse terminals demonstrates how your end-users can access your XenDesktop VDI environment with efficient hardware and little administrative effort. The combination of Dell PowerEdge VRTX and Citrix XenDesktop 7.5 can offer a unified, efficient, and simple enterprise-value VDI solution for your business, but without the resources and commitment need for supporting an enterprise data center.

APPENDIX A – SYSTEM CONFIGURATION INFORMATION

Figure 8 provides detailed configuration information for the test systems.

Platform (Chassis)	
Vendor and model number	Dell PowerEdge VRTX
CMC Firmware	1.00.A00.201306122025
Chassis Infrastructure Firmware	1.0.A00.201307102026
Power supplies	
Total number	4
Vendor and model number	Dell 80 Plus Platinum E1100E-S0 (P/N 0YT39Y)
Wattage of each (W)	1100
Cooling fans	
Total number	6 fans
Vendor and model number	Delta Electronics, Inc
Dimensions (h × w) of each	60mm × 60mm
Volts	12
Chassis RAID controller	
Vendor and model number	Dell SPERC8
Firmware version	23.8.2-0005
Cache size (GB)	1
Total Chassis Shared Hard drives	25
Vendor and model number	Hitachi HUC101212CSS600
Number of drives	5
Size (GB)	1.2 TB
RPM	10K
Vendor and model number	Toshiba MK3001GRRB
Number of drives	20
Size (GB)	300 GB
RPM	15K
Type	SAS 6 Gbps
Chassis USB ports	
Number	2
Type	2.0
Platform (Nodes)	
Vendor and model number	Dell PowerEdge M620
BIOS name and version	BIOS 1.7.2
Firmware Version	1.40.40 (Build 08)

CPU	
Vendor	Intel
Name	Xeon
Model number	E5-2690 v2
Stepping	M1
Socket type	FCLGA12A
Core frequency (GHz)	3
Bus frequency (GT/s)	8
L1 cache	128 KB
L2 cache	1 MB
L3 cache	10 MB
Number of processor packages	2
Number of cores per processor	10
Number of hardware threads per core	2
RAM	
Memory module(s) Per Node	16
Size (GB)	16
Total RAM in system (GB)	256
Vendor and model number	Kingston K20D6F-HYA
Type	DDR3L
Speed (MHz)	1600
Speed running in the system (MHz)	1600
Timing/Latency (tCL-tRCD-tRP-tRASmin)	11-11-11-35
Rank	Double
RAID controller	
Vendor and model number	Dell PERC H710P mini
Firmware version	21.2.1-0000
Cache size (GB)	1024 MB
Hard drive	
Vendor and model number	Dell (Seagate Technologies) Savvio
Number of drives	2
Size (GB)	300
RPM	10K
Type	SAS
Network adapter	
Vendor and model number	Broadcom® BRCM 10GbE 2P 57810s bNDC
Type	Embedded
Number of ports	2
USB ports	
Number	2

Miscellaneous	
Operating system	VMware ESXi 5.1 Update 1
Build number	1065491
File system	VMFS
Service Pack	N/A
Language	English

Figure 8: Detailed information of our test solution.

APPENDIX B – HOW WE TESTED

Setting up the Dell PowerEdge VRTX chassis shared storage

1. Connect the iDRAC port on the chassis to a valid network. It should obtain an address via DHCP.
2. Obtain the iDRAC IP address from the LCD front panel.
3. Connect to the iDRAC with a Web browser and log in as `root`. If this is a first-time configuration, enter the password `calvin`
4. Click on Virtual Disks under Storage.
5. Create a new VD.
6. Use all twenty 300GB disks to create a RAID 10, and enter the name `Client`
7. Create another VD.
8. Use all five 1.2 TB disks to make a RAID 6, and enter the name `Infrastructure`
9. Click on the Assign menu.
10. Assign the VDs to each blade with Full access.

Setting up the Dell PowerEdge M620 node

1. Connect to the console of the M620 node.
2. Boot the M620 node.
3. Press `F2` to enter setup.
4. Select System BIOS, and configure the BIOS with the following settings:

BIOS sub menu	Setting	Value
Processor Settings	QPI speed	Maximum
Memory Settings		Optimizer Mode
Integrated Devices	Internal SD Card Module	Enabled
Integrated Devices	Internal SD Card Redundancy	Disabled
Boot Settings	Boot Mode	UEFI
Boot Settings	UEFI Boot Order	Place the SD Card first

5. Click Finish, click Yes to accept changes, and click OK to confirm success.
6. Click Finish. Click Yes to confirm exit and reboot.

Setting up the Dell PowerEdge VRTX chassis I/O module

1. In the CMC, select I/O Module Overview, and click Launch I/O Module.
2. Log in with the username `root` and the password `calvin`
3. Click the Submit button.
4. Expand Switching→VLAN and click on VLAN Membership.
5. Click Add under the VLAN Membership Tab.
6. For the VLAN ID number, enter `10`
7. For the VLAN Name, enter `mgmt`
8. Click Apply.
9. Click Add under the VLAN Membership Tab.

10. For the VLAN ID number, enter `100`
11. For the VLAN Name, enter `priv-net`
12. Click Apply.
13. Click Add under the VLAN Membership Tab.
14. For the VLAN ID number, enter `200`
15. For the VLAN Name, enter `Filer`
16. Click Apply.
17. Click Add under the VLAN Membership Tab.
18. For the VLAN ID number, enter `300`
19. For the VLAN Name, enter `vMotion`
20. Click Apply.
21. Click on Switching→VLAN→Port Settings.
22. Click Edit under the Port Settings tab.
23. Select the radio button for External Port.
24. Use the pull-down menu to select gi0/1.
25. For Port VLAN Mode, use the pull-down menu and select Access.
26. In the VLAN List, select 1 and click Remove. Enter `10` in the text field on the left and click Add. Click Apply.
27. Use the Port pull-down menu to select gi0/4.
28. For Port VLAN Mode, use the pull-down menu and select Access.
29. In the VLAN List, select 1 and click Remove. Enter `100` in the text field on the left and click Add. Click Apply.
30. Use the Port pull-down menu to select gi0/8.
31. For Port VLAN Mode, use the pull-down menu and select Access.
32. In the VLAN List, select 1 and click Remove. Enter `200` in the text field on the left and click Add. Click Apply.
33. Select the Port radio button for Internal Port.
34. After the screen populates, use the pull-down menu to select gi1/1.
35. For Port VLAN Mode, use the pull-down menu and select Trunk.
36. Select all the entries in the VLAN list and click the Remove button.
37. Enter 10,100 in the VLAN list box and click the Add button.
38. Click Apply.
39. Use the Port pull-down menu to select gi1/2.
40. For Port VLAN Mode, use the pull-down menu and select Trunk.
41. Select all the entries in the VLAN list and click the Remove button.
42. Enter `200`,`300` in the VLAN list box and click the Add button.
43. Click Apply.
44. After the screen populates, use the pull-down menu to select gi2/1.
45. For Port VLAN Mode, use the pull-down menu and select Trunk.
46. Select all the entries in the VLAN list and click the Remove button.
47. Enter `10`,`100` in the VLAN list box and click the Add button.
48. Click Apply.
49. Use the Port pull-down menu to select gi2/2.
50. For Port VLAN Mode, use the pull-down menu and select Trunk.

51. Select all the entries in the VLAN list and click the Remove button.
52. Enter `200,300` in the VLAN list box and click the Add button.
53. Click Apply.
54. After the screen populates, use the pull-down menu to select gi3/1.
55. For Port VLAN Mode, use the pull-down menu and select Trunk.
56. Select all the entries in the VLAN list and click the Remove button.
57. Enter `10,100` in the VLAN list box and click the Add button.
58. Click Apply.
59. Use the Port pull-down menu to select gi3/2.
60. For Port VLAN Mode, use the pull-down menu and select Trunk.
61. Select all the entries in the VLAN list and click the Remove button.
62. Enter `200,300` in the VLAN list box and click the Add button.
63. Click Apply.
64. After the screen populates, use the pull-down menu to select gi4/1.
65. For Port VLAN Mode, use the pull-down menu and select Trunk.
66. Select all the entries in the VLAN list and click the Remove button.
67. Enter `10,100` in the VLAN list box and click the Add button.
68. Click Apply.
69. Use the Port pull-down menu to select gi4/2.
70. For Port VLAN Mode, use the pull-down menu and select Trunk.
71. Select all the entries in the VLAN list and click the Remove button.
72. Enter `200,300` in the VLAN list box and click the Add button.
73. Click Apply.
74. At the top of the Port Settings page, click the diskette icon to save your settings.

Installing and configuring ESXi 5.1 U1

Installing ESXi 5.1 U1 on the M620 node

In order to use the Shared PERC 8 controller on the VRTX, each blade must be equipped with the Dell Customized version of ESXi 5.1 Update 1 available at www.dell.com/support/drivers/in/en/19/driverdetails?driverid=V1P4T.

Configuring ESXi 5.1 U1

For our deployment, we configured ESXi 5.1 as follows:

- Configure local storage as a VMFS volume named `Local0x`, where `x` is the blade number.
- Configure Shared PERC 8 storage.
- Increase the ports available on the vSwitch0 to 248 (default is 120).
- Define vSwitch0 with an uplink to NIC1.
- Define vSwitch0 with a management network (VLAN 10) and a private network (VLAN 100).
- Define vSwitch1 with an uplink to NIC2.
- Define vSwtich1 with a file storage network (VLAN 200) and a vMotion network (VLAN 300).

Creating Microsoft Windows 2012 template VM

1. Using the vSphere client, connect and log in to one of the blades as `root`

2. Create a new VM named `Win2012` under one of the VRTX blade hosts, stored on Infrastructure storage.
3. Define 1 vCPU and 4.0 GB memory.
4. Provision the HDD as 150 GB.
5. Allocate 1 NIC with the default settings.
6. Set the Win2012.iso file as the CD/DVD drive ISO file and check the box for Connect at startup.
7. Power on the VM and wait for the Windows 2012 installation to start.
8. Once booted, install Windows 2012 Datacenter. Set the login name as `administrator` and set the password as `Password1`
9. Log in as `administrator` using the password `Password1`
10. Click on the Dashboard item on the left panel.
11. Under Configure this local server, click Add roles and features.
12. Click Next in the wizard.
13. On Installation Type, leave the default Role-based or feature-based installation, and click Next.
14. Under Server Selection, leave the default local server, and click Next.
15. On Server Roles, do not check any roles, and click Next.
16. On Features, check the box for .NET Framework 3.5 features, and click Next.
17. On Confirmation, click Specify an alternate Source.
18. In the browse window, find the DVD drive and select D:\sources\sxs.
19. Begin the installation.
20. Reboot when prompted.
21. Using the console, navigate to VM→Guest and click VMware Tools Install.
22. On the DVD Drive (D:) panel, click Run setup64.exe.
23. In the VMware Tools Setup window, click Next.
24. On the Choose Setup Type screen, choose Typical, and click Next.
25. Click Install and restart the machine when prompted.
26. When the server manager application appears click on Local Server on the left.
27. Click on the Remote Desktop: Enabled link.
28. Click the option for Allow remote connections to this computer.
29. Uncheck the box to disable the NLA requirement.
30. Click OK.
31. Open the Control Panel and launch Windows Update.
32. Choose the option to Check for updates but let me choose whether to install.
33. Check for updates and install whatever updates are available.
34. Reboot when prompted. Repeat Windows Update until all updates have been applied.
35. Open the Control Panel and launch Windows Firewall.
36. Select Advanced settings.
37. Select Windows Firewall Properties.
38. On the Domain Profile tab, change Firewall State to Off.
39. On the Private Profile tab, change Firewall State to Off.
40. On the Public Profile tab, change Firewall State to Off.
41. Click OK.
42. Open a PowerShell prompt from the taskbar.

43. Type `enable-psremoting –confirm:$false` and press Enter.
44. Type `set-executionpolicy remotesigned` and press Enter.
45. Press `Y` to confirm the change. Open a PowerShell prompt and type
    `c:\windows\system32\sysprep\sysprep /generalize /oobe /mode:VM /shutdown`

Deploying Microsoft Windows 2012 VM for vrtx-ad

1. Launch vSphere Client and connect to the blade that is hosting Win2012.
2. Right-click on the Win2012 VM.
3. Clone the Win2012 VM to a VM named `vrtx-ad`
4. Change the CPUs to 2 and memory to 4096 MB.
5. Power on the VM named vrtx-ad.
6. When Windows boots up, check the box to accept the license terms and click Accept.
7. For the Region and Language settings click Next.
8. Set the Administrator password to `Password1`
9. Log in as the local administrator.
10. When the Server manager starts up, click on Local Server.
11. Set the IP address to a static IP, `192.168.1.1`, netmask `255.255.255.0`, gateway `192.168.1.1`, DNS `192.168.1.1`
12. Change the hostname to `vrtx-ad`. Reboot the server when prompted.

Deploying Microsoft Windows 2012 VM for vCenter 5.1 U1 vrtx-vc

1. Launch vSphere Client and connect to the blade that is hosting Win2012.
2. Right-click on the Win2012 VM.
3. Clone the Win2012 VM to a VM named `vrtx-vc`
4. Change the CPUs to 2, and change the memory to `8192` MB.
5. Power on the VM named vrtx-vc.
6. When Windows boots up, check the box to accept the license terms and click Accept.
7. For the Region and Language settings click Next.
8. Set the Administrator password to `Password1`
9. Log in as the local administrator.
10. When the Server manager starts up, click on Local Server.
11. Set the IP address to a static IP, `192.168.1.2`, netmask `255.255.255.0`, gateway `192.168.1.1`, DNS `192.168.1.1`
12. Change the hostname to `vrtx-vc`. Reboot the server when prompted.

Creating a VM named vrtx-xd

1. Launch vSphere Client and connect to the blade that is hosting Win2012.
2. Right-click on the Win2012 VM.
3. Clone the Win2012 VM to a VM named `vrtx-xd`
4. Change the CPUs to 2, and change the memory to `4096` MB.
5. Power on the VM named vrtx-xd.
6. When Windows boots up, check the box to accept the license terms and click Accept.

7. For the Region and Language settings click Next.
8. Set the Administrator password to `Password1`
9. Log in as the local administrator.
10. When the Server manager starts up, click on Local Server.
11. Set the IP address to a static IP, `192.168.1.50`, netmask `255.255.255.0`, gateway `192.168.1.1`, DNS `192.168.1.1`
12. Change the hostname to `vrtx-xd`. Reboot the server when prompted.

Preparing ISO files

We made the following ISO files available on the ESXi shared storage:

- Windows 2012 installation ISO
- SQL Server 2012 SP1 installation ISO (en_sql_server_2012_standard_edition_with_sp1_x64_dvd_1228198.iso)
- VMware vCenter 5.1 Update 1 (VMware-VIMSetup-all-5.1.0-1123966.iso)
- XenDesktop 7 install ISO, VDI Edition
- Windows 7 x64 Professional installation ISO

Creating AD/DNS

Installing Active Directory and DNS services

1. On VRTX-AD, log in as `test.local/administrator`
2. Launch Server Manager.
3. Click Manage→Add Roles and Features.
4. At the Before you begin screen, click Next.
5. At the Select installation type screen, leave Role-based or feature-based installation selected, and click Next.
6. At the Server Selection Screen, select the server from the pool, and click Next.
7. At the Select Server Roles screen, select Active Directory Domain Services. Click Add Features when prompted, and click Next.
8. At the Select Features screen, click Next.
9. At the Active Directory Domain Services screen, click Next.
10. At the Confirm installation selections screen, check Restart the destination server automatically if required, and click Install.

Configuring Active Directory and DNS services

1. After the installation completes, a screen should pop up with configuration options. If not, click the Tasks flag in the upper-right section of Server Manager.
2. Click Promote this server to a Domain Controller.
3. At the Deployment Configuration screen, select Add a new forest. In the Root domain name field, type `test.local` and click Next.
4. At the Domain Controller Options screen, leave the default values, and enter `Password1` twice.
5. Click Next four times to accept default settings for DNS, NetBIOS, and directory paths.
6. At the Review Options screen, click Next.

7. At the Prerequisites Check dialog, allow the check to complete. If there are no relevant errors, check Restart the destination server automatically if required, and click Install.

8. When the server restarts, log on using `test.local\Administrator` and the specified password.

Setting up DHCP services

1. Launch Server Manager.
2. Click Manage→Add Roles and Features.
3. At the Before you begin screen, click Next.
4. At the Select installation type screen, leave Role-based or feature-based installation selected, and click Next.
5. At the Server Selection Screen, select the server from the pool, and click Next.
6. At the Select Server Roles screen, select DHCP Server. Click Add Features when prompted, and click Next.
7. At the Select Features screen, click Next.
8. At the DHCP Server screen, click Next.
9. At the Confirm installation selections, check Restart the destination server automatically if required, and click Next.
10. Once the installation is finished, click Complete DHCP configuration.
11. At the DHCP Post-Install configuration wizard, click Next, and click Commit.
12. At the Summary dialog, click Close.
13. In the Add Roles and Features Wizard, click Close.
14. Click Start→DHCP.
15. Expand VRTX-AD.test.local, and click IPv4. Right-click IPv4→New Scope.
16. At the New Scope Wizard Welcome screen, click Next.
17. In the Name field, type `test` and click Next.
18. Enter the lowest IP address in your test setup for Start IP address, and the highest IP address for End IP address. Leave the Length and Subnet mask as defaults, and click Next.
19. Click Next eight times to accept default scope settings, and click Finish.
20. Close the DHCP Manager console.

Adding Certificate Authority Role

1. Log on to VRTX-AD as `administrator`
2. Start the Add Roles and Features Wizard. Click Next.
3. Select Role-based or feature-based installation. Click Next.
4. Select the current system.
5. Select Active Directory Certificate Services. Click Next three times.
6. On the Role Services screen, select Certification Authority and click Next.
7. Click the Restart the destination server automatically if required box, and click Install.
8. Once that finishes open the Post deployment AD CS Configuration utility.
9. At the Credentials scree, enter credentials. We used `test.local\administrator`
10. At the Role Services screen, select Certification Authority and click Next.
11. At the Setup Type screen, leave as Enterprise CA and click Next.
12. At the CA Type screen, leave as Root CA and click Next.
13. At the Private Key screen, leave as Create a new private key and click Next.

14. At the Cryptography screen, leave defaults and click Next.
15. At the CA Name screen, leave the default CA Name and click Next.
16. At the Validity Period screen, leave the default validity period and click Next.
17. Leave the default Certificate Database and click Next.
18. Click Configure and then close when it is finished.
19. If it asks if you would like to configure additional roles select OK.
20. Select Certificate Authority Web Enrollment and click Next.
21. Click Configure and then close when it is finished.

Configuring the Domain

1. On vrtx-vc and vrtx-xd, log in as `administrator` and add each system to the test.local domain.
2. Log in as `test.local\administrator`
3. Open User Accounts.
4. Click Add…
5. Click Browse…
6. Enter `test.local\Administrator` and click Check Names.
7. Select Administrator and click Next.
8. Click Finish.

Installing Microsoft SQL Server 2012 x64 SP1 for VMware vCenter 5.1 Update 1

Installing SQL Server 2012

1. On vrtx-xd, join the system to the test.local domain and log in as `test.local\administrator`
2. Attach the SQL Server 2012 SP1 ISO file to the virtual CD/DVD drive on vrtx-vc.
3. If prompted to "Tap here to decide what happens…" click on the prompt and run the setup program.
4. In the SQL Server Installation Center click on the Installation link on the left side panel.
5. Click the link New SQL Server stand-alone installation or add features…
6. On the Setup Support Rules dialog, if all tests pass, click OK.
7. On the Product Key page, accept the default key and click Next.
8. On the license Terms page, accept the EULA and click Next.
9. On the Product Updates page accept the default (include product updates found online) and click Next.
10. The installer will download and extract the updates and install setup files.
11. On the Setup Support Rules screen, click Next after all rules pass.
12. On the Setup Role screen, select SQL Server Feature Installation.
13. On the Feature Selection screen select the following:
    a. Database Engine Services
    b. Client Tools Connectivity
    c. Integration Services
    d. Management Tools – Basic
    e. Management Tools – Complete
14. Leave the Shared feature directories alone and click Next.
15. Once the Installation Rules pass, click Next.
16. Choose the Default Instance.

17. On the Disk Space Requirements screen, click OK.
18. On the Server Configuration screen, set each account name to `test.local\SVC_SQL` and set the password.
19. Set the SQL Server Agent service to Startup Type Automatic.
20. Click Next.
21. On the Database Engine Configuration screen, select Mixed Mode and set the SA password to `Password1`
22. Click Add Current User.
23. Leave the Data Directories at their defaults.
24. Click Next.
25. For Error Reporting, click Next.
26. Installation Configuration Rules: click Next after all the rules pass.
27. On the Ready to Install screen, click Install.
28. On the Complete screen, click Close.

Configuring SQL Server 2012 for VMware vCenter

1. Open the Start Menu and locate SQL Server Management Studio.
2. Login as `sa` using SQL Server Authentication.
3. Right-click on the Databases folder and select New Database…
4. Set the database name to `vcdb`
5. On the left under Select a page, click on Options.
6. Change the Recovery Model to Simple.
7. Click OK.
8. Under the Security folder, expand the folder and select Logins. Right-click New Login…
9. Set the following fields:
    a. Set the Login Name to `vcdb_user`
    b. Change the authentication to SQL Server authentication.
    c. Set the password to `Password1`
    d. Uncheck Enforce password policy.
    e. Change the default database to `vcdb`
10. Under Select a page click on User Mapping:
    a. Check the box for msdb and click the … button at the far right of the row.
    b. In the select schema dialog, click Browse… and select [dbo] from the list. Click OK, then click OK again.
    c. Under Database Role membership for: msdb, check the box for db_owner.
11. Repeat the same steps for the vcdb database.
12. Attach the vCenter 5.1 update 1 install ISO to the DVD drive and browse to D:\Single Sign On\DBScripts\SSOServer\schema\mssql
13. Double-click on rsaIMSLiteMSSQLSetupTablespaces.sql. This will open the SQL file editor.
14. Replace C:\CHANGE ME\ with the correct data file path for the install: `C:\Program files\Microsoft SQL Server\MSSQL11.MSSQLSERVER\DATA\`
15. Click Execute on the tool bar. Make sure that no text is selected before you click the button. If there are no errors, a message will say, "Command(s) completed successfully."
16. On the Databases folder click Refresh and the RSA database will appear.
17. In File Explorer, browse back to D:\Single Sign On\DBScripts\SSOServer\schema\mssql\

18. Double-click on rsaIMSLiteMSSQLSetupUsers.sql
19. When the file opens in the SQL Editor change the password values to `Password1`
20. Click Execute to run the script. Make sure that no text is selected before you click the button, or it will not execute the whole script. If there are no errors, a message will say, "Command(s) completed successfully."
21. Refresh the tree view on the navigation panel.
22. Under the Security, Logins, right-click on RSA_DBA and select Properties.
23. Uncheck the box for Enforce Password policy and click OK.
24. Do the same on RSA_USER.
25. Close the SQL Manager and do not save the file changes.
26. Open the Start menu and find SQL Configuration manager.
27. Select SQL Server Network Configuration\Protocols for MSSQLSERVER.
28. Enable Named Pipes on the right panel. A warning will appear that this action will not take effect until a restart.
29. Click on SQL Server Services and select SQL Server (MSSQLSERVER).
30. Right-click and select Restart and wait for the restart to complete.
31. Close SQL Server Configuration Manager.
32. Open Start menu again and select Administrative Tools.
33. Open ODBC Data Sources (64-bit).
34. Select the System DSN tab.
35. Click the Add… button.
36. Select SQL Server Native Client 11.0 and click Finish.
37. Set the Name of the DSN to `vcdb` and Select VRTX_VC as the server.
38. Click Next.
39. Select With SQL Server authentication… and enter `vcdb_user` and `Password1`. Then click Next.
40. Click Next again and click Finish with no changes.
41. Click Test Data Source. It should return success.
42. Click OK.

Installing VMware vCenter 5.1 update1 on vrtx-vc

Installing VMware vCenter Single Sign On

1. Attach the VMware VIMSetup ISO file to the VM DVD drive and make sure it is connected.
2. On vrtx-vc, open Windows Explorer and launch the VMware VIM install from the DVD drive by right-clicking on the DVD drive and selecting Install or run program from your media.
3. In the VMware vCenter Installer program, select the vCenter Single Sign On install and click Install.
4. Click OK for the English Language.
5. When the install wizard appears, click Next on the Welcome dialog.
6. On the End User Patent Agreement, screen click Next.
7. On the End User License Agreement screen, Accept and click Next.
8. On the vCenter Single Sign On Deployment Type, select Create the primary node for a new vCenter Single Sign On installation and click Next.
9. On the vCenter Single Sign On Type, select Install basic vCenter Single Sign On and click Next.
10. On the vCenter Single Sign On Information screen, enter a password and click Next. We used `Password1!`
11. On the vCenter Single Sign On Database screen, select Use an existing supported database and click Next.

12. On the Database Information screen, enter the information as follows:
    - Database Type: `Mssql`
    - Host name: `vrtx-vc.test.local`
    - Port: `1433`
    - Database user name: `RSA_User`
    - Database Password: `Password1`
    - Database DBA user name: `RSA_DBA`
    - Database Name: `RSA`
    - JDBC URL: `jdbc:sqlserver://;serverName=vrtx-vc.test.local;port=1433;databaseName=RSA`
13. On the Local System Information screen, enter `vrtx-vc.test.local` and click Next.
14. On the Security Support Provide Interface Service Information screen, make sure that User Network Service account is checked. Click Next.
15. On Destination Folder, accept the default folder path and click Next.
16. On vCenter Single Sign On Port Settings, accept the default port (7444) and click Next.
17. On the Ready to Install screen, click Install.
18. Allow the installation to complete. When complete, click Finish on the final dialog.

Installing VMware vCenter Inventory Service
1. In the VMware vCenter Installer click on VMware vCenter Inventory Service.
2. Click Install.
3. Click OK to accept English.
4. On the Welcome screen, click Next.
5. On the End User Patent Agreement screen, click Next.
6. On the End User License Agreement screen, Accept and click Next.
7. On the Destination Folder screen, Accept the default and click Next.
8. On the Local System Information screen, enter the FQDN of the vCenter Server and click Next.
9. On the Configure Ports screen, leave the defaults. Click Next.
10. On the JVM Memory screen, select Small (less than 100 hosts or 1000 virtual machines) and click Next.
11. On the vCenter Single Sign On Information screen, enter the password here and select Next. The password we set earlier was `Password1!`
12. At the Certificate Installation for Secure Connection screen, click Install certificates.
13. On the Ready to Install screen, click Install.
14. Click Finish when complete.

Installing VMware vCenter Server
1. In the VMware vCenter Installer, click on VMware vCenter Server.
2. Click Install.
3. Click OK to accept English.
4. At the Welcome screen, click Next.
5. On the End User Patent Agreement screen, click Next.
6. On the End User License Agreement screen, accept and click Next.
7. On the License Key screen, enter a valid vCenter license key.

8. On the Database Options screen, select Use an existing supported database and select the DSN created while setting up an SQL Server 2012 named vcdb. Click Next.
9. On the Database Options screen, enter the vcdb_user password `Password1` and click Next.
10. You will see a message box appear with instructions about how to configure networking on SQL server. Click OK.
11. On the vCenter Server Service screen, the defaults should already be set to Use System Account and should have the correct FQDN. Click Next.
12. On the vCenter Server Linked Mode Options, select Create standalone VMware vCenter Server instance and click Next.
13. On the Configure Ports screen, accept the defaults and click Next.
14. On the vCenter Server JVM Memory screen, select Small (less than 100 hosts or 1000 virtual machines) and click Next.
15. On the vCenter Single Sign On Information screen, enter the SSO admin password, `Password1!` and click Next.
16. On the vCenter Single Sign On Information screen, set the vCenter Server administrator recognized by vCenter Server Single Sign On to `admin@System-Domain` and uncheck This administrator is a user group. and click Next.
17. On the vCenter Inventory Service Information screen, accept the default URL and click Next.
18. On the Destination Folder screen, accept the default and click Next.
19. On the Ready to Install the Program screen, click Install.
20. Click Finish when complete.
21. Reboot the vrtx-vc virtual machine.
22. Log in as Administrator.
23. Click Start, type `regedit` and press Enter.
24. Navigate to HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\vpxd
25. Right-click the DependOnService key, and click Modify.
26. Delete the line that says "ProtectedStorage," and click OK.
27. Restart the server.
28. Verify that the vCenter service has started.

Installing VMware vCenter Web Client
The Web client may be required for XenDesktop to connect to the SDK URL.
1. Connect the ISO file for VMware vCenter 5.1 Update 1 and select autorun.
2. During installation, accept all defaults to finish the installation.

Setting up a VMware vSphere cluster with the Dell PowerEdge VRTX blades
1. Launch the vSphere Client, and connect to vrtx-vc using the username `Admin@system-domain` and the password `Password1!`
2. Check the box to install the certificate and click Ignore.
3. Once you have logged in, right-click on the server name in the top left and click New Datacenter.
4. Name the datacenter `VRTX`
5. Right-click on the Datacenter VRTX and select Add Host… and enter the name and root password for vrtx-01.
6. Click Yes to trust the host certificate.
7. On the Host Summary screen, click Next.
8. On the Assign License screen, click Next.

9. On the Lockdown Mode screen, click Next.
10. On the Virtual Machine Location screen, Select VRTX as the location. Click Next.
11. On the Ready to Complete screen, click Finish.
12. Repeat the Add Host… steps for the other blades.
13. Right-click on VRTX again and select New Cluster.
14. Cluster Features: Name the cluster VDI and check the boxes for HA and DRS.
15. On the vSphere DRS screen, Select Fully Automated. Click Next.
16. On the Power Management screen, ensure that power management is set to Off. Click Next.
17. On the vSphere HA screen, leave the defaults and click Next.
18. On the Virtual Machine Options screen, leave the defaults and click Next.
19. On the VM Monitoring screen, leave the defaults and click Next.
20. On the VMware EVC screen, disable EVC and click Next.
21. On the VM Swapfile Location screen, set it to Store the swapfile in the same directory… and click Next.
22. On the Ready to Complete screen, click Finish.
23. Drag and drop each of the three hosts into the VDI cluster. Each time it will start another wizard.
24. For Research Pool, choose Put all of this host's virtual machines in the cluster's root resource pool and click Next.
25. On the Ready to Complete screen, click Finish.
26. Wait for the HA configuration to complete.

Installing Citrix XenDesktop 7.5 on vrtx-xd

In this configuration, all of the XenDesktop server components will be installed on a single VM. This includes:

- SQL Server 2012 Express Instance
- Delivery Controller
- License Server
- StoreFront

Installing the VMware vCenter certificate from vrtx-vc on vrtx-xd

1. Launch Internet Explorer and enter the URL http://vrtx-vc.test.local/
2. Since the certificate is untrusted, you will be prompted to Click here to close or Continue to this website (not recommended). Click Continue.
3. In the URL field, you will see a red icon with a Certificate error. Click on the certificate error and select View Certificates from the popup window.
4. In the Certificate details window click on Install Certificate…
5. The Certificate Import Wizard should appear. On the Store Location selection, choose Current User and click Next.
6. On the Certificate Store screen, select Place all certificate in the following store and click Browse.
7. Check the box for Show physical stores and select Trusted People\Local Computer. Click OK.
8. Click Next.
9. On the page Completing the Certificate Import Wizard, click Finish.
10. An Import was successful popup will appear. Click OK.
11. On the Certificate details window, click OK.

Installing Citrix XenDesktop 7.5 components

1. Attach the XenDesktop7 ISO file to the VM named vrtx-xd.
2. Inside the VM, click on the DVD drive and select AutoRun.
3. This will launch the XenDesktop 7.5 installer. Click Start.
4. On the next page under Get Started click on Delivery Controller.
5. On the Licensing Agreement screen, click I have read, understand, etc. and click Next.
6. On the Core Components screen, make sure the Delivery Controller, Studio, License Server and StoreFront, check boxes are checked and click Next.
7. On the Features screen, uncheck Install Microsoft SQL Server 2012 Express and uncheck Install Windows Remote Assistance, and click Next.
8. On the Firewall screen, select Manually and click Next. Windows firewall is disabled during this deployment.
9. On the summary screen, click Install.
10. On the Finish Installation screen, click Finish.

Granting full permissions to administrator in Microsoft SQL Server 2012

1. On vrtx-vc, launch the SQL Server Management Studio.
2. Login as `sa` with the password `Password1`
3. Right-click on the server name and select Properties.
4. Select Permissions and scroll down to the domain administrator.
5. Check all of the permissions under the GRANT column.
6. Click OK when done.

Creating and configuring a Citrix XenDesktop site in Citrix Studio

1. After the XenDesktop 7 install completes, Citrix Studio will launch. Click on Get Started! Create a Site under Full deployment.
2. The Full Deployment wizard will start. On the Introduction screen, select Configure the Site and start delivering applications and desktops to users (recommended for new users) and set Name your Site to `M5-VRTX`. Click Next.
3. On the Database screen, set the Database server location to `vrtx-vc`. Use the default database name of `CitrixM5-VRTX`. Click Test Connection…
4. No database will be found on the database server. A prompt will appear requesting to create the database automatically. Click OK to allow the creation of the database.
5. A prompt will appear confirming the creation of the database. Click Close, and then click Next.
6. On the Licensing screen, leave the default Use the free 30-day trial option and click Next.
7. On the Connection screen, for Host Type, select VMware vSphere and enter the parameters as shown below:
   a. For Host type, choose VMware vSphere.
   b. For address, enter https://vrtx-vc.test.local/sdk
   c. For Username, enter `admin@SYSTEM-DOMAIN`
   d. For Password, enter `Password1!`
   e. For connection name, enter `vrtx-vc`
   f. For Create virtual machine using, select Studio tools (Machine Creation Services).
8. On the Resources screen, enter the name `Compute` and click Browse.

9. Select the Cluster VDI and click OK.
10. Select a network for the virtual machines to use and click Next.
11. On the Storage screen, check the box for Tier1. Select Use different storage for Personal vDisk and click Select different storage…
12. Check the box for Tier2 and click OK.
13. Click Next.
14. On the App-V Publishing screen, leave it set to No and click Next.
15. On the Summary screen, confirm that the settings are correct and click Finish.

Creating the VM master image

1. Using vSphere client, create a new VM named `Win7x64` under one of the vrtx blade hosts, stored on Tier2 storage.
2. Grant 1vCPU and 2.0 GB memory.
3. Provision the HDD as 100 GB.
4. Allocate 1 NIC with the defaults.
5. Set the Windows7.iso file as the CD/DVD drive ISO file and check the box for Connect at startup.
6. Power on the VM and wait for the Windows 2012 install to start (should automatically boot from the ISO file).
7. Once booted, install Windows 2012 Datacenter. Set the login name as `user` and the password as `Password1`
8. Log in as `user` with the password `Password1`
9. Using the console, navigate to VM→Guest and click End VMware Tools Install.
10. On the DVD Drive (D:) panel, click Run setup64.exe.
11. In the VMware Tools Setup window, click Next.
12. On the Choose Setup Type screen, choose Typical, and click Next.
13. Click Install and restart the machine when prompted.
14. When the server manager application appears click on Local Server on the left.
15. In System Properties, click on the Remote Tab.
    a. Choose the option to Allow remote connections to this computer.
    b. Click OK.
16. Open the Control Panel and launch Windows Update.
    a. Choose the option to Check for updates but let me choose whether to install.
    b. Check for updates and install whatever updates are available.
    c. Reboot when prompted. Check if there are any remaining updates to install, and repeat this process until there are no updates left to install.
17. Open the Control Panel and launch Windows Firewall.
    a. Select Advanced settings.
    b. Select Windows Firewall Properties.
    c. On the Domain Profile tab, change Firewall State to Off.
    d. On the Private Profile tab, change Firewall State to Off.
    e. On the Public Profile tab, change Firewall State to Off.
    f. Click OK.
18. Attach the XenDesktop7 ISO file to the VM named vrtx-xd.
19. Inside the VM, click on the DVD drive and select AutoRun.

20. This will launch the XenDesktop 7.0 installer. Click Start.
21. On the next page under Get Started click on Virtual Delivery Agent for Windows Desktop OS.
22. At the Environment Screen, select Create a Master Image.
23. At the HDX 3D Pro screen, click Next.
24. At the Core Components screen, click Next.
25. At the Delivery Controller screen, select Let Machine Creation Services do it automatically and click Next.
26. At the Features screen, leave the defaults and click Next.
27. At the Firewall screen, select Manually and click Next.
28. Review the Summary and click Install.
29. Open a PowerShell prompt as administrator and type:
    `c:\windows\system32\sysprep\sysprep /generalize /oobe /shutdown`

Creating the Citrix XenDesktop Catalog

1. In the Citrix Studio window, click on the large banner labeled 2 Create Catalog. This will start a wizard.
2. On the Introduction screen of the wizard, click Next.
3. On the Operating System and Hardware screen, select Windows Desktop OS and click Next.
4. On the Machine Management screen, under This infrastructure will be built using:, select Virtual machines. Under Desktop images are managed using:, select Machine Creation Services (MCS).
5. On the Desktop Experience screen, under What user experience are you expecting for your users? select I want users to connect to a random desktop each time they log on. This selection will not enable personal vDisks.
6. On the Master Image screen, under Select a snapshot (or a Virtual Machine), select Win7x64.
7. On the Virtual Machines screen, set the number of virtual machines you want to deploy, and grant each VM one CPU and 1536 MB of memory.
8. On the Computer Accounts screen, select the Create new Active Directory accounts option.
9. In the Active Directory location for computer accounts, select the OU Computers.
10. Under the Account naming scheme, type `vrtxesxbas###`
11. On the Summary screen, for the machine catalog name, enter `VRTX ESXi Basic`
12. Leave the description blank, and click Finish.

Creating and applying a domain certificate for IIS

1. Open the IIS Configuration manager from Control Panel\Administrative tools on vrtx-xd.
2. On the main server node, on the vrtx-xd Home screen, open the Server Certificates feature.
3. In Actions Panel, click Create Domain Certificate…
4. In the Create Domain Certificate window, for Common name we used vrtx-xd.test.local. Fill in the rest of the information and click Next.
5. On the Online Certification Authority screen, click the Select button and pick TEST-VRTX-AD-CA\VRTX-AD.test.local. Add the friendly name `vrtx-xd.test.local` and click Finish.
6. In the Connections Panel, navigate to the ISS main node.
7. Expand the nodes in the tree down to Default Web Site.
8. In Actions Panel, select Bindings…
9. In the Site Bindings window, click Add…

10. In the Add site binding window, click on Type: and change it to https, select vrtx-xd.test.local as the SSL certificate, and click OK.

11. Click Close.

Changing the StoreFront base URL to https

1. In Citrix Studio, open the StoreFront node.
2. Click on the Server Group subnode.
3. Under the Actions menu, click on Change Base URL.
4. Change the beginning of the URL to `https://` and click OK.

Creating the store

1. Click on the Stores subnode.
2. If a store already exists, remove it using Remove Store under the Actions menu.
3. In the Action Menu, click Create Store.
4. The Create Store wizard will start.
5. On the Store Name screen, enter ESXi Basic Store.
6. On the Delivery Controllers screen, click Add…
7. In the Add Delivery Controller window, enter `XenDesktop7` for the name, and set XenDesktop as the type. Click Add… and fill in `vrtx-xd.test.local` as the server name.
8. Click OK and Next.
9. On the Remote Access screen, leave the selection as None and click Create.
10. Click Finish.

Setting up the Citrix XenDesktop delivery group and user assignment

1. Open Citrix Studio, or click on the Citrix Studio node in the tree view on the left.
2. Click on the Create Delivery Group, Applications and Assign Users button.
3. In the Create Delivery Group Wizard, on the Introduction screen, click Next.
4. On the Machines screen, increase the number of machines to the size of your deployment.
5. On the Delivery Type screen, Leave the Default, Desktops, and click Next.
6. On the Users screen, add the Domain users and click Next.
7. On the StoreFront screen, select Automatically… and click Add new… and enter the information below:
   - Name: `vrtx-xd`
   - Description: `vrtx-xd storefront`
   - URL: `https://vrtx-xd.test.local/`
8. Check the box to select the server you just added, and click Next.
9. On the Summary screen, enter the Delivery Group name and the Display name, and click Finish.

Configuring the Wyse client

1. Obtain the Enterprise CA root certificate by opening https://vrtx-xd.test.local/Citrix/VRTX-VDI-StoreWeb on a Web browser.
2. Click on the padlock beside the address bar to view certificate information.
3. Click the tab for Certification Path.

4. Select the top-level certificate.
5. Click View Certificate.
6. Click the Details Tab.
7. Click Copy to File.
8. In the Certificate Export Wizard, click Next.
9. Leave the default option selected and click Next.
10. Browse to the location you want to save the certificate file. Select a USB key.
11. Provide a name for the certificate and click save.
12. Eject the USB key from the system.
13. Insert the USB key into the Wyse terminal to be configured.
14. Click on the desktop of the Wyse terminal.
15. Select System Setup→Network Setup.
16. Click the Security tab.
17. Click Certificate Center.
18. Select Import From USB Storage and click Import.
19. Browse for the certificate file you just created. Select it and click OK.
20. Click OK.
21. Remove the USB key from the Wyse terminal.
22. Reboot the terminal.
23. When prompted, enter the FQDN or IP address of the Citrix XenDesktop server housing the Citrix StoreFront.
24. Provide authentication credentials to connect to the Citrix XenDesktop service.

APPENDIX C – WHAT WE TESTED

About the Dell PowerEdge VRTX

The Dell PowerEdge VRTX is a compact, all-in-one solution in a 5U rack-able tower chassis. Designed to be quiet under normal operating conditions, the Dell PowerEdge VRTX can be stowed under a desk in a small office. Its four bays house M520 or M620 compute nodes, providing a space-saving alternative to four separate tower or rack servers. In addition to space savings, the Dell PowerEdge VRTX provides administrators with a unified management interface, the Chassis Management Controller, for performing routine systems management tasks. The Dell PowerEdge VRTX chassis supports up to 48 TB of shared internal storage that is presentable as virtual drives to single or multiple compute nodes, and provides optional pass-through and eight PCIe slots for additional device connectivity. The chassis integrated storage is available with 25 bays for 2.5-inch drives or with 12 bays for 3.5-inch drives. The Dell PowerEdge VRTX integrated switch contains multiple external network ports for easy expansion or integration into any computing environment.

For more information about the Dell PowerEdge VRTX, visit www.Dell.com/PowerEdge/VRTX.

About the Intel Xeon processor E5 family

The new Intel Xeon processor E5 family, which comes standard in new Dell PowerEdge servers, incorporates new technology and features to meet the computing demands of the present and future. The Intel Xeon processor E5 family delivers intelligent and adaptive performance using such features as Intel Turbo Boost Technology 2.0, Intel Advanced Vector Extension, Intel Integrated I/O, and Intel Data Direct I/O Technology. These new processors also feature Intel Trusted Execution Technology (Intel TXT) and utilize Intel Advance Encryption Standard New Instructions (Intel AES-NI) to help keep your data safe.

For more information about the Intel Xeon processor E5 family, visit www.intel.com.

About Citrix XenDesktop 7.5

According to Citrix, "With XenDesktop, IT can mobilize the business, while reducing costs by centralizing control and security for intellectual property. Incorporating the full power of XenApp, XenDesktop can deliver full desktops or just the apps to any device. HDX technologies enable XenDesktop to deliver a native touch-enabled look-and-feel that is optimized for the type of device, as well as the network."

For more information about Citrix XenDesktop 7.5, visit www.citrix.com/products/xendesktop/overview.html.

ABOUT PRINCIPLED TECHNOLOGIES

![Principled Technologies® logo]

Principled Technologies, Inc.
1007 Slater Road, Suite 300
Durham, NC, 27703
www.principledtechnologies.com

We provide industry-leading technology assessment and fact-based marketing services. We bring to every assignment extensive experience with and expertise in all aspects of technology testing and analysis, from researching new technologies, to developing new methodologies, to testing with existing and new tools.

When the assessment is complete, we know how to present the results to a broad range of target audiences. We provide our clients with the materials they need, from market-focused data to use in their own collateral to custom sales aids, such as test reports, performance assessments, and white papers. Every document reflects the results of our trusted independent analysis.

We provide customized services that focus on our clients' individual requirements. Whether the technology involves hardware, software, Web sites, or services, we offer the experience, expertise, and tools to help our clients assess how it will fare against its competition, its performance, its market readiness, and its quality and reliability.

Our founders, Mark L. Van Name and Bill Catchings, have worked together in technology assessment for over 20 years. As journalists, they published over a thousand articles on a wide array of technology subjects. They created and led the Ziff-Davis Benchmark Operation, which developed such industry-standard benchmarks as Ziff Davis Media's Winstone and WebBench. They founded and led eTesting Labs, and after the acquisition of that company by Lionbridge Technologies were the head and CTO of VeriTest.