

# DELL™ POWEREDGE™ R720 SERVER SOLUTION WITH SAMSUNG SSDs AND WINDOWS SERVER 2012

60 virtual desktop sessions

Great performance

Server resources to spare



For businesses with remote offices looking for a solution that allows for a wide base of employees to access virtual desktops hosted on a server, a virtual desktop infrastructure (VDI) can be a wise choice. Such a solution can simplify management, enhance security, and save on power costs, among other benefits. If your business is implementing such a solution, it's essential to select a server that can comfortably host the virtual desktops you need today and have plenty of room to support your needs as your company grows. The Dell PowerEdge R720 server with Samsung SM825 200GB solid-state drives (SSDs), in conjunction with the enhanced VDI hosting platform in Microsoft® Windows Server® 2012, provides a viable solution for your VDI needs.

In our labs, PT set out to determine the VDI-hosting capability of the Dell PowerEdge R720 with Samsung SSDs running Windows Server 2012. We found that this server could support 60 simultaneous virtual desktop users with great performance—and with hardware resources to spare. This makes the Dell PowerEdge R720 with Samsung SSDs and Windows Server 2012 an excellent choice for a 60-user virtual desktop infrastructure.



## HOW MANY VIRTUAL DESKTOPS?

To find out how many typical remote office workers the Dell PowerEdge R720 with Samsung SM825 200GB SSDs could support, we used a workload that reflects typical office activities, including performing various tasks in Microsoft® Office applications, Web browsing, and multimedia viewing.

We set up a single Dell PowerEdge R720 with Samsung SSDs running Microsoft Windows Server 2012. We used Microsoft Hyper-V™ and Remote Desktop Services (RDS) on this server to host the virtual machines.

To measure the server's ability to support 60 virtual desktops, we employed the widely used Login Consultants Virtual Session Indexer (Login VSI) 3.6 benchmark. Login VSI consists of several workloads that perform a range of common desktop computing tasks.

In our testing, the Dell PowerEdge R720 ran 60 virtual desktop sessions with a medium workload while meeting the Login VSI requirements for acceptable response time and user experience.

We provide server configuration information in [Appendix A](#), our detailed workload and test descriptions in [Appendix B](#), and a detailed test methodology in [Appendix C](#).

## RESOURCES TO SPARE

In addition to supporting 60 simultaneous sessions, the Dell PowerEdge R720 server with Samsung SSDs, in conjunction with the enhanced VDI hosting platform in Windows Server 2012, had room to grow with additional hardware resources.

Figure 1 shows the average processor, memory, and disk utilization throughout the whole Login VSI test and the segment where all 60 sessions are running simultaneously once they have logged in. With 60 simultaneous users, all of which achieved an acceptable response time as determined by the Login VSI 3.6 benchmark, the Dell, Samsung, and Windows solution had ample resources to spare.

	Average total run time	Average 60 sessions run time
CPU % utilization	23.76	30.89
Memory % utilization	54.73	54.72
Disk % utilization	13.12	5.99

**Figure 1: CPU, memory, and disk average and peak utilization for the Dell PowerEdge R720 host server. Lower numbers are better.**

Figure 2 shows resource utilization trend lines, averaged each minute, throughout the run. This additionally demonstrates that the resources were not a performance bottleneck at any point during the run.

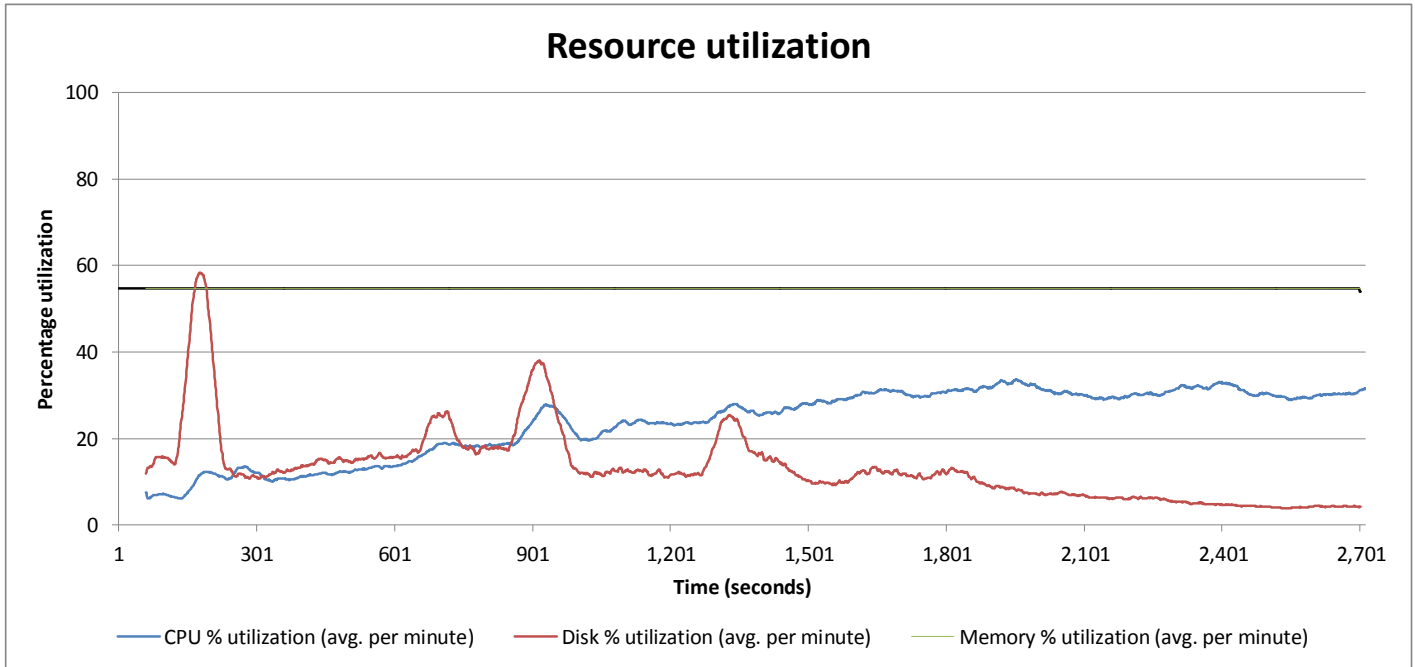


Figure 2: Resource utilization throughout the test.

## ABOUT OUR TESTING

### Remote Desktop Services

We used the Microsoft Remote Desktop Services (RDS) role in Windows Server 2012 to build our virtual desktop infrastructure. Microsoft RDS is a server role that allows the user to deploy and manage a virtual desktop infrastructure from one location. A standard VDI deployment allows for a managed pool of VMs and a Web access portal that allows users in remote offices to connect through a Web browser. Because Microsoft RDS manages incoming remote connections as well as the desktop pool, remote users can be paired with an optimal VM, allowing for server resources to be allocated without waste.

For our testing, we used Microsoft RDS to create the virtual desktop pool, but bypassed the Web portal during testing for ease of use with Login VSI. This circumvents the RDS pairing management feature, but because our virtual desktops were identical, this had no impact on performance.

## Login VSI 3.6

After all desktops are idle, Login VSI incrementally logs users into virtual desktop sessions and begins workloads on each. Login VSI measures the total response times of seven typical office operations from each session and calculates the VSI Index by taking the average response times and dropping the highest and lowest 2 percent.

To initiate our test, we used Hyper-V to start up all Windows 7 VMs and reach an idle state. We monitored our test bed during the startup and perceived no bottlenecks in server CPU, network, or storage I/O at the Hyper-V default startup rate of five VMs at a time. When the VMs were idle we started Login VSI testing.

## ABOUT THE COMPONENTS OF OUR SOLUTION

### Dell PowerEdge R720

The new Intel® Xeon® processor E5-2680-powered Dell PowerEdge R720 2U rack server incorporates many enhancements and features designed to improve performance, lower power consumption, and ease maintenance. Some of these features include the following:

- **Performance.** Dell engineered the PowerEdge R720 to handle complex workloads, with I/O and internal data management technologies (i.e., NSC, NPAR, CacheCade) to allow faster access to information and GPU accelerators for faster than ever computational performance.
- **Processors.** The Dell PowerEdge R720 is powered by two Intel Xeon processors E5-2680, which incorporate the very latest in technology from Intel. The powerful processors provide exceptional performance and make the PowerEdge R720 a solid virtualization platform.
- **Power efficiency.** Dell PowerEdge R720 servers implement leading industry power efficiency standards, and are designed to optimize performance while maintaining low power consumption. Automated tracking and regulation of thermal activity, intelligent design of right-sized power options, and high efficiency fans and airflow management work to save power, saving you money in the process.
- **Management.** The Dell PowerEdge R720, like all late-model Dell servers, comes with the Dell Lifecycle Controller. This tool simplifies server management by providing a single interface for management functions and by storing critical system information in the system itself. There are no CDs or USB keys to keep track of for drivers or firmware.

- **Storage.** With impressive storage capacity for small business servers, the Dell PowerEdge R720 is available in both an 8-bay and 16-bay chassis.
- **Memory.** The Dell PowerEdge R720 holds up to 768 GB of RAM, many times the memory capacity of older small business servers, allowing for powerful flexibility with virtualized database solutions.

## Samsung SM825 200GB SATA SSDs

According to the Dell Web site, the addition of Samsung SM825 200GB SSDs lets the Dell PowerEdge servers deliver outstanding sustained read, write and sequential speeds. Compared to 15K SAS hard disk drives, Samsung's E-MLC SSDs deliver 57 times more operations per second.

The Samsung SSDs also deliver an increased level of performance and reliability with their power-loss protection. Samsung's E-MLC SSDs increase write endurance by more than 100 times than that of standard MLC SSDs. That translates into long-lasting, sustained performance for your servers.

Dell PowerEdge servers with Samsung SSDs also provide the ability to scale for capacities from 100 GB to 400 GB and ensure that all sensitive data is secure. They help protect your data with AES 256-bit encryption, delivering the optimal level of security.

For more information, visit [www.dell.com/business/ssd/server](http://www.dell.com/business/ssd/server).

## Microsoft Windows Server 2012

Windows Server 2012, the latest release of this server OS from Microsoft, includes many new features and enhancements. According to Microsoft, Windows Server 2012 focuses on four core areas:

- **Beyond virtualization.** Windows Server 2012 provides a robust and dynamic virtualization platform through Hyper-V, and includes new features that provide flexible options for delivering cloud services.
- **The power of many servers, the simplicity of one.** Windows Server 2012 offers improvements in its features that allow for better-than-ever high availability and ease of management for multiple-server infrastructures.
- **Every app, any cloud.** Windows Server 2012 delivers a scalable and flexible Web and application platform by providing a consistent and open set of tools and frameworks that apply to applications on-premises, in the cloud, or in a hybrid environment.
- **Modern work style, enabled.** Microsoft Windows Server 2012 empowers users and IT staff with remote access to data, applications, and simpler management tools while strengthening security and compliance.

## WHAT THIS MEANS FOR YOU

As your business implements a virtual desktop solution, selecting the appropriate server is critical. In our hands-on tests, the Dell PowerEdge R720 with Samsung SM825 200GB SSDs supported 60 virtual desktops with resources to spare. This makes it an excellent choice for supporting your remote office workers now and in the future.

## APPENDIX A – SERVER CONFIGURATION INFORMATION

Figure 3 provides detailed configuration information for the servers in our configuration.

System	Dell PowerEdge R720
<b>General</b>	
Number of processor packages	2
Number of cores per processor	8
Number of hardware threads per core	2
<b>CPU</b>	
Vendor	Intel
Name	Xeon
Model number	E5-2680
Stepping	C1
Socket type	LGA2011
Core frequency (GHz)	2.70
Bus frequency	8.0 GT/s
L1 cache	32 KB + 32 KB (per core)
L2 cache	256 KB (per core)
L3 cache (MB)	20
<b>Platform</b>	
Vendor and model number	Dell PowerEdge R720
Motherboard model number	0VWT90
BIOS name and version	Dell 1.2.6
BIOS settings	Default
<b>Memory module(s)</b>	
Total RAM in system (GB)	128
Vendor and model number	Samsung M393B1K70DH0-YH9
Type	PC3L-10600R
Speed (MHz)	1,333
Speed running in the system (MHz)	1,333
Timing/Latency (tCL-tRCD-tRP-tRASmin)	9-9-9-36
Size (GB)	8
Number of RAM module(s)	16
Chip organization	Double-sided
<b>Operating system</b>	
Name	Windows Server 2012 Datacenter 64-bit
Build number	9200
File system	NTFS
Service Pack	N/A
Language	English
<b>RAID controller</b>	
Vendor and model number	Dell PERC H710P Mini
Firmware version	21.0.2-0001
Driver version	5.2.112.0

System	Dell PowerEdge R720
Cache size	1 GB
<b>Hard drive 1</b>	
Vendor and model number	Dell ST9300653SS
Number of drives	4
Size (GB)	300
RPM	15K
Type	SAS
<b>Hard drive 2</b>	
Vendor and model number	Dell MZ5EA200HMDR-000D3
Number of drives	6
Size (GB)	200
RPM	N/A
Type	SATA SSD
<b>Network adapter 1</b>	
Vendor and model number	Intel I350 Quad Port Gigabit Network Daughter Card
Type	Integrated
<b>Network adapter 2</b>	
Vendor and model number	Intel X520-DA2 Dual Port 10 Gb Network Adapter
Type	PCI-E
<b>Power supplies</b>	
Total number	2
Vendor and model number	Dell F750E-S0
Wattage of each (W)	750
<b>Cooling fans</b>	
Total number	6
Vendor and model number	Delta PFR0612UHE
Dimensions (h x w) of each	2-1/2" x 2-1/2"
Volts	12
Amps	1.50
<b>Optical drive</b>	
Vendor and model number	PLDS DS-8D3SH

Figure 3: System configuration information for the test server.



## APPENDIX B – DETAILED WORKLOAD AND TEST DESCRIPTIONS

### About Microsoft RDS

To create the virtual desktop pool, we deployed the Microsoft RDS virtual desktop infrastructure. This requires a server farm consisting of three servers: a Connection Broker server, a Web Access server and a Virtual Desktop Host server. The virtual desktop infrastructure deployment and virtual desktop pool creation can be done from the Connection Broker. To do this, we installed the Microsoft RDS role on the Connection Broker and used it to remotely install and configure the appropriate roles and features on the rest of the server farm. We then created and configured a VM using Hyper-V to be used as a template for our virtual desktop pool. We used Microsoft RDS to automate the process of building our virtual desktop pool of 60 VMs based on our template VHD. Microsoft RDS allowed us to easily build the required infrastructure and automate the process of creating a virtual desktop pool. Once the infrastructure was in place and the pool was created, Microsoft RDS gave us one location from which to manage everything.

### About Login VSI

Login VSI benchmarks virtual desktop sessions to determine how scalable a particular virtualized system is. Specifically, it benchmarks a virtual desktop solution by simulating Windows-based office user workloads. The Medium workload of Login VSI, which we tested as indicative of a typical “knowledge worker,” opens and closes the following applications and runs their respective tasks:

- Microsoft Outlook®: Browsing a message
- Microsoft Word® (TimerDoc): Initiating response timer to see how the program responds throughout the workload
- Microsoft Internet Explorer® instance one: Maximizing, scrolling, and minimizing
- Microsoft Internet Explorer instance two: Navigating a Web site, maximizing, and scrolling
- Adobe® Flash® KA movie trailer
- Microsoft Word (UserRead): Reading and typing text, and printing to PDF
- Bullzip: Generating a PDF
- Adobe® Reader®: Reading a PDF
- Microsoft PowerPoint®: Watching a presentation and adding a slide
- Microsoft Excel®: Reading and minimizing
- 7-Zip: Saving a ZIP file

The Login VSI 3.6 benchmark uses seven operations to determine the VSI<sub>max</sub>, the maximum number of users the system can handle before suffering serious degradation in performance. By using seven operations instead of only two, as earlier versions of Login VSI did, Login VSI 3.6 better reflects what a user actually experiences. The seven operations are as follows:

- Copying a new document from the document pool in the home drive
- Starting Microsoft Word
- Starting the File Open dialogue
- Starting the Search and Replace dialogue
- Starting the Print dialogue
- Starting Notepad
- Compressing the document into a ZIP file with 7-zip command line

Login VSI records response times, the time taken to execute a given task, in milliseconds. Login VSI then reports minimum, average, and maximum response times, as well as the VSI Index average while performing the workload. The Login VSI Index average is similar to the average response time, as it averages the maximum and minimum response times, but it removes 2 percent from the maximum and minimum response time before calculating the average. VSI max is then calculated in one of two ways, Classic and Dynamic. When the VSI Index average is higher than the default threshold of 4000ms, Classic VSI max is achieved. Dynamic VSI max calculates a dynamic threshold based on the average response times of the first 15 sessions and applies the formula  $\text{Baseline} \times 125\% + 3000$ , when the VSI index is higher than the dynamic baseline then dynamic VSI Max is achieved. In our testing, we were able to run 60 sessions without surpassing the Dynamic VSI Max.

For more information on Classic and Dynamic VSI max, see

<http://www.loginvsi.com/en/admin-guide/analyzing-results#h0-1-calculating-vsimax> . For more information on Login VSI 3.6, see <http://www.loginvsi.com/product-overview>.

## About the servers we used

In addition to the Dell PowerEdge R720 that hosted the VDI virtual machines we tested, we also used a Dell PowerEdge R900, Dell PowerEdge R710 and Dell PowerEdge R720 to support the infrastructure required to run this benchmark. The Dell PowerEdge R900 hosted two Login VSI launcher VMs, each of which launched 30 VDI sessions, the Dell PowerEdge R710 hosted Active Directory and DHCP services, and the Dell PowerEdge R720 hosted the RDS connection broker and web access roles used to create and clone the virtual machines.

## APPENDIX C – DETAILED TEST METHODOLOGY

### Deploying the virtual desktop infrastructure

Microsoft's VDI solution requires four servers: an Active Directory® Domain controller, a virtual desktop host, a connection broker and a Web access portal. Our Active Directory Domain controller was a Dell PowerEdge R710 named *domaincontroller*; our virtual desktop host was a Dell PowerEdge R720 with Samsung solid-state drives named *vdihost*; our connection broker and Web access portal were virtual machines hosted on a separate Dell PowerEdge R720, named *connbroker* and *webaccess* respectively. All components used Windows Server 2012 Datacenter Edition.

### Configuring the Active Directory server

#### *Installing Microsoft Windows Server 2012 Datacenter on the Dell PowerEdge R710 Active Directory server*

1. Insert the installation media into the CD/DVD drive, and restart the server.
2. When the option appears, press F11 to enter the Boot Manager.
3. Select SATA Optical Drive, and press Enter.
4. Press any key when prompted to boot from DVD.
5. When the installation screen appears, click My language is English.
6. Leave language, time/currency format, and input method as default and click Next.
7. Click Install now.
8. When the Windows Setup window appears, click No thanks when prompted to go online to install updates.
9. Select Windows Server 2012 Datacenter (Server with a GUI), and click Next.
10. Check I accept the license terms, and click Next.
11. Click Custom: Install Windows only (advanced).
12. Press Alt+A to open advanced partition options. Delete any partitions until there is only Drive 0 Unallocated Space.
13. Select Drive 0 Unallocated Space, and click Next, at which point Windows will begin installing, and will restart automatically after completing.
14. When the Settings page appears, fill in the Password and Reenter Password fields with the same password.
15. Log in with the previously set up password.

#### *Configuring Windows Update*

1. In the left pane of the Server Manager window, click Local Server.
2. In the main frame, next to Windows Update, click Never configured.
3. In the Windows Update window, in the main pane, click Let me choose my settings.
4. Under Important updates, select Never check for updates (not recommended), and then click OK.
5. In the left pane, click Check for updates, and install all available updates.
6. Restart the server.
7. Repeat steps 1 through 6 until all updates are installed.

#### *Configuring Windows Firewall*

1. In Server Manager, click Tools→Windows Firewall with Advanced Security.
2. In the Overview section, click Windows Firewall Properties.
3. In the Domain Profile tab, for Firewall state, click Off.
4. In the Private Profile tab, for Firewall state, click Off.
5. In the Public Profile tab, for Firewall state, click Off.
6. Click OK.

7. Close the Windows Firewall Properties window.

### **Setting up Remote Desktop**

1. In the Local Server tab of the Server Manager window, next to Remote Desktop, click Disabled.
2. In the System Properties window that appears, in the Remote Desktop section, select the Allow remote connections to this computer radio button, and click OK when the warning message appears.
3. Uncheck Allow connections only from computers running Remote Desktop with Network Level Authentication (recommended), and click OK.

### **Disabling IE Enhanced Security Configuration**

1. In the Local Server tab of the Server Manager window, next to IE Enhanced Security Configuration, click On.
2. In the Internet Explorer Enhanced Security Configuration window, select the Off radio buttons for both Administrators and Users, and click OK.

### **Setting a static IP address**

1. Open the Run prompt and type `ncpa.cpl`. Click OK.
2. Right-click the network adapter, and select Properties.
3. Select Internet Protocol Version 4 (TCP/IPv4), and click Properties.
4. Select the Use the following IP address radio button, and enter the appropriate addresses in the IP address, Subnet mask, Default gateway and Preferred DNS server fields.
5. Click OK.

### **Choosing a hostname**

1. Launch Server Manager, and click Local Server.
2. In the Properties section, click the current name shown next to Computer name.
3. At the System Properties screen, click Change.
4. At the Computer Name/Domain Changes, enter an appropriate hostname. Click OK.
5. Click OK at the restart confirmation dialog.
6. Click OK at the System Properties screen.
7. Click Restart Now.

### **Installing Active Directory and DNS 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 Active Directory Domain Services. Click Add Features when prompted, and click Next.
7. At the Select Features screen, click Next.
8. At the Active Directory Domain Services screen, click Next.
9. 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 a password 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\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 `domaincontroller.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.

### *Creating the Login VSI users*

1. On the ADDS server, run `VSI36.exe` to extract the Login VSI setup files.
2. Browse to the extraction location and run `\\VSI361\Setups\AD Setup\AD Setup.exe`.
3. In the Amount of users field, enter 60 users. Choose a username root and password. We used `Login_VSI` and `Password1`. Click Start.
4. After the installation completes, click Exit twice.

### Modifying the Login VSI group policy

1. On the ADDS server, open a Run prompt, type `gpmmc.msc` and click OK.
2. Expand Forest: test.local→Domains→test.local→Login\_VSI→Computers. Right-click the VSI System group policy object, and click Edit.
3. Under Computer Configuration, expand Policies→Administrative Templates: Policy definitions (ADMX files) retrieved from the local computer→Windows Components→Remote Desktop Services→Remote Desktop Session Host, and click Security.
4. In the Security GPO folder, right-click Require user authentication for remote connections using Network Level Authentication, and click Edit.
5. Select the radio button next to Disabled, and click OK.
6. Close the Group Policy Management Editor and the Group Policy Management Console.

### Creating the Login VSI network share

1. Log onto *connbroker* with the test\Administrator credentials.
2. Launch Windows Explorer.
3. Click Computer, and then double-click Local Disk (C:).
4. Press Ctrl-Shift-N to create a New Folder. Type `Share` and press Enter.
5. Right-click the Share folder, and click Properties.
6. Click the Sharing tab, and click Advanced Sharing.
7. Check Share this folder.
8. Click Permissions. Select the Everyone group, and check the Allow box next to Full Control to grant read and write access to the Everyone group.
9. Click OK twice to return to the Properties screen.
10. Click the Security tab, and click Edit.
11. Click Add.
12. In the Enter the object names to select field, type `Login_VSI_TS` and click Find Now.
13. Select LOGIN\_VSI\_TS, and check the Allow box next to Modify.
14. Click Object Types, check the Computers box, and click OK.
15. In the Enter the object names to select field, type `vdihost.test.local` and click Find Now.
16. Select vdihost, and check the Allow box next to Modify.
17. Click OK twice.

### Setting up the remaining virtual desktop infrastructure machines

Install Microsoft Windows Server 2012 Datacenter with all updates on *vdihost* and apply the firewall/remote desktop/IEsec settings specified above. Assign an appropriate IP address and join the test.local domain. Repeat this for the VMs *connbroker* and *webaccess*.

### Adding the servers to the server pool

1. Log onto the connection broker server using the test\Administrator credentials.
2. Launch Server Manager.
3. In the Quick Start section, click Add other servers to manage.
4. In the Name (CN): box, type `vdihost` and click Find Now.
5. Click vdihost, and click the right arrow to add the server to the pool.
6. Repeat steps 4 and 5 for *webaccess*.

### Creating the VDI deployment

1. Log onto the connection broker server.
2. Launch Server Manager.
3. Click Manage→Add Roles and Features.
4. At the Before you begin screen, click Next.
1. At the Select installation type screen, select Remote Desktop Services scenario-based Installation, and click Next.
2. At the Select deployment type screen, select Standard deployment, and click Next.
3. At the Select deployment scenario screen, select Virtual Desktop Infrastructure, and click Next.
4. At the Review role services page, click Next.
5. At the Specify RD Connection Broker server page, click connbroker.test.local, click the right arrow, and click Next.
6. At the Specify RD Web Access server page, click webaccess.test.local, click the right arrow, and click Next.
7. At the Specify RD Virtualization Host server page, click vdihost.test.local, click the right arrow, and click Next.
8. At the Confirm selections screen, check Restart the destination server automatically if required, and click Deploy.
9. After the installation is complete, click Close.

### Building the virtual desktop pool

In this section, we show how to create 60 virtual desktops running Windows 7 Enterprise 32-bit OS on the vdihost Dell PowerEdge R720 server.

### Creating a user profile disk network share

1. Log onto *connbroker* with the test\Administrator credentials.
2. Launch Windows Explorer.
3. Click Computer, and then double-click Local Disk (C:).
4. Press Ctrl-Shift-N to create a New Folder. Type UPD and press Enter.
5. Right-click the UPD folder, and click Properties.
6. Click the Sharing tab, and click Advanced Sharing.
7. Check Share this folder.
8. Click Permissions. Select the Everyone group, and check the Allow box next to Full Control to grant read and write access to the Everyone group.
9. Click OK twice to return to the Properties screen.
10. Click the Security tab, and click Edit.
11. Click Add.
12. Click Object Types, check the Computers box, and click OK.
13. In the Enter the object names to select field, type vdihost.test.local and click Find Now.
14. Select vdihost, and check the Allow box next to Modify.
15. Click OK twice.

### Creating a virtual desktop template

1. Log on to *vdihost* with the test\Administrator credentials.
2. Click Start→Hyper-V Manager.
3. Right-click vdihost→New→Virtual Machine.
4. At the Before you begin screen, click Next.
5. At the Specify name and location screen, type Template in the name field, and click Next.
6. At the Assign memory screen, type 1024 in the Startup memory field, and then click Next.

7. At the Configure networking page, open the drop-down Connection menu, select RDS Virtual, and click Next. This virtual switch was created during the VDI deployment.
8. At the Connect Virtual Hard Disk screen, select the Create a virtual hard disk radio button, and enter 20 in the Size field.
9. Click Finish.

### **Installing Windows 7 Enterprise 32-bit OS**

1. Right-click the Template virtual machine in Hyper-V Manager and click Settings.
2. Under IDE Controller 1, click DVD Drive. Select the radio button for Image file, and enter the location of the Windows 7 Enterprise 32-bit DVD image. Click OK.
3. Right-click the Template virtual machine, and click Start. Double-click the Template virtual machine to connect to it.
4. Press any key when prompted to boot from DVD.
5. Follow the on-screen instructions to install Windows 7 Enterprise 32-bit, taking care to select the same time zone as the server pool.
6. Install all Windows Updates and apply the firewall/remote desktop/IEsec settings specified above.
7. Assign an IP address, and join the test.local domain.

### **Installing Microsoft Office 2010 Standard**

1. Right-click the Template virtual machine in Hyper-V Manager and click Settings.
2. Under IDE Controller 1, click DVD Drive. Select the radio button for Image file and enter the location of the Microsoft Office 2010 Standard DVD image. Click OK.
3. In the Template virtual machine, run D:\setup.exe.
4. Follow the on-screen instructions to install Microsoft Office 2010 Standard with default settings.

### **Installing Microsoft .NET Framework 4.0**

1. In the Template virtual machine, open Internet Explorer, navigate to <http://www.microsoft.com/en-us/download/details.aspx?id=24872>, and download the Standalone Installer.
2. Run dotNetFx40\_Client\_x86\_x64.exe, and follow the on-screen instructions to install Microsoft .NET Framework 4.0 with default settings.

### **Setting page file**

1. In the Template virtual machine, click Start, and right-click Computer→Properties.
2. Click Advanced System Settings.
3. Under the Advanced tab, click Settings.
4. At the Performance Options screen, click the Advanced tab, and click Change.
5. Uncheck Automatically manage paging file size for all drives.
6. Select the Custom size radio button, and enter 2048 for Initial size and Maximum size.
7. Click OK three times to close all screens.

### **Enabling ClearType**

1. In the Template virtual machine, click Start, and type `clearType` in the search box.
2. Click Adjust ClearType text.
3. Check Turn on ClearType. Click Next.
4. Click Next four times to go through the adjustment process.
5. Click Finish.



### Deleting default printers

1. In the Template virtual machine, click Start→Devices and printers.
2. Right-click Fax, and click Remove device.
3. Click Yes.
4. Repeat steps 2 and 3 for Microsoft XPS Document Writer and Send to OneNote 2010.

### Installing Login VSI target software

1. In the Template virtual machine, run VSI36.exe to extract the installation files.
2. Browse to the location of the extraction files and run VSI361\Setups\Target Setup\Setup.exe.
3. In the Please specify VSI Share: (UNC Path) field, type \\connbroker\share and click Start.
4. Allow the installation to complete, and click OK on the Warning dialog.
5. Log onto the ADDS server, and open Server Manager→Tools→Active Directory Users and Computers.
6. Click Action→Find.
7. In the drop-down menu labeled Find, select Computers.
8. In the drop-down menu labeled In, select test.local.
9. In the Name field, type Template and click Find Now.
10. Right-click Template and click Move.
11. Expand Login\_VSI and select the Computers folder. Click OK and then close the Find Computers and Active Directory Users and Computers windows.
12. Restart the Template virtual machine.

### Prepping the Template for duplication

1. Log onto the Template virtual machine using test\Administrator credentials.
2. Press Windows+R to open the Run prompt.
3. Type sysprep and click OK.
4. Run sysprep.exe.
5. From the System Cleanup Action drop-down menu, select Enter System Out-of-Box Experience (OOBE).
6. Check the Generalize checkbox.
7. From the Shutdown Options drop-down menu, select Shutdown.
8. Click OK.
9. Allow the system to be sysprepped and let it shut down automatically. Do not restart the Template virtual machine until it has been cloned.

### Cloning the virtual desktop template and creating a pooled virtual desktop collection

1. Log onto connbroker using the test\Administrator credentials.
2. Launch Server manager.
3. Click Remote Desktop Services, and click Collections.
4. Click Tasks→Create Virtual Desktop Collection.
5. At the Before you begin screen, click Next.
6. At the Name the collection screen, type Test Pool in the Name field, and click Next.
7. At the Specify the collection type screen, select the Pooled virtual desktop collection button, check the Automatically create and manage virtual desktops checkbox, and click Next.
8. At the Specify the virtual desktop template screen, select Template, and click Next.
9. At the Specify the virtual desktop settings screen, click Provide unattended settings, and click Next.
10. At the Specify the unattended installation settings screen, select an appropriate time zone for the server pool. Select the Select the organizational unit: radio button and select test.local for the Active Directory domain name and Login\_VSI for the Active Directory Domain Services organization unit (OU). Click Next.

11. At the Specify users and user groups screen, click Add. Type `Login_VSI_TS` and press Enter. Verify that `TEST>Login_VSI_TS` appears in the User Groups box. In the Virtual desktops to be created in the collection field, type `60`. In the Specify characters that should be added to the beginning or end of the name of each virtual desktop fields, select a prefix and starting index for your collection. We used `Test-` and `1`, so our desktops were named `Test-1`, `Test-2`, `Test-3`, etc. Click Next.
12. At the Specify virtual desktop allocation screen, leave the default settings, and click Next.
13. At the Specify virtual desktop storage screen, select the Store on a network share radio button. Enter the location of a folder on the solid-state drives on `vdihost`. Check the Automatically roll back the virtual desktop when the user logs off checkbox. Click Next.
14. At the Specify user profile disks screen, check Enable user profile disks. Enter `\\connbroker\UPD` for the Location of user profile disks field. Leave the Maximum size (in GB) as 20. Click Next.
15. At the Confirm selections screen, click Create.
16. Let the deployment complete, and click Finish.

### Moving the pooled desktops to the Login\_VSI organizational unit

1. Log onto the ADDS server and open Server Manager→Tools→Active Directory Users and Computers.
2. Click Action→Find.
3. In the drop-down menu labeled Find, select Computers.
4. In the drop-down menu labeled In, select `test.local`.
5. In the Name field, type `Test` and click Find Now.
6. Select `Test-1` through `Test-60`. Right-click the selection, and click Move.
7. Expand `Login_VSI`, and select the Computers folder. Click OK, and then close the Find Computers and Active Directory Users and Computers windows.
8. Reboot the pooled desktops to ensure delivery of the `Login_VSI` group policy.

## Creating the Login VSI launchers

In this section, we show how to create the two virtual machines used to launch the Login VSI benchmark. We used a Dell PowerEdge R900 to host the launcher VMs.

### Creating a virtual machine with Windows 7 Enterprise 64-bit OS

1. Using Hyper-V, create two virtual machines named `VSI-1` and `VSI-2`. We gave each launcher 8192 MB of static RAM, four vCPUs, and a 30 GB VHD. Install Microsoft Windows 7 Enterprise 64-bit OS with all updates and the firewall/remote desktop/ Isec settings specified above on both machines. Assign appropriate IPs and join them to the `test.local` domain.
2. Move `VSI-1` and `VSI-2` to the `Login_VSI` organizational unit as you did for the Template and Test VMs.
3. Reboot `VSI-1` and `VSI-2` to ensure delivery of the `Login VSI` group policy.

### Installing the Login VSI launcher and analyzer software

1. Log into `VSI-1` using the `TEST\Administrator` credentials.
2. Run `VSI36.exe`.
3. Browse to the extraction location, and run `VSI361\Setups\Launcher\Setup.exe`.
4. At the Welcome screen, click Next.
5. At the Select Destination Location, leave the default location, and click Next.
6. At the Select VSI Share screen, enter `\\connbroker\Share` for the UNC path, and click Next.
7. At the Select Components screen, click Next.
8. At the Select Start Menu Folder, click Next.
9. At the Ready to Install screen, click Install.
10. Repeat steps 1 through 9 for `VSI-2`.
11. On `VSI-1`, run `VSI361\Setups\Analyzer\Setup.exe`.

12. At the Welcome screen, click Next.
13. At the Select Destination Location screen, click Next.
14. At the Select VSI Share screen, enter `\\connbroker\Share` for the UNC path, and click Next.
15. At the Select Components screen, click Next.
16. At the Select Start Menu Folder, click Next.
17. At the Ready to Install screen, click Install.

## Setting up the Login VSI benchmark

In this section we show how to make the configurations necessary to run the test.

### Setting up the test configuration

1. Log into VSI-1 using the TEST\Administrator credentials.
2. Use a spreadsheet program to create a table as shown:

input_servername	input_username	input_password	input_domain
Test-1	Login_VSI1	Password1	test.local
Test-2	Login_VSI2	Password1	test.local
(rows 3-59 omitted)	(rows 3-59 omitted)	(rows 3-59 omitted)	(rows 3-59 omitted)
Test-60	Login_VSI60	Password1	test.local

3. Save it as RDPCSV.csv in `\\connbroker\Share` to create a comma-separated values file.
4. Click Start→Login Consultants→VSI→Launcher→VSI Management Console.
5. Click Launchers on the left pane:
  - a. Right-click in the middle pane and click Add Launcher.
  - b. When the Add Launchers Wizard pops up, select the Single manual entry radio button, and click Next.
  - c. In the Launcher name field, type `VSI-2.test.local`. Set the Launcher capacity to 30, and check the Launcher enabled checkbox. Click OK.
  - d. Click Finish.
  - e. Under Launchers, right-click VSI-1, and click Modify. Set the Launcher capacity to 30, and check the Launcher-enabled checkbox. Click OK.
6. Click Workload Configuration:
  - a. Make sure Global Settings is selected in the drop-down menu.
  - b. Set Office Version to 14.
  - c. Click Save workload settings, and save under an appropriate file name.
7. Click Test Configuration in the left pane.
  - a. In the Workload drop-down menu, select Medium.
  - b. Check the Auto start launcher checkbox.
  - c. In the Launch type drop-down menu, select Sequential Launching.
  - d. Check the Auto logoff checkbox.
  - e. Set the Auto logoff timeout to 900 seconds.
  - f. If this is the very first run, check the Create profiles checkbox. This will pre-create the user profiles and suppress any results output. If the profiles have been created, uncheck this box.
  - g. In the Connection type drop-down menu, select Custom Commandline with CSV.
  - h. In the Specify Custom Commandline field, enter the following:

```
"C:\Program Files>Login Consultants\VSI\Launcher\Agent\LaunchRDP.exe"  
%CSV_input_servername% 3389 %CSV_input_username% test Password1 0 0 0
```

- i. In the Specify CSV File field, enter the following:

```
\\ConnBroker\Share\RDPCSV.csv
```

- j. Leave the Pre-Test script and Post-test script fields blank.
  - k. In the Connect drop-down menu, select User.
  - l. Leave the Connection Settings options as default. They are overridden by the custom command line.
  - m. Set Sessions to 60.
  - n. Set Start number to 1.
  - o. Set Interval to 30.
  - p. Click Save test settings and save under an appropriate file name.
8. Click Start Test.
    - a. Review the configuration, and click Start test.
    - b. Enter a testname, and click Next.
    - c. At the Pre//PostScripts screen, click Next.
    - d. At the SessionMonitor screen, click Next.
    - e. At the Check launchers screen, wait for both launchers to become ready and then click Start Test. If a launcher shows Not ready for more than 3 minutes, restart the VSI Agent on that machine, and then click Start Test after both launchers are ready.
  9. After the test has completed, reboot Test-1 through Test-60 as well as both launchers. This prepares the test bed for a new run.

## ABOUT PRINCIPLED TECHNOLOGIES



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