

One Lenovo® ThinkServer® RD630 replaced three legacy servers



- Supported **3x** as many Microsoft® Exchange® users
- Reduced response time by **88.3%**
- Reduced power consumption per VM by **74.7%**



The last time you updated your data center, virtualization technology allowed you to migrate your application servers into virtual machines (VMs), providing hardware independence and the ability to transfer your VMs to other servers with relative ease. Now that your business is growing, purchasing new, more powerful servers can help you consolidate multiple VMs onto a single server, maximizing resource utilization and reducing the number of servers populating your data center.

A typical business refreshes their server hardware every four to five years. To emulate this business practice, we consolidated a typical Microsoft® Exchange Server 2010 workload of an older HP ProLiant DL385 G5 server running a VM into a new Lenovo ThinkServer RD630 and demonstrated how many of these legacy server workloads the ThinkServer RD630 could consolidate while lowering the response time, or latency, and power utilization. In the Principled Technologies labs, we found that that a single Lenovo ThinkServer RD630 was able to consolidate the workload of three HP ProLiant DL385 G5 servers, supporting three times as many users, reducing response time by 88.3 percent, and reducing power consumption per VM by 74.7 percent. Such a consolidation gives you a considerable decrease in response time and has the potential to save data center space, power and cooling, and management costs.

THINK ABOUT A SERVER UPGRADE

Consolidating older servers in your data center is an excellent strategy to bring savings to your organization. Upgrading to new high-performing servers that can consolidate many older systems not only saves physical space in your data center, but can also reduce many costs associated with operating your infrastructure, including power and cooling costs, maintenance costs, data center port costs, and more.

Consolidate with the Lenovo ThinkServer RD630

Virtualization has become increasingly popular as businesses discovered that running multiple VMs on a single physical server makes more efficient use of system resources. IT administrators must ensure the VM and its host server can complete the workload generated by the business application it hosts, even during usage spikes. To find how many older HP ProLiant DL385 G5 servers running Microsoft Exchange VMs could be consolidated into a single Lenovo ThinkServer RD630, we configured the HP ProLiant DL385 G5 with VMware® vSphere® 5 running a VM with a typical Microsoft Exchange workload of 600 heavy users, and noted how many of these VMs the Lenovo ThinkServer RD630 was able to support. Additionally, we measured power consumption of the servers and the decrease in Microsoft Exchange Information Store Remote Procedure Call (RPC) Averaged Latency from each VM on the Lenovo ThinkServer RD630 compared to that of the HP ProLiant DL385 G5.

We tested Exchange performance using the Microsoft Load Generator 2010 benchmark running with 600 heavy users against each of the VMs. The new Lenovo ThinkServer RD630, powered by the Intel® Xeon® processor E5-2680, supported three VMs running heavy Exchange workloads while significantly reducing the average response time, allowing for a threefold consolidation of the workload on the HP ProLiant DL385 G5 (see Figure 1). Additionally, you could expect to be able to run even more Exchange VMs for greater consolidation or future growth on the Lenovo ThinkServer RD630 by using larger-capacity SSDs or attaching an external storage array. Thus, a single Lenovo ThinkServer RD630 can handle the work of three older servers while also providing you with significantly improved performance in each VM, making it an excellent consolidation platform.

Figure 1: A single Lenovo ThinkServer RD630 had the power to consolidate the Exchange workloads of three HP ProLiant DL385 G5 servers.

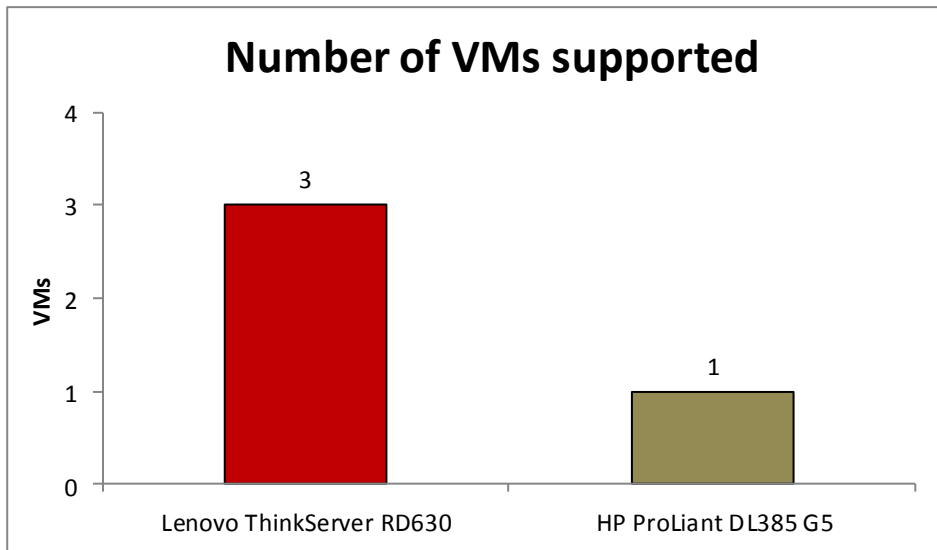


Figure 2 compares the number of users the two servers supported. With each VM supporting 600 users, the Lenovo ThinkServer RD630's three VMs supported a total of 1,800 users, while the HP ProLiant DL385 G5 supported 600 users.

Figure 2: The Lenovo ThinkServer RD630 supported three times the number of users as the HP ProLiant DL385 G5 server.

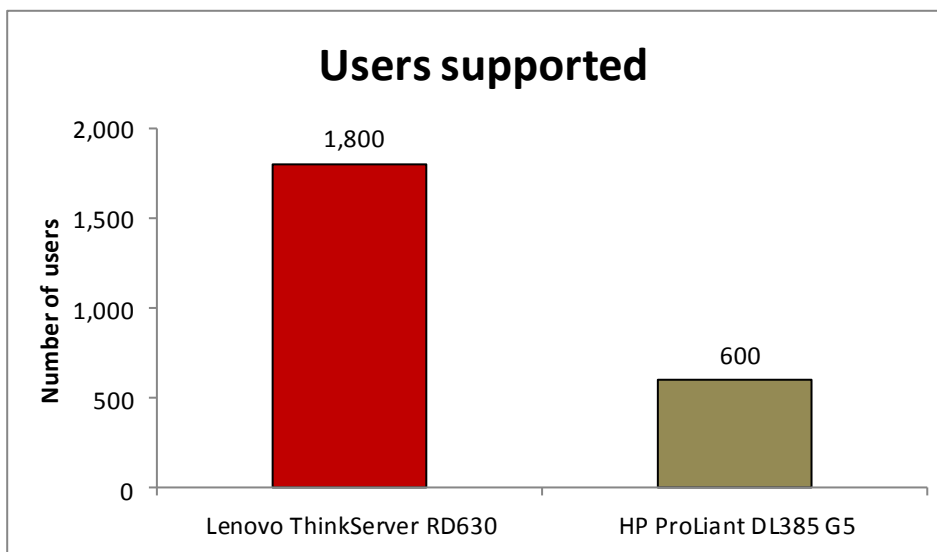
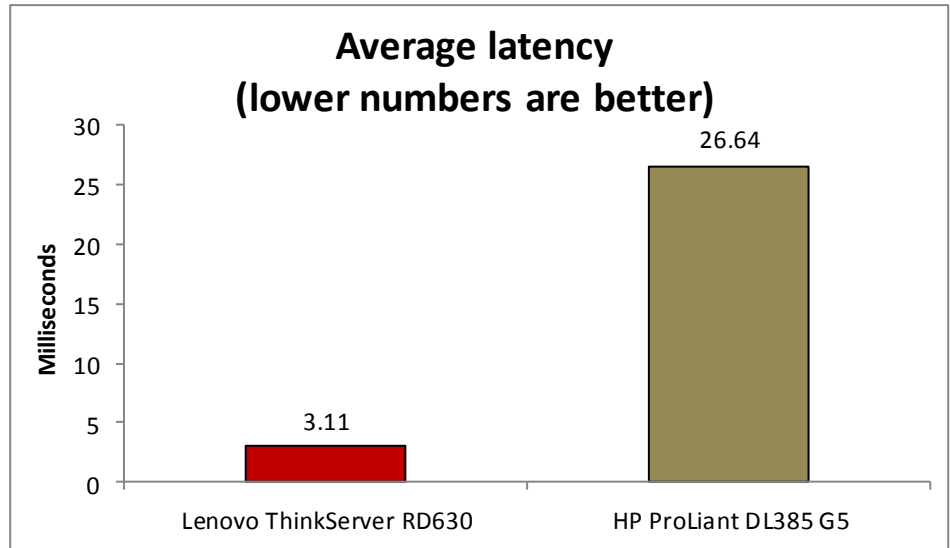


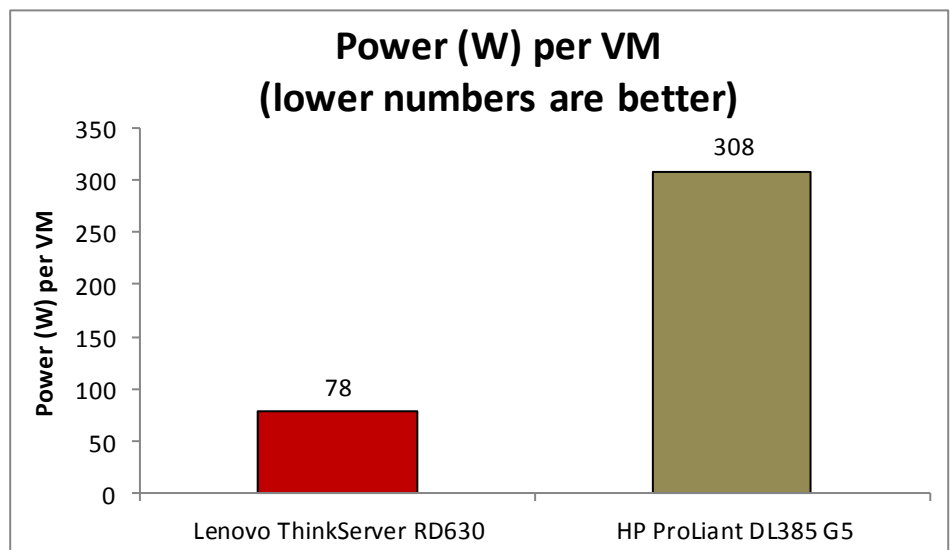
Figure 3 compares the RPC Averaged Latency of the two servers, with the Lenovo ThinkServer RD630 demonstrating a staggering 88.3 percent decrease in latency over the HP ProLiant DL385 G5. The RPC Averaged Latency reports results in milliseconds (ms) and helps to quantify how long an end user has to wait to receive a response from the Exchange server. This means that the 1,800 Exchange users accessing the Lenovo ThinkServer RD630 would spend less time waiting for the server to respond than the 600 Exchange users accessing the HP ProLiant DL385 G5.

Figure 3: The Lenovo ThinkServer RD630 delivered a much shorter average latency than the HP ProLiant DL385 G5 server.



Not only do you have the potential to save on power by reducing the number of servers running in your data center, advances in newer servers allow you to get more performance at a lower power cost. We compared the amount of power each server consumed per VM. As Figure 4 shows, the Lenovo ThinkServer RD630 consumed 74.7 percent less power per VM than the HP ProLiant DL385 G5.

Figure 4: Power, in watts, per VM for the two servers.



ABOUT THE LENOVO THINKSERVER RD630

Lenovo describes its server as follows: “The all-new Lenovo ThinkServer RD630 mainstream rack server provides powerful new choices to meet your demanding enterprise needs while offering outstanding value. Supporting two of the latest Intel Xeon E5-2600 processors, the ThinkServer RD630 can provide outstanding Exchange and virtualization performance for deployments large or small. Nicely configured, these

servers come standard with Web-based remote management, rail kits, hardware RAID, and EasyManage tool-suite for unbeatable value. You enjoy enterprise-grade performance, built-in redundancy, and world-class reliability you expect from the makers of Think products.”

Below, we highlight some of the Lenovo ThinkServer RD630’s key features.

- **Performance and storage capacity.** The Intel Xeon processor E5-2600 family has up to 16 cores, providing a significant performance improvement over previous-generation processors. Storage choices for the ThinkServer RD630 include up to 16 SATA, SAS and SSD hot-swap drives.
- **Reliability.** The ThinkServer RD630 comes with redundant power supplies, fans, and a selection of RAID adapters to prevent data loss.
- **Power efficiency.** The power-efficient ThinkServer RD630 features the Lenovo ThinkServer Smart Grid Technology. This feature allows IT administrators the ability to monitor and intelligently manage power consumption, even making recommendations for optimal power settings, for a server or group of servers via a central console. This power management technology helps to reduce energy consumption and infrastructure costs. Additionally, the ThinkServer RD630 is Energy Star 1.1 certified and Climate Savers certified.
- **Ease of use and manageability.** ThinkServers are supported by a suite of management tools that enables you to easily install, maintain, and manage your ThinkServer RD630. Systems management based on open standards and protocols mean easy integration into your existing network.

Lenovo ThinkPlus® Productivity, ThinkPlus Priority Support and available 4-hour service response further assist you in installation and IT support.

For detailed information about the Lenovo ThinkServer RD630, visit the Lenovo server site at www.lenovo.com. For details on the specific configuration we tested, see [Appendix A](#).

WHAT WE FOUND

Figure 5 presents the results of our tests, including the number of VMs the servers ran and the total RPC averaged latency for the servers.

Host server	Number of VMs	Number of users	RPC Averaged Latency (ms)
Lenovo ThinkServer RD630	3	1,800	3.11
HP ProLiant DL385 G5	1	600	26.64

Figure 5: Performance results for the two servers. More VMs and users supported are better. Lower latency times are better. Note that the RPC Averaged Latency of the Lenovo ThinkServer RD630 is an average of the RPC Averaged Latency of the three VMs.

Figure 6 presents the power results of our testing. Even while running three times the workload of a single HP ProLiant DL385 G5, the ThinkServer RD630 used 24.0 percent less power. This means that when directly comparing the power usage of a single VM on each server running the same workload, the Lenovo ThinkServer RD630 used 74.7 percent less power than the HP ProLiant DL385 G5, while simultaneously providing a lower latency.

Host server	Power (W)	Number of VMs	Power/VM (W)
Lenovo ThinkServer RD630	234	3	78
HP ProLiant DL385 G5	308	1	308

Figure 6: Power, in watts, the two servers used to run the workload. Less power consumed is better.

WHAT WE TESTED

We optimized the virtual hardware configuration for each VM for best performance using the available resources on each server. We configured one VM on the HP ProLiant DL585 G5 with 6GB of virtual memory and six vCPUs, and configured the three VMs on the Lenovo ThinkServer RD630 with 8GB of memory and eight vCPUs. In that way, we were able to create a real-world representation of how these servers would be utilized while under stress from running mail servers.

We used Microsoft Load Generator 2010 to test the performance of the servers. We configured a client machine for each Exchange VM, and used the MExchangeIS: RPC Averaged Latency counter to measure the response time. MExchangeIS: RPC Averaged Latency records the average time (in milliseconds) it takes the Exchange Server Information Store to process the last 1,024 packets, and is an indicator of Exchange server performance. We completed three runs on each server, and took the median run based on the RPC Average Latency.

For detailed configuration information on the servers we tested, see [Appendix A](#). For detailed instructions on how we tested, see [Appendix B](#).

About Microsoft Load Generator 2010

To test the configuration's mail server performance, we used the Microsoft Load Generator 2010 (LoadGen) benchmark, which performs tasks to simulate a standard user generating mail activity. We simulated 600 users for each VM, and used the following settings:

- Mailbox Profile: 100MB mailboxes
- Action Profile: Very Heavy
- Client Type: Outlook 2007 Cached

For more details about LoadGen, see

<http://www.microsoft.com/downloads/details.aspx?FamilyId=DDEC1642-F6E3-4D66-A82F-8D3062C6FA98&displaylang=en>.

IN CONCLUSION

Populating your data center with new, more powerful and energy efficient servers can deliver numerous benefits to your organization. By consolidating multiple older servers onto a new platform, you can save in the areas of data center space and port costs, management costs, and power and cooling costs.

In our tests, we found that the Lenovo ThinkServer RD630 could consolidate the email workloads of three HP ProLiant DL385 G5 servers, supporting three times the number of users. It did so while reducing response time by 88.3 percent and reducing power consumption per VM by 74.7 percent, making the ThinkServer RD630 an excellent choice to reduce the costs associated with running your data center.

APPENDIX A – SERVER CONFIGURATION INFORMATION

Figure 7 provides detailed configuration information for the test servers.

System	Lenovo ThinkServer RD630	HP ProLiant DL385 G5
Power supplies		
Total number	2	2
Vendor and model number	Delta Electronics DPS-800RB	HP 379124-001
Wattage of each (W)	800	1000
Cooling fans		
Total number	6	6
Vendor and model number	AVC 2B06038B12G	Nidec® B35441-94
Dimensions (h x w) of each	3" x 1-7/8"	2-1/2" x 1-1/2"
Volts	12	12
Amps	2.7	1.5
General		
Number of processor packages	2	2
Number of cores per processor	8	4
Number of hardware threads per core	16	1
System power management policy	Balanced	Balanced
CPU		
Vendor	Intel	AMD
Name	Xeon	Opteron™
Model number	E5-2680	2356
Stepping	C1	B3
Socket type	2011 LGA	F - 1207
Core frequency (GHz)	2.70	2.30
L1 cache	32 KB (per core)	64 KB
L2 cache	256 KB (per core)	512 KB (per core)
L3 cache	20 MB (shared)	2 MB (shared)
Platform		
Vendor and model number	Lenovo ThinkServer RD630	HP ProLiant DL385 G5
BIOS name and version	American Megatrend Inc. 2.14 Lenovo BIOS 0.21	HP BIOS A09 (05/02/2011)
BIOS settings	Default	Default
Memory module(s)		
Total RAM in system (GB)	160	8
Vendor and model number	Samsung® M393B1K70CH0-CH9	Qimonda® HYS72T512220EP
Type	PC3-10600R DDR3	PC2-5300P
Speed (MHz)	1,333	667
Speed running in the system (MHz)	1,333	667
Timing/Latency (tCL-tRCD-tRP-tRASmin)	9-9-9-24	5-5-5-15
Size (GB)	8	4
Number of RAM module(s)	20	2
Chip organization	Double-sided	Double-sided

System	Lenovo ThinkServer RD630	HP ProLiant DL385 G5
Rank	Dual	Dual
Operating system (host)		
Name	VMware ESXi 5	VMware ESXi 5
Build number	5.0.0	5.0.0
Operating system (virtualized)		
Name	Windows Server 2008 R2	Windows Server 2008 R2
Build number	7601	7601
Service pack	SP1	SP1
File system	NTFS	NTFS
Kernel	ACPI x64-based PC	ACPI x64-based PC
Language	English	English
RAID controller		
Vendor and model number	LSI™ MegaRaid® SAS 9260-8i	HP Smart Array P400 Controller
Firmware version	2.120.183-1415	7.22
Cache size (MB)	512	512
Hard drives #1		
Vendor and model number	Seagate® ST9600204SS	HP MBF2300RC
Number of drives	2	8
Size (GB)	600	300
RPM	10,000	10,000
Type	SAS	SAS 6.0 Gb/s
Hard drives #2		
Vendor and model number	STEC® M16ISD2-200UCP	N/A
Number of drives	4	N/A
Size (GB)	200	N/A
Type	SATA/SSD 300 Gb/s	N/A
Ethernet adapters		
First network adapter		
Vendor and model number	Intel I350	HP NC373i Gigabit Server Adapter
Type	Integrated	Integrated
Second network adapter		
Vendor and model number	Intel I350	HP NC373i Gigabit Server Adapter
Type	Integrated	Integrated
Third network adapter		
Vendor and model number	Intel 82574L	N/A
Type	Integrated	N/A
Optical drive(s)		
Vendor and model number	HL-DT-ST CD-ROM	HL-DT-ST CD-ROM
Type	SATA	SATA

System	Lenovo ThinkServer RD630	HP ProLiant DL385 G5
USB ports		
Number	7	5
Type	2.0	2.0

Figure 7: System configuration information for the test servers.

APPENDIX B - HOW WE TESTED

Setting up the servers – VMware vSphere 5.0

Configuring partitions on the servers

Boot the server and enter RAID controller configuration when prompted (F8 for HP and CTRL+H for Lenovo). Following the setup wizard, we configured two drives in a RAID 1 configuration for one partition and six in a RAID 10 for a second partition for the HP ProLiant DL585 G5. For the Lenovo ThinkServer RD630, we assigned the 600GB SAS drives in a RAID 1 configuration for one partition and the 4 SSD drives in a RAID 5 configuration for the second partition.

Installing VMware vSphere 5.0 (ESXi) on the servers

1. Insert the disk, and select Boot from disk.
2. On the Welcome screen, press Enter.
3. On the End User License Agreement (EULA) screen, press F11.
4. On the Select a Disk to Install or Upgrade Screen, select the relevant volume to install ESXi on and press Enter. (We choose to install to internal USB devices.)
5. On the Please Select a Keyboard Layout screen, press Enter.
6. On the Enter a Root Password Screen, assign a root password and confirm it by entering it again. Press Enter to continue.
7. On the Confirm Install Screen, press F11 to install.
8. On the Installation complete screen, press Enter to reboot.

Configuring ESXi after Installation

1. On the 5.0.0 ESXi screen, press F2, enter the root password, and press Enter.
2. On the System Customization screen, select Troubleshooting Options, and press Enter.
3. On the Troubleshooting Mode Options screen, select enable ESXi Shell, and press Enter.
4. Select Enable SSH, press Enter, and press ESC.
5. On the System Customization screen, select Configure Management Network.
6. On the Configure Management Network screen, select IP Configuration.
7. On the IP Configuration screen, select set static IP, enter an IP address, subnet mask, and default gateway, and press Enter.
8. On the Configure Management Network screen, press Esc. When asked if you want to apply the changes, press Y.

Configuring VM networking on ESXi

1. Using the vSphere client from another machine, connect to the ESXi server.
2. Add the necessary vSwitch for the network that DVD Store traffic will use:
 - a. Click the host, click the Configuration tab, and click Networking.
 - b. Click Add Networking.
 - c. Choose Virtual Machine, and click Next.
 - d. Choose create a vSphere standard switch.
 - e. Choose the NIC associated with VM traffic.
 - f. Assign the network label and assign IP settings.
 - g. Click Finish.

Configuring VMware datastores on the servers

We created datastores on HP ProLiant DL385 G5 and the Lenovo ThinkServer RD630 using the parameters in Figure 8, following the steps below.

Host	Datastore name
HP ProLiant DL385 G5	Datastore
HP ProLiant DL385 G5	extra_6_disk_raid10
Lenovo ThinkServer RD630	DatastoreLenovo
Lenovo ThinkServer RD630	4_disks_SSD_raid5

Figure 8: Datastore parameters for the servers we tested.

1. Using the vSphere client, select Home→Datastore and Datastore Clusters.
2. Right-click Cluster and select Add new Datastore.
3. Select the appropriate host, and click Next.
4. Leave default Storage type as Disk/LUN, and click Next.
5. Select the desired Disk/LUN, and click Next.
6. Select VMFS-5, and click Next.
7. Click Next.
8. Enter corresponding datastore name from above, and click Next.
9. Keep default capacity of Maximum available space, and click Next.
10. Click Finish.
11. Repeat all steps above to create the remaining datastores using the partitions you created above in the Configuring partitions section.

Creating the first VM

We created the first virtual machine for each platform using the parameters in Figures 9 and 10 and following the steps below.

Basic VM settings	
HP ProLiant DL385 G5	
Virtual Memory (GB)	6
vCPUs	6
Lenovo ThinkServer RD630	
Virtual Memory (GB)	8
vCPUs	8

Figure 9: Basic VM settings for the servers.

	Datastore	Size (GB)	Node	Provisioning
HP VM virtual disk settings				
Hard Disk 1	datastore	40	0:0	Thick, Lazy Zeroed
Hard Disk 2	extra_6_disk_raid10	838	0:1	Thick, Lazy Zeroed
Lenovo VM virtual disk settings				
Hard Disk 1	datastorelenovo	40	0:0	Thick, Lazy Zeroed
Hard Disk 2	4_disks_SSD_raid5	180	0:1	Thick, Lazy Zeroed

Figure 10: Virtual disk settings for the servers.

1. In the vSphere client, connect to the vCenter Server, and browse to the ESXi host.
2. Click the Virtual Machines tab.
3. Right-click, and choose New Virtual Machine.
4. Choose Custom, and click Next.
5. Assign a name to the virtual machine, and click Next.
6. Select the corresponding OS Datastore, and click Next.
7. Choose Virtual Machine Version 8, and click Next.
8. Choose Windows, choose Microsoft Windows Server 2008 R2 (64-bit), and click Next.
9. Choose the preferred system number of virtual processors from Figure 9, and click Next.
10. Choose the appropriate amount of memory listed in Figure 9, and click Next.
11. Click 1 for the number of NICs, select vmnicX, and click Next.
12. Leave the default virtual storage controller, and click Next.
13. Choose to create a new virtual disk, and click Next.
14. Reference Figure 10 to assign OS virtual disk parameters, (e.g., 40 GB, thick-provisioned lazy zeroed), specify the OS datastore, and click Next.
15. Keep the default virtual device node (0:0), and click Next.
16. Click Finish.
17. Right-click the VM, and choose Edit Settings.
18. On the Hardware tab, click Add...
19. Click Hard Disk, and click Next.
20. Click Create a new virtual disk, and click Next.
21. Reference Figure 10 for the appropriate virtual disk size, choose thick-provisioned lazy zeroed, and specify the datastore for mailbox data usage.
22. Choose SCSI(0:1) for the device node, and click Next.
23. Click Finish, and click OK.
24. Start the VM.
25. Attach the Windows Server 2008 R2 SP1 ISO image to the VM, and install Windows Server 2008 R2 on your VM.

Configuring the VMs

See the above sections regarding the initial creation of the virtual machines on each hypervisor. We provide steps below for installing the operating system, Microsoft Exchange Server, and configurations of the VMs.

Installing the VM operating system on the first VM

1. Insert the installation DVD for Windows Server 2008 R2 SP1 Enterprise into the DVD drive, and attach the physical DVD drive to the VM. Alternatively, use an ISO image and connect to the ISO image from the VM console.
2. Open the VM console on vSphere.
3. At the Language Selection Screen, click Next.
4. Click Install Now.
5. Select Windows Server 2008 R2 Enterprise (Full Installation), and click Next.
6. Click the I accept the license terms check box, and click Next.
7. Click Custom.
8. Click Next.
9. At the User's password must be changed before logging on warning screen, click OK.
10. Enter the desired password for the administrator in both fields, and click the arrow to continue.
11. At the Your password has been changed screen, click OK.
12. Install the latest VMware Tools package on the VM. Restart as necessary.
13. Connect the machine to the Internet, and install all available Windows updates. Restart as necessary.

14. Enable remote desktop access.
15. Change the hostname and reboot when prompted.
16. Create a shared folder to store test script files. Set permissions as needed.
17. Set up networking:
 - a. Click Start→Control Panel, right-click Network Connections, and choose Open.
 - b. Right-click the VM traffic NIC, and choose Properties.
 - c. Select TCP/IP (v4), and choose Properties.
 - d. Set the IP address, subnet, gateway, and DNS server for the virtual NIC, which will handle outgoing server traffic. Click OK, and click Close.
18. In the VM, configure the VM storage:
 - a. Click the Server Manager icon in the taskbar.
 - b. In the left pane, expand Storage and click Disk Management.
 - c. Right-click the first volume and choose Initialize Disk.
 - d. In the right pane, right-click the volume and choose New Simple Volume...
 - e. At the welcome window, click Next.
 - f. At the Specify Volume Size window, leave the default selection, and click Next.
 - g. At the Assign Drive Letter or Path window, choose a drive letter, and click Next.
 - h. At the Format Partition window, choose NTFS and 64K allocation unit size, and click Next.
 - i. At the Completing the New Simple Volume Wizard window, click Finish.
 - j. Repeat steps c through i for the remaining VM volumes.

Configuring additional VMs on vSphere

1. Log into the vCenter Server, which manages the host.
2. Right-click the first VM, and choose Clone.
3. Name the new VM.
4. Choose the cluster, and select the host.
5. For the storage screen, choose advanced and direct the new virtual disks to the applicable datastores. Choose to customize using the customization wizard. Save the clone details as a new customization specification.
6. Continue cloning each VM, modifying the customization specification as necessary for IP addressing and so on.
7. Ensure in each VM that the necessary virtual disks are all online, the hostname is renamed, and the IP addressing was properly assigned by the customization wizard.
8. To configure automatic start for your specified number of VMs, click the Host configuration tab in the vSphere client, and click Virtual Machine Startup/Shutdown.

Installing Exchange 2010 SP2 prerequisites on the VMs

After completing the following steps for the first VM, repeat on the remaining VMs.

1. Select Start→Administrative Tools→Server Manager.
2. Click Add Roles.
3. At the Before You Begin screen, click Next.
4. At the Select Server Roles screen, click Web Server (IIS).
5. If prompted by an Add features required for Web Server (IIS) pop-up window, click Add Required Features.
6. Click Next.
7. At the Web Server (IIS) screen, click Next.
8. At the Select Role Services screen, select the IIS 6 Metabase Compatibility, IIS WMI Compatibility, HTTP Errors, HTTP Redirection, IIS 6 Management Console, Basic Authentication, Windows Authentication, Tracing, Digest Authentication, and Dynamic and Static content Compression checkboxes, and click Next.
9. At the Confirm Installation Selections screen, click Install.
10. At the Installation Results screen, click Close.

11. Select Start→Administrative Tools→Server Manager.
12. Click Features.
13. Click Add Features.
14. Select .NET Framework 3.5.1 Features.
15. When the Add Features Wizard pop-up window prompts you, click Add Required Role Services.
16. Click Next.
17. At the Introduction to Web Server (IIS) screen, click Next.
18. At the Select Role Services screen, click Next.
19. Click Install.
20. At the Installation Results screen, click Close.
21. Download the Microsoft Filter Pack 2.0.
(<http://www.microsoft.com/downloads/en/details.aspx?FamilyID=5cd4dcd7-d3e6-4970-875e-aba93459fbee>)
22. Run FilterPackx64.EXE.
23. Click Next.
24. Click I accept the terms in the License Agreement, and click Next.
25. Click OK once installation is complete.
26. Click Start→Administrative Tools→Services.
27. Right-click the Net.Tcp Port Sharing service, and click Properties.
28. Change the Net.Tcp Port Sharing startup type to Automatic, and click OK.
29. Open command prompt, type `ServerManagerCmd -i RSAT-ADDS`, and press Enter.
30. Reboot the server.

Installing Exchange Server 2010 SP2

After completing the following steps for VM1, repeat them for the other VMs.

1. Insert the Exchange Server 2010 installation DVD, and capture the DVD drive in the VM session. When the Autoplay window appears, click Run Setup.EXE.
2. The installer should consider steps 1 and 2 to be complete (they appear grayed out). Click the link to Step 3: Choose Exchange Language Option.
3. Click Install only languages from the DVD.
4. Click the link to Step 4: Install Microsoft Exchange Server.
5. To go past the introduction screen, click Next.
6. Accept the license agreement, and click Next.
7. Select No for error reporting, and click Next.
8. Select Typical Exchange Server Installation, and click Next.
9. Leave the organization name at default (First Organization), and click Next.
10. At the question about client computers running Outlook 2003 or Entourage, select No, and click Next.
11. To accept defaults for Configure Client Access server external domain, click Next.
12. At the Customer Experience Improvement Program screen, select I don't wish to join the program at this time, and click Next.
13. Click Install to start the installation process.
14. Once the installation has completed, click Finish. Exchange should automatically open the Exchange Management Console.

Enabling circular logging

1. Click Start→All Programs→Microsoft Exchange Server 2010→Exchange Management Console.
2. Expand Organization Configuration, and click Mailbox.
3. Right-click DB1, and click Properties.
4. Click the Maintenance tab, and check the box next to Enable circular logging, and click OK.

Disabling Maintenance Schedule

1. Click Start→All Programs→Microsoft Exchange Server 2010→Exchange Management Console.
2. Expand Organization Configuration, and click Mailbox.
3. Right-click Mailbox Database, and click Properties.
4. Click Maintenance.
5. Click Customize and Double-click the empty gray box above Sunday.
6. Ensure that all cells on the graph turn white, and click OK.
7. Click OK.

Changing the default Mailbox Database drive location

1. Click Start, and click Exchange Management Console.
2. Right-click Mailbox Database.
3. Select Move Database Path.
4. Click Browse, navigate to E:\exchdata, and click Save.
5. Click Move.
6. When the application prompts you to dismount the mailbox database, click Yes.
7. Click Finish.

Configuring LoadGen 2010 clients

We installed Windows Server 2008 R2 SP1 on all clients. We installed the latest updates on as of 5/22/2012.

Configuring client 1

1. Change the Computer name to Client 1
2. Set NIC to the following:
 - IP address: 192.168.15.53
 - Subnet mask: 255.255.255.0
 - Default Gateway: 192.168.15.1
3. Join the domain test.com.
4. Reboot when necessary.

Installing .Net 3.5.1

A prerequisite for LoadGen is that you have .NET 3.5.1 Installed on the client. Repeat these steps for each client after joining the domain.

1. On Client1, click Server Manager.
2. On Server Manager, expand Features.
3. At Features, click Add.
4. At the Features screen, check .Net Framework 3.5.1.
5. At the Add Features Wizard, click Add Required Role Services.
6. At the Select Features screen, click Next.
7. At the Web Server (ISS), screen click Next.
8. At the Select Role Services screen, click Next.
9. At the Confirm Installation Selections screen, click Install.

Installing LoadGen 2010

Repeat this for each client after joining the domain.

1. Double click loadgen2010.exe.
2. At the Welcome screen, click Next.
3. At the EULA screen, accept, and click Next.
4. At the Select Installation Folder screen, click Next.

5. At the Confirm Installation screen, click Next
6. At the Installation Complete screen, click Close.
7. At the Restart Your System prompt, click Yes.

Configuring client 2

1. Change the Computer name to Client 2.
2. Set a NIC to the following:
 - IP address: 192.168.21.21
 - Subnet mask: 255.255.255.0
 - Default Gateway: 192.168.21.1
3. Join the domain test.com.

Configuring client 3

1. Change the Computer name to Client 3.
2. Set a NIC to the following:
 - IP address: 192.168.21.22
 - Subnet mask: 255.255.255.0
 - Default Gateway: 192.168.21.1
3. Join the domain test.com.

Configuring client 4

1. Change the Computer name to Client 4.
2. Set a NIC to the following:
 - IP address: 192.168.21.23
 - Subnet mask: 255.255.255.0
 - Default Gateway: 192.168.21.1
3. Join the domain test.com.

Preparing LoadGen on the client 1 for HP DL385-G5 test

1. Select Start→All Programs→Microsoft Exchange→Exchange Load Generator.
2. When the Load Generator window appears, select Start a new test.
3. Select Create a new test configuration, and click Continue.
4. In the Specify test settings window, type Password1 as the Directory Access Password and Mailbox Account Master Password, and click Continue with recipient management.
5. Make 600 users in the Mailbox Database, and click Continue.
6. To accept defaults for Advanced recipient settings, click Continue.
7. In the Specify test user groups window, select the plus sign (+) to add a user group.
8. Change the Client Type to Outlook 2007 Cached and the Action Profile to Very Heavy, 100MB and click Continue.
9. Leave defaults in Remote configurations, and click Continue.
10. Click Save the configuration file as, and name it 100x600.xml
11. Click Start the initialization phase (recommended before running the test) to start initialization. The initialization process might take a several hours.

Preparing LoadGen on the client 2 for Lenovo RD630 test

1. Select Start→All Programs→Microsoft Exchange→Exchange Load Generator.
2. When the Load Generator window appears, select Start a new test.
3. Select Create a new test configuration, and click Continue.
4. In the Specify test settings window, type Password1 as the Directory Access Password and Mailbox Account Master Password, and click Continue with recipient management.
5. Make 600 users in each of the 3 Mailbox Databases, and click Continue.

6. To accept defaults for Advanced recipient settings, click Continue.
7. In the Specify test user groups window, select the plus sign (+) to add a user group.
8. Change the Client Type to Outlook 2007 Cached and the Action Profile to Very Heavy, 100MB and click Continue.
9. For Remote configurations, check the Enable the task engine to distribute the load to remote load generators'
10. Click plus sign to add the IP address of each of the LoadGen clients and click Continue.
11. Click Save the configuration file as, and name it 100x1800.xml
12. Click Start the initialization phase (recommended before running the test) to start initialization. The initialization process might take a several hours.

Backing up the mail database on clients

On the test server, once you have set up LoadGen and created its initial mail database, you need to back up that database and logs so you can have clean copies for each test. Use this process to back up that database:

1. Select Start→All Programs→Microsoft Exchange Server 2010→Exchange Management Console in the mail server.
2. In the left pane, under Server Configuration, click Mailbox.
3. In the right pane, right-click Mailbox Database, and select Dismount Database from the menu.
4. At the Do you want to continue? pop-up message, click Yes.
5. Right-click Public Folder Database, and select Dismount Database from the menu.
6. At the Do you want to continue? pop-up message, click Yes. The red arrow appears when you have dismounted the Public Folder Store.
7. Using Windows Explorer, create two new folders: C:\backup\mailstore and C:\backup\publicstore.
8. With Windows Explorer, copy all files from D:\DB\Mailbox\First Storage Group to D:\backup. This process may take several minutes.
9. Close Windows Explorer.
10. In Exchange Management Console, right-click Mailbox Database, and select Mount Database from the menu.
11. Right-click the Public Folder Database, and select Mount Database from the menu.

Running the LoadGen tests

1. Clean up prior outputs from the host system and all client driver systems.
2. Dismount all mailbox databases from all target VMs.
3. Delete databases.
4. Restore all databases on all target VMs.
5. Mount all mailbox databases on all target VMs.
6. Shut down all VMs.
7. Reboot the host system and all client systems.
8. Wait for a ping response from the server under test (the hypervisor system), all client systems, and all VMs.
9. Start Performance monitoring on all target VMs and Host.
10. Start LoadGen simulation. (Runs for 30 minutes)
11. Record performance counters from target VMs and host, and repeat steps to complete three cycles.

ABOUT PRINCIPLED TECHNOLOGIES



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