Dell™ PowerEdge™ R720 server with integrated agent-free management

Easier deployment using Microsoft System Center Configuration Manager or VMware vCenter Server

Comprehensive management   Saves time and money

By utilizing agent-free technology and advanced remote management technologies, Dell servers and their associated software provided superior process automation features and increased ease of management as compared to HP servers and their associated software in our testing. Using Dell servers and software could provide time and cost savings across enterprises with hundreds or thousands of servers. Specifically, we compared the management capabilities of the Dell PowerEdge R720 server and the HP ProLiant DL380 G7 server, each with its own software packages, in both a virtualized environment using VMware technologies and a non-virtualized environment using Microsoft System Center Configuration Manager (SC ConfigMgr).

In our testing, we used the following Dell tools: the Dell Management Plug-In for VMware® vCenter™ Server, the Dell Server Deployment Pack (DSDP), the Dell Lifecycle Controller Integration (DLCI), the HP Deployment Pack add-in for VMware vCenter Server, and HP Insight Control 6.3.1 for SC ConfigMgr.

The integrated, agent-free systems management capabilities of the Dell solution provided a faster administrator experience with fewer tasks compared to the HP solution in our testing scenarios, which included a VMware virtualized environment and a physical Windows Server environment. The agent-free Dell approach allows some management tasks to be performed regardless of the host operating system.

The more automated management tasks are, the less time it takes systems administrators to perform such tasks. This ultimately saves cost and enables greater resources to be allocated to innovative new IT initiatives instead of to mundane maintenance.

A PRINCIPLED TECHNOLOGIES TEST REPORT
Commissioned by Dell Inc., June 2012

DELL TOOLS SIMPLIFY SERVER MANAGEMENT

Server management automation has become a key driver in managing costs within the enterprise IT infrastructure. Organizations with hundreds or thousands of servers must consider all ownership costs, including day-to-day management time costs, associated with their choice of vendor and that vendor's available automation tools. With Dell tools—in particular the Dell Management Plug-In for VMware vCenter, the Dell Server Deployment Pack, and the Dell Lifecycle Controller Integration with SC ConfigMgr—we experienced a process with fewer steps and less incurred administrative time than when using equivalent tools from HP. For all testing with both HP and Dell servers in SC ConfigMgr, we assume that the administrator has already created the necessary hardware profiles, such as those necessary for network cards or other expansion components. We performed on our testing scenarios on a Dell PowerEdge R720 server and an HP ProLiant DL380 G7 server, the current production model at the time of this report. For detailed test results, see Appendix A. For information on the configuration of our test servers, see Appendix B.

The Dell Management Plug-In for VMware vCenter Server works in concert with Dell servers and VMware vCenter Server to reduce tasks and time associated with managing your virtual infrastructure by natively incorporating Dell server management features directly into the vCenter Server Console. The DSDP works in conjunction with Microsoft SC ConfigMgr 2007 R3 to reduce time associated with Windows operating system deployment tasks. The DLCI enables quicker and easier BIOS and firmware update capabilities, along with integration with SC ConfigMgr and the DSDP for operating system deployments. In our comparative testing using the HP ProLiant DL380 G7 server, we used the HP Deployment Pack add-in for VMware vCenter Server, and HP Insight Control 6.3.1 for SC ConfigMgr.

Dell tools could save up to $250,000 or 5,500 engineering hours over the data center replenishment lifecycle

Compared to the HP DL380 G7 solution, which required installing, testing, and maintaining a systems management software agent, we estimate the Dell solution can save up to $250 or 5.5 engineering hours over the server lifecycle. In a hypothetical data center with 1,000 servers, this savings per server cumulatively adds up to $250,000.

We assume this enterprise has 1,000 servers supporting 20 configurations of operating systems and hardware. We assume these servers have a 4-year lifecycle and require a patch on at least one of their agents, patched in bundles, every 2 months. This means that every 2 months, the patches need to be tested on 20 test servers, one for each configuration, and then these patches need to be rolled out to the servers supporting each configuration.

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In our hypothetical scenario, the system administrator performs the following process for these management tasks: prepare test platform, patch it, complete a health check on platform, remediate problems on test platforms as needed, roll out the patch to all servers, and finally remedy problems on the few servers that have them.

We assume that carrying out these tasks and remediating problems requires a system administrator-level staff member at an average salary of $70,000. We multiply that salary by a loading factor of 1.4 to include benefits for a total salary of $98,000. We base our $70,000 on several sources that put average salary for system administrator between $65,000 and $72,000.

Automated discovery with SC ConfigMgr saved 19 steps

By using the Dell Lifecycle Controller Integration features with Microsoft SC ConfigMgr, bare-metal discovery of Dell servers is completely automated and requires only adding power to the server. The server must be ordered from Dell with AutoDiscover enabled, a free option when customizing your server order. In contrast, using HP Operating System Deployment Pack for Microsoft SC ConfigMgr requires 19 manual steps for each server in an infrastructure.

Administrator time for deployment from SC ConfigMgr was 86.5 percent less

Provisioning of Dell PowerEdge servers with Dell Lifecycle Controller Integration required 86.5 percent less administrator time than HP's PXE-based server deployment process, due to the automated discovery functionality of Dell's product. This saves a tremendous amount of time, and therefore money, when you consider the scale of deployment in larger data centers. Figure 1 shows the administrator time required when deployment operating systems on each solution.
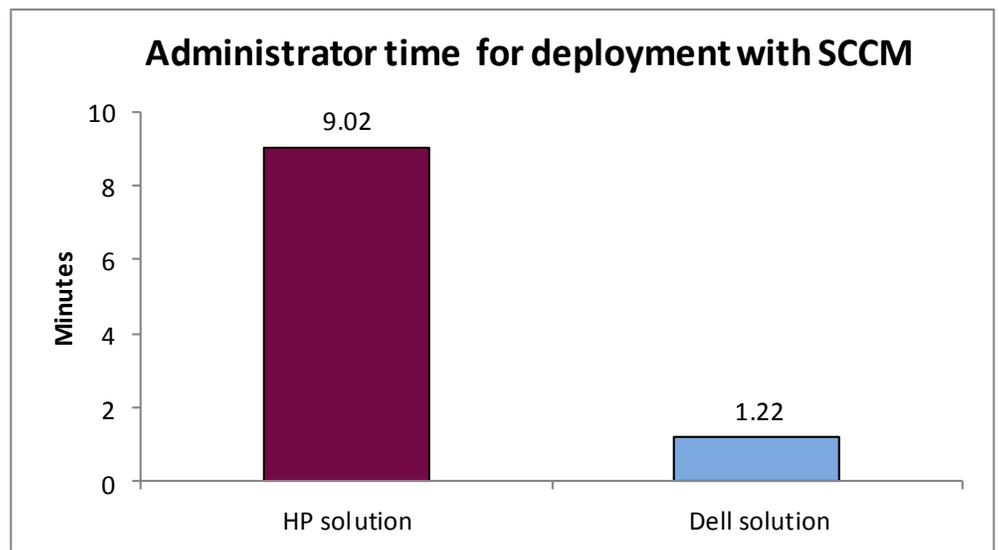
Figure 1: Administrator time to deploy an operating system from SC ConfigMgr. Lower numbers are better.

Administrator time for deployment with SCCM

HP solution: 9.02
Dell solution: 1.22
(Minutes)

Agent-free management: Dell PowerEdge R720 vs. HP ProLiant DL380 G7 deployment and manageability

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Server deployment time from SC ConfigMgr was 28.2 percent faster

For this test scenario, we deployed Microsoft Windows Server 2008 R2 Enterprise SP1 to both servers. With the Dell PowerEdge R720, we used the Dell Server Deployment Pack and Dell Lifecycle Controller Integration add-in for SC ConfigMgr. With the HP ProLiant DL380 G7 server, we used the HP Deployment Pack in SC ConfigMgr.

Not only did the Dell solution save on administrator time for server deployment, it also took 28.3 percent less time for the full deployment to actually complete on the hardware compared to the HP solution, as Figure 2 illustrates. Full deployment includes both administrator interaction time and machine wait time.
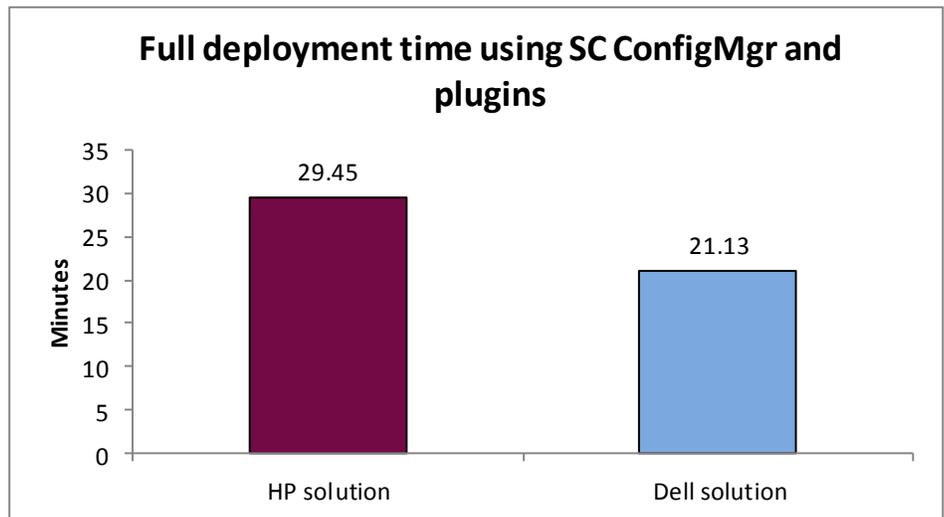
Figure 2: The Dell Server Deployment Pack and DLCI for SC ConfigMgr made server deployment quicker. Lower numbers are better.

Full deployment time using SC ConfigMgr and plugins

|	Minutes
HP solution	29.45
Dell solution	21.13

Server deployment from VMware vCenter Server was 21.5 percent faster

To test multiple operating system deployment scenarios, we also deployed VMware vSphere to both the Dell server and the HP server. For deploying the Dell server, we used the Dell Management Plug-in for VMware vCenter, a tool that allowed us to handle all administrative tasks—monitoring, managing, updating, configuring, and deploying—from the VMware vCenter console. For deploying the HP server, we used HP Insight Control 6.3.1 for VMware vCenter.

In our test scenarios, the Dell Management Plug-In for VMware vCenter simplified the deployment, updating, and management processes as compared to using HP Insight Control for vCenter. To use the HP solution with VMware vCenter Server, we also needed to install HP Systems Integration Manager (HP SIM) and HP's Remote Deployment Server (RDPServer). In our test scenarios, deploying and configuring the Dell PowerEdge R720 server with VMware vSphere using the Dell Management Plug-In for VMware vCenter was 21.5 percent faster than deploying and configuring VMware vSphere to the HP ProLiant DL380 G7 server using HP Insight Control 6.3.1 for VMware

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vCenter. Figure 3 shows the time it took each solution to deploy a new system from VMware vCenter.

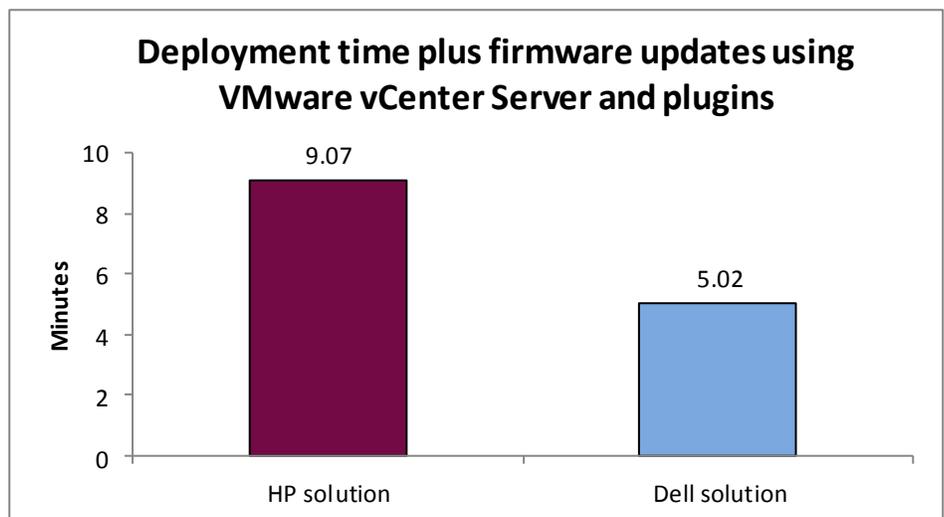**Figure 3: The server deployment process using Dell Management Plug-In for vCenter took less time. Lower numbers are better.**

Deployment time using VMware vCenter Server and plugins
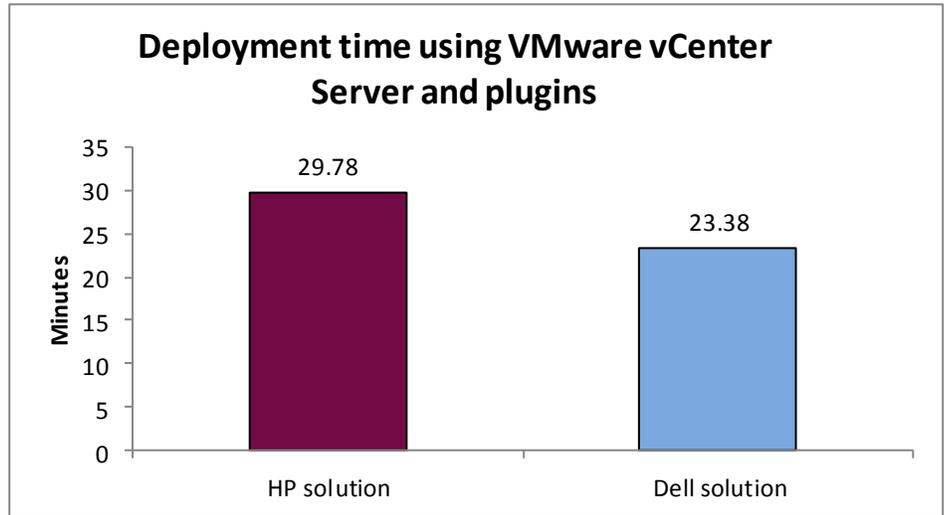
Server updates, deployment, and configuration from VMware vCenter Server were 44.7 percent faster

In our test scenarios, the process of deploying and updating our virtual machines from VMware vCenter was considerably faster when using the Dell solution, as compared to the HP solution. Deploying the operating system and updating firmware from VMware vCenter Server using Dell Remote Access Controller (iDRAC7) required fewer steps and less time. Figure 4 shows the time it took each solution to deploy and update a physical system from VMware vCenter Server.

Figure 4: Deployment and updates from VMware vCenter Server took less time using the Dell Remote Access Controller. Lower numbers are better.

Deployment time plus firmware updates using VMware vCenter Server and plugins

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Server updates from VMware vCenter Server took 28.6 percent fewer steps

Using the Dell Management Plug-In for VMware vCenter, we were able to update the firmware of our Dell PowerEdge R720 in 28.6 percent fewer steps than when we used HP Insight Control 6.3.1 for VMware vCenter to update the firmware of our HP ProLiant DL380 G7. Figure 5 shows the number of steps it took the solutions to update firmware and software in vCenter.
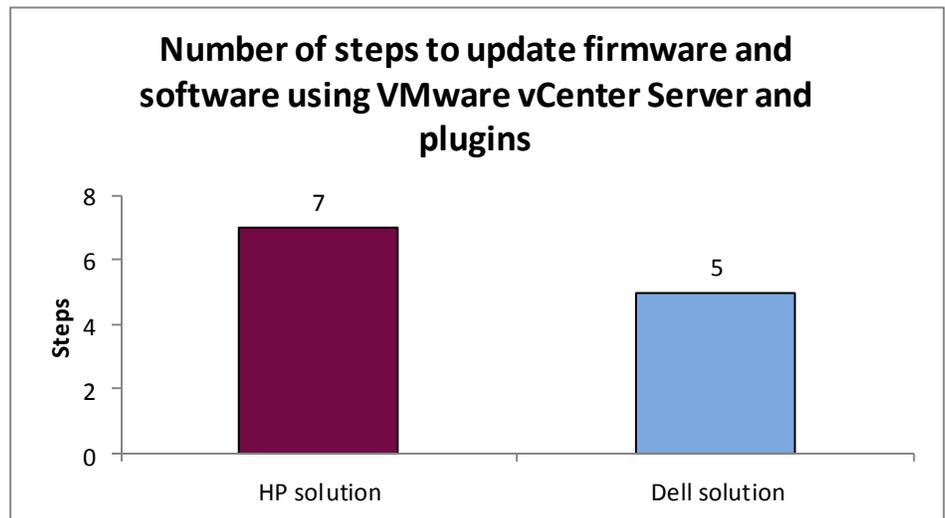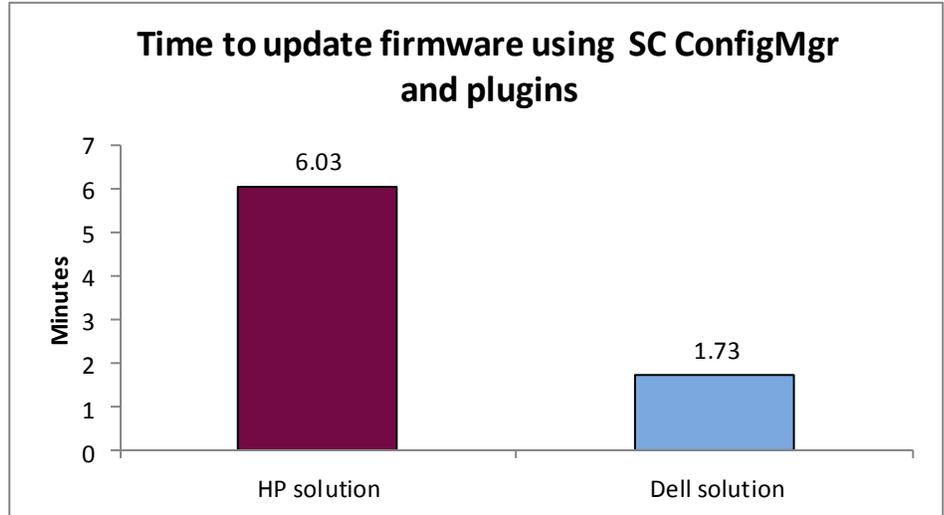
Figure 5: The Dell Management Plug-In reduced the steps needed to update servers from VMware vCenter Server. Lower numbers are better.

Number of steps to update firmware and software using VMware vCenter Server and plugins

Server updates from SC ConfigMgr were 71.3 percent faster and took 70 percent fewer steps

Using the DLCI with SC ConfigMgr, the process of updating servers from SC ConfigMgr was faster as compared to the HP process; deploying, configuring, and updating firmware from SC ConfigMgr using the DLCI required fewer steps and less time.

The Dell solution required only the DLCI plugin for SC ConfigMgr to perform the task. The HP solution required that we install Microsoft System Center Updates Publisher (SCUP) in order to publish new HP catalogs to SC ConfigMgr. In our scenarios, we assume that the publication for the updates has already been created for SCUP, and therefore do not include this time. The creation of the publication would add additional time to the HP scenario. Figure 6 compares the time it took the solutions to apply one update bundle, which was related to the RAID controller firmware.

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Time to update firmware using SC ConfigMgr and plugins

Figure 6: Using the DLCI with SC ConfigMgr took less time. Lower numbers are better.

[Bar chart showing Minutes on the y-axis (0 to 7). HP solution bar: 6.03. Dell solution bar: 1.73.]

Uniform management of multi-hypervisor and -OS environments took 81.3 percent fewer steps

DLCI for SC ConfigMgr allows uniform management of multi-hypervisor and multi-operating system environments utilizing Dell agent-free management capabilities provided by iDRAC7 Enterprise. In contrast, HP Insight Control for Microsoft SC ConfigMgr 6.3 is limited to managing only Microsoft Windows-based systems.

In our test scenario, we used one Microsoft Windows server, one Linux server, and one VMware vSphere server in the environment. Using the DLCI plug-in for SC ConfigMgr, we were able to select an entire collection of Dell servers all running different operating systems, compare firmware revisions, choose which to update, and perform the update. This required only nine steps. The HP process through SC ConfigMgr could remotely manage Microsoft Windows platforms in 30 steps, but could not manage Linux and VMware platforms from within SC ConfigMgr. We therefore used a manual process to update the HP firmware and BIOS, which required an additional nine steps for both the Linux server and the VMware vSphere server. The process of updating the three HP servers required 48 total steps: 30 steps for Windows and 9 steps each for the Linux and VMware vSphere servers. These steps assume that the Publication has already been created for SCUP and the HP Firmware Update DVD has already been downloaded and created. In contrast, the process of updating the three Dell servers required only the original nine steps. Figure 7 compares the number of steps it took to update firmware on multiple systems.

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Number of steps to update firmware on multiple systems using SC ConfigMgr and plugins

Figure 7: Updating firmware on Dell systems with the DLCI agent-free approach took fewer steps than on HP systems in multi-hypervisor and -OS environments. Lower numbers are better.
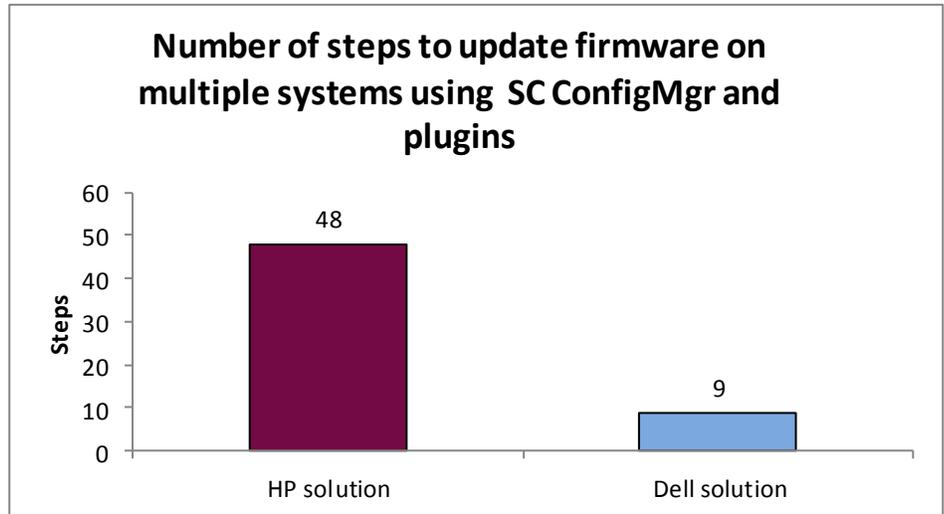
Dell reduced server downtime by 85.5 percent

We tested the failure of a RAID controller and the replacement of that RAID controller using both Dell and HP's available processes and tools. In our test scenario, the Dell server's downtime was over 85 percent less than that of the HP server.

In our test, we assumed that each server had a failed RAID controller, a spare controller was available, and a local administrator was present. The timing started with the server in a powered-down state. The server downtime that would be incurred by this outage is the time it took to replace the RAID controller and update the RAID controller firmware. The Dell PowerEdge R720 automatically detected the new card and applied all settings and firmware, taking a total of two steps and 5 minutes to complete the task. The HP ProLiant DL380 G7 required previous knowledge of the firmware and several steps, including the download of the latest HP Firmware update DVD to update the RAID controller firmware, taking 14 steps and 34.54 minutes to complete the task. In the case of this scenario, the administrator time and the down time are identical, therefore we report only the results below. Figure 8 shows the server downtime each solution required when replacing a RAID controller.

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Figure 8: The Dell solution's management features decreased downtime by 85.5 percent as compared to the HP solution, when replacing a failed RAID controller. Lower numbers are better.
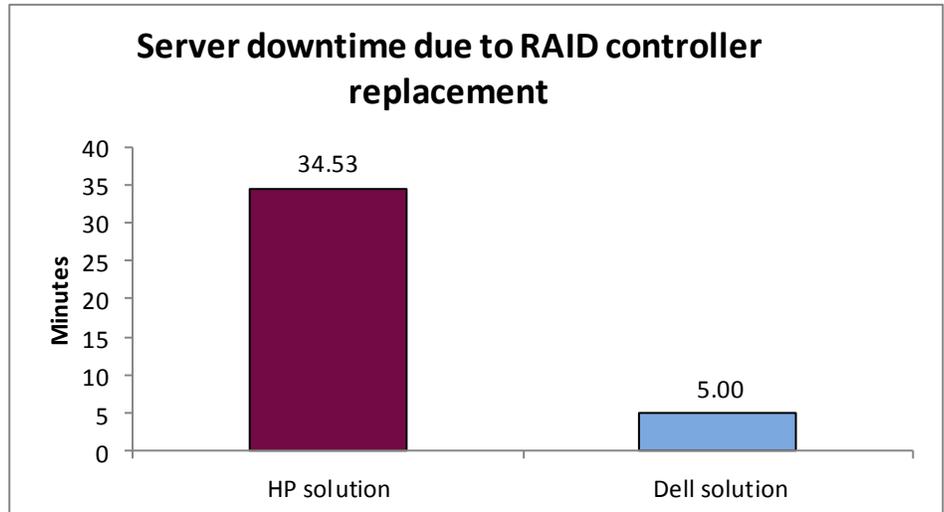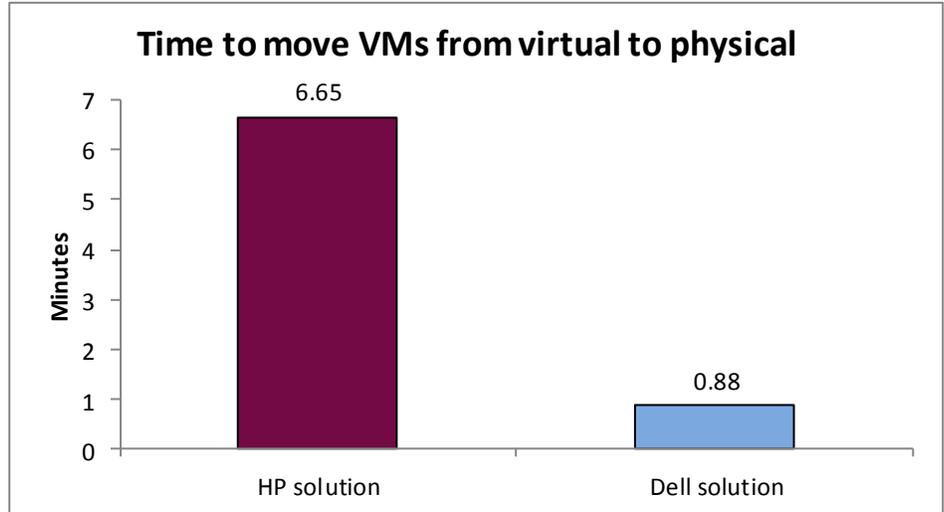
Dell is 86.7 percent faster and less complex (16 fewer steps) than HP in moving workloads from virtual-to-physical (V2P)

Dell's agent-free approach to system management on the PowerEdge R720 server eases the hassle that come with management agents when moving from virtual to physical systems. Having multiple system-management agents on a server, such as those required by HP SIM, requires adding these agents after every V2P migration and removing the same agents when migrating from physical to virtual. Adding these agents each time the OS was moved to the physical HP server took 16 steps and 5.8 minutes of administrator face time during post-migration configuration; whereas the Dell process required no post-migration time or steps in our test scenario using Dell Advanced Infrastructure Manager (AIM). The process of implementing the V2P migration using HP's tools required more than seven times the amount of administrator time than with the Dell tools.

A variety of tools are available for executing a V2P migration, ranging from backup-style solutions to more robust virtualization management products like Dell AIM. We used Dell AIM for our testing and we assume the servers are already configured and visible in Dell AIM. To provide system management in an HP environment after an OS is moved to an HP server requires adding HP's OS-based management agent. If the OS is once again virtualized (P2V), the HP agents must be removed prior to migration. HP's requirement of an OS-based agent adds time to administrative tasks. Figure 9 shows the time it took the solutions to move V2P workloads.

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Figure 9: Dell AIM made V2P migration a quicker process. Lower numbers are better.

To view detailed results for each scenario, see Appendix A.

WHAT WE TESTED

Our test bed configuration

Our test bed for each solution consisted of three different servers: an Active Directory server running DNS and DHCP, a server for each environment's management software, and the target managed server. For the VMware vCenter Server scenarios, we also added a server running VMware vSphere to act as a host for the Dell Management Plug-In for VMware vCenter Server.

We installed Microsoft Windows Server 2008 R2 SP1 on the Active Directory and management servers. We installed Microsoft SC ConfigMgr 2007 R3 for our SC ConfigMgr testing and VMware vCenter Server and VMware vSphere version 5 for our VMware testing. We used HP Insight Control 6.3.1 to install HP SIM and add-ins for SC ConfigMgr and vCenter for the HP solution testing.

About the Dell Management Plug-In for VMware vCenter Server

The Dell Management Plug-In for VMware vCenter 1.0.1 is part of the Dell Integrated Systems Management suite of applications, which Dell designed to help administrators deploy and manage their servers, operating system, and other components that comprise their IT infrastructure. The Dell Management Plug-In for VMware vCenter Server provides a central management tool in the VMware vCenter Server console for your hardware and your virtual infrastructure, making it easy to deploy VMs, BIOS, and firmware updates, monitor hardware, and perform provisioning tasks.

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To learn more about Dell Management Plug-In for VMware vCenter, visit http://content.dell.com/us/en/enterprise/d/virtualization/management-plug-in-for-vmware-vcenter.aspx.

About iDRAC7 and the Dell Lifecycle Controller

Using the iDRAC7 and the Dell Lifecycle Controller allow simplified management of both local and remote servers. Embedded management features are directly on the server, and reduce reliance on external tools and media. The overall result of this centralized management location is a reduction in steps, time, and potential errors, as well as an increase in efficiency, when managing your servers.

To learn more about the Dell Lifecycle Controller, visit http://en.community.dell.com/techcenter/systems-management/w/wiki/lifecycle-controller.aspx. To learn more about iDRAC7, visit http://www.dell.com/us/enterprise/p/d/solutions/integrated-dell-remote-access-controller-idrac

About the Dell Server Deployment Pack

The Dell Server Deployment Pack allows you to install and configure your Dell servers directly from the Microsoft System Center Configuration Manager console.

To learn more, visit http://www.dell.com/support/drivers/us/en/555/DriverDetails/DriverFileFormats?DriverId=R290118.

About Microsoft SC ConfigMgr, Dell Lifecycle Controller Integration, and the Dell Server Deployment Pack

The Dell Lifecycle Controller Integration for Microsoft SC ConfigMgr, along with the Dell Server Deployment Pack, allows you to fully utilize the remote deployment and management capabilities of your Dell servers directly from the Microsoft SC ConfigMgr console, removing the reliance on a separate PXE infrastructure.

CONCLUSION

Whether in a virtualized or a non-virtualized environment, Dell made server management, deployment, and discovery simpler and faster in our test scenarios. In our tests, using Dell server management features saved time and steps compared to using HP management tools, which required additional OS-based agents. Dell's agent-free management approach eases tasks for administrators, and removes the need for OS-based agents. This approach can potentially offer an organization dramatic savings in time, effort, and money over the server lifecycle.

Agent-free management: Dell PowerEdge R720 vs. HP ProLiant DL380 G7 deployment and manageability

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APPENDIX A – DETAILED TEST RESULTS

Discovery in Microsoft SC ConfigMgr

Dell discovery using SC ConfigMgr 1 step (13 sec)	HP SIM discovery using SC ConfigMgr 19 steps (5 min, 51 sec)
1. Plug in network and power cables.	**Retrieve MAC Address information and verify PXE boot order (3 min 25 sec)** 1. Plug in power to server. 2. Press Power button on server. 3. Press F9 when prompted by the POST to enter the BIOS. 4. With System Options highlighted, write down the MAC address of the NIC that will be used for PXE communication. 5. Using the arrow keys, scroll down to Standard Boot Order (IPL), and press Enter. 6. Verify the NIC is first in the boot order. If not, alter the boot order. 7. Exit the BIOS. 8. Communicate the MAC address via email to the system administrator for ConfigMgr. **Import the machine into a collection (2 min 26 sec)** 1. In the Configuration Manager console, navigate to System Center Configuration Manager→Site Database→Computer Management→Operating System Deployment→Computer Association. 2. Right-click Computer Association. 3. Select Import Computer Information. 4. At the Select Source screen, select Import single computer, and click Next. 5. At the Single Computer screen, provide a computer name, enter the MAC address associated with the target system, and click Next. 6. At the Data Preview screen, click Next. 7. At the Choose Target Collection screen, select Add computers to the following collection, and click Browse. 8. Select the appropriate collection, and click OK. 9. Click Next. 10. At the Summary screen, click Next. 11. Click Close.

Physical server OS deployment and configuration with SC ConfigMgr

Dell OS deployment from SC ConfigMgr 5 steps (21 min, 13 sec)	HP OS deployment from SC ConfigMgr 45 steps (29 min, 45 sec)
Dell – OS Deployment from SC ConfigMgr Notes: We assume that all SC ConfigMgr profiles have already been created. We timed both administrator time and machine wait time. 1. In the SC ConfigMgr console, select Computer Management→Collections, right-click Managed Dell Lifecycle Controllers (OS Unknown) and select Dell Lifecycle Controller Launch Config Utility. 2. In the Dell Lifecycle Controller Configuration Utility, select Hardware Configuration and Operating System Deployment. 3. Keep default Do Not update firmware, and click Next. 4. Configure the BIOS, select desired profile, and click Next. 5. Configure the RAID, select desired profile, and click Next. 6. Configure the Network interface, select desired profile, and click Next. 7. Configure the Integrated Dell Remote Access Controller select desired profile, and click Next. 8. Deploy the operating system, select Advertisement, Operating System, and click Next. 9. Select boot media of your choice, and click Reboot target collection.	Note: We timed both administrator time and machine wait time. **Retrieve MAC Address information and verify PXE boot order (3 min 25 sec)** 1. Plug in power to server. 2. Press Power button on server. 3. Press F9 when prompted by the POST to enter the BIOS. 4. With System Options highlighted, write down the MAC address of the NIC that will be used for PXE communication. 5. Using the arrow keys, scroll down to Standard Boot Order (IPL), and press Enter. 6. Verify the NIC is first in the boot order. If not, alter the boot order. 7. Exit the BIOS. 8. Communicate the MAC address via email to the system administrator for SC ConfigMgr. **Importing the machine into a collection (2 min, 26 sec)** 1. In the Configuration Manager console, navigate to System Center Configuration Manager→Site Database→Computer Management→Operating System Deployment→Computer Association. 2. Right-click Computer Association. 3. Select Import Computer Information. 4. At the Select Source screen, select Import single computer, and click Next. 5. At the Single Computer screen, provide a computer name, enter the MAC address associated with the target system, and click Next. 6. At the Data Preview screen, click Next. 7. At the Choose Target Collection screen, select Add computers to the following collection, and click Browse. 8. Select the appropriate collection, and click OK. 9. Click Next. 10. At the Summary screen, click Next. 11. Click Close. **Create and configure new task sequence (1 min, 43 sec)** 1. Open SC ConfigMgr Console. 2. Open Computer Management→Operating System

Dell OS deployment from SC ConfigMgr 5 steps (21 min, 13 sec)	HP OS deployment from SC ConfigMgr 45 steps (29 min, 45 sec)
	Deployment, and then click Task Sequences.
	3. In the Actions pane, click Bare Metal Server Deployment→Create HP ProLiant Deployment Template.
	4. For Server Hardware Configuration, keep the default Boot Order selected.
	5. Enter Task Sequence Name.
	6. Enter Account name and Password.
	7. Select Operating System package to use
	8. Set Package with Unattend.xml info: to <do not select now>
	9. Click Create.
	10. Click Close.
	11. Right-click task sequence, and click Properties.
	12. Select the Advanced tab, ensure the boot image matches the selected operating system package, and click OK.
	13. Right-click task sequence, and click Edit.
	14. Click Apply Driver Package under Install Operation System and make sure driver package matches selected operation system package and then click OK.
	Advertise the task sequence (1 min, 27 sec)
	1. Right-click task sequence, and click Advertise.
	2. Select the HP Test collection we created earlier.
	3. Select the Make this task sequence available to boot media and PXE checkbox.
	4. Click Next.
	5. Under Mandatory assignments, add the As soon as possible assignment, and click Next.
	6. Click Access content directly from a distribution point when needed by the running task sequence and check the box beside When no local distribution point is available, use a remote distribution point.
	7. Click Next.
	8. On Interaction screen, Click Next.
	9. On Security screen, Click Next.
	10. On Summary screen, Click Next.
	11. Click Close.
	Initiate the OS Deployment
	1. Reboot the server utilizing PXE boot. (5 sec)

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Hypervisor deployment from vCenter

Dell hypervisor deployment from vCenter Server 12 steps (23 min, 23 sec)	HP hypervisor deployment from vCenter Server 28 steps (29 min, 47 sec)

Note: We assume the hardware and hypervisor profiles are already created. We also assume the deployment template is already configured and the connection profile is already created.
 	
1. Select Home→Management→Management Center.
2. Select Deployment and Run Deployment Wizard.
3. Click Add Server and Enter IP address with user name and password into iDRAC.
4. Click Add Server.
5. Select server to deploy, and click Next.
6. Select Deployment Template for server, and click Next.
7. Verify hard disk is selected, and click Next.
8. Expand server and select NIC for management tasks, and click Obtain DHCP or enter IP info.
9. Click Apply Settings to all selected servers and then click Next.
10. Select Connection Profile to apply, and click Next.
11. Click Finish.
12. Click Close. (You can monitor progress in Job Queue.)
	Set iLO IP address (2 min, 52 sec)
	1. Power system on and start timer.
	2. Press F8 to enter ilO settings.
	3. Go to network tab and select NIC à TCP/IP, press Enter and fill the IP information settings.
	4. Press F10 to save.
	5. Go to User tab, and click Add.
	6. Enter the following information:
	   • Username name: Administrator
	   • Login Name: hpadmin
	   • Password: Password1
	   • Verify Password: Password1
	7. Press F10 to save.
	8. Select file and exit, stop timer.
	
	Retrieve server information for Deployment Server Console (2 min, 53 sec)
	1. Open IE from management server and start timer.
	2. At the certificate warning screen, click Yes to navigate to the Web site.
	3. At the login screen enter login credentials. (i.e., hpadmin\Password1)
	4. At the Overview screen record the UUID & Serial Number.
	5. Select System Information, and click NIC Information Tab (usually takes a few seconds to gather).
	6. Record NIC Port 1 MAC Address.
	7. Log out and stop timer.
	
	Select server in Deployment Server Console (1 min, 2 sec)
	1. Open Deployment Console and start timer.
	2. Select File→New→Computer.
	3. On New Computer screen click Add.
	4. Enter Name, MAC address or UUID, computer name for server, and click OK. (Note: This information was gathered from iLO interface.)
	5. Click OK, stop timer.
	
	HP Insight Control Deployment Wizard (1 min, 16 sec)
	1. Launch vSphere client and start timer.
	2. Select Home→Management→HP Insight Control Deployment Wizard.
	3. Select server to deploy, and click Next.
	4. Enter hostname and domain information.

Dell hypervisor deployment from vCenter Server 12 steps (23 min, 23 sec)	HP hypervisor deployment from vCenter Server 28 steps (29 min, 47 sec)
	5. Uncheck Use DHCP, enter static IP information, and click Next.
	6. Click and drag ESXi job to server that is to be deployed, and click Next.
	7. On Add to vCenter screen, enter username and password for host, and click Next.
	8. Click Finish, stop timer.

Server updates, deployment, and configuration from vCenter Server

Dell OS deployment and configuration from vCenter Server 17 steps (5 min, 1 sec)	HP OS deployment and configuration from vCenter Server 35 steps (9 min, 4 sec)

Note: We assume the hardware and hypervisor profiles are already created. We also assume the Deployment Template already configured and the Connection Profile is already created.
 	
Setup server deployment task (3 min, 48 sec)
1. Select Home→Management→Management Center.
2. Select Deployment and Run Deployment Wizard.
3. Click Add Server and Enter IP address with user name and password into iDRAC.
4. Click Add Server.
5. Select server to deploy, and click Next.
6. Select Deployment Template for server, and click Next.
7. Verify hard disk is selected, and click Next.
8. Expand server and select NIC for management tasks, and click Obtain DHCP or enter IP info.
9. Click Apply Settings to all selected servers, and click Next.
10. Select Connection Profile to apply, and click Next.
11. Click Finish.
12. Click Close. (You can monitor progress in Job Queue,)
 	
Dell Update Firmware in vCenter (1 min, 13 sec)
 	
1. Start timer and select the Dell tab, and select Run Firmware Update Wizard.
2. Select Update from a repository and use the default Dell Online ftp location, and click Next.
3. Select the desired bundle, and click Next.
4. Select the appropriate updates from the bundle, and click Next.
5. Select Enter maintenance mode, apply update(s), and reboot, and click Finish.
	Set iLO IP address (2 min, 52 sec)
	1. Power system on and start timer.
	2. Press F8 to enter ilO settings.
	3. Go to network tab and select NIC→TCP/IP, press Enter and fill the IP information settings.
	4. Press F10 to save.
	5. Go to User tab, and click Add.
	6. Enter the following information:
	   • Username name: Administrator
	   • Login Name: hpadmin
	   • Password: Password1
	   • Verify Password: Password1
	7. Press F10 to save.
	8. Select file and exit, stop timer.
	
	Retrieve server information for Deployment Server Console (2 min, 53 sec)
	1. Open IE from management server and start timer.
	2. At the certificate warning screen, click Yes to navigate to the Web site.
	3. At the login screen, enter login credentials. (i.e., hpadmin\Password1)
	4. At the Overview screen, record the UUID & Serial Number.
	5. Select System Information, and click NIC Information Tab (usually takes a few seconds to gather).
	6. Record NIC Port 1 MAC Address.
	7. Log out and stop timer.
	
	Select server in Deployment Server Console (1 min, 2 sec)
	1. Open Deployment Console and start timer.
	2. Select File→New→Computer.

Dell OS deployment and configuration from vCenter Server 17 steps (5 min, 1 sec)	HP OS deployment and configuration from vCenter Server 35 steps (9 min, 4 sec)
	3. On New Computer screen click Add. 4. Enter Name, MAC address or UUID, computer name for server, and click OK. (Note: This information was gathered from iLO interface.) 5. Click OK, stop timer. **HP Insight Control Deployment Wizard (1 min, 16 sec)** 1. Launch vSphere client and start timer. 2. Select Home→Management→HP Insight Control Deployment Wizard. 3. Select server to deploy, and click Next. 4. Enter hostname and domain information. 5. Uncheck Use DHCP, enter static IP information, and click Next. 6. Click and drag ESXi job to server that is to be deployed, and click Next. 7. On Add to vCenter screen enter username and password for host, and click Next. 8. Click Finish, stop timer. **HP Firmware Update using VMware vCenter Server (1 min, 2 sec)** 1. Open vSphere client on management server and start timer. 2. Select host system to update. 3. Select HP Insight Software tab. 4. Under HP Management select Firmware. 5. Select Smart Update Component Update tab. 6. Select Update from Managed Smart Component and chose component update to apply. 7. Click Update and stop timer.

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Server firmware update from SC ConfigMgr

Dell firmware update using SC ConfigMgr 9 steps (1 min, 44 sec)	HP firmware update using SC ConfigMgr 30 steps (6 min, 2 sec)
1. Open SC Config Manager. 2. Expand Computer Management→Collections→All Dell Lifecycle Controller Services. 3. Right-click and select Dell Lifecycle Controller→ Launch Configuration Utility. 4. Select Firmware Inventory, Compare, and Update. 5. Click Next. 6. Specify Dell PDK Catalog or Select ftp.dell.com, and click Next. 7. Enter File Share details, and click Next. 8. Click Next and Repository is updated. 9. Select when to start update, and click Update.	**SCUP - Import and Publish HP Catalog (1 min, 52 sec)** 1. Open SCUP. 2. On Updates screen select Overview→All Software Updates→HP ProLiant Servers. 3. Select desired update, and click Next. (For our example we selected Online ROM Flash Component from Windows – HP ProLiant DL380 G7.) 4. Click Assign. 5. Select Assign software update to a new or existing Publication, and click OK. 6. Select desired publication, and click Publish. 7. On Specify publish options, click Next. 8. On Confirm the settings screen, click Next. 9. Click Close. **SC ConfigMgr – Synchronize WSUS and deploy updates (required prerequisite) (4 min, 10 sec)** 1. Open Configuration Manager Console. 2. Expand Site Database→Computer Management→Software Updates. 3. Right-click Update Repository and select Run Synchronization. 4. Click Yes on Run Update Synchronization screen. 5. After the synchronization has completed, go to Computer Management→Software Updates→Update Repository→Updates→ Hewlett-Packard ProLiant Servers→ProLiant Firmware folder. 6. Right-click the desired update and select Deploy Software Updates. 7. Enter name for update, and click Next. 8. Select Create a new deployment definition, and click Next. 9. Choose collection to be updated by clicking Browse, and click Next. 10. Select to Suppress notification on clients, and click Next. 11. On Restart Settings screen, click Next. 12. On Event Generation screen, click Next. 13. On update Binary Download screen, click Next. 14. Check Save deployment properties as a template, enter a name, and click Next. 15. Select Create a new deployment package and enter a name and location of shared directory that will store update packages, and click Next.

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Dell firmware update using SC ConfigMgr 9 steps (1 min, 44 sec)	HP firmware update using SC ConfigMgr 30 steps (6 min, 2 sec)
	16. Select the server on the Distribution Points screen, and click Next. 17. On Download Location screen, leave default setting, and click Next. 18. On Language Selection screen, click Next. 19. Select As soon as possible on the Deployment Schedule screen, and click Next. 20. On Summary screen, click Next. 21. Click Close.

Server firmware update from vCenter Server

Dell firmware update using vCenter Server 5 steps (1 min, 2 sec)	HP firmware update using vCenter Server 7 steps (1 min, 13 sec)
1. Start timer and select the Dell tab, then select Run Firmware Update Wizard. 2. Select Update from a repository and use the default Dell Online ftp location, and click Next. 3. Select the desired bundle, and click Next. 4. Select the appropriate updates from the bundle, and click Next. 5. Select Enter maintenance mode, apply update(s), click Finish, and initiate a reboot.[1]	1. Open vSphere client on management server, and start timer. 2. Select host system to update. 3. Select HP Insight Software tab. 4. Under HP Management select Firmware. 5. Select Smart Update Component Update tab. 6. Select Update from Managed Smart Component and chose component update to apply. 7. Click Update and stop timer.

Uniform management of multi-hypervisor and -OS environments

Dell solution 9 steps (1 min, 44 sec)	HP solution 48 steps (22 min, 30 sec)
Dell Update Firmware using SC ConfigMgr 1. Open Config Manager. 2. Expand Computer Management→Collections→All Dell Lifecycle Controller Services. 3. Right-click and select Dell Lifecycle Controller→Launch Configuration Utility. 4. Select Firmware Inventory, Compare, and Update. 5. Click Next. 6. Specify Dell PDK Catalog or Select ftp.dell.com, and click Next. 7. Enter File Share details, and click Next. 8. Click Next and Repository is updated. 9. Select when to start update, and click Update.	*HP Firmware/Software updates using SC ConfigMgr* **SCUP - Import and Publish HP Catalog** Note: We assume that Publication has already been created. 1. Open SCUP. 2. On the Updates screen, select Overview→All Software Updates→HP ProLiant Servers. 3. Select desired update, and click Next. (For our example, we selected Online ROM Flash Component from Windows – HP ProLiant DL380 G7) 4. Click Assign. 5. Select Assign software update to a new or existing Publication, and click OK. 6. Select desired publication, and click Publish. 7. On Specify publish options, click Next. 8. On Confirm the settings screen, click Next.

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[1] Reboots were not included in timings, as we measured only administration interaction time.

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Dell solution 9 steps (1 min, 44 sec)	HP solution 48 steps (22 min, 30 sec)
	9. Click Close. **SC ConfigMgr – Synchronize WSUS and deploy updates** 1. Open Configuration Manager Console. 2. Expand Site Database→Computer Management→ Software Updates. 3. Right-click Update Repository and select Run Synchronization. 4. Click Yes on Run Update Synchronization screen. 5. After the synchronization has completed, go to Computer Management→Software Updates→Update Repository→Updates→Hewlett-Packard ProLiant Servers→ProLiant Firmware folder. 6. Right-click the desired update and select Deploy Software Updates. 7. Enter name for update, and click Next. 8. Select Create a new deployment definition, and click Next. 9. Choose collection to be updated by clicking Browse, then click Next. 10. Select to Suppress notification on clients, and click Next. 11. On Restart Settings screen, click Next. 12. On Event Generation screen, click Next. 13. On update Binary Download screen, click Next. 14. Check Save deployment properties as a template, enter a name, and click Next. 15. Select Create a new deployment package and enter a name and location of shared directory that will store update packages, and click Next. 16. Select the server on the Distribution Points screen, and click Next. 17. On Download Location screen, leave default setting, and click Next. 18. On Language Selection screen, click Next. 19. Select As soon as possible on the Deployment Schedule screen, and click Next. 20. On Summary screen, click Next. 21. Click Close. *HP Manual Firmware Update on Non-Windows Servers* 1. Turn on the server and insert the HP Firmware Maintenance CD. 2. Select Interactive Firmware Update Version 9.3.0. 3. Select English, and click Continue.

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Dell solution 9 steps (1 min, 44 sec)	HP solution 48 steps (22 min, 30 sec)
	4. Accept the license agreement by clicking Agree. 5. Select the Firmware Update tab, and click Install Firmware. 6. Click OK. 7. Select ML-DL-SL 300/500/700/900 catalog. 8. Select desired updates, and click Install. 9. When prompted to reboot, click Reboot Now.

Replacing the RAID controller

Dell Replacement of RAID Controller 2 steps (5 min, 0 sec)	HP Replacement of RAID Controller 14 steps (34 min, 32 sec)
1. Replace RAID controller. 2. Turn on the server. Wait through the three-step firmware upgrade and reboot process for the firmware update to automatically complete. Once the three-step firmware process has completed, the system will reboot.	1. Replace RAID controller. 2. Locate HP Firmware Update DVD and download. 3. Burn ISO image to DVD. 4. Turn on the server, start timer, and insert the HP Firmware Maintenance CD. 5. Select Interactive Firmware Update Version 9.3.0. 6. Select English, and click Continue. 7. Accept the license agreement by clicking Agree. 8. Select the Firmware Update tab, and click Install Firmware. 9. Click OK. 10. Select ML-DL-SL 300/500/700/900 catalog. 11. Deselect All choices and check Firmware CD Supplemental update Online ROM files for P212, and click Install. 12. When prompted to reboot, click Reboot Now. 13. On Post screen displaying Press any Key to view optional ROM messages, press any key. 14. Visually check controller firmware version on POST to make sure the correct version applied and stop timer.

Making servers manageable after virtual-to-physical workload transfers

Making a Dell server manageable after a virtual-to-physical migration using Dell tools (no agent installation required) 6 steps (53 sec)	Making an HP server manageable after a virtual-to-physical migration using HP tools (agent installation required) 16 steps (5 min, 46 sec)
1. Open AIM. 2. Right-click and stop desired VM. 3. Select Personas on the menu tree on the left. 4. Right-click the desired Personas, and select Start Personas. 5. On Select Operation screen, choose On Select Server, and click Next.	1. Open HP SIM. 2. Select Options→Discovery. 3. For System Automatic Discovery click Edit. 4. Enter IP or IP range, and click Save. 5. Click Run Now. 6. Select the newly discovered system, and click Run the managed systems setup wizard.

Making a Dell server manageable after a virtual-to-physical migration using Dell tools (no agent installation required) 6 steps (53 sec)	Making an HP server manageable after a virtual-to-physical migration using HP tools (agent installation required) 16 steps (5 min, 46 sec)
6. Select Server screen, select physical server, and click Finish.	7. Click Next on Verify Target System(s). 8. Click Next on Introduction. 9. Select features to install, and click Next. 10. Choose options, and click Next. 11. Review Analysis of systems, and click Next. 12. Select licenses, and click Next. 13. Verify or enter task credentials, if any, and click Next. 14. Review Summary, and click Run Now. 15. Expand Systems by Type and then All Servers. 16. Click System (Server) to check status.

Agent-free management: Dell PowerEdge R720 vs. HP ProLiant DL380 G7 deployment and manageability

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APPENDIX B – SERVER CONFIGURATION INFORMATION

Figure 10 provides detailed configuration information for the test servers.

System	Dell PowerEdge R720	HP ProLiant DL380 G7
Power supplies		
Total number	2	2
Vendor and model number	Dell D750E-S1	HP DPS-750RB A
Wattage of each (W)	750	750
Cooling fans		
Total number	6	6
Vendor and model number	AVC DBTC0638B2V	Nidec UltraFlo™
Dimensions (h x w) of each	2-1/2" x 2-1/2"	2-3/8" x 2-5/8"
Volts	12	12
Amps	1.20	2.45
General		
Number of processor packages	2	2
Number of cores per processor	8	6
Number of hardware threads per core	2	2
System power management policy	Balanced	Balanced
CPU		
Vendor	Intel	Intel
Name	Xeon	Xeon
Model number	E5-2680	E5620
Stepping	6	2
Socket type	LGA2011	Socket 1366 LGA
Core frequency (GHz)	2.70	2.40
Bus frequency	8.0 GT/s	5.8 GT/s
L1 cache	32 KB + 32 KB (per core)	32 KB + 32 KB (per core)
L2 cache	256 KB (per core)	256 KB (per core)
L3 cache	20 MB	12 MB (shared)
Platform		
Vendor and model number	Dell PowerEdge R720	HP ProLiant DL380 G7
Motherboard model number	00W9X3	ProLiant DL380 G7
BIOS name and version	Dell 0.3.37	HP P67
BIOS settings	Default	Default
Memory module(s)		
Total RAM in system (GB)	64	64
Vendor and model number	Hynix HMT31GR8BFR4A	Samsung M393B1K70BH1-CH9
Type	PC3-10600R	PC3-10600R
Speed (MHz)	1,333	1,333
Speed running in the system (MHz)	1,333	1,333
Timing/Latency (tCL-tRCD-tRP-tRASmin)	9-9-9-36	9-9-9-24
Size (GB)	8	8
Number of RAM module(s)	8	8

Agent-free management: Dell PowerEdge R720 vs. HP ProLiant DL380 G7 deployment and manageability

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System	Dell PowerEdge R720	HP ProLiant DL380 G7
Chip organization	Double-sided	Double-sided
Rank	Dual	Dual
Operating system #1		
Name	VMware ESXi 5.0.0	VMware ESXi 5.0.0
Build number	515841	515841
File system	EXT3	EXT3
Kernel	5.0.0	5.0.0
Language	English	English
Operating system #2		
Name		
Build number		
File system		
Kernel		
Language		
Graphics		
Vendor and model number	Matrox® G200e	ATI ES1000
Graphics memory (MB)	8	64
Driver	Matrox Graphics, Inc 2.4.1.0 (9/8/2011)	Microsoft 6.1.7600.16385 (6/21/2006)
RAID controller		
Vendor and model number	PERC H710P Mini	HP Smart Array P410i
Firmware version	3.130.05-1311	3.66
Cache size	1 GB	512 MB
RAID configuration	RAID 5	RAID 5
Hard drives		
Vendor and model number	Dell WD3000BKHG-18A29V0	459512-002
Number of drives	5	5
Size (GB)	300	146
Buffer size (MB)	64	16
RPM	10,000	10,000
Type	SAS	SAS
Ethernet adapters		
Vendor and model number	Intel I350 Gigabit Controller	HP NC382i Dual Port Gigabit Adapter
Type	Integrated	Integrated
Driver	Intel 11.14.48.0 (11/28/2011)	6.2.9.0 (2/4/2011)
Optical drive(s)		
Vendor and model number	TEAC DV-28SW	N/A
Type	DVD-ROM	N/A
USB ports		
Number	4 external, 1 internal	4 external, 1 internal
Type	2.0	2.0

Figure 10: System configuration information for the test servers.

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ABOUT PRINCIPLED TECHNOLOGIES

Principled Technologies®

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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.

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