Efficiency in systems management is a fundamental requirement of today's data center. Automation of necessary but repetitive management tasks for the system administrator saves time and frees resources for more strategic tasks. If you are a system administrator, many solutions on the market let you perform common system management functions, such as deploying firmware updates to your servers. However, the embedded management solution you choose should allow you to better adhere to ever-decreasing maintenance windows and reduce your scheduled downtime. How do you determine which embedded server management solution offers the most effective automation? To answer this question, we analyzed the abilities of two well-known embedded systems management subsystems: the Dell Lifecycle Controller on Dell PowerEdge™ 12G servers and HP's Intelligent Provisioning system found on the latest Gen 8 servers; with special focus on administrator hands-on time savings, and improvement in platform uptimes.

Specifically, we compared the process of updating the storage controller firmware and the BIOS of the Dell PowerEdge R720xd server using its Lifecycle Controller 2 user interface, to the same process on the HP ProLiant DL380p Gen8 server with HP Intelligent Provisioning. Our findings show that the embedded Dell Lifecycle Controller 2 provided a dramatically faster process than that of the embedded HP Intelligent Provisioning – requiring up to 78 percent less hands-on time when applying firmware via the management interface and performing the complete upgrade up to 2.5 times faster.

We designed the tests to reflect what an IT administrator would experience when using the embedded management subsystem of each platform. We measure the times in seconds – both hands-on administrator task time requiring interaction from IT staff, and full machine wait time where the system is rebooting or performing other tasks with no interaction. By more thoroughly automating the update process, Dell servers and the Lifecycle Controller provided faster firmware update automation and reduced administrative hands-on time in our testing, as compared to the HP embedded solution.

A PRINCIPLED TECHNOLOGIES TEST REPORT

Commissioned by Dell Inc., October 2012

# DELL LIFECYCLE CONTROLLER 2 SIMPLIFIES SYSTEM MANAGEMENT

The heart of Dell 12G automated systems management is the embedded Lifecycle Controller 2, which works in conjunction with the iDRAC (Integrated Dell Remote Access Controller) to receive instructions from management systems; serve as a staging point for updates; and perform automated tasks as directed to create and maintain healthy servers. The Lifecycle Controller 2 provides a user interface that allows an administrator to leverage the power of the embedded controller without having to utilize additional management tools. The LC user interface provides a connection to Dell's Internet based firmware and software repository via FTP, eliminating the need for removable media.

In our tests, we compared deployment of BIOS and storage controller firmware updates to a Dell PowerEdge R720xd server using Lifecycle Controller 2 v1.0, and to an HP ProLiant DL380p Gen8 server using HP's embedded Intelligent Provisioning 1.10.174. The results showed Dell's implementation of firmware updates via embedded management substantially decreased the amount of hands-on administrator time and wait time required to perform system updates.

Dell Lifecycle Controller 2: Updates applied 2.5 times faster, with 78 percent less hands-on time than HP Intelligent Provisioning

Applying BIOS and storage controller firmware updates to a Dell PowerEdge R720xd using Lifecycle Controller was 2.5 times faster overall and required 78 percent less administrative hands-on time than applying BIOS and storage controller firmware updates on an HP ProLiant DL380p Gen8 using HP Intelligent Provisioning, as shown in Figures 1 and 2. The efficiencies in Dell's user interface accounted for a great deal of this time. Below we discuss these efficiencies in detail.

Figure 1: Dell Lifecycle Controller 2 yielded faster results when updating firmware than HP Intelligent Provisioning.
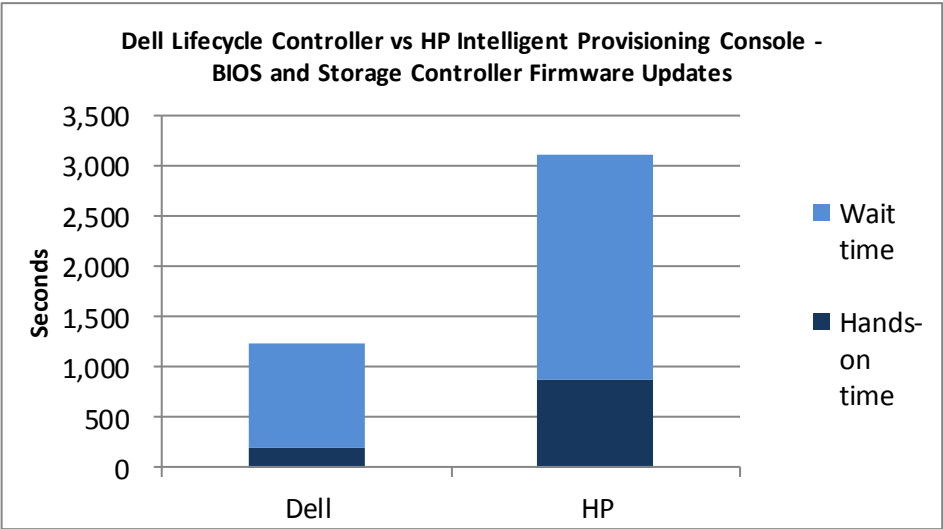
Time to update firmware: Dell Lifecycle Controller 2 vs. HP Intelligent Provisioning

Console BIOS and Storage Controller Firmware Updates	Hands-on time	Wait time	Total time
Dell Lifecycle Controller 2	191	1,035	1,226
HP Intelligent Provisioning	875	2,244	3,119

Figure 2: Hands-on and wait time to update firmware with the two management solutions. All times are in seconds.

We categorized the time into two types, hands-on time and wait time. Hands-on time was the time required for the administrator to perform required interactive steps such as UI navigation, mouse clicks, and data entry. Wait time was a significant time block in which the administrator must wait for the server to complete a task.

Dell Lifecycle Controller 2 options and features improve efficiency

UI design and simplicity are key features, and especially important in something as critical as updating firmware on hardware that runs your critical enterprise business applications. The hands-on time required to perform updates is only one of the business costs associated with server maintenance – downtime of the server itself is likely more costly, and since servers undergoing maintenance are typically unavailable while updates complete, that downtime is critical. By providing a UI that lets an administrator perform maintenance tasks with maximum efficiency, the Dell Lifecycle Controller 2 was able to reduce the downtime window in our tests by 31 minutes, 33 seconds – resulting in an overall update time 2.5 times faster than in HP Intelligent Provisioning.

The Dell Lifecycle Controller 2 user interface offers options and features that help streamline server management tasks for administrators. For example, the interface uses quick access link-style menus and provides descriptive notifications before executing lengthy operations, giving administrators a chance to consider the operations they are about to execute before performing the full update. Whereas while HP Intelligent Provisioning uses a graphical layout, it does so with smaller click targets embedded in icons, impeding quick progress during the update. Also, in the case of firmware updating, Intelligent Provisioning executed lengthy tasks without notifying an administrator about the long duration of the operation about to occur.

Additionally, while both solutions offer an administrator the ability to modify the firmware source repository, Dell's user interface allows the operator to choose the preferred source for any given job, while HP's Intelligent Provisioning forces the operator to exit the firmware update module and make the change in the Intelligent Provisioning Preferences module – a global change affecting subsequent update jobs. Dell's approach also allows an administrator to configure a job to install "back-rev" or one-off updates from a custom repository without making any changes that would impact the ability to receive new firmware updates directly from Dell.

The Dell Lifecycle Controller 2 on the Dell PowerEdge R720xd was able to update the NIC firmware in addition to the other components, while HP Intelligent

Time to update firmware: Dell Lifecycle Controller 2 vs. HP Intelligent Provisioning

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Provisioning on an HP ProLiant DL380p Gen8 was unable to update the NIC firmware at the time of testing. While updated firmware for the NICs was available via HP's Web site, it was not included in the list of applicable updates from within the Intelligent Provisioning interface at the time of testing. This is significant because updating the NICs on the HP server would require additional administrative actions including downloading HP update software, creating an update DVD, and then performing the remaining updates from the DVD.

The early access release of Dell Lifecycle Controller 2 applied updates 3.6 times faster, with 79 percent less hands-on administrative time, than HP Intelligent Provisioning

In addition to performing the tests with shipping releases of iDRAC and Lifecycle Controller firmware, we also tested the same scenarios using early access releases of the upcoming versions of iDRAC and Lifecycle Controller 2 firmware. We re-ran our head-to-head tests, once again updating the BIOS and the storage controller on each server.

Applying BIOS and storage controller firmware updates to a Dell PowerEdge R720xd using the Lifecycle Controller 2 early access version was 3.6 times faster and required 79 percent less administrative time than applying firmware updates on an HP ProLiant DL380p Gen8 using HP Intelligent Provisioning in our tests, as shown in Figures 3 and 4. The improvement in time directly relates to the reduction in the number of reboots required – the early access release of Lifecycle Controller 2 processed all firmware updates within a single reboot cycle. The elimination of reboots between each update dramatically reduced rollout times, becoming a significant factor for servers that may require many component updates.

Figure 3: Using early access iDRAC and Lifecycle Controller firmware yielded even faster updates than previous versions when compared to HP Intelligent Provisioning .
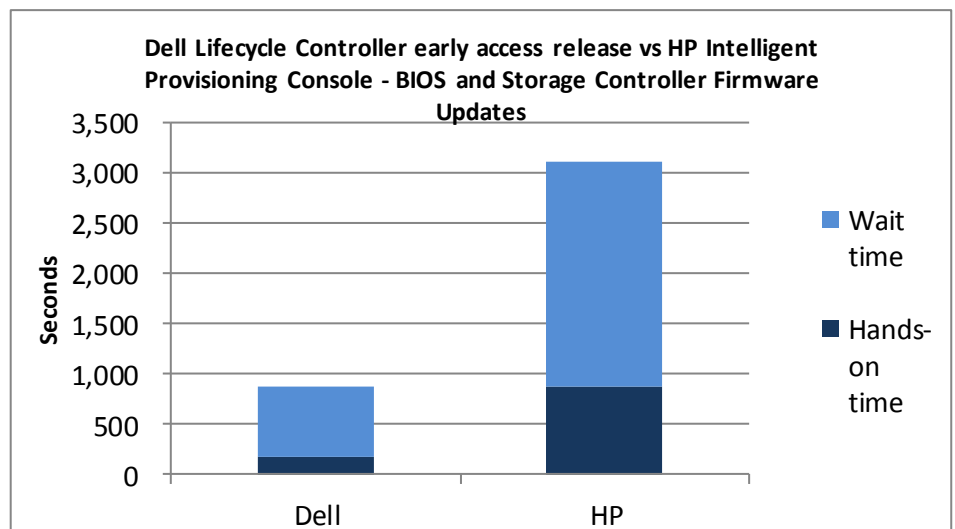
Dell Lifecycle Controller early access release vs HP Intelligent Provisioning Console - BIOS and Storage Controller Firmware Updates

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Console BIOS and Storage Controller Firmware Updates	Hands-on time	Wait time	Total time
Dell Lifecycle Controller 2 Unified Server Configurator	179	685	864
HP Intelligent Provisioning	875	2,244	3,119

Figure 4: Hands-on and wait time to update firmware with the two management solutions. All times are in seconds.

WHAT WE TESTED

Our test configuration

Our test configuration for each solution consisted of two different servers: a Microsoft Windows 2008 R2 SP1 server for Active Directory, DNS, and DHCP, and the server targeted for management.

We configured each target server for remote access using their dedicated management interfaces – iDRAC7 for the Dell PowerEdge R720xd and iLO4 for the HP ProLiant DL380p Gen8.

About iDRAC7 and the Dell Lifecycle Controller

The iDRAC7 and the Dell Lifecycle Controller allow simplified management of both local and remote servers. Embedded management features are built into 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

CONCLUSION

This paper focuses on Dell's embedded systems management component, Lifecycle Controller 2 and its user interface. Leveraging the power of the Lifecycle Controller 2 User Interface, Dell made server management simpler and faster via automation in our test scenarios. In our tests, using Dell server embedded management features saved time and required fewer steps when compared to using similar HP server embedded management features. This approach can potentially offer an organization dramatic savings in time, effort, and money over the server lifecycle.

Time to update firmware: Dell Lifecycle Controller 2 vs. HP Intelligent Provisioning

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APPENDIX A – DETAILED TEST RESULTS

Firmware updates using Embedded Management

Our target server for performing Dell server firmware updates using Dell Lifecycle Controller was a Dell PowerEdge R720xd containing two 147GB hard drives configured as a RAID 1 array, 64 GB of RAM, and two Intel Xeon E5-2660 processors. The iDRAC7 was licensed with an Enterprise license, configured to use its own dedicated interface, and assigned a static IP address. The Lifecycle Controller utilized LOM1 for network access, and assigned a static IP address. Both addresses resided on a private network dedicated to Dell testing, with Internet access via a gateway.

Our target server for performing HP server firmware updates using Intelligent Provisioning was an HP ProLiant DL380p Gen8, containing two 146GB hard drives configured as a RAID 1 array, 64 GB of RAM, and two Intel Xeon E5-2680 processors. The iLO 4 was licensed with an ILO 4 Advanced license, and assigned a static IP address. The address resided on a private network dedicated to HP testing, with Internet access via a gateway.

For both target servers, we accepted firmware versions available to the embedded management systems as of September 4, 2012.

Dell firmware updates using Lifecycle Controller UI 8 steps (20 min, 26 sec)	HP firmware updates with Intelligent Provisioning 18 steps (51 min, 59 sec)

1. Boot the server.
2. Press F10 to enter Lifecycle controller.
3. Select Platform Update.
4. Select the link for Launch Platform Update.
5. Select the location for repository (ftp.dell.com) and click Next.
6. Configure Access settings:
   a. Leave username and password blank.
   b. Under Proxy Settings, clear the checkbox for Enable settings and click Next.
7. Select the firmware to update by checking the boxes beside BIOS and Storage Controller, and press Apply. The system begins component updates and performs a reboot between each update. The system launches into Lifecycle Controller and verifies each updated component.
8. Exit Lifecycle Controller by pressing ESC on keyboard, confirm exit, and reboot.
	1. Boot the server.
	2. Press F10 to enter Intelligent Provisioning.
	3. Select Perform Maintenance.
	4. Select the icon for Firmware Update. Intelligent Provisioning displays the following messages: "Looking for updates, this might take a few minutes" and "Checking hardware, this may take a bit longer."
	5. Select the firmware to update by checking the boxes for BIOS and Storage controller and click Install.
	6. Review the changes, and click Continue.
	7. Intelligent Provisioning displays a warning: "The operation you are about to perform **CAN NOT** be cancelled once started…" Click Continue.
	8. Firmware updates begin. Upon completion, click Continue.
	9. The Firmware update main screen appears with a message at the top of the screen: "You must reboot for the latest firmware information to be reflected here." Intelligent Provisioning re-launches the discovery process and displays the following notifications:

Time to update firmware: Dell Lifecycle Controller 2 vs. HP Intelligent Provisioning

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Dell firmware updates using Lifecycle Controller UI 8 steps (20 min, 26 sec)	HP firmware updates with Intelligent Provisioning 18 steps (51 min, 59 sec)
	"Looking for updates, this may take a few minutes" and "Checking hardware, this may take a bit longer." Click Exit at the Select Updates panel. A reboot is required to see version changes.
	10. At the options screen for Perform Maintenance , click arrow at bottom left for Previous.
	11. At the Intelligent Provisioning screen, there is no Exit or Finish button. Click the power icon beside the HP logo at the top of the screen.
	12. Select Reboot.
	13. Press F10 to re-enter Intelligent Provisioning.
	14. Select Perform Maintenance.
	15. Select the icon for Firmware Update. Intelligent Provisioning displays the following messages: "Looking for updates, this might take a few minutes" and "Checking hardware, this may take a bit longer."
	16. Verify the updates were performed by comparing the installed version to the available version.
	17. Click the power icon beside the HP logo at the top of the screen.
	18. Select Reboot to return the server to service.

Firmware updates using Embedded Management with Early Access iDRAC and Lifecycle Controller

Dell firmware updates using Lifecycle Controller UI 8 steps (14 min, 24 sec)	HP firmware updates with Intelligent Provisioning 18 steps (51 min, 59 sec)

1. Boot the server.
2. Press F10 to enter Lifecycle controller.
3. Select Firmware Update.
4. Select the link for Launch Firmware Update.
5. Select the location for repository (ftp.dell.com) and click Next.
6. Configure Access Settings:
    a. Leave username and password blank.
    b. Under Proxy Settings, clear checkbox for Enable Settings and click Next.
7. Select the firmware to update by checking the boxes beside BIOS and Storage Controller, and press Apply. The system performs component updates and reboots once after completion of all
	1. Boot the server.
	2. Press F10 to enter Intelligent Provisioning.
	3. Select Perform Maintenance.
	4. Select the icon for Firmware Update. Intelligent Provisioning displays the following messages: "Looking for updates, this might take a few minutes" and "Checking hardware, this may take a bit longer."
	5. Select the firmware to update by checking the boxes for BIOS and Storage controller and click Install.
	6. Review the changes, and click Continue.
	7. Intelligent Provisioning displays a warning: "The operation you are about to perform **CAN NOT** be

Time to update firmware: Dell Lifecycle Controller 2 vs. HP Intelligent Provisioning

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Dell firmware updates using Lifecycle Controller UI 8 steps (14 min, 24 sec)	HP firmware updates with Intelligent Provisioning 18 steps (51 min, 59 sec)
component updates. The system launches into Lifecycle Controller and verifies each updated component. 8. Exit Lifecycle Controller by pressing ESC on keyboard, confirm exit, and reboot.	cancelled once started…" Click Continue. 8. Firmware updates begin. Upon completion, click Continue. 9. The Firmware update main screen appears with a message at the top of the screen: "You must reboot for the latest firmware information to be reflected here." Intelligent Provisioning re-launches the discovery process and displays the following notifications: "Looking for updates, this may take a few minutes" and "Checking hardware, this may take a bit longer." Click Exit at the Select Updates panel. A reboot is required to see version changes. 10. At the options screen for Perform Maintenance, click arrow at bottom left for Previous. 11. At the Intelligent Provisioning screen, there is no Exit or Finish button. Click the power icon beside the HP logo at the top of the screen. 12. Select Reboot. 13. Press F10 to re-enter Intelligent Provisioning. 14. Select Perform Maintenance. 15. Select the icon for Firmware Update. Intelligent Provisioning displays the following messages: "Looking for updates, this might take a few minutes" and "Checking hardware, this may take a bit longer." 16. Verify the updates were performed by comparing the installed version to the available version. 17. Click the power icon beside the HP logo at the top of the screen. 18. Select Reboot to return to service.

Time to update firmware: Dell Lifecycle Controller 2 vs. HP Intelligent Provisioning

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APPENDIX B – SERVER CONFIGURATION INFORMATION

Figure 5 provides detailed configuration information for the test servers.

System	Dell PowerEdge R720xd	HP ProLiant DL380p Gen8
Power supplies		
Total number	1	1
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	Delta Electronics PFR0612XHE
Dimensions (h x w) of each	2-1/2" x 2-1/2"	60mm x 60mm
Volts	12	12
Amps	1.20	2.3
General		
Number of processor packages	2	2
Number of cores per processor	8	8
Number of hardware threads per core	2	2
System power management policy	Balanced	Balanced
CPU		
Vendor	Intel	Intel
Name	Xeon	Xeon
Model number	E5-2660	E5-2680
Stepping	0	0
Socket type	LGA2011	LGA2011
Core frequency (GHz)	2.20	2.70
QPI Speed	8.0 GT/s	8.0 GT/s
L1 cache	256 KB	256 KB
L2 cache	2 MB	2 MB
L3 cache	20 MB	20 MB
Platform		
Vendor and model number	Dell PowerEdge R720xd	HP ProLiant DL380p Gen8
Motherboard part/model number	0M1GCRX04	ProLiant DL380p Gen8
BIOS name and version	Dell 1.2.6	HP P70
BIOS settings	Default	Default
Memory module(s)		
Total RAM in system (GB)	64	64
Manufacturer and model number	Micron Technology 36KSF1G72PZ-1G4D1	Samsung M393B5270CH0-CH9Q4
Type	PC3-10600R	PC3-10600R
Speed (MHz)	1,333	1,333
Speed running in the system (MHz)	1,333	1,333
Size (GB)	8	4
Number of RAM module(s)	8	16
Chip organization	Double-sided	Double-sided

Time to update firmware: Dell Lifecycle Controller 2 vs. HP Intelligent Provisioning

System	Dell PowerEdge R720xd	HP ProLiant DL380p Gen8
Rank	Dual	Single
Graphics		
Vendor and model number	Matrox G200eR2	Matrox G200
Graphics memory (MB)	16	16
Driver	N/A	N/A
RAID controller		
Vendor and model number	PERC H710P Mini	HP Smart Array P420i
Firmware version	21.0.2-0001	2.14
Cache size	1 GB	0 MB
RAID configuration	RAID 1	RAID 1
Hard drives		
Vendor and model number	Dell HUC151414CSS600	HP EH0146FBQDC
Number of drives	2	2
Size (GB)	147	146
Buffer size (MB)	64	64
RPM	15000	15000
Type	SAS	SAS
Ethernet adapters		
Vendor and model number	Intel(R) Gigabit 4P I350-t rNDC	HP Ethernet 1Gb 4-port 331FLR
Type	Integrated	Integrated
Driver	N/A	N/A
Optical drive(s)		
Vendor and model number	N/A	HP DS8D3SH
Type	N/A	DVD
USB ports		
Number	3 external, 1 internal	4 external, 1 internal
Type	2.0	2.0
Firmware Versions		
BIOS	2.1.6	(P70) 2012.2.25
Storage Controller	21.0.2-0001	2.14

Figure 5: System configuration information for the test servers.

Time to update firmware: Dell Lifecycle Controller 2 vs. HP Intelligent Provisioning

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ABOUT PRINCIPLED TECHNOLOGIES

Principled Technologies, Inc.
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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.

Time to update firmware: Dell Lifecycle Controller 2 vs. HP Intelligent Provisioning

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