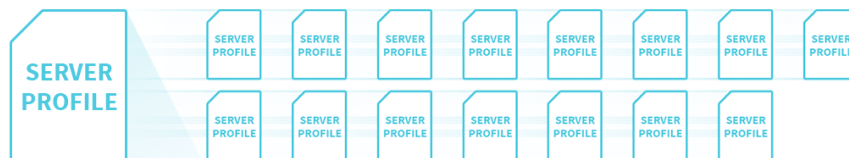


REDUCING DEPLOYMENT TIME WITH DELL CHASSIS MANAGEMENT CONTROLLER

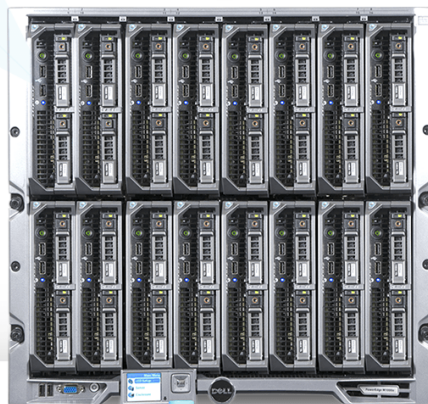
Dell™ OpenManage™ Chassis Management Controller 4.45 **SIMPLIFIED CHASSIS MANAGEMENT**



Deployed server configurations in

92.3% LESS TIME

compared to manual configuration



with as many as

741 FEWER STEPS

freeing time for other critical tasks

On a Dell PowerEdge™ M1000e blade enclosure

Today's blade server technologies, like those in the Dell PowerEdge M1000e, are designed to handle a broad range of workloads, from large virtual desktop infrastructure (VDI) implementations, to wide-reaching enterprise resource planning (ERP) solutions, to customer relationship management (CRM) programs. These demanding applications require more and more server nodes as your business grows. In the past, this meant administrators had to spend long hours researching and configuring hardware settings to provide the best performing configuration for each blade. This process was not only time-consuming, which hurt your bottom line, but also had the potential to introduce errors and misconfigurations, which could prolong mitigation efforts and negatively affect application availability.

Blade technologies not only provide a self-contained hardware environment for housing multiple server nodes, but they address the server deployment issue with purpose-built software that acts as a single management pane for integrated control of these dedicated environments. The embedded chassis management firmware can significantly reduce the time and effort required to add more server nodes to the environment. Instead of repeatedly and manually duplicating the hardware configurations for each server, administrators can now use automation technologies to quickly and cleanly add new nodes.



A PRINCIPLED TECHNOLOGIES TEST REPORT

Commissioned by Dell Inc.

JULY 2013

In the Principled Technologies labs, we created a representative blade infrastructure to see how well the Dell PowerEdge M1000e with the Dell Chassis Management Controller met these challenges. The Dell Chassis Management Controller 4.45 provides administrators with the ability to capture all the settings within a server profile and replicate those settings to other identical servers within the chassis.

We first deployed a Dell PowerEdge M620 blade server manually to demonstrate hands-on configuration changes to individual servers without the newest time saving technologies from Dell. We then repeated the blade deployment, this time replicating configuration settings with the Dell PowerEdge M1000e Chassis Management Controller. Our test results showed the Dell Chassis Management Controller dramatically reduced the amount of time and number of steps required to deploy a new environment compared to the manual method. In a full 16-blade chassis, our results show that an administrator could save over an hour and a half of tedious and error-prone manual setup time. Defining the settings for a single server, capturing the server profile, and replicating the profile using the Dell Chassis Management Controller required only 59 steps instead of 800 repetitive manual steps.

The Dell Chassis Management Controller server profile capture and replication feature needs only nine steps to deploy server configuration settings to the entire chassis population. Furthermore, the Quick Deploy feature of Dell Chassis Management Controller enable administrators to provision empty chassis slots with pre-built hardware profiles, allowing rapid deployment of additional hardware to meet the demands of a growing environment. Administrators can also export server profiles and import them to additional Dell PowerEdge M1000e blade enclosures, further reducing blade-server deployment times.

In addition to saving time and reducing complexity, Dell Chassis Management Controller automation capabilities can minimize misconfigurations due to human error, reduce recovery time, and free administrators to perform other critical work in your organization. As this environment grows, your administrators will have more time to attend to other customer-oriented and high-value tasks such as application maintenance, systems management, infrastructure monitoring, and issue resolution.

AUTOMATING DEPLOYMENT WITH DELL POWEREDGE M1000E CHASSIS MANAGEMENT CONTROLLER

Large-scale enterprise applications, such as Citrix® XenDesktop®, can be configured to distribute computing workloads across a large number of identically configured servers for high availability, redundancy, and scalability. Rather than deploying these workloads on individual rack-servers, each with its own management software, network and storage cabling, power supplies, and physical footprint, many organizations opt for blade enclosures, such as the Dell PowerEdge M1000e. Blade

server administrators benefit from a single chassis management interface, consolidated power, reduced cabling, and a smaller footprint which readily meet the needs of their distributed workloads.

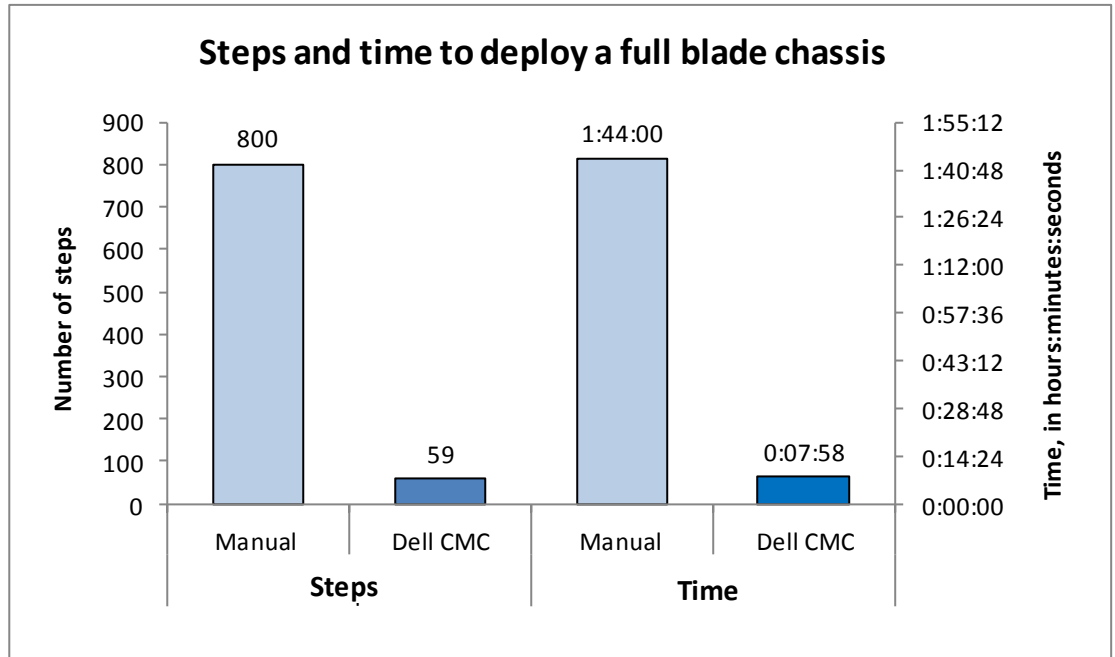
Before using the application in our testing, we consulted a Citrix XenDesktop best practices guide to determine beneficial BIOS or device configuration settings and added iDRAC SNMP parameters for an enterprise monitoring and management tool, such as Dell OpenManage Essentials (OME). We then captured the amount of time and the number of steps required to perform those modifications to a Dell PowerEdge M620 blade server housed within a Dell PowerEdge M1000e blade enclosure.

In our tests, we found that deploying a single Dell PowerEdge M620 blade server with the recommended BIOS and iDRAC settings required 6 minutes 30 seconds and 50 steps. Extrapolating that data, it would require 1 hour 44 minutes and 800 steps to manually configure and deploy identical settings on sixteen Dell PowerEdge M620 blades within a fully populated Dell PowerEdge M1000e blade enclosure. It is easy to see how manual deployment of identical nodes with specific settings is time consuming, especially when considering a Dell PowerEdge M1000e blade enclosure could house up to 32 Dell PowerEdge M420 blade servers. The Dell PowerEdge M1000e Chassis Management Controller meets administrators' deployment and maintenance configuration needs with automated server replication using XML-based profiles.

The Dell Chassis Management Controller automates the process of deploying a full chassis, requiring only nine steps beyond the initial manual process of configuring a single blade. As Figure 1 shows, using Dell Chassis Management Controller reduced full-chassis deployment times by as much as 92.3 percent in 741 fewer steps than manually configuring an entire chassis. This process creates a single master profile, so deployment of an entire chassis occurs in less than eight minutes. This saves more than an hour and a half compared to manual configuration of the chassis. In the time saved, an administrator could deploy and completely configure a Dell PowerEdge VRTX solution in a remote office,¹ with time to spare.

¹ www.principledtechnologies.com/Dell/PowerEdge_VRTX_configuration_0513.pdf

Figure 1: Using the Dell Chassis Management Controller reduced the number of steps and time required to deploy a full 16-blade chassis.



[Appendix B](#) details the steps and times it took to complete each deployment.

Expanding an existing environment

Organizations deploy distributed enterprise applications to benefit from higher levels of availability, redundancy, and scalability. The ability to grow without disruptions increases productivity by reducing downtime and the costs associated with system outages. One of the challenges of expanding an existing environment is ensuring configuration parameters are identical within a given hosting infrastructure.

The Dell Chassis Management Controller Quick Deploy feature allows an administrator to assign a completed profile to an empty slot within a chassis. Scaling this environment to meet new demands is as simple as obtaining an additional blade and inserting it into a slot with a pre-assigned profile. Immediately following insertion, the LCD panel on the front of the chassis prompts an administrator to accept the Quick Deploy profile assigned to the slot. If the administrator accepts the offer, the profile settings are automatically applied, and the server is ready for operating system installation.

In larger enterprise environments, distributed computing resources may exceed the capacity of a single chassis. In such cases, the Dell Chassis Management Controller allows administrators to “build once,” capture a system profile, and export the complete XML profile to a management workstation or network share. Administrators can then import the saved profiles to other chassis, and apply those profiles to any compatible hardware contained in them. In our tests, exporting a capture profile from the Dell Chassis Management Controller took only five seconds. Importing to an additional chassis required 18 seconds.

Consider a scenario in which you must add five full chassis of Dell PowerEdge M620 blade servers to your environment in order to provide for a sudden growth in service demands – such as an enterprise-wide rollout of virtual desktops. Manually configuring each server node in those chassis would require 8 hours and 40 minutes of administrative time, with 80 distinct instances where human error could lead to misconfiguration and operational inconsistencies. Compare that scenario to one in which you use the profile management features of the Dell Chassis Management Controller to capture a known good profile, import that server profile into the five new chassis, and then deploy that profile to every blade in each chassis. In only 6 minutes and 19 seconds you can deploy 80 blade servers with the identical configuration. That is a 98.8 percent reduction for time required to deploy the same infrastructure – saving more than a day’s work.

Your technical staff could use that valuable time to deploy additional infrastructure, attend to remote office systems management, perform infrastructure monitoring and maintenance, and assist in issue resolution and customer support. With median times to resolve all helpdesk tickets in the four to nine hour range,^{2,3} the time saved in deploying new infrastructure can mean additional workers available for proactive measures or faster issue response, which enhances customer relationships. The improved IT metrics highlight your organizations competitive advantages.

See [Appendix B](#) for a detailed explanation on how to export capture profiles and import profiles to other Dell PowerEdge M1000e Chassis.

Quick return to service

Returning to service after an outage can be a challenge when replacing servers with new hardware. An administrator would have to remove a functioning server from service to capture the correct configuration settings to use when setting up the replacement hardware. This can lead to downtime and all the associated costs,⁴ especially if the only available source is a sole remaining member of a cluster. Additionally, if the administrator misses a setting, the new hardware configuration will introduce inconsistencies in the environment that could contribute to performance degradation and require additional scheduled downtime to correct.

The Dell Chassis Management Controller server profile capture and replication functions can significantly reduce the challenges associated with replacement hardware configuration. Using the Quick Deploy features to assign a known good profile to a slot lifts the burden of configuration discovery from busy administrators and decreases the

² <http://www.hdiconnect.com/boards/081413/18467.aspx>

³ http://www.thinkhdi.com/~media/HDICorp/Files/Library-Archive/Insider%20Articles/mean-time-to-resolve.pdf?utm_content=091212_IndustryInsider

⁴ www.nasi.com/downtime_cost.php

likelihood of inconsistencies in production environments. The Dell Chassis Management Controller can capture profiles from a server while it remains in service; this eliminates further downtime caused by shutting down that last remaining cluster member simply to capture configuration settings.

WHAT WE TESTED

About the Dell PowerEdge M1000e blade enclosure

The Dell PowerEdge M1000e blade chassis and its supported fabric interconnects are designed for dense computing situations. Features of the PowerEdge M1000e include the following:

- **Management.** Reduces administrative demand using the Dell Chassis Management Controller - secure centralized management interface for the chassis and blades within, using proven Web (SSL-encrypted) and CLI (SSH/Telnet) technologies. The Dell Chassis Management Controller can capture all the settings of a server profile and replicate those settings to other identical servers within the chassis.
- **Flexible I/O.** Six interconnect sockets with the capability to support three fully redundant fabrics, a passive midplane with more than 8 Tbps in I/O bandwidth capacity, and FlexIO support provide a number of connectivity options for your servers.
- **Reliability and efficiency.** Six power supplies and nine fans, all hot-swappable, allowing for no-downtime maintenance of key chassis components. All components are tuned for maximum power efficiency to reduce datacenter power consumption.

For more information about the Dell PowerEdge M1000e Blade Enclosure, visit www.dell.com/us/enterprise/p/poweredge-m1000e/pd.

About the Dell PowerEdge M620 blade server

The Dell PowerEdge M620 has features optimized for performance, density, and energy efficiency.

- **Processors.** The Dell PowerEdge M620 is powered by two Intel® Xeon® E5-2600-series processors, which incorporate the very latest in processor technology from Intel. The powerful processors provide the performance you need for your essential mainstream tasks. The Intel Xeon E5-2600-series processor gives you up to eight cores per processor or up to 16 cores per server.
- **Memory.** The Dell PowerEdge M620 holds up to 768GB DDR3 RAM (up to 1600 MHz) across 24 DIMM slots per server node.

- **Management.** The Dell PowerEdge M620, like all late-model Dell servers, comes with the Dell Lifecycle Controller. This tool simplifies server management by providing a single interface for management functions and by storing critical system information in the system itself. There are no CDs or USB keys to monitor for drivers or firmware.

For full details on the hardware we tested, see [Appendix A](#). For detailed steps on how we tested, both manually and with Dell Chassis Management Controller, see [Appendix B](#). See [Appendix C](#) for details on the specific changes we made to the Dell PowerEdge M620 BIOS, iDRAC, and device settings.

IN CONCLUSION

Implementing and managing large and distributed enterprise solutions presents unique administrative challenges. Anything that can streamline the process to minimize error and save administrator time and effort can have a strong, positive effect on your company's bottom line. We found that the Dell Chassis Management Controller made deploying Dell PowerEdge M620 blades in a Dell PowerEdge M1000e chassis much quicker and easier by allowing you to import existing server profiles in just a few clicks. In our test case to configure for a common mission critical application, Citrix XenDesktop, manually deploying a full 16-blade chassis required 800 steps; but only 59 steps with Dell Chassis Management Controller, transforming a multi-hour task to one that took just minutes. Certain demanding applications can require even greater hardware configuration — these would benefit even more from the “all settings” profile capture and replication features of the Dell Chassis Management Controller.

The ability to pre-provision empty slots and export profiles for redeployment on other chassis further increases the value of the Dell Chassis Management Controller in bigger environments by largely eliminating tedious, redundant tasks and decreasing the opportunities for human error, while freeing administrators to perform other mission-critical or innovative activities. Choosing a solution that automates much of the deployment process is an asset to managing your infrastructure and your business.

APPENDIX A – SYSTEM CONFIGURATION INFORMATION

Figures 2 and 3 provide detailed configuration information for the hardware we used in our tests.

System	Dell PowerEdge M1000e blade enclosure
Power supplies	
Number of power supplies	6
Vendor and model number	Dell E2700P-00
Wattage of each (W)	2,700
Cooling fans	
Total number of fans	9
Vendor and model number	Dell YK776 Rev. X50
Dimensions (h x w) of each	3.1" x 3.5"
Volts	12
Amps	7
Midplane	
Chassis midplane	1.0
Chassis firmware	
Chassis Management Controller firmware	4.45.A00.201307240137
iKVM firmware	01.00.01.01
IOM firmware	12
IOM software	4.2.2.3
I/O modules	
Switch	Dell M8024-k 10GbE
Occupied bay	B1, B2
Management modules	
Chassis Management Controller slot 1	Chassis Management Controller Hardware X28
iKVM slot	Avocent iKVM Switch (OPR005) Hardware X06
Chassis Management Controller slot 2	N/A

Figure 2: Configuration information for the blade enclosure.

System	Dell PowerEdge M620 blade server
General	
Number of processor packages	2
Number of cores per processor	8
Number of hardware threads per core	2
System power management policy	Custom (see Appendix B)
CPU	
Vendor	Intel
Name	Xeon
Model number	E5-2660
Stepping	C2
Socket type	FCLGA2011
Core frequency (GHz)	2.2
Bus frequency (GHz)	8.0
L1 cache	32 KB (per core)
L2 cache	256 KB (per core)
L3 cache	20 MB
Platform	
Vendor and model number	Dell PowerEdge M620
Motherboard model number	0VHRN7A03
BIOS name and version	1.7.6
BIOS settings	Custom (see Appendix B)
Memory module(s)	
Total RAM in system (GB)	256
Vendor and model number	Hynix Semiconductor HMT42GR7MFR4C-PB
Type	PC3-12800
Speed (MHz)	1,600
Speed running in the system (MHz)	1,600
Timing/Latency (tCL-tRCD-tRP-tRASmin)	11-11-11-35
Size (GB)	16
Number of RAM module(s)	16
Chip organization	Double-sided
Rank	Dual
Graphics	
Vendor and model number	Matrox® G200eR2
Graphics memory (MB)	16
RAID controller	
Vendor and model number	Dell PERC H310 Embedded
Firmware version	20.12.0-0004
Cache size (MB)	0
Hard drive	
Vendor and model number	Hitachi HUC151414CSS600
Number of disks in system	2

System	Dell PowerEdge M620 blade server
Size (GB)	147
Buffer size (MB)	64
RPM	15k
Type	SAS 6Gb/s
Ethernet adapters	
Vendor and model number	2 x Broadcom® BCM57810 NetXtreme® II 10 GigE
Type	LOM
Vendor and model number	2 x Broadcom BCM57810 NetXtreme II 10 GigE
Type	Mezzanine - BRCM 10GbE 2P 57810S-k
USB ports	
Number	2 external
Type	2.0
Firmware	
Integrated Dell Remote Access Controller	1.40.40
Broadcom NetXtreme II 10 Gb Ethernet BCM57810	7.6.15
BIOS	1.7.6
Lifecycle Controller, 1.1.5.165, A00	1.1.5.165
Enterprise UEFI Diagnostics	4223A3
OS Drivers Pack	7.3.0.16
System CPLD	1.0.6
PERC H310 Mini	20.12.0-0004
Physical Disk 0:1:0	K516
Physical Disk 0:1:1	K516
BP12G+ 0:1	1

Figure 3: Configuration information for the blade server we used in our tests.

APPENDIX B - HOW WE TESTED

In each section, we show the time it took to complete each set of steps in parentheses at the end of each heading.

Deploying blade servers (manual steps)

Complete steps 1 through 50 below to deploy a blade manually. For a manual chassis deployment, complete these steps 16 times. For deployment with Dell Chassis Management Controller, complete these steps once, and continue to the next section for instructions on how to automate the process for the rest of the chassis.

Configuring single blade hardware and BIOS (6 minutes, 30 seconds)

1. Boot the blade server.
2. Press F2 to enter System Setup.
3. Select System BIOS.
4. Select Processor settings.
5. Set Virtualization Technology: Enabled. Click Back.
6. Select System Profile Settings.
7. Set System Profile: Custom.
8. Set CPU Power Management: Maximum Performance.
9. Set Memory Frequency: Maximum Performance.
10. Set Turbo Boost: Disabled.
11. Set CIE: Disabled.
12. Set C States: Disabled.
13. Set Collaborative CPU Performance Control: Disabled. Click Back.
14. Click Finish. Click Yes to accept changes. Click OK to confirm Success.
15. Select Device Settings.
16. Select Integrated NIC1 Port 1.
17. Set Virtualization Mode: NPAR.
18. Select NIC Partitioning Configuration Menu.
19. Select Partition 1.
20. Set iSCSI Offload Protocol: Disabled. Click Back.
21. Select Partition 2.
22. Set iSCSI Offload Protocol: Disabled. Click Back.
23. Select Partition 3.
24. Set iSCSI Offload Protocol: Disabled. Click Back.
25. Select Partition 4.
26. iSCSI Offload Protocol: Enabled. Click Back.
27. Click Finish. Click Yes to accept changes. Click OK to confirm Success.
28. Select Integrated NIC Port 2.
29. Set Virtualization Mode: NPAR.
30. Select NIC Partitioning Configuration Menu.
31. Select Partition 1.
32. Set iSCSI Offload Protocol: Disabled. Click Back.
33. Select Partition 2.
34. Set iSCSI Offload Protocol: Disabled. Click Back.
35. Select Partition 3.
36. Set iSCSI Offload Protocol: Disabled. Click Back.
37. Select Partition 4.

38. Set iSCSI Offload Protocol: Enabled. Click Back.
39. Click Finish. Click Yes to accept changes. Click OK to confirm Success.
40. Click Finish.
41. Select iDRAC Settings.
42. Select Network.
43. Set Enable IPMI over LAN: Enabled. Click Back.
44. Select Alerts.
45. Select Trap Settings.
46. Set IPv4 Destination List: Enabled.
47. Set Destination 1: 192.168.0.20.
48. Set Community String: <environment specific>. Click Back.
49. Click Finish. Click Yes to accept changes. Click OK to confirm Success.
50. Click Finish. Click Yes to confirm exit and reboot.

Using Dell Chassis Management Controller to automate the process for a full chassis

Capturing a server profile (44 seconds)

1. Under Server Profiles, check the box beside the slot number containing the server profile to capture.
2. Click Save Profile.
3. In the Profiles on SD Card section, enter the name for the profile.
4. Click Save Profile. Upon completion, the profile will appear and is exportable.

Deploying a saved profile to an existing chassis blade (44 seconds)

1. Under Server Profiles, check the boxes for the slots containing the target servers.
2. In the pull-down menu, choose the profile to deploy.
3. Click Apply Profile.
4. Click OK to confirm server reboot and apply profile.
5. Click OK to confirm Operation Successful. Information is sent to Lifecycle Controller of target server.

Exporting and importing profiles to another chassis

Exporting a captured profile (5 seconds)

1. Under Profiles on SD Card, select the profile to export.
2. Click Export Profile.
3. Select Save File, and click OK. The file is downloaded to your local workstation, and saved in the default folder for downloads.

Importing a saved profile (18 seconds)

1. Under Profiles on SD Card, click Import Profile.
2. Under Import server Profile, click Browse to locate the <filename>.xml profile you wish to import.
3. Click Import Profile.
4. Click OK to confirm Operation Successful. The profile will appear under Profiles on SD Card.

APPENDIX C – CONFIGURATION SETTINGS

Best Practice Guide	Dell PowerEdge M620 setting
BIOS	
Turbo Boost: Disabled	Turbo Boost: Disabled
Enhanced Intel Speedstep: Disabled	Collaborative CPU Performance Control: Disabled
Processor C State: Disabled	C States: Disabled
Processor C3, C6, and C7 report: Disabled	CIE: Disabled
CPU Performance: enterprise	System Profile: Custom CPU Power Management: Maximum Performance
Advanced->Intel Directed I/O->VT for Director IO: Enabled	Virtualization Technology: Enabled
Advanced-> RAS Memory->Memory RAS Config : Maximum Performance	Memory Frequency: Maximum Performance
NUMA: Enabled	N/A
NIC traffic isolation	
	Integrated NIC 1 Port 1 Virtualization Mode: NPAR
MGMT	Partition 1->iSCSI Offload Protocol: Disabled
VM_DATA	Partition 2->iSCSI Offload Protocol: Disabled
VM_MOTION	Partition 3->iSCSI Offload Protocol: Disabled
IP_STORAGE	Partition 4->iSCSI Offload Protocol: Enabled
	Integrated NIC1 Port 2
MGMT	Partition 1->iSCSI Offload Protocol: Disabled
VM_DATA	Partition 2->iSCSI Offload Protocol: Disabled
VM_MOTION	Partition 3->iSCSI Offload Protocol: Disabled
IP_STORAGE	Partition 4->iSCSI Offload Protocol: Enabled
iDRAC	
	Enable IPMI over LAN: Enabled
	Alerts->Trap Settings IPv4 Destination List: Enabled Destination 1: 192.168.0.20 Community String: public

Figure 4: Blade configuration modifications.

ABOUT PRINCIPLED TECHNOLOGIES



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