

Faster, more efficient implementation with Dell™ ProDeploy

91% less admin effort*

39% faster to deploy

Reduced planning time

Ensured best practices

*compared to our in-house administrator

Deploying new solutions is a complicated endeavor that takes significant time and attention to detail. We found that installing new Dell hardware in the Principled Technologies datacenter was fast and efficient with help from Dell ProDeploy. A ProDeploy Engineer from Dell deployed a Dell solution consisting of servers, networking components, and storage arrays onsite over three business days in approximately 20 hours and thirty minutes. Our in-house administrator needed more than 28 hours over five business days to deploy the same solution. That means ProDeploy was 39 percent faster—saving almost a full business day.

There are two key ways to view this saved time. First, having a ProDeploy Engineer from Dell deploy the new solution meant our in-house administrator could continue focusing on crucial strategic initiatives such as development and planning of new applications, instead of bouncing between tasks, which could introduce errors or delays in deploying the new solution and leave end users without timely assistance. Our in-house administrator's level of involvement in the deployment dropped from over 28 hours to just two-and-a-half hours of planning.

Second, this can be great for businesses that want to deploy new Dell hardware because it eases the burden on internal administrators and speeds up the delivery of new services. Faster deployment means less time spent waiting for new hardware to improve datacenter functionality or increase capacity. Instead of trying to do everything in-house, ProDeploy gives your business a faster and more efficient alternative.



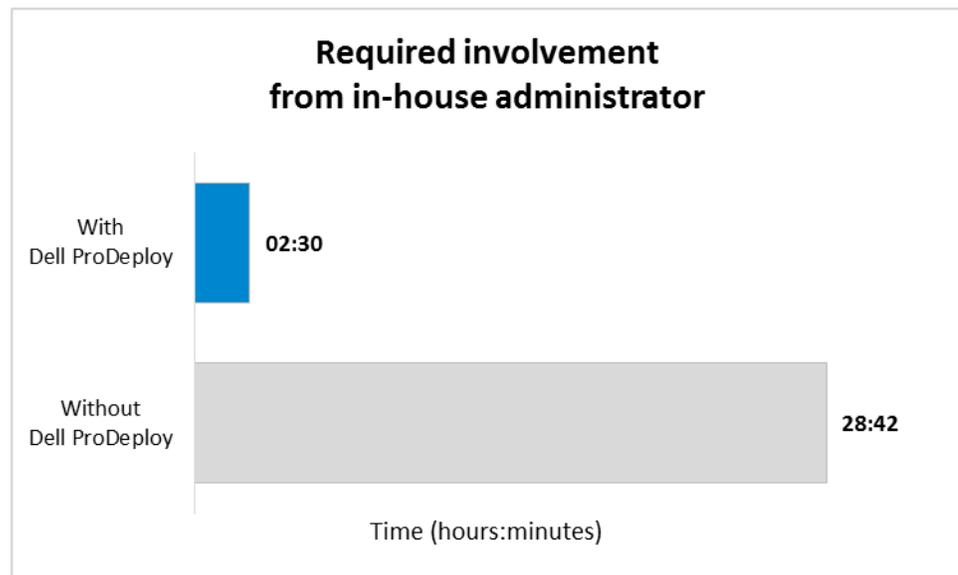
CONSULTATION AND PLANNING WITH DELL

A business has two options when implementing a new Dell hardware solution: The business could choose to plan the deployment, or choose to use Dell ProDeploy instead. With ProDeploy, a system administrator would plan the deployment with Dell after assigning a project manager to the new hardware order. With Dell's help, a company could develop a strict roadmap toward successful deployment, including the arrival of the Dell ProDeploy Engineer. To learn more about ProDeploy, see [Appendix A](#).

Being unprepared for deployment can lead to a number of complications, including delays due to waiting on forgotten components, miscalculations in required time, or improper installation and configuration. We tested both deployment options by having an in-house administrator deploy a new hardware solution while a ProDeploy Engineer from Dell also deployed the same solution separately.

Figure 1 shows how much time was required from our in-house administrator with and without ProDeploy—a difference of over 26 hours. Based on our findings, choosing to deploy with ProDeploy could reduce a system administrator's involvement in the deployment by 91 percent.

Figure 1: Deploying the Dell solution with Dell ProDeploy reduced our in-house administrator's involvement by 91.3 percent. Lower numbers are better.



Our in-house administrator and the ProDeploy Engineer set up the solution in Figure 2. For detailed configuration information for the Dell PowerEdge™ R720 servers, see [Appendix B](#).

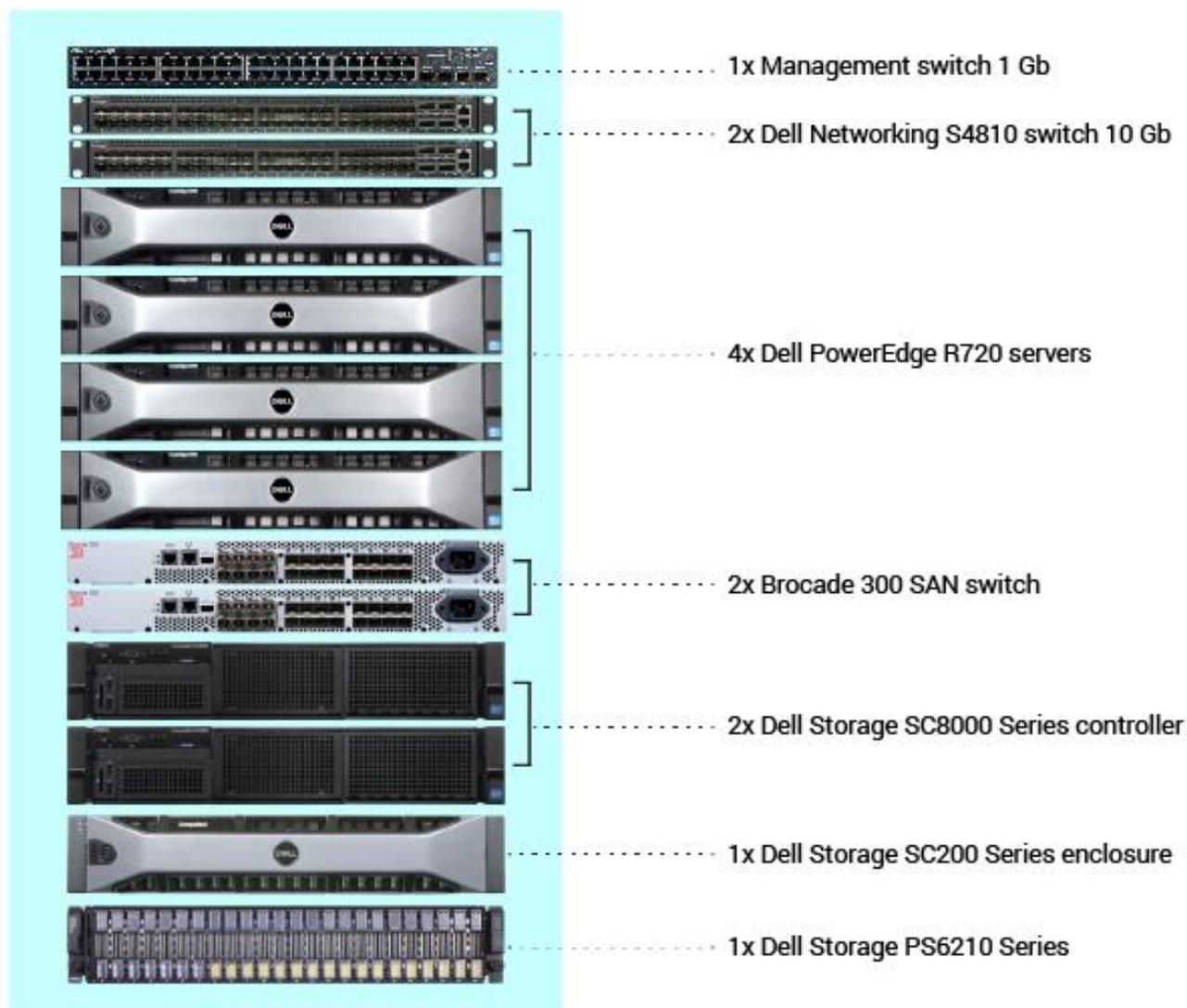


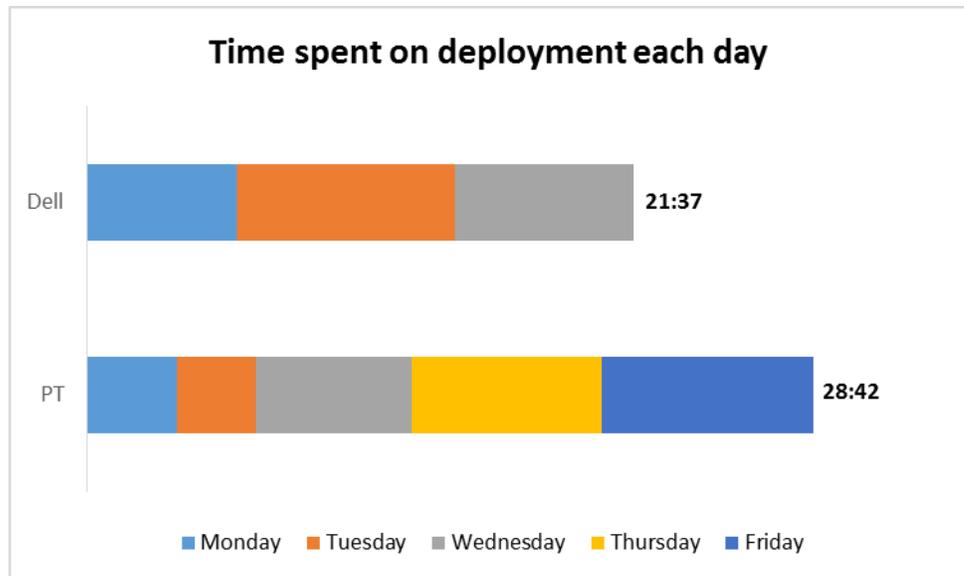
Figure 2: The solution our administrator and the Dell ProDeploy Engineer deployed.

HOW WAS YOUR WEEK?

Over the course of three business days, Dell spent 21 hours and 37 minutes physically deploying the hardware and software. We spent two and a half hours planning for the deployment with Dell before the Dell ProDeploy Engineer arrived to our datacenter. Those two and a half hours completed our involvement in the planning process with Dell ProDeploy; we were not required for any further planning.

Without ProDeploy, we spent 28 hours and 42 minutes deploying the solution over the course of five business days. This time includes our planning. Figure 3 breaks down the business week.

Figure 3: Deploying the Dell solution with Dell ProDeploy was 39 percent faster and took two fewer business days than deploying the solution without it. Lower numbers are better.



Racking the hardware with ProDeploy was 38 percent faster and saved 11 minutes compared to the time it took our in-house administrator without ProDeploy (29 for Dell versus 40 minutes for us). Wiring the solution with ProDeploy saved 19 minutes than without it. Setting up the networking components with Dell saved nearly two hours and was 64 percent faster. Configuring the network took longer for our in-house administrator because he was unfamiliar with the technology and needed to rely on appropriate documentation for careful guidance. Configuring the Dell Storage PS Series array saved 32 minutes and was 53 percent faster.

Planning for the solution with ProDeploy saved a sizable chunk of time, nearly seven and a half hours—that’s nearly 300 percent faster. The advantage with ProDeploy was due to a pre-visit planning session and the ProDeploy Engineer’s familiarity with the Dell solution components.

Figure 4 breaks down the total time spent on each stage of deployment. We based our “percent faster” calculations on the assumption that a one-hour rate of completion is two hundred percent faster than a three-hour rate of completion.

Stage	In-house administrator	Dell ProDeploy	Dell ProDeploy percent faster
Planning	9:55	2:30	297%
Racking hardware	0:40	0:29	38%
Wiring	2:20	2:01	16%
Networking	4:30	2:45	64%
OS & firmware	6:55	9:47	
Dell Storage SC Series configuration	2:35	2:00	29%
Dell Storage PS Series configuration	1:32	1:00	53%
Time spent deploying the Dell solution	28:27	20:32	39%

Figure 4: The time it took our administrator without Dell ProDeploy and the Dell ProDeploy Engineer to complete each stage of deployment.

Monday

Figure 5 shows how our administrator, without using Dell ProDeploy, and the Dell ProDeploy Engineer spent their time on the first day. Without ProDeploy, we spent the first few hours confirming implementation details with the project manager. It took the Dell ProDeploy Engineer less time to rack and wire the solution than we spent in this day's planning sessions.

Stage	In-house administrator	Dell ProDeploy
Monday		
Planning	2:55	(2:30 – before visit)
Racking hardware	0:40	0:29
Wiring		2:01
Networking		0:15
OS & firmware		2:27
Dell Storage SC Series configuration		0:45
Time spent deploying the Dell solution	3:35	5:57

Figure 5: How our administrator without Dell ProDeploy and the Dell ProDeploy Engineer spent their time (in hours and minutes) on the first day.

Tuesday

Figure 6 shows how our administrator without Dell ProDeploy and the Dell ProDeploy Engineer spent their time on the second day. We had to spend time with administrative and routine tasks that needed immediate attention. The ProDeploy Engineer, however, was able to focus on the deployment.

Stage	In-house administrator	Dell ProDeploy
Tuesday		
Planning	0:30	
Wiring	2:20	
Networking	0:15	2:30
OS & firmware		3:50
Dell Storage SC Series configuration		1:15
Dell Storage PS Series configuration		1:00
Time spent deploying the Dell solution	3:05	8:35

Figure 6: How our administrator without Dell ProDeploy and the Dell ProDeploy Engineer spent their time (in hours and minutes) on the second day.

Wednesday

Figure 7 shows how our administrator and the Dell ProDeploy Engineer spent their time on the third day. Our administrator spent three hours and 45 minutes on the networking; the ProDeploy Engineer spent three hours and 15 minutes installing the OSs and updating the firmware.

Stage	In-house administrator	Dell ProDeploy
Wednesday		
Planning	0:30	
Networking	3:45	
OS & firmware	1:55	3:30
Time spent deploying the Dell solution	6:10	3:30

Figure 7: How our administrator without Dell ProDeploy and the Dell ProDeploy Engineer spent their time (in hours and minutes) on the third day.

The next two days...

It took our in-house administrator two more days to finish deploying the new hardware from Dell. That's five business days total, compared to the three business days it took the Dell ProDeploy Engineer. A company could have had the new hardware up and running two days earlier by using Dell ProDeploy.-Figure 8 shows how our administrator spent his time on the deployment for the next two days without Dell ProDeploy.

Stage	In-house administrator	Dell ProDeploy
Thursday		
Planning	2:30	
OS & firmware	5:00	
Time spent deploying the Dell solution	7:30	
Friday		
Planning	3:30	
Networking	0:30	
Dell Storage SC Series configuration	2:35	
Dell Storage PS Series configuration	1:32	
Time spent deploying the Dell solution	8:07	

Figure 8: How our administrator, without using Dell ProDeploy, spent his time over the next two days.

VALUABLE POST-DEPLOYMENT CARE FROM DELL

After the solution was up and running, our in-house administrator and the Dell ProDeploy Engineer initiated post-deployment services. These were mostly checks and balances to ensure things were running smoothly. However, the ProDeploy Engineer took some extra time to do things beyond mere deployment. In addition to collecting environment configuration across all the platforms, he performed a final health check, installed SAN HQ software, validated that all configuration best practices were implemented, and completed any remaining documentation.

CONCLUSION

Choosing Dell ProDeploy to deploy new Dell hardware means your business won't have to rely on an administrator's skillset and knowledge to get through a new deployment, or tie up too much of an administrator's time.

In our datacenter:

- Deploying a Dell solution with ProDeploy reduced our in-house administrator's involvement with the project by 91 percent
- The Dell ProDeploy Engineer needed only about 21 hours over three business days to deploy our Dell solution
- Without ProDeploy, it took more than 28 hours over five business days for our in-house administrator
- ProDeploy deployed the Dell solution 39 percent faster, saving six hours and forty minutes, and allowed our in-house administrator to focus on organizational demands and other strategic initiatives
- Familiarity with the solution components allowed the Dell ProDeploy Engineer to complete tasks, such as configuring the network, faster than our in-house administrator who sometimes needed documentation and guidance from the project manager

With ProDeploy, your organization can realize a faster, more efficient implementation with minimal impact on your in-house staff.

APPENDIX A – ABOUT THE COMPONENTS

About Dell ProDeploy

According to Dell, “Dell ProDeploy Enterprise Suite helps you get more out of technology starting on day one. Trust Dell experts to lead deployments from basic hardware installations through planning, configuration and complex integrations. [Their] complete suite of deployment services and professional certifications helps you achieve business outcomes today and tomorrow.

The ProDeploy Enterprise Suite includes:

- **ProDeploy Plus**, the most complete deployment offer available in the market, includes expert installation, configuration, and integration services. Integrate new technology into existing environments with confidence through extensive planning and validation by expert engineers. Post-deployment configuration assistance, full project documentation with knowledge transfer, and flexible training credits improve technology adoption and optimize the long-term performance of mission-critical systems.
- **ProDeploy** combines installation and configuration by experienced certified engineers to get your data center up and running quickly, minimizing downtime and disruption. With Dell driving deployments, you are free to focus on what matters most.
- **Basic Deployment** provides worry-free hardware installations by experienced technicians who do deployments every day.
- **Deployment Training and Certification** is designed for individuals to gain greater deployment expertise and industry recognition through training and testing. As a Dell Certified Deployment Professional, you can advance your career and expand your knowledge with deployment training and certification to improve job opportunities and validate your skillset.”

Learn more at www.dell.com/prodeploy.

APPENDIX B – SYSTEM CONFIGURATION INFORMATION

Figure 9 provides detailed configuration information for the test systems.

	Dell PowerEdge R720 (four)
Power supplies	
Total number	2
Vendor and model number	Dell D750E-S1
Wattage of each (W)	750
Cooling fans	
Total number	6
Vendor and model number	San Ace® 60 9GA0612P1K641
Dimensions (h × w) of each	2.5" × 2.5"
Volts	12
Amps	0.95
General	
Number of processor packages	2
Number of cores per processor	8
Number of hardware threads per core	2
System power management policy	Balanced
CPU	
Vendor	Intel®
Name	Xeon®
Model number	E5-2640 v2
Stepping	M1
Socket type	LGA2011
Core frequency (GHz)	2.00
Bus frequency	7.2 GT/s
L1 cache	32 KB + 32 KB (per core)
L2 cache	256 KB (per core)
L3 cache (MB)	20
Platform	
Vendor and model number	Dell PowerEdge R720
BIOS name and version	Dell 2.5.2
BIOS settings	Default
Memory module(s)	
Total RAM in system (GB)	144
Vendor and model number	Hynix HMT41GR7AFR4A-PB
Type	PC3-12800R
Speed (MHz)	1,600
Speed running in the system (MHz)	1,333
Timing/Latency (tCL-tRCD-tRP-tRASmin)	11-11-11-35
Size (GB)	8
Number of RAM module(s)	8
Chip organization	Double-sided

Dell PowerEdge R720 (four)	
Rank	1
Operating system	
Name	VMware® vSphere® 5.5
Build number	2068190
Language	English
Graphics	
Vendor and model number	Matrox® G200e
Graphics memory (MB)	256
Disk controller	
Type	PERC H710P Mini Mono
Firmware version	21.3.1-0004
Cache size (MB)	1024
Hard drives	
First Disk	
Vendor and model number	Dell ST9300653SS
Number of drives	3
Size (GB)	300
RPM	15k
Type	SAS 6.0
Second Disk	
Vendor and model number	Dell ST91000640SS
Number of drives	13
Size (GB)	1,000
RPM	7,200
Type	SAS 6.0
Ethernet adapters	
First network adapter	
Vendor and model number	Intel 10G Dual Port Ethernet Controller X520/I350
Type	Integrated
Second network adapter	
Vendor and model number	Intel Dual Port Ethernet Controller X520/I350
Type	PCIe®

Figure 9: Detailed configuration information for our servers.

APPENDIX C – HOW WE TESTED

Configuring the networking components

See Appendices D, E, and F for the Dell PowerConnect™ 5448, Dell Networking S4810, and Brocade 300 switch configurations.

Configuring the Dell Networking S4810

We configured the two Dell Networking switches to serve as the backbone of the test environment.

1. Enable stacking between the two switches.
2. Configure management IP, DNS, and NTP server IP addresses.
3. Set MTU to 12,000.
4. Configure VLANs to allow traffic for iSCSI, vMotion®, VM traffic, and management.

For further details, see [Appendix E](#).

Configuring the Brocade 300

We configured the two Brocade switches to transport the Fibre Channel data for the test environment.

1. Assign management IP, DNS, and NTP server addresses.
2. Configure Fibre Channel zone parameters as indicated in the following diagrams.

Dell Storage SC8000 / Dell Storage SC200

Label the equipment using the labels provided in Figure 10.

	Port	Connection to	Zones	Fault Domain	Purpose
R720 A					
	FC1	Brocade A/0	Zone1A		
	FC2	Brocade B/0	Zone1B		
	10Gb 1	Force10 A/1			
	10Gb 2	Force10 B/1			
	NIC 4	PowerConnect			
	iDRAC	PowerConnect			
R720 B					
	FC1	Brocade A/1	Zone2A		
	FC2	Brocade B/1	Zone2B		
	10Gb 1	Force10 A/17			
	10Gb 2	Force10 B/17			
	NIC 4	PowerConnect			
	iDRAC	PowerConnect			
R720 C					
	FC1	Brocade A/2	Zone3A		
	FC2	Brocade B/2	Zone3B		
	10Gb 1	Force10 A/25			
	10Gb 2	Force10 B/25			
	NIC 4	PowerConnect			
	iDRAC	PowerConnect			
R720 D					
	FC1	Brocade A/3	Zone4A		
	FC2	Brocade B/3	Zone4B		
	10Gb 1	Force10 A/37			
	10Gb 2	Force10 B/37			
	NIC 4	PowerConnect			
	iDRAC	PowerConnect			
SC8000 A					
	FC 1	Brocade A/4	All A zones	A	Front End
	FC 2	Brocade A/5	All A zones	A	Front End
	FC 3	Brocade B/4	All B zones	B	Front End
	FC 4	Brocade B/5	All B zones	B	Front End
	SAS 1	SC200/EMM 1A			Back End
	SAS 2	SC8000 #2/SAS 4			Unknown (IPC)
	SAS 3	SC200/EMM 2B			Back End
	SAS 4	SC8000 #2/SAS 2			Unknown (IPC)
	eth0	PowerConnect			
	eth1	SC8000 B eth1			10Gb IPC
SC8000 B					
	FC 1	Brocade A/6	All A zones	A	Front End
	FC 2	Brocade A/7	All A zones	A	Front End
	FC 3	Brocade B/6	All B zones	B	Front End
	FC 4	Brocade B/7	All B zones	B	Front End

	SAS 1	SC200/EMM 2A			Back End
	SAS 2	SC8000 #1/SAS 4			Unknown (IPC)
	SAS 3	SC200/EMM 1B			Back End
	SAS 4	SC8000 #1/SAS 2			Unknown (IPC)
	eth0	PowerConnect			
	eth1	SC8000 A/eth1			10Gb IPC
S4810 A					
	43	S4810 B/43			
	47	S4810 B/47			
S4810 B					
	43	S4810 A/43			
	47	S4810 A/47			
5448					
	1	Trunk to private network			

Figure 10: Equipment labels.

I/O cards did not need to be installed; they were already in the controllers.

1. Power on the SC200.
2. Power on both SC8000 controllers.
3. Create zones in Brocade 300 as follows:
 - All Dell Storage endpoints under alias Compellent
 - Each R720 has a WWN initiator alias containing both FC ports
 - Each zone has one R720 initiator alias and the Compellent alias

Reset the license information and configuration

1. Connect at 115,200, 8,N,1 via serial cable.
2. On the first controller, enter:

```
shellaccess developer
platform init hsn set [lower HSN provided by vendor]
platform init ssn set [lower SSN provided by vendor]
cs purge all
-reset
```
3. Repeat the procedure on the second controller:

```
shellaccess developer
platform init hsn set [higher HSN provided by vendor]
platform init ssn set [higher SSN provided by vendor]
cs purge all
-reset
```
4. Wait for both controllers to restart and display Finish at the end of the process.

Configure the management IP addresses

1. On the both controllers, enter:

```
controller ipconfig eth0 [IP address] [netmask] [gateway]
controller dnsserver [Primary DNS server IP] [Secondary DNS server IP]
controller domainname [local domain name]
```
2. Type `controller show` and confirm changes.

Configure the iDRAC interface

On both controllers, type:

```
platform bmc set ip [IP address]
platform bmc set netmask [netmask]
platform bmc set gateway [gateway]
```

Configure the SC8000 stack via Web UI

1. Type `controller show`
2. Confirm that the version is greater than 6.2.1 for compatibility with the SC200 enclosure.
3. Open a web browser to the IP address of the first controller.
4. Enter the default username and password:
 - User: Admin (Case-sensitive)
 - Password: mmm (Case-sensitive)
5. Click Login.
6. Enter the Customer Name and Title.
7. Accept the license agreement.
8. Browse to the supplied license file, and click Load License.
9. Click Continue.
10. On the Create a Disk Folder screen, ensure all boxes are checked to include all drives in the configuration, and click Continue.
11. Select the first disk in the list as a hot spare, and click Continue.
12. On the IPv6 Address Configuration page, click Continue Setup.
13. Click Add Controller.
14. Enter the IP addresses for the secondary controller, and click Continue.
15. A summary page will be displayed. Click Join Now.
16. Configure the time settings for Storage Center; enter the Region, Time Zone, and NTP server. Click Continue.
17. Enter the System Name and management IP address for Storage Center.
18. Leave the Write and Read caches enabled, and click Continue.
19. On the Configure SMTP screen, click Continue to bypass configuration for this test.
20. Select the Download software updates and automatically notify me option, and click Continue.
21. Leave the session timeout value at 2 hours, and click Continue.
22. Select Virtual Port Mode for future flexibility, and click Continue.
23. Click Configure Local Ports.
24. Create two Fault Domains, DomainA and DomainB.
25. Assign the ports as shown in Figure 10.
26. Click Assign Now when each section is complete.
27. On the Generate Certificate dialog, click Generate.
28. Make any changes necessary to the IP address and hostname field, and click Generate Now.
29. The session will be disconnected. Reconnect, confirm any security warnings, and log in.
30. Select Storage Management → System → Update → Check for update.
31. Install any updates and reboot the system if necessary.

Configure ESX servers in Storage Center

1. Right-click on the Servers node, and select Create Server Folder.
2. Name the folder `ESX Clusters`, and click Create Now.
3. Right-click on the ESX Clusters folder, and select Create Server.
4. Select the detected HBAs from the first ESX server.
5. Click Continue.
6. Name the server, select the operating system, and place it within the ESX Clusters folder. Click Continue.
7. On the summary page, click Create Now.
8. Repeat steps 3 through 7 for the other three ESX hosts.

9. Right-click on the ESX Clusters folder, and select Create Server Cluster.
10. Select the four ESX servers you previously created, and click Continue.
11. Select the ESX Clusters folder, and click Continue.
12. On the summary page, click Create Now.

Configure VMware vCenter

1. Right-click on the Datacenter node in the vSphere tree, and click New Cluster.
2. Name the cluster, and enable vSphere HA and vSphere DRS. Click Next.
3. Leave the cluster settings at their defaults, and click Next through each dialog.
4. Click Finish to create the cluster.
5. Add the four ESXi™ 5.5 hosts to the cluster by drag-and-drop, and accept any prompts.
6. On one host:
 - a. Go to Configuration → Storage Adapters, and click Rescan All.
 - b. Go to Configuration → Storage, and click Add Storage.
 - c. Select Disk/LUN, and click Next.
 - d. Select the LUN to connect, and click Next.
 - e. Select VMFS-5, and click Next.
 - f. Review the summary, and click Next.
 - g. Name the datastore, and click Next.
 - h. Select Maximum available space, and click Next.
 - i. Click Finish.
 - j. Repeat this for any additional storage available.
7. On each host, in Configuration → Storage:
 - a. Select the new storage volume(s), and click Properties.
 - b. Click Manage Paths...
 - c. Change Path Selection to Round Robin (VMware).
 - d. Click Change, and then click Close.
 - e. Repeat this for all Datastores on all hosts.
8. Open Inventory → Datastores and Datastore Clusters.
9. Right-click the datacenter name, and select New Datastore Cluster.
10. Name the datastore cluster, ensure Storage DRS is enabled, and click Next.
11. Select Fully Automated, and click Next.
12. Click Next.
13. Check the box next to the cluster the datastore cluster should attach to, and click Next.
14. Select the datastores previously created to add to the Datastore Cluster, and click Next.
15. Click Finish.

APPENDIX D – POWERCONNECT 5448 MANAGEMENT SWITCH CONFIGURATION

```
interface range ethernet g(1,45-48)
switchport mode trunk
exit
vlan database
vlan 10,128,142
exit
interface range ethernet g(1,45-48)
switchport trunk allowed vlan add 10
exit
interface range ethernet g(1,45-48)
switchport trunk allowed vlan add 128
exit
interface range ethernet g(2-10,13-44)
switchport access vlan 142
exit
interface range ethernet g(1,45-48)
switchport trunk allowed vlan add 142
exit
voice vlan oui-table add 0001e3 Siemens_AG_phone_____
voice vlan oui-table add 00036b Cisco_phone_____
voice vlan oui-table add 00096e Avaya_____
voice vlan oui-table add 000fe2 H3C_Aolynk_____
voice vlan oui-table add 0060b9 Philips_and_NEC_AG_phone_____
voice vlan oui-table add 00d01e Pingtel_phone_____
voice vlan oui-table add 00e075 Polycom/Veritel_phone____
voice vlan oui-table add 00e0bb 3Com_phone_____
interface range ethernet g(45-48)
no negotiation
exit
iscsi target port 860 address 0.0.0.0
iscsi target port 3260 address 0.0.0.0
iscsi target port 9876 address 0.0.0.0
iscsi target port 20002 address 0.0.0.0
iscsi target port 20003 address 0.0.0.0
iscsi target port 25555 address 0.0.0.0
interface vlan 142
ip address 10.142.0.5 255.255.0.0
exit
interface vlan 1
ip address dhcp
exit
hostname 5448
username admin password 2ac9cb7dc02b3c0083eb70898e549b63 level 15 encrypted
snmp-server community Dell_Network_Manager rw view DefaultSuper
clock timezone -5
ntp client enable vlan 1
ntp client enable vlan 10
clock source sntp
```

```
sntp client poll timer 60
sntp server 10.41.0.5
ip name-server 10.128.0.10 10.41.0.10
```

```
Default settings:
Service tag: 8KBS7F1
```

```
SW version 2.0.0.46 (date 14-Apr-2011 time 13:10:53)
```

```
Gigabit Ethernet Ports
```

```
=====
```

```
no shutdown
speed 1000
duplex full
negotiation
flow-control off
mdix auto
no back-pressure
```

```
interface vlan 1
interface port-channel 1 - 8
```

```
spanning-tree
spanning-tree mode STP
```

```
qos basic
qos trust cos
```

APPENDIX E – DELL NETWORKING S4810 STACK CONFIGURATION

```
Current Configuration ...
! Version 9.6(0.0)
! Last configuration change by admin
! Startup-config last updated by admin
!
boot system stack-unit 0 primary system: A:
boot system stack-unit 0 secondary system: B:
boot system stack-unit 0 default system: A:
boot system stack-unit 1 primary system: B:
!
redundancy auto-synchronize full
!
hardware watchdog
!
hostname s4810-a
!
enable password 7 XXXXXXXX
!
username admin password 7 XXXXXXXX
!
stack-unit 0 provision S4810
!
stack-unit 0 stack-group 10
!
stack-unit 0 stack-group 11
!
interface TenGigabitEthernet 0/0
  no ip address
  mtu 12000
  switchport
  no shutdown
!
interface TenGigabitEthernet 0/1
  no ip address
  mtu 12000
  switchport
  no shutdown
!
interface TenGigabitEthernet 0/2
  no ip address
  mtu 12000
  switchport
  no shutdown
!
interface TenGigabitEthernet 0/3
  no ip address
  mtu 12000
  switchport
  no shutdown
```

```
!  
interface TenGigabitEthernet 0/4  
  no ip address  
  mtu 12000  
  switchport  
  no shutdown  
!  
interface TenGigabitEthernet 0/5  
  no ip address  
  mtu 12000  
  switchport  
  no shutdown  
!  
interface TenGigabitEthernet 0/6  
  no ip address  
  mtu 12000  
  switchport  
  no shutdown  
!  
interface TenGigabitEthernet 0/7  
  no ip address  
  mtu 12000  
  switchport  
  no shutdown  
!  
interface TenGigabitEthernet 0/8  
  no ip address  
  mtu 12000  
  switchport  
  no shutdown  
!  
interface TenGigabitEthernet 0/9  
  no ip address  
  mtu 12000  
  switchport  
  no shutdown  
!  
interface TenGigabitEthernet 0/10  
  no ip address  
  mtu 12000  
  switchport  
  no shutdown  
!  
interface TenGigabitEthernet 0/11  
  no ip address  
  mtu 12000  
  switchport  
  no shutdown  
!  
interface TenGigabitEthernet 0/12  
  no ip address  
  mtu 12000
```

```
switchport
no shutdown
!
interface TenGigabitEthernet 0/13
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 0/14
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 0/15
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 0/16
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 0/17
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 0/18
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 0/19
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 0/20
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 0/21
```

```
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 0/22
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 0/23
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 0/24
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 0/25
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 0/26
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 0/27
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 0/28
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 0/29
no ip address
mtu 12000
switchport
no shutdown
```

```
!  
interface TenGigabitEthernet 0/30  
  no ip address  
  mtu 12000  
  switchport  
  no shutdown  
!  
interface TenGigabitEthernet 0/31  
  no ip address  
  mtu 12000  
  switchport  
  no shutdown  
!  
interface TenGigabitEthernet 0/32  
  no ip address  
  mtu 12000  
  switchport  
  no shutdown  
!  
interface TenGigabitEthernet 0/33  
  no ip address  
  mtu 12000  
  switchport  
  no shutdown  
!  
interface TenGigabitEthernet 0/34  
  no ip address  
  mtu 12000  
  switchport  
  no shutdown  
!  
interface TenGigabitEthernet 0/35  
  no ip address  
  mtu 12000  
  switchport  
  no shutdown  
!  
interface TenGigabitEthernet 0/36  
  no ip address  
  mtu 12000  
  switchport  
  no shutdown  
!  
interface TenGigabitEthernet 0/37  
  no ip address  
  mtu 12000  
  switchport  
  no shutdown  
!  
interface TenGigabitEthernet 0/38  
  no ip address  
  mtu 12000
```

```
switchport
no shutdown
!
interface TenGigabitEthernet 0/39
no ip address
mtu 9216
switchport
speed 1000
no shutdown
!
interface fortyGigE 0/48
no ip address
shutdown
!
interface fortyGigE 0/52
no ip address
shutdown
!
interface fortyGigE 0/56
no ip address
shutdown
!
interface fortyGigE 0/60
no ip address
shutdown
!
stack-unit 1 provision S4810
!
stack-unit 1 stack-group 10
!
stack-unit 1 stack-group 11
!
interface TenGigabitEthernet 1/0
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 1/1
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 1/2
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 1/3
no ip address
```

```
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 1/4
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 1/5
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 1/6
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 1/7
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 1/8
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 1/9
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 1/10
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 1/11
no ip address
mtu 12000
switchport
no shutdown
!
```

```
interface TenGigabitEthernet 1/12
  no ip address
  mtu 12000
  switchport
  no shutdown
!
interface TenGigabitEthernet 1/13
  no ip address
  mtu 12000
  switchport
  no shutdown
!
interface TenGigabitEthernet 1/14
  no ip address
  mtu 12000
  switchport
  no shutdown
!
interface TenGigabitEthernet 1/15
  no ip address
  mtu 12000
  switchport
  no shutdown
!
interface TenGigabitEthernet 1/16
  no ip address
  mtu 12000
  switchport
  no shutdown
!
interface TenGigabitEthernet 1/17
  no ip address
  mtu 12000
  switchport
  no shutdown
!
interface TenGigabitEthernet 1/18
  no ip address
  mtu 12000
  switchport
  no shutdown
!
interface TenGigabitEthernet 1/19
  no ip address
  mtu 12000
  switchport
  no shutdown
!
interface TenGigabitEthernet 1/20
  no ip address
  mtu 12000
  switchport
```

```
no shutdown
!  
interface TenGigabitEthernet 1/21  
no ip address  
mtu 12000  
switchport  
no shutdown  
  
!  
interface TenGigabitEthernet 1/22  
no ip address  
mtu 12000  
switchport  
no shutdown  
  
!  
interface TenGigabitEthernet 1/23  
no ip address  
mtu 12000  
switchport  
no shutdown  
  
!  
interface TenGigabitEthernet 1/24  
no ip address  
mtu 12000  
switchport  
no shutdown  
  
!  
interface TenGigabitEthernet 1/25  
no ip address  
mtu 12000  
switchport  
no shutdown  
  
!  
interface TenGigabitEthernet 1/26  
no ip address  
mtu 12000  
switchport  
no shutdown  
  
!  
interface TenGigabitEthernet 1/27  
no ip address  
mtu 12000  
switchport  
no shutdown  
  
!  
interface TenGigabitEthernet 1/28  
no ip address  
mtu 12000  
switchport  
no shutdown  
  
!  
interface TenGigabitEthernet 1/29  
no ip address
```

```
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 1/30
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 1/31
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 1/32
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 1/33
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 1/34
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 1/35
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 1/36
no ip address
mtu 12000
switchport
no shutdown
!
interface TenGigabitEthernet 1/37
no ip address
mtu 12000
switchport
no shutdown
!
```

```
interface TenGigabitEthernet 1/38
  no ip address
  mtu 12000
  switchport
  no shutdown
!
interface TenGigabitEthernet 1/39
  no ip address
  mtu 12000
  switchport
  speed 1000
  no shutdown
!
interface fortyGigE 1/48
  no ip address
  shutdown
!
interface fortyGigE 1/52
  no ip address
  shutdown
!
interface fortyGigE 1/56
  no ip address
  shutdown
!
interface fortyGigE 1/60
  no ip address
  shutdown
!
interface ManagementEthernet 0/0
  ip address 10.142.0.6/16
  no shutdown
!
interface ManagementEthernet 1/0
  ip address 10.142.0.7/16
  no shutdown
!
interface ManagementEthernet 2/0
  no shutdown
!
interface ManagementEthernet 3/0
  no shutdown
!
interface ManagementEthernet 4/0
  no shutdown
!
interface ManagementEthernet 5/0
  no shutdown
!
interface ManagementEthernet 6/0
  no shutdown
!
```

```
interface ManagementEthernet 7/0
  no shutdown
!
interface ManagementEthernet 8/0
  no shutdown
!
interface ManagementEthernet 9/0
  no shutdown
!
interface ManagementEthernet 10/0
  no shutdown
!
interface ManagementEthernet 11/0
  no shutdown
!
interface Port-channel 1
  no ip address
  portmode hybrid
  shutdown
!
interface Vlan 1
!
interface Vlan 100
  no ip address
  tagged TenGigabitEthernet 1/0-38
  no shutdown
!
interface Vlan 142
  no ip address
  tagged TenGigabitEthernet 0/0-39
  tagged TenGigabitEthernet 1/0-39
  no shutdown
!
interface Vlan 200
  no ip address
  tagged TenGigabitEthernet 0/0-38
  tagged TenGigabitEthernet 1/0-38
  no shutdown
!
management route 0.0.0.0/0 10.142.0.1
!
ip name-server 10.128.0.10
!
stack-unit 0 priority 1
stack-unit 1 priority 1
!
ntp server 10.41.0.5
!
ip ssh server enable
!
protocol lldp
!
```

```
line console 0
line vty 0
line vty 1
line vty 2
line vty 3
line vty 4
line vty 5
line vty 6
line vty 7
line vty 8
line vty 9
!
define interface-range allports tengigabitethernet 0/0 - 38 , tengigabitethernet
1/0 - 38
define interface-range uplink tengigabitethernet 0/39 , tengigabitethernet 1/39
!
reload-type normal-reload
!
end
```

APPENDIX F – ISCSI STORAGE CONFIGURATION

1. Using the command-line console via serial cable, reset the Dell Storage PS6210 with the `reset` command.
2. Enter a group name, group IP address, and IP address for eth0.
3. After group creation and with a computer connected to the same subnet as the storage, use the Dell Storage PS Series web interface to do the following:
 - a. Click on the array, and when prompted to configure the member, choose Yes, and select RAID 10.
 - b. Create one LUN that uses all available space.
 - c. Enable shared access to the iSCSI target from multiple initiators on the volume.
 - d. Create an access control record for the volume.

Installing VMware vSphere 5.5 (ESXi) on the Dell R720 Servers

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

Configuring ESXi after Installation

1. On the ESXi 5.5 screen, press F2, enter the root password, and press Enter.
2. On the System Customization screen, select Troubleshooting Options, and press Enter.
3. On the Troubleshooting Mode Options screen, select enable ESXi Shell, and press Enter.
4. Select Enable SSH, press Enter, and press Esc.
5. On the System Customization screen, select Configure Management Network.
6. On the Configure Management Network screen, select IP Configuration.
7. On the IP Configuration screen, select static IP, enter an IP address, subnet mask, and default gateway, and press Enter.
8. On the Configure Management Network screen, press Esc. When asked to apply the changes, type Y.
9. Repeat steps 1 through 8 for each server.

For our vCenter management server, we deployed the vCenter Appliance on the first ESXi host and configured it for our environment.

Configuring VM networking on ESXi

1. Log into the vSphere Web Client with the administrator credentials and navigate to the B200 M3 host.
2. In the Manage tab, click on Networking, and in the Virtual switches pane, click the Add host networking button.
3. Select Physical Network Adapter, and click Next.
4. Select New standard switch, and assign to it two of the R720's 10Gb ports connected to the physical test network.
5. Click Next.
6. Provide a label for the switch, and click Next.
7. Click Next.

8. Click Finish.
9. Select VMkernel adapters in the pane on the left.
10. Click Add Networking.
11. Choose Virtual machine Port Group for a Standard Switch, and click Next.
12. Select the switch you just created, and click Next.
13. Label the network and assign the appropriate VLAN ID, and click Next.
14. Click Finish.
15. Click Add Networking again, and choose VMkernel Network Adapter.
16. Choose the switch you created earlier, and click Next.
17. Label the network, choose the appropriate VLAN ID, check Management traffic, and click Next.
18. Use static IPv4 settings, and set the appropriate address. Click next.
19. Click Finish.
20. Repeat steps 1 through 8 to create a second vSwitch.
21. Click on the new vSwitch, and click Edit.
22. Change the MTU to 9,000 Bytes, and click OK.
23. Repeat steps 15 through 19 to create a vMotion VMkernel (check vMotion traffic instead of Management).
24. Click edit and change the NIC settings to 9,000 MTUs.
25. Click on Virtual switches in the pane on the left.
26. Click on the vMotion vSwitch, and highlight the vMotion VMkernel.
27. Click Edit.
28. Go to Teaming and failover, and check Override.
29. Choose one vmnic to be active, and set the rest as Standby.
30. Click OK.

APPENDIX G – NETWORKING AND STORAGE CONFIGURATIONS

Figure 11 shows our storage components for the solution.

Storage network diagram

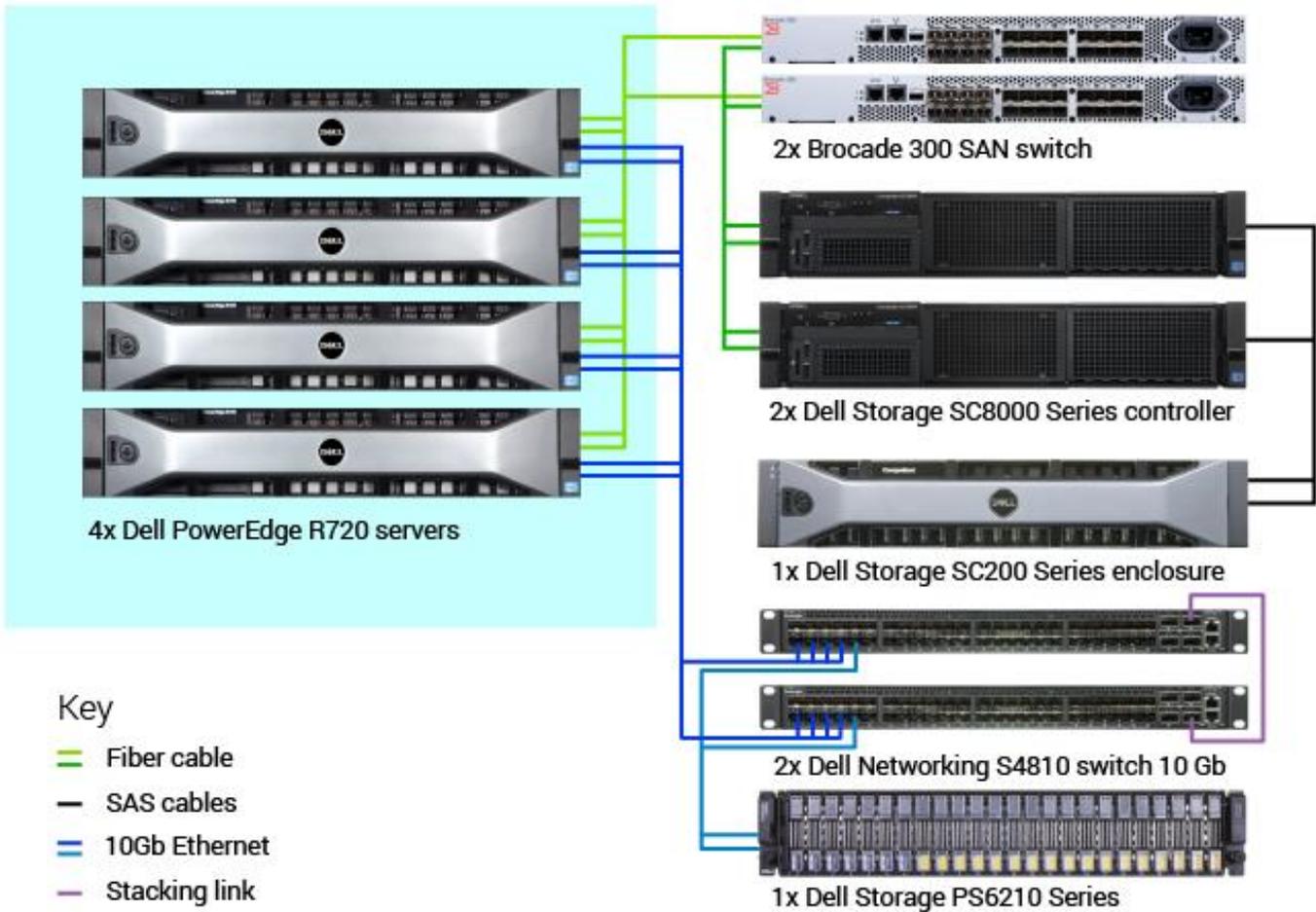


Figure 11: The storage map for the solution.

Figure 12 shows only our network components for the solution.

Network diagram

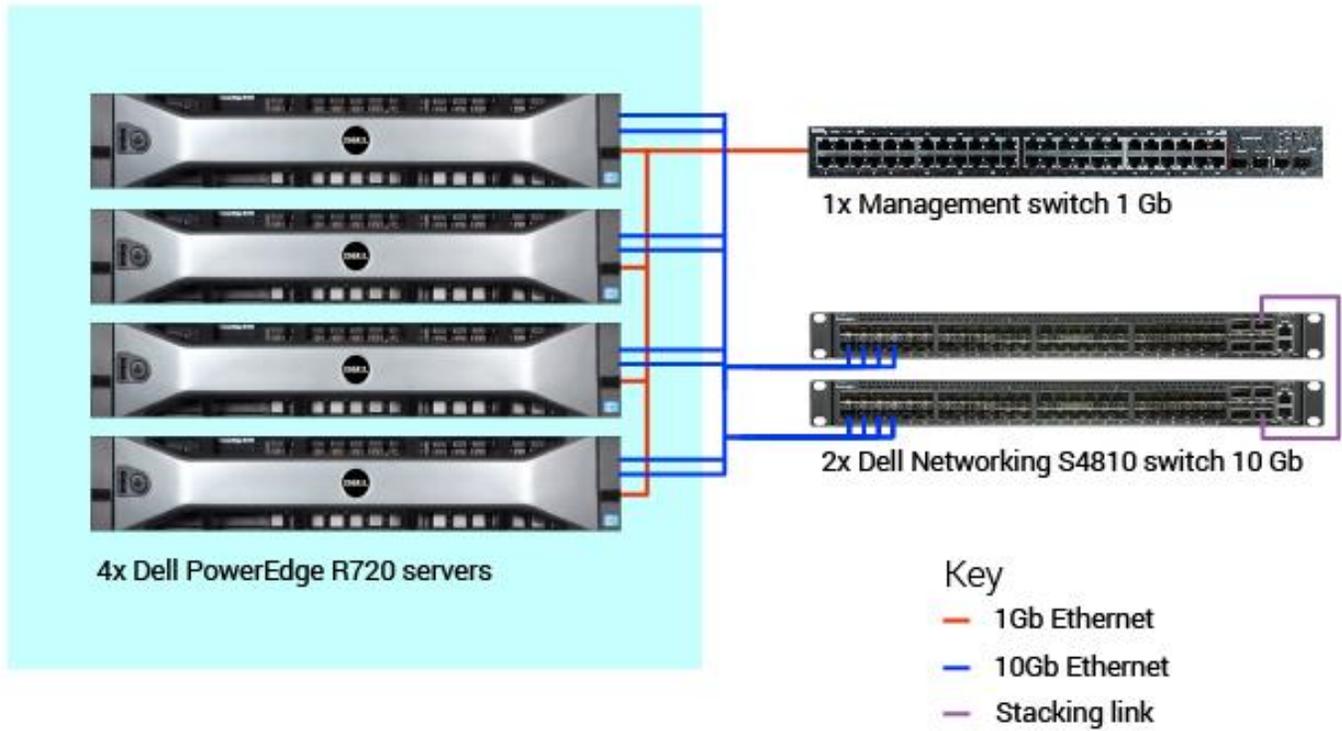


Figure 12: The network map for the solution.

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1007 Slater Road, Suite 300
Durham, NC, 27703
www.principledtechnologies.com

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