



BEST PRACTICES DEPLOYMENT GUIDE

# Oracle Validated Configuration with Cisco UCS, Nimble Storage, and Oracle Linux



# **Best Practices Deployment Guide: Oracle Validated Configuration with Cisco UCS, Nimble Storage, and Oracle Linux**

This document will highlight end-to-end design best practices for deploying Oracle Database on SmartStack, and showcase what was validated jointly by Oracle, Cisco, and Nimble Storage. For more information on Oracle databases with Cisco UCS, Nimble Storage, and Oracle Linux with the Unbreakable Enterprise Kernel, please contact your sales rep or visit:

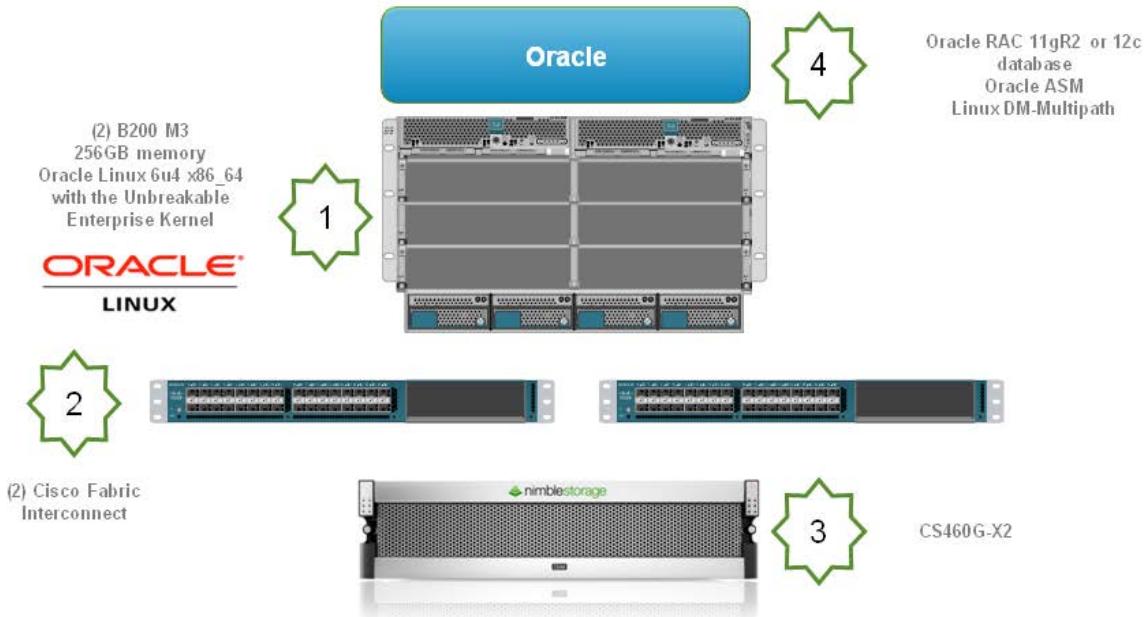
<http://www.nimblestorage.com/resources/SmartStack.php>

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# 1. No Single Point of Failure (SPOF)

When you deploy Oracle databases, you want to ensure the entire infrastructure has no single point of failure, for both hardware and software, across all layers (compute, network, storage, and applications). Here is a list of design considerations:

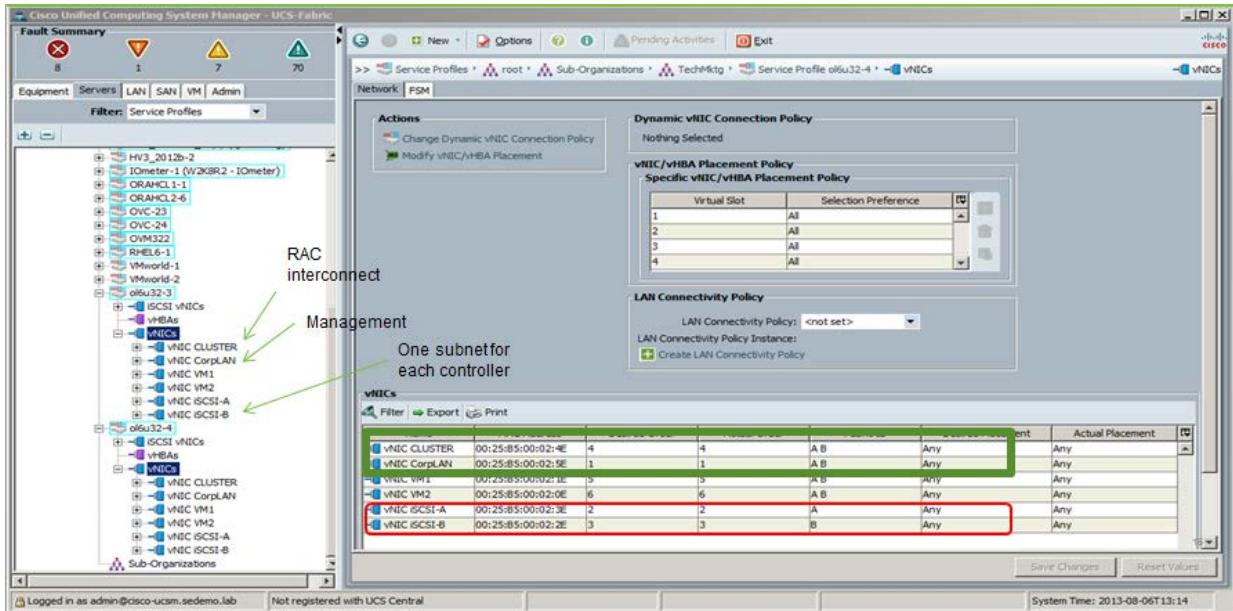


## 1. Compute

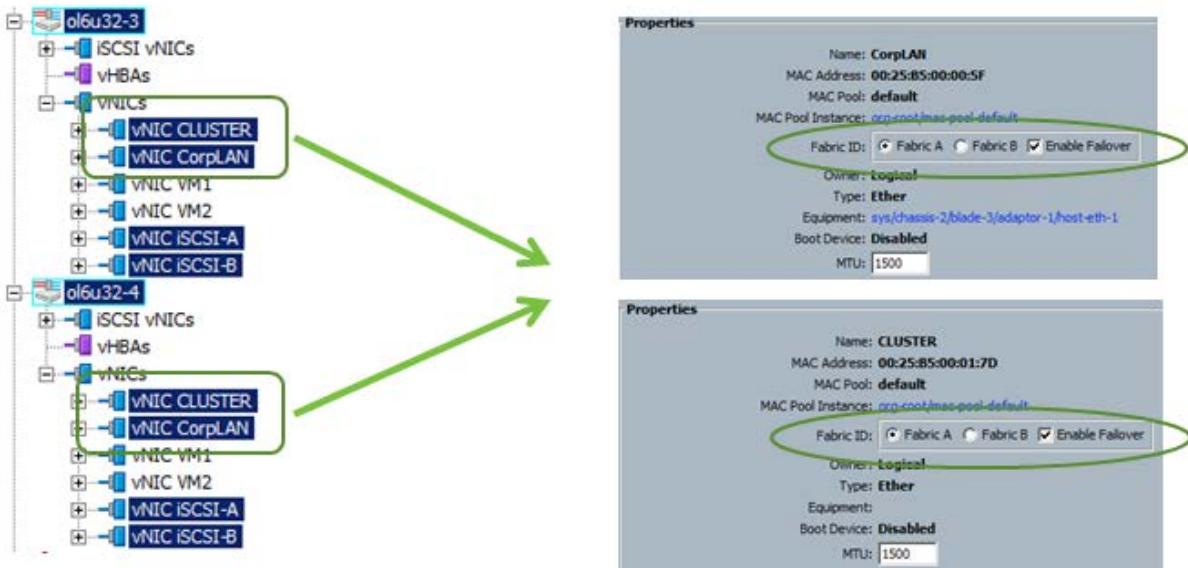
- Cisco UCS blade chassis has redundant everything
- Two UCS blade servers in case one of them fails
- Oracle Linux 6u4 x86\_64 with the Unbreakable Enterprise Kernel
- Oracle Database 11gR2 RAC

## 2. Network

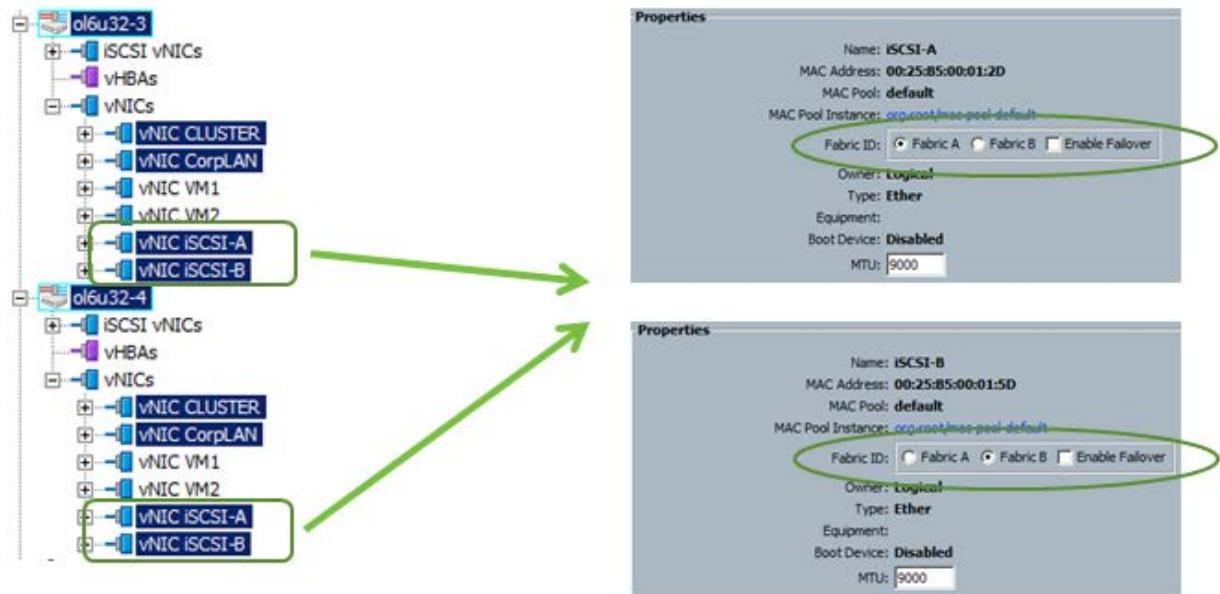
- Dual Fabric Interconnect
- Leverage UCS fabric NIC failover for management and cluster traffic only
- Use 10GigE for iSCSI traffic
- Leverage UCS Jumbo Frame (MTU 9000) for iSCSI traffic



Example of configuring the Cluster network and the Management network. Note the “Enable Failover” box is checked.

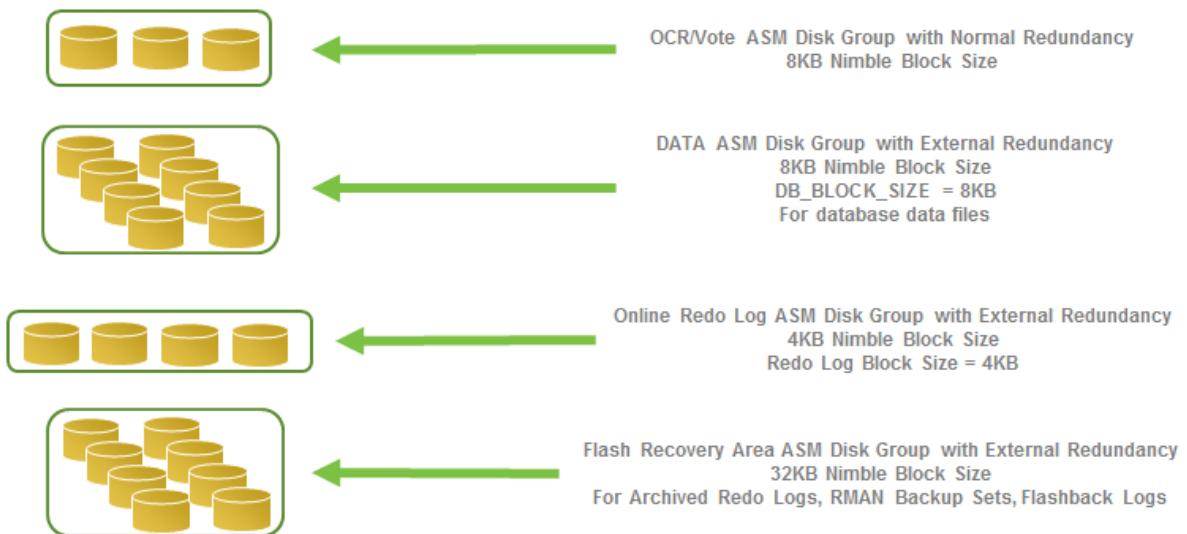


Example of configuring the iSCSI networks. Note the “Enable Failover” box is not checked.



### 3. Storage

- Nimble Storage CS-Series array has redundant everything
- All volumes provisioned use Linux DM-Multipath



## 2. Performance Optimizations

### Server Operating System:

- Oracle Linux 6.x x86\_64
  - Boot to Unbreakable Enterprise Kernel (default installation)
  - Use internal drive or Boot From SAN (Configure multipath for boot LUN if BFS)
- iSCSI Settings (/etc/iscsi/iscsi.conf)

```
node.session.timeout.replacement_timeout = 10
node.conn[0].timeout.noop_out_interval = 5
node.conn[0].timeout.noop_out_timeout = 10
```

- DM-Multipath Settings (/etc/multipath.conf)

```
defaults {
    user_friendly_names yes
    path_grouping_policy group_by_serial
    find_multipaths yes
    features           "1 queue_if_no_path"
    path_selector      "round-robin 0"
}

devices {
    device {
        vendor          "NIMBLE"
        product         "Server"
        path_checker    tur
        rr_min_io_rq   1000
        rr_weight       priorities
        fallback        immediate
    }
}

blacklist {
    wwid 26353900f02796769
    devnode "^(\ram|raw|loop|fd|md|dm-|sr|scd|st)[0-9]*"
    devnode "^hd[a-z]"
}

multipaths {
    multipath {
        wwid            234eb4150c30140656c9ce900251fa9df
        alias           DATA1
    }
    multipath {
        wwid            2636311704885db8b6c9ce900251fa9df
        alias           DATA2
    }
    multipath {
        wwid            2636311704885db8b6c9ce900251fa9df
        alias           LOG1
    }
}
```

```

        wwid      2636311704885db8b6c9ce900251fa9df
        alias    LOG2
    }
multipath {
    wwid      2636311704885db8b6c9ce900251fa9df
    alias    Add more LUNs.....
}

```

- /etc/security/limits.conf

```

# oracle-rdbms-server-11gR2-preinstall setting for nofile soft limit is 1024
oracle soft nofile 131072
# oracle-rdbms-server-11gR2-preinstall setting for nofile hard limit is 65536
oracle hard nofile 131072
# oracle-rdbms-server-11gR2-preinstall setting for nproc soft limit is 2047
oracle soft nproc 131072
# oracle-rdbms-server-11gR2-preinstall setting for nproc hard limit is 16384
oracle hard nproc 131072
# oracle-rdbms-server-11gR2-preinstall setting for stack soft limit is 10240KB
oracle soft stack 10240
# oracle-rdbms-server-11gR2-preinstall setting for stack hard limit is 10240KB
oracle hard stack 32768
oracle soft core unlimited
oracle hard core unlimited
oracle soft memlock 50000000
oracle hard memlock 50000000

```

- /etc/sysctl.conf

```

# oracle-rdbms-server-11gR2-preinstall setting for fs.file-max is 6815744
fs.file-max = 6815744
# oracle-rdbms-server-11gR2-preinstall setting for kernel.sem is '250 32000 100 128'
kernel.sem = 250 32000 100 128
# oracle-rdbms-server-11gR2-preinstall setting for kernel.shmmni is 4096
kernel.shmmni = 4096
# oracle-rdbms-server-11gR2-preinstall setting for kernel.shmall is 1073741824
kernel.shmall = 1073741824
# oracle-rdbms-server-11gR2-preinstall setting for kernel.shmmax is 4398046511104 on x86_64
kernel.shmmax = 4398046511104
# oracle-rdbms-server-11gR2-preinstall setting for net.core.rmem_default is 262144
net.core.rmem_default = 262144
# oracle-rdbms-server-11gR2-preinstall setting for net.core.rmem_max is 4194304
net.core.rmem_max = 4194304
# oracle-rdbms-server-11gR2-preinstall setting for net.core.wmem_default is 262144
net.core.wmem_default = 262144
# oracle-rdbms-server-11gR2-preinstall setting for net.core.wmem_max is 1048576
net.core.wmem_max = 1048576
# oracle-rdbms-server-11gR2-preinstall setting for fs.aio-max-nr is 1048576
fs.aio-max-nr = 3145728
# oracle-rdbms-server-11gR2-preinstall setting for net.ipv4.ip_local_port_range is 9000 65500
net.ipv4.ip_local_port_range = 9000 65500

# Increase these parameters
net.core.wmem_max=16780000
net.core.rmem_max=16780000
net.ipv4.tcp_rmem= 10240 87380 16780000
net.ipv4.tcp_wmem= 10240 87380 16780000

```

- /etc/profile (add to the end of the file)

```
if [ $USER = "oracle" ] || [ $USER = "grid" ] ; then
  if [ $SHELL = "/bin/ksh" ]; then
    ulimit -p 16384
    ulimit -n 65536
  else
    ulimit -u 16384 -n 65536
  fi
fi
```

- IO Scheduler

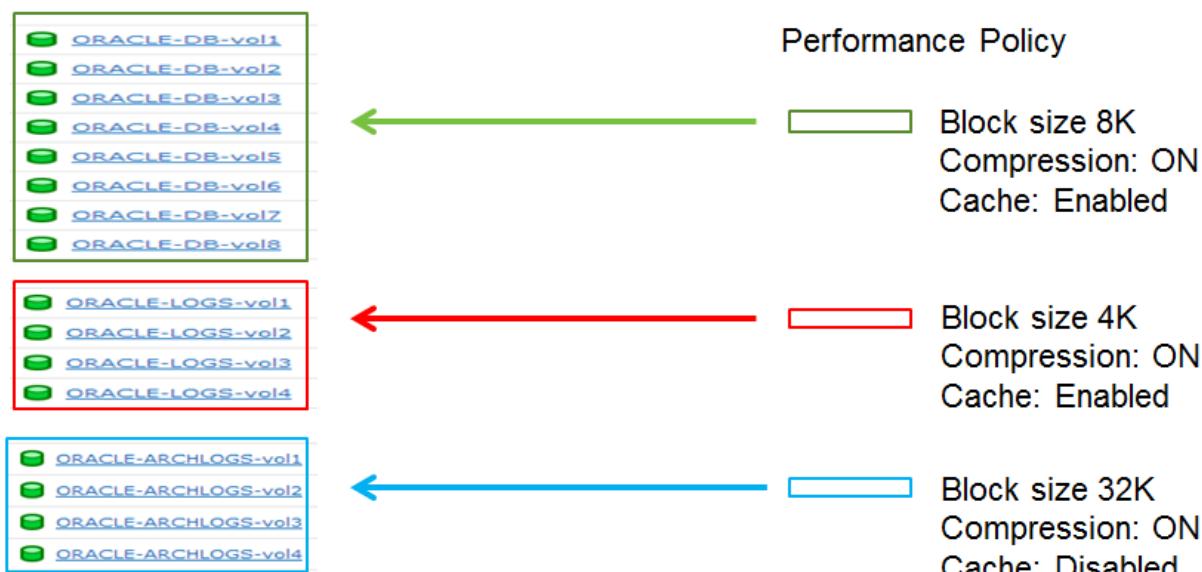
- noop

### Oracle Database:

- Use Oracle Automatic Storage Management (ASM)
- Use External Redundancy for ASM disk groups
- Use default AU size (1MB)
- Configure the database to allow 4KB block size for Online Redo Logs
  - Change “\_disk\_sector\_size\_override=TRUE”
  - Re-create online redo logs with 4K option and remove the original

### Storage:

Performance policy for database volumes:

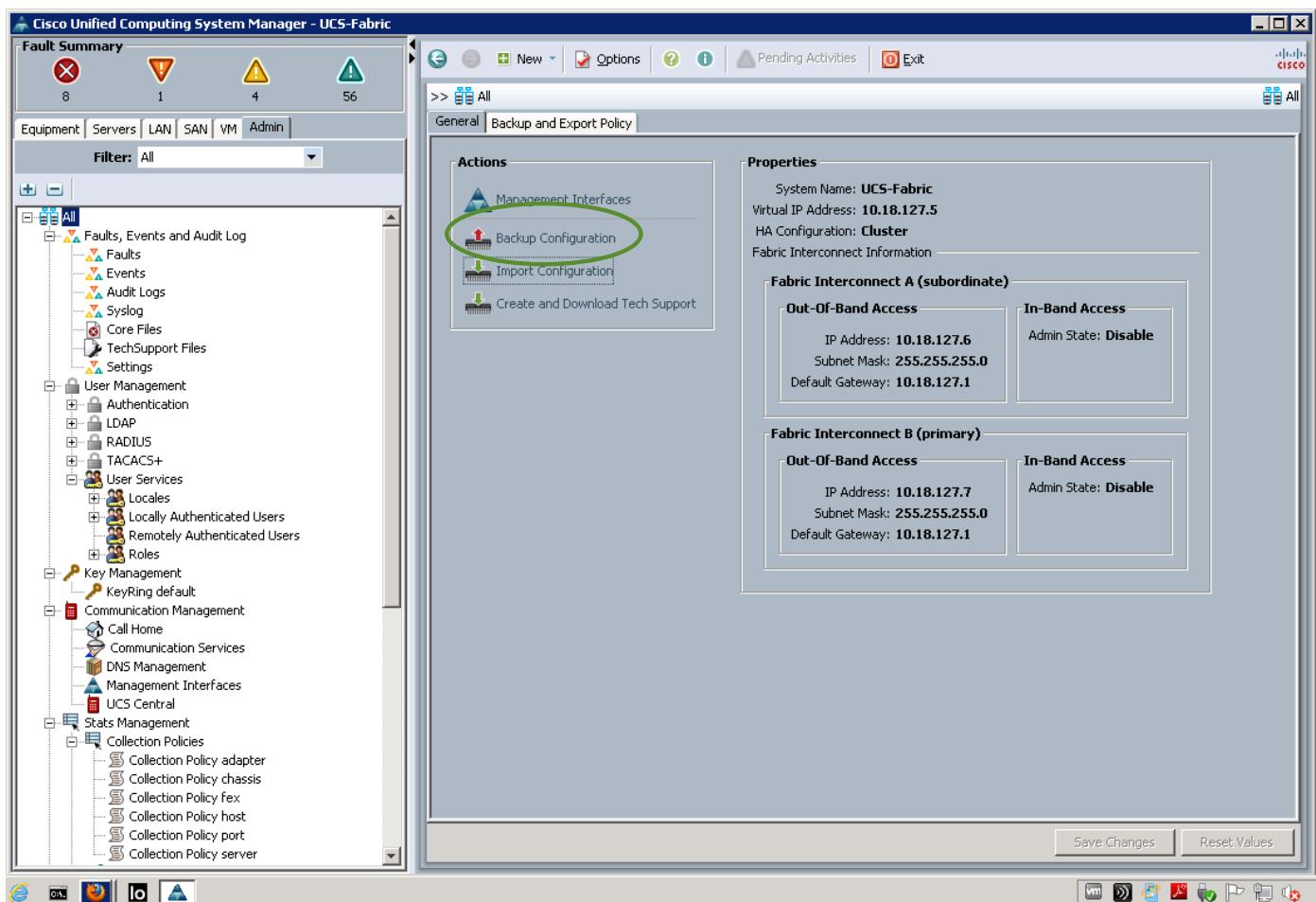


# 3: Data Protection

## High Level Considerations

- Backup UCSM configuration
- All Oracle database volumes in same Volume Collection
- Volume Collection by application type + RPO

## Infrastructure:



## Application:

Oracle Database

-DB/Log/Archive/OCR-Vote volumes all in Oracle volume collection

Volume Collections > Oracle-ERP

			Status	Snapshots	Replication
			Volumes: 19	Total Usage: 0 B	Free: 18.85 TB
<b>SYNCHRONIZATION</b>			<b>PROTECTION STATUS</b>		
Type	-		Last Snapshot Time	09/04 12:00 PM	
Server	N/A		Next Snapshot Time	09/04 01:00 PM	
Application	N/A		Last complete replication	Unknown	
Username	N/A		<b>"ORACLE-ERP" PROTECTION SCHEDULE</b>		
Password	N/A		Snapshot every	1 hours	
			Starting at	12:00 AM	
			Repeat Until	11:59 PM	
			On the following days	Sun, Mon, Tue, Wed, Thu, Fri, Sat	
			Number snapshots to retain	5 (on mktg-cs460gx2)	
			Replicate to	None	
			Verify backups	N/A	
<b>REPLICATION PARTNERS</b>			<b>ASSOCIATED VOLUMES</b>		
Name	Direction	Status	Volume/Clones		
No items to show.			ORACLE-ARCHLOGS-vol1 ORACLE-ARCHLOGS-vol2 ORACLE-ARCHLOGS-vol3 ORACLE-ARCHLOGS-vol4 ORACLE-DB-vol1 ORACLE-DB-vol2 ORACLE-DB-vol3 ORACLE-DB-vol4 ORACLE-DB-vol5 ORACLE-DB-vol6 ORACLE-DB-vol7 ORACLE-DB-vol8 ORACLE-LOGS-vol1 ORACLE-LOGS-vol2 ORACLE-LOGS-vol3 ORACLE-LOGS-vol4 ORACLE-OCRVOOTE-vol1 ORACLE-OCRVOOTE-vol2 ORACLE-OCRVOOTE-vol3		

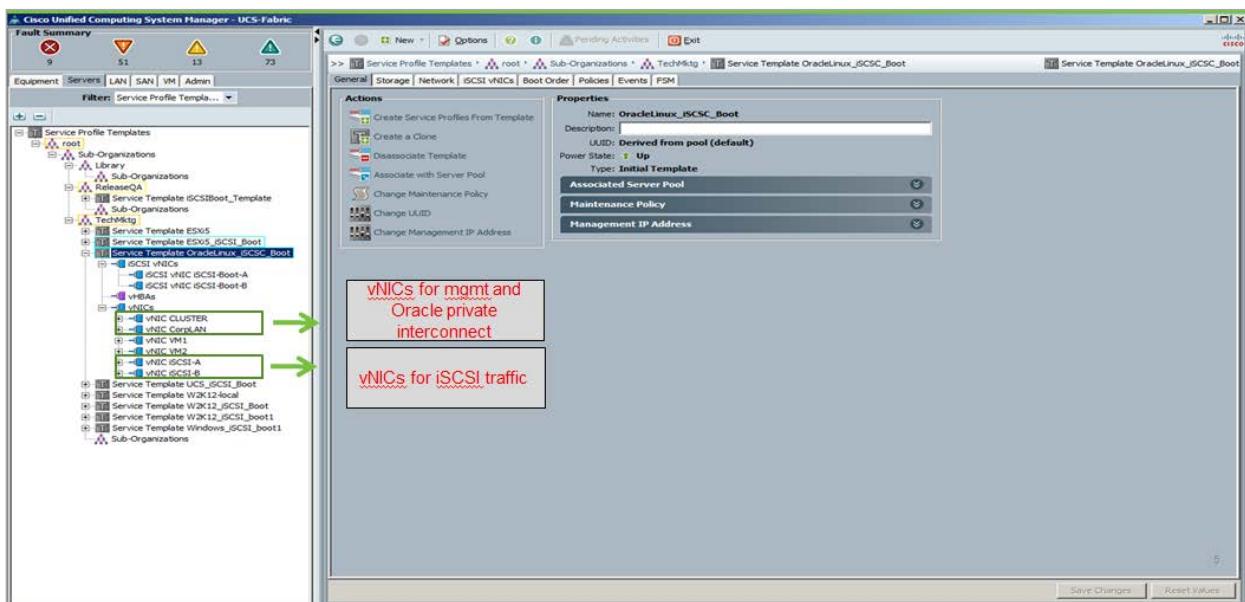
## 4: Operational Management

In this chapter, we will highlight tools and integrations that help making deployment and operational management simple and easy.

### UCS Service Profile:

A custom UCS Service Profile template was created for Oracle RAC database. It creates a standard for deploying the Oracle environment serving business-critical applications, and simplifies scalability expansion down the line.

## For vNIC



## Nimble Storage InfoSight:

It is a good practice to regularly monitor Nimble InfoSight™ for storage health, availability, performance, and data protection reports based on heartbeats from the array:

The screenshot shows the Nimble Storage InfoSight web interface. At the top, there are navigation links: Downloads, NimbleConnect, Feedback, Help, Company (set to Nimble Storage TechMktg), and a user dropdown (wen). Below the header, there is a navigation bar with tabs: Assets (selected), Wellness, Capacity, Volumes, Performance, Data Protection, and Dashboard. A refresh icon is also present.

The main content area is titled "Your Wellness Overview". It includes a sub-header "This page was last updated on: Jul 29 2013 12:49AM local time". There are three buttons: Daily Summary Emails..., Case Creation Options..., and Show hints.

Below this, there is a section titled "Event Summary" with a table:

	Urgent	Important	For Review
Arrays	1		
Volumes	267		12
Snapshots	2,288		

To the right of the table, there is a note: "Click on colored buttons (left) to filter the Events Details table. To select more than one button, hold down the Ctrl key. Click on rows in the Event Details table to edit case creation options." Below this, there are two radio buttons: "Show all events" (selected) and "Hide closed events".

## Appendix: Oracle Validated Configuration

The following table includes details of the validation of SmartStack performance with real applications.

<b>Configuration Summary</b>	Oracle Database 11gR2 and 12c Single Instance and Oracle Real Application Cluster (RAC) for Linux x86_64 on Oracle Linux 6 Update 4 using ASMLib
<b>Server Platform</b>	Cisco UCS Blade B200 M3
<b>Storage Model</b>	Nimble Storage CS400 Series
<b>Oracle Software</b>	Oracle Database 11gR2 (11.2.0.3) and 12c (12.1.0.1.0) for Linux x86-64
<b>Linux Distribution</b>	Oracle Linux 6 Update 4 x86_64 with Unbreakable Enterprise Kernel

<b>Server Model</b>	2 x Cisco UCS Blade B200 M3
<b>Processors</b>	2 x 16 cores Intel® Xeon® CPU E5-2600
<b>Memory</b>	256GB
<b>OnBoard Storage</b>	300GB 6Gb SAS 10K RPM 2.5" HDD/hot plug/drive sled mounted
<b>Network/Interconnect</b>	2 x Cisco Fabric Interconnect
<b>Multipath</b>	Device mapper multipath 0.4.9-64.0.1.el6
<b>Storage Model</b>	Nimble Storage CS400 series 1.4.x
<b>Kernel</b>	2.6.39-400.17.1.el6uek.x86_64 or higher

NOTE: The Oracle Validated Configuration was conducted with Oracle 11gR2 and 12c Real Application Cluster (RAC).

### Oracle Database 11g Release 2

[http://linux.oracle.com/pls/apex/f?p=102:2:4213554191891752::NO::P2\\_VC\\_ID:627](http://linux.oracle.com/pls/apex/f?p=102:2:4213554191891752::NO::P2_VC_ID:627)

### Oracle Database 12c Release 1

[http://linux.oracle.com/pls/apex/f?p=102:2:4213554191891752::NO::P2\\_VC\\_ID:631](http://linux.oracle.com/pls/apex/f?p=102:2:4213554191891752::NO::P2_VC_ID:631)



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