

# Integrating the Oracle Database Appliance with the Sun ZFS Storage Appliance to Achieve High Availability and Security

# Agenda

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- Introductions
- Executive Summary
- Puzzle Pieces (HA)
- ODA
  - What and Why
  - Installation
  - Value Adds
- ZFS File System
  - Pooling
  - Redundancy
- ZFS Storage Appliance
- Questions

# Daniel A. Morgan



Oracle ACE Director



Consultant to Harvard University



University of Washington Oracle Instructor, ret.



The Morgan of Morgan's Library on the web



Board Member: Western Washington OUG

## ■ Upcoming Presentations

- Feb 24-15: Rocky Mountain Oracle Users Group
- Mar 13-14: Utah Oracle Users Group
- Apr 16-18: Oracle User Group Norway
- Apr 19-20: Oracle User Group Finland
- May 13: Oracle User Group Turkey
- May 15 Oracle User Group Azerbaijan
- May 19 Bulgarian Oracle User Group

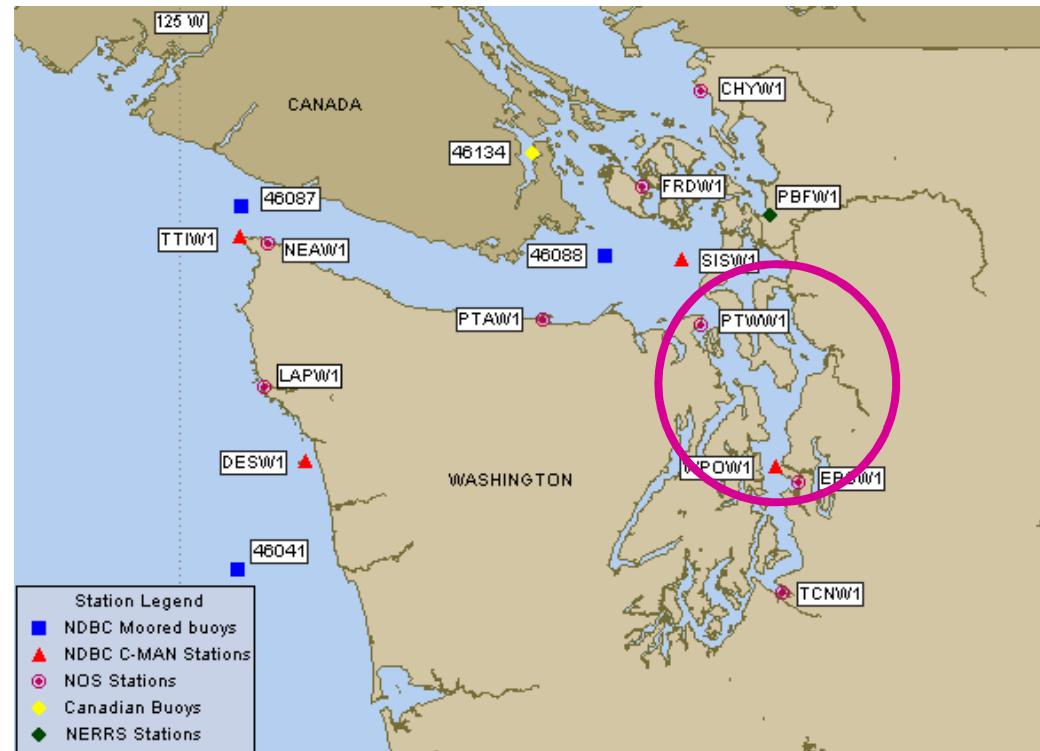


Official Beta Site  
**ORACLE**  
DATABASE **11g**

**ORACLE**  
**RAC SIG**

International  
zSeries  
Oracle SIG

# cd \$MORGAN\_HOME



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[ don't censor the web ] [ don't be silent ]

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Next Event: RMOUG Denver, CO Feb 14-16

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aboard USA-71





ORACLE  
ACE Director


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Congratulations to our newest ACEs

# My Sled



# Travels





# LAD Tour: Machu Picchu Peru



# Eyjafjallajökull



Time Flight Gate Destination			17:44
0630 DY1800	46	Malaga	Gate closed
1710 BLX692		Goteborg	Cancelled
1710 SK811		London/Heathrow	Cancelled
1715 SK841		Zurich	Cancelled
1715 AY660		Helsinki	Cancelled
1720 QJ4796		Bilund	Cancelled
1725 DY1494		Paris/Orly	Cancelled
1725 KL1148		Amsterdam	Cancelled
1725 KQ1148		Amsterdam	Cancelled
1730 SK461		Kobenhavn	Cancelled
1740 DY1866		Pisa	Cancelled
1750 DY3232		Kobenhavn	Cancelled
1805 LH3145		Munchen	Cancelled
1805 SK3681		Munchen	Cancelled
1805 SK1465		Kobenhavn	Cancelled
1810 DY1306		London/Gatwick	Cancelled
1815 DY1978		Beograd	Cancelled
1820 SK1484	36	Stockholm	Cancelled
1825 DY1108		Berlin/Schoenef	Cancelled
1825 BA8272		Aarhus	Cancelled
1830 DY3774		Stockholm	Cancelled
1845 FI325	46	Reykjavik	New time 1925
1855 SK3621		Frankfurt	Cancelled
1855 LH3135		Frankfurt	Cancelled
1855 SK6616	39	Helsinki	
1855 KF506	39	Helsinki	
1900 SK463		Kobenhavn	Cancelled
1905 DY1256		Amsterdam	Cancelled
1915 TP509		Lisboa	Cancelled
1915 DY1132		Dusseldorf	Cancelled
1920 WF336		Goteborg	Cancelled
1920 DY1352		Edinburgh	Cancelled
1920 SK3192		Goteborg	Cancelled
1920 QJ4798		Bilund	Cancelled

Time Flight Gate Destination		
1930 DY990		Bilund
1935 DY934		Kobenhavn
1940 KL1150		Amsterdam
1945 LX1217		Zurich
1950 SK8416		Tallinn
1950 OV138		Tallinn
2010 QJ5742		Aalborg
2015 SK815		London/Heathrow
2025 DY2028		Warszawa
2035 SK1475		Kobenhavn
2055 BA769		London/Heathrow
2055 LH3155		Hamburg
2055 SK3651		Hamburg
2100 BT154		Riga
2100 SK9624		Riga
2100 DY3782		Stockholm
2120 SK1488		Stockholm

# Fun things to not do in Iceland



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Tuesday, April 20, 2010

## TOURIS tour booking - Step 1

Search

### Top Packages

The Full Circle Express.

Grand tour around Iceland including the Westfjords.

A real 4x4 highland adventure.

South Iceland at leisure.

### Explore

### ::Tour Information

Tour: TT45  
Volcano in Action - This tour is currently not available !

Season: All year  
Departures: Daily  
Departure times: 17:30  
Duration: 6,5

Price info:  
- Adults: € 55,00  
- Age 12-17: € 27,50  
- Age 3-11: € 0,00  
- Age 0-2: € 0,00

\* All prices are per person.  
\* Please select your details here to the right and click next to determine your total price.

Included in the price:  
- Bus tour with English speaking guidance

### ::Your details

Date of tour:

Adults:

Youth (12-17):

Children (3-11):

Infants (0-2):

Comments or special wishes:

### Top Day Tours

Gullfoss Geyser.

Northern Lights Mystery.

Blue Lagoon.

Reykjavik City Sightseen.

The South Coast and the Jokulsarlon Glacial Lagoon.

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# Executive Summary

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- Never make a technology argument when a financial argument will suffice
  - Your CFO wants to talk about ROI not IOPS
  - Will this technology support our organization's needs?
  - Can we right-size it today and will it scale for tomorrow?
  - Does it meet our regulatory and compliance requirements?
  - What is involved in migrating current operations to it?
  - Can our existing team deploy and maintain it?
  - Can we find qualified technologists who already know it?
  - Can the vendor(s) involved fully support the tech stack?
  - How will this affect our customers?
  - How will this affect our financial position?
    - capital expense to obtain it
    - operating expense to maintain it
    - future retirement expense



# Questions we as IT professionals must answer

---



- Why does deployment take so long and cost so much?
- Why are we spending so much on support?
- Why does patching so often break something else?
- Why do we spend so much time fighting fires?



# IT infrastructure on a good day

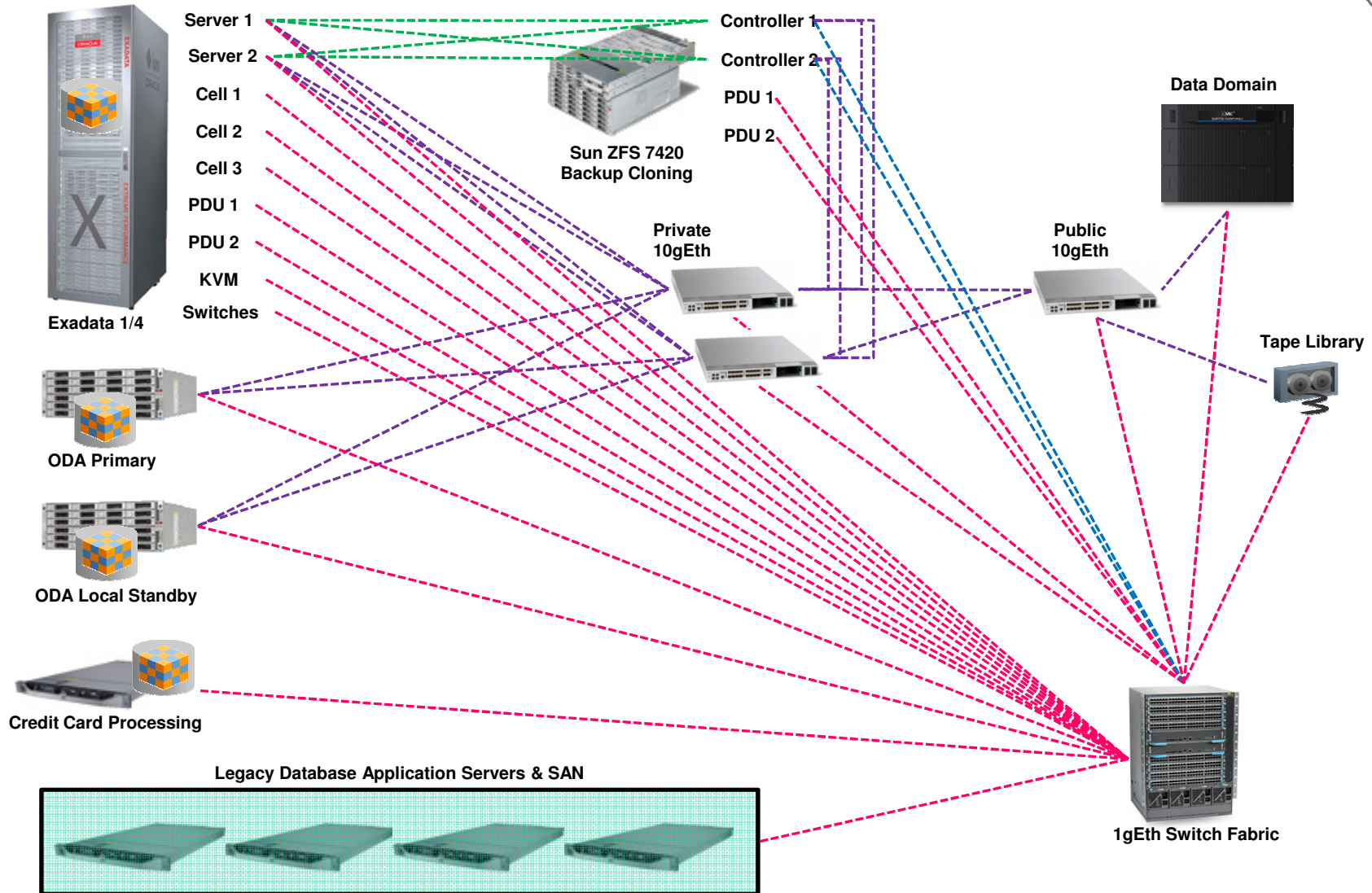
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# IT infrastructure meets a single point of failure



# Puzzle Pieces



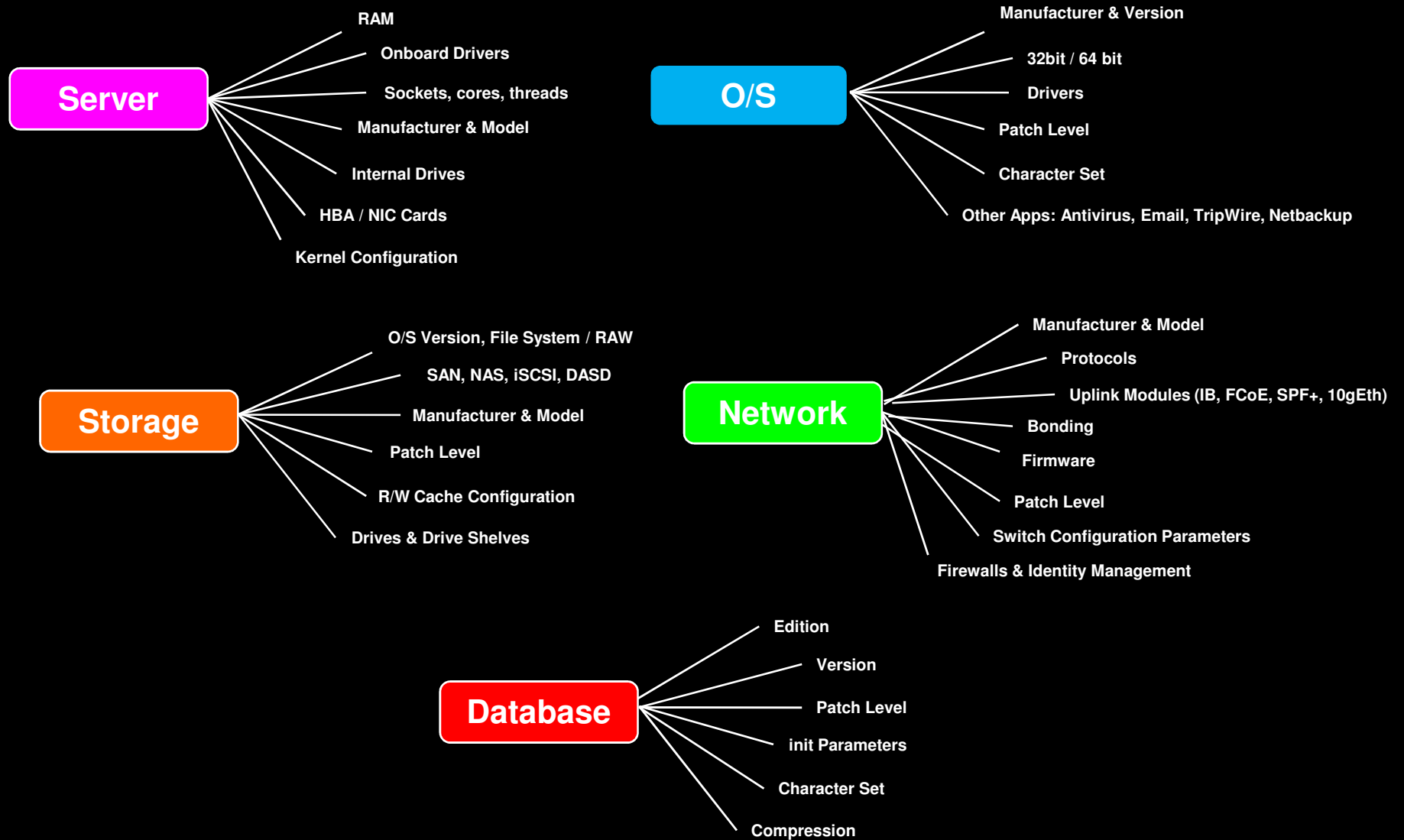
Each connection shown must be multiplexed and bonded

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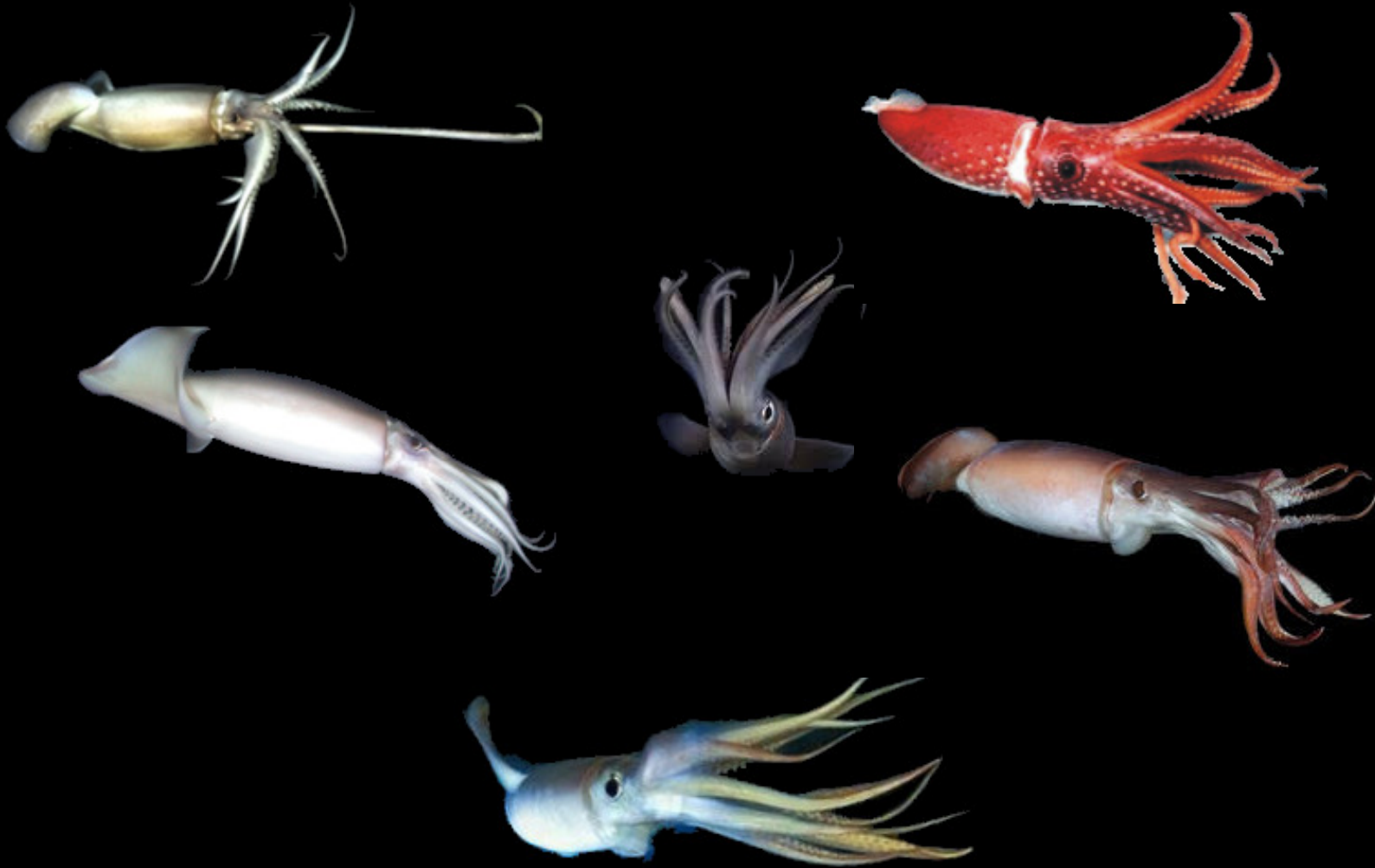
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# Static Puzzle Pieces



# Animated Puzzle Pieces



# It's hard to embrace a barrel of squid



# Puzzle Pieces

---



- The decisions we've made in the past guarantee that
  - No one has ever built a RAC cluster with our configuration
  - No one has ever applied operating system and firmware patches to our configuration
  - No one has ever patched to our configuration
  - Oracle has never tested and certified our configuration
  - No one in support can exactly duplicate our environment





# LONELINESS

IF YOU FIND YOURSELF STRUGGLING WITH LONELINESS, YOU'RE NOT ALONE.  
AND YET YOU ARE ALONE. SO VERY ALONE.



# The Solution

make different, and better, decisions

# What is an ODA?

---



- An appliance
  - A single line on the invoice ... plus the power chords
  - But you get root and sys: The customer is in control
- Announced last year at OpenWorld
- Engineered two server RAC cluster in a 4U case
  - 24 CPU cores
  - 192 GB of RAM
  - 12 TB of direct attached storage with ASM triple mirroring
  - 2TB RAID mirrored disks for O/S and Oracle binaries
- One size fits all ... but ...
- License only the resources you need
- Cores licensed dictate all on-board Oracle licensing

# ODA in Pictures

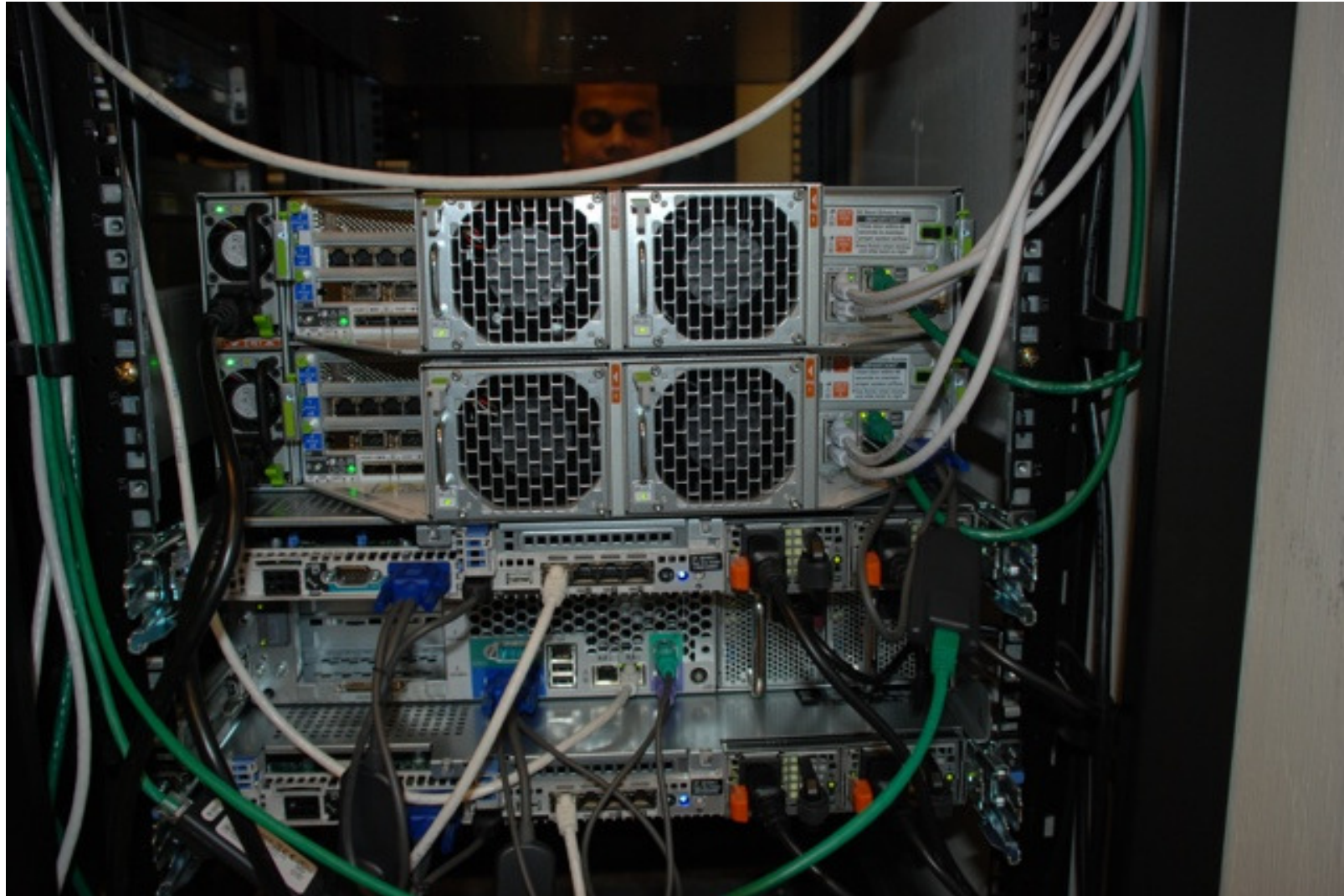


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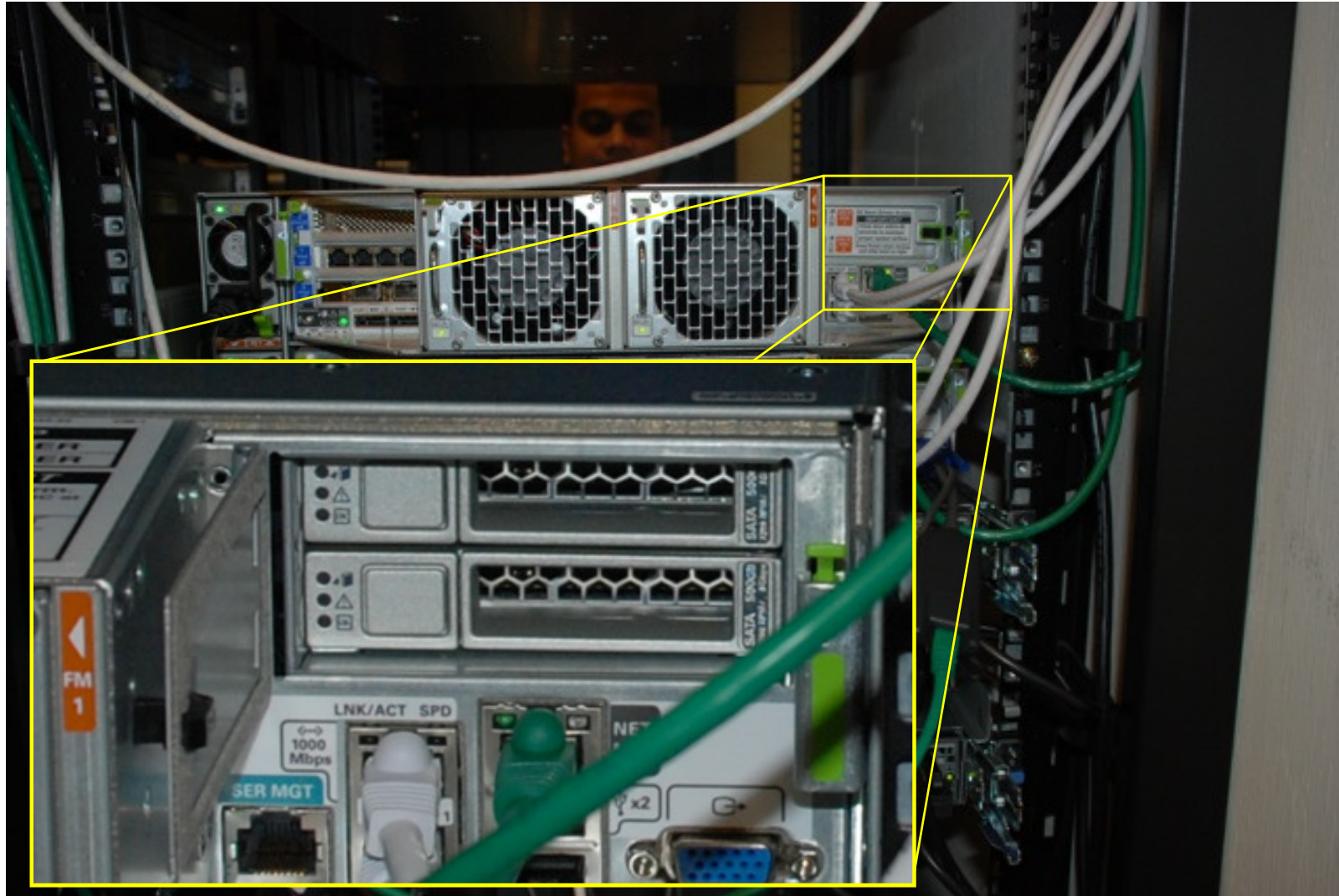
# ODA in Pictures



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# ODA in Pictures



# Why an ODA?



- Minimize complexity from rack-and-stack through database deployment
- Fewer resources required to deploy
  - UNIX System Admins: not required
  - Network Admins: not required
  - Storage Admins: not required
- Ease of maintenance and patching
  - One patch combines O/S, drivers, networking, infrastructure
  - One patch database
- Supports multiple Oracle databases
- Petabyte storage available with ZFS
- Can form the basis for deploying HA applications in organizations that lack in-depth technical resources



# No rolling patches ... and they are not childproof



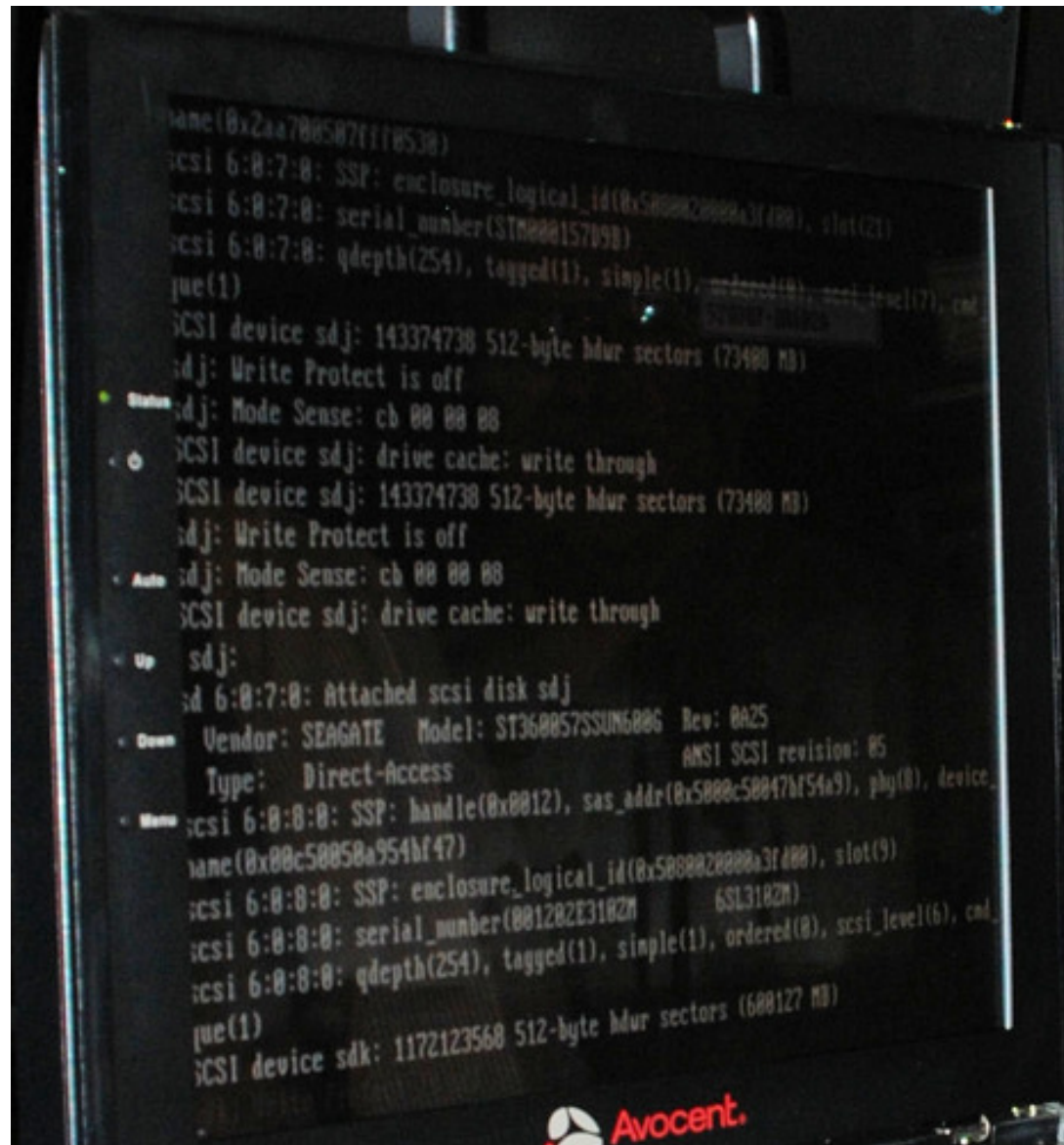




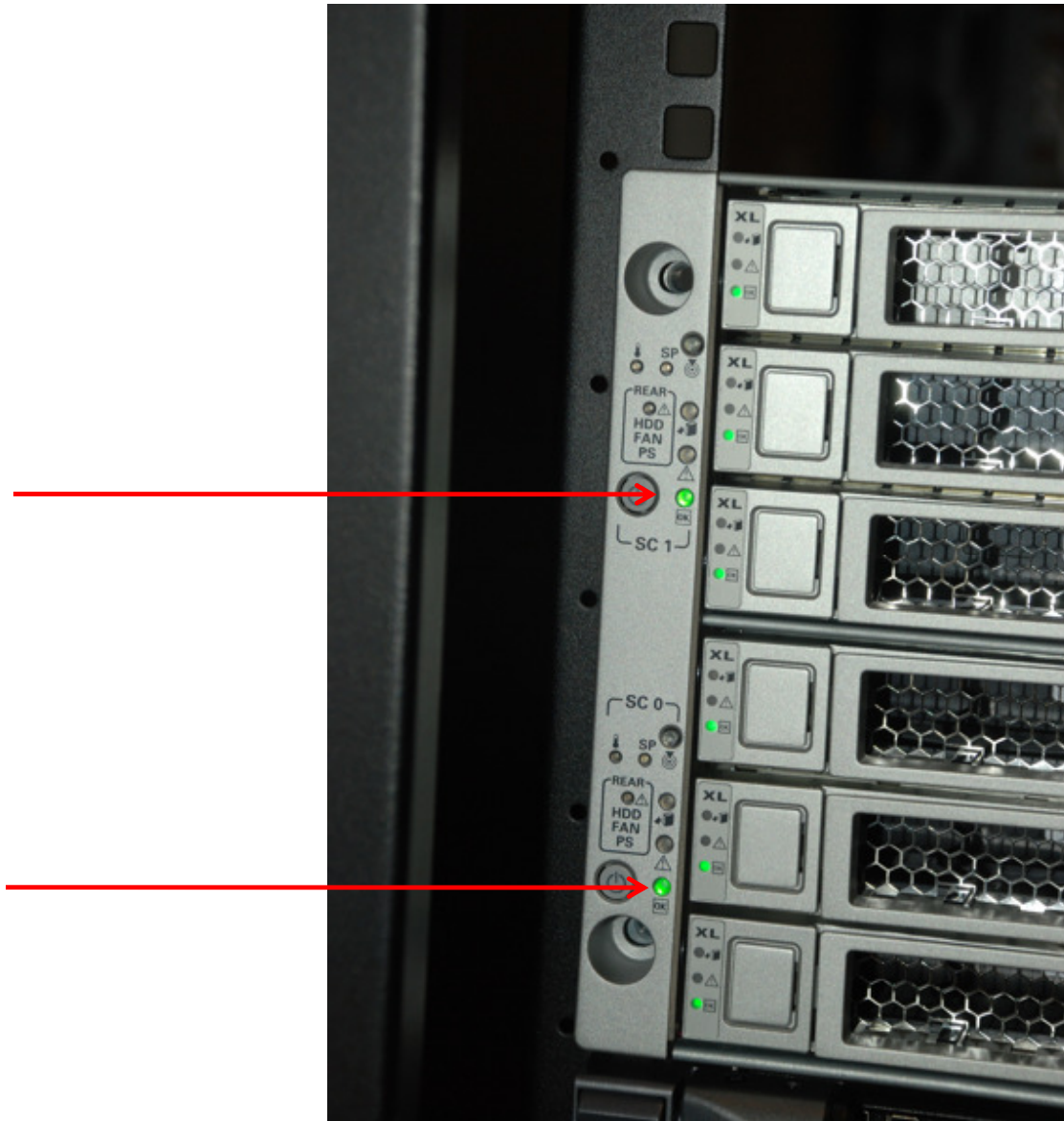
# Discussion

## Installation

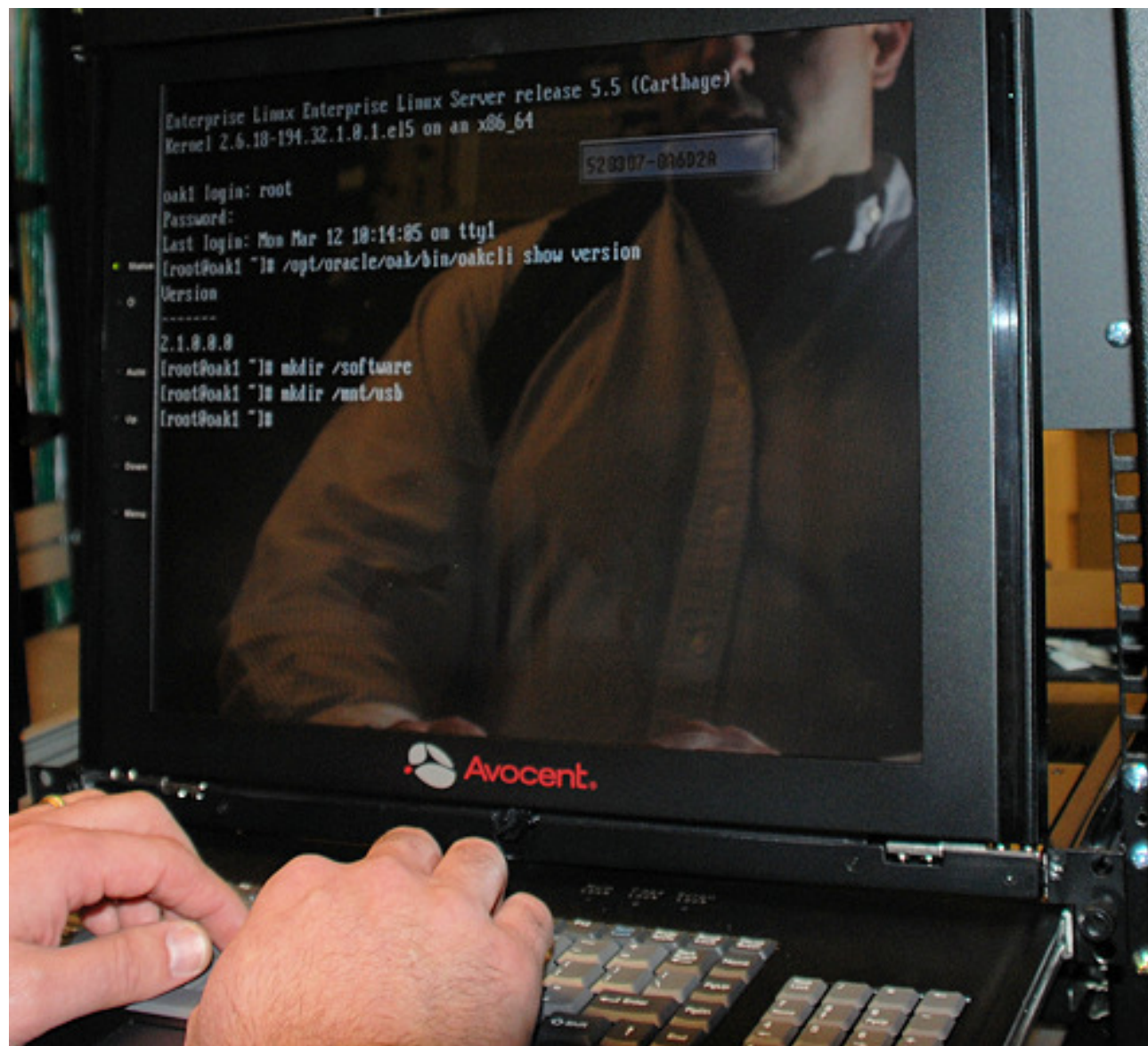
# Step 1: Power On



## Step 2: Wait for OK Lights

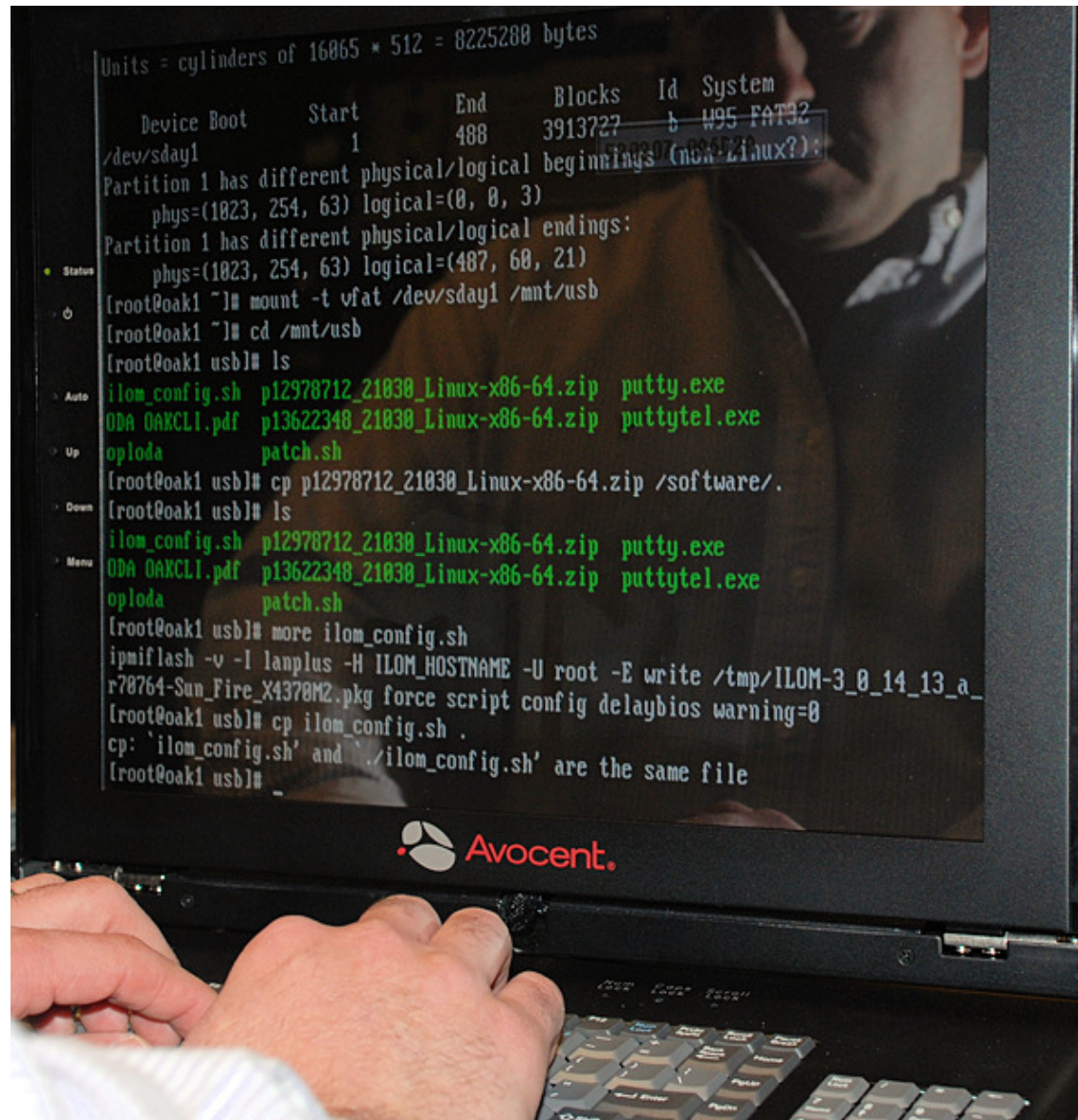


# Step 3: Log In as root



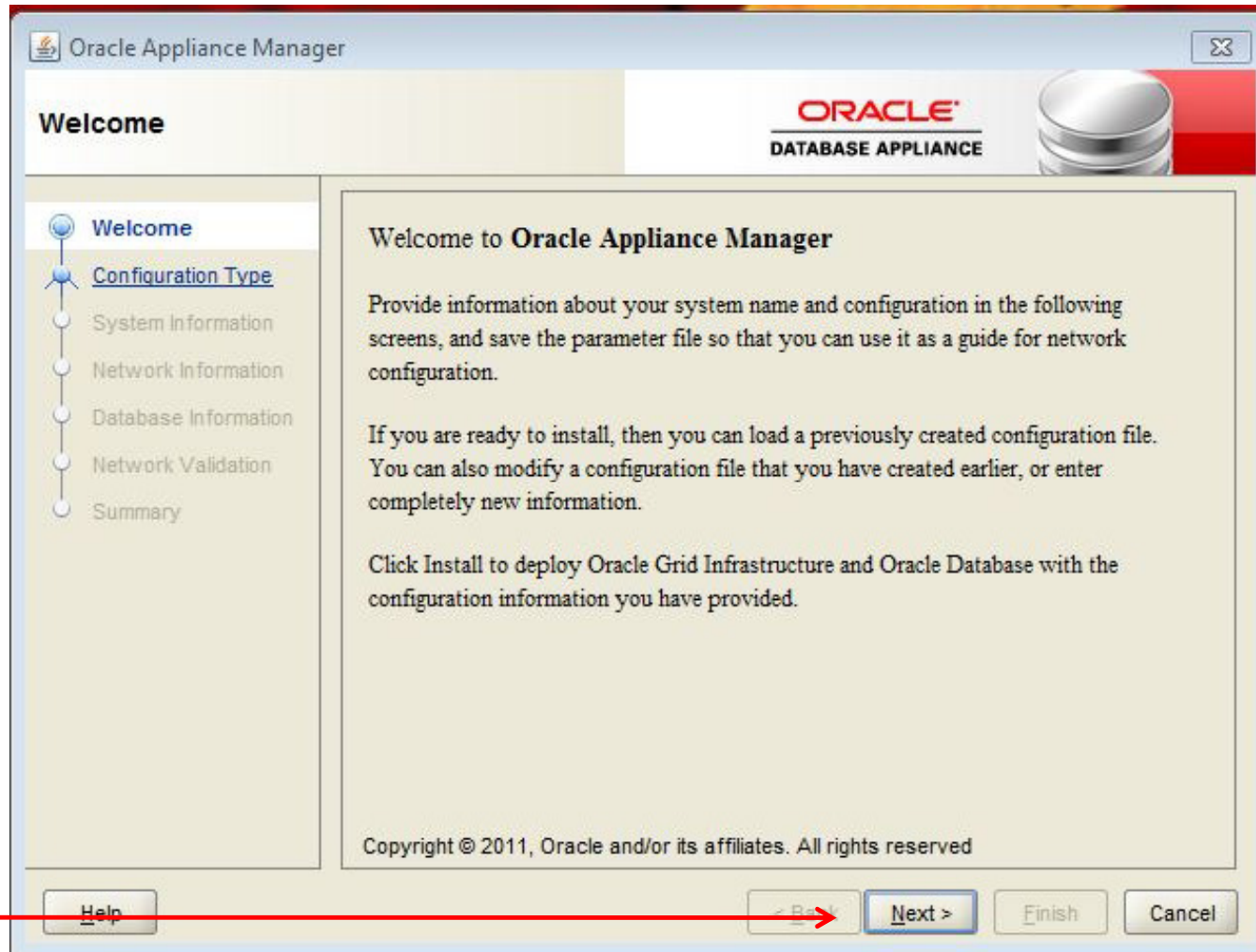


# Step 5: Perform ILOM Configuration

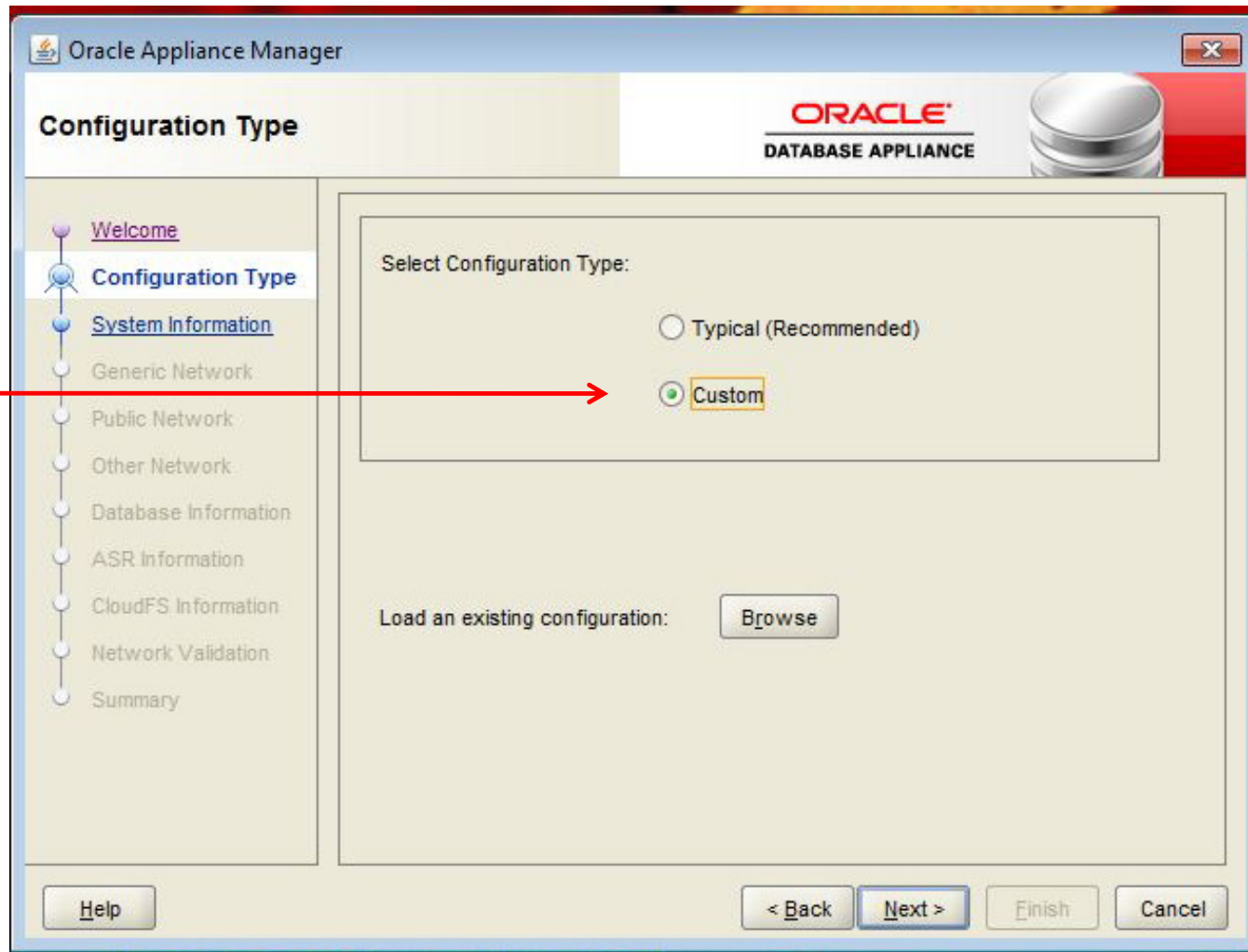




# Install Screens: 1



# Install Screens: 2



# Install Screens: 3



The screenshot shows the "Oracle Appliance Manager" window, specifically the "System Information" tab. The window has a sidebar on the left with a list of steps: Welcome, Configuration Type, System Information (selected), Generic Network, Public Network, Other Network, Database Information, ASR Information, CloudFS Information, Network Validation, and Summary. The main area contains several configuration fields:

Field	Value
System Name:	hqodarac02t
Region:	America
Timezone:	America/Los_Angeles
Database Deployment:	RAC
Database Backup:	Local
New Root Password:	.....
New Root Password(confirm):	.....

At the bottom of the window, there are four buttons: Help, < Back, Next >, and Finish. The "Next >" button is highlighted. Two red arrows point from the left towards the "ASR Information" and "Network Validation" steps in the sidebar.

# Install Screens: 4



The screenshot shows the "Generic Network" configuration screen in the Oracle Appliance Manager. The window title is "Oracle Appliance Manager". On the left is a navigation pane with a tree view containing the following items: Welcome, Configuration Type, System Information, Generic Network (selected), Public Network, Other Network, Database Information, ASR Information, CloudFS Information, Network Validation, and Summary. The main area is titled "Generic Network" and features the Oracle Database Appliance logo. It contains the following fields and controls:

- Domain Name:
- ☐ No DNS Server available
- DNS Servers:
- NTP Servers:

At the bottom of the window are four buttons: Help, < Back, Next >, and Finish. The "Next >" button is highlighted.

# Install Screens: 5



Oracle Appliance Manager

**Public Network**

ORACLE  
DATABASE APPLIANCE

Welcome  
Configuration Type  
System Information  
Generic Network  
**Public Network**  
Other Network  
Database Information  
ASR Information  
CloudFS Information  
Network Validation  
Summary

	Node1-Name	Node1-IP	Node2-Name	Node2-IP
Public	hqodrac02s	10.221.0.21	hqodrac02t	10.221.0.25
VIP	hqodrac02s	10.221.0.23	hqodrac02t	10.221.0.27
SCAN	hqodrac02t-s	Addresses	10.221.0.24	10.221.0.28
Netmask	255.255.255.0	Gateway	10.221.0.1	
Interface	bond0			

ILOM	hqodrac02s	10.221.0.22	larac02bt-ilor	10.221.0.26
Netmask	255.255.255.0	Gateway	10.221.0.1	

Help < Back Next > Finish Cancel



# Install Screens: 6



Oracle Appliance Manager

**Other Network**

ORACLE  
DATABASE APPLIANCE

Welcome  
Configuration Type  
System Information  
Generic Network  
Public Network  
**Other Network**  
Database Information  
ASR Information  
CloudFS Information  
Network Validation  
Summary

	Node1-Name	Node1-IP	Node2-Name	Node2-IP
bond1	rac02t1-net1		rac02t2-net1	
Netmask		Gateway		

bond2	rac02t1-net2		rac02t2-net2	
Netmask		Gateway		

xbond0	rac02t1-net3		rac02t2-net3	
Netmask		Gateway		

Help < Back Next > Finish Cancel

# Install Screens: 7



The screenshot shows the "Oracle Appliance Manager" window, specifically the "Database Information" tab. The window has a title bar with the Oracle logo and "DATABASE APPLIANCE". On the left is a navigation pane with a tree view containing the following items: Welcome, Configuration Type, System Information, Generic Network, Public Network, Other Network, Database Information (selected), ASR Information, CloudFS Information, Network Validation, and Summary. The main area displays configuration options for the database:

Field	Value
Database Name:	TEST
Database Class:	Medium
Database Language:	AMERICAN
Database Block Size:	8192
Database Characterset:	AL32UTF8
Database Territory:	AMERICA

At the bottom of the window are four buttons: Help, < Back, Next >, and Finish. A red arrow points from the "Database Name" field to the "TEST" text.

# Install Screens: 8



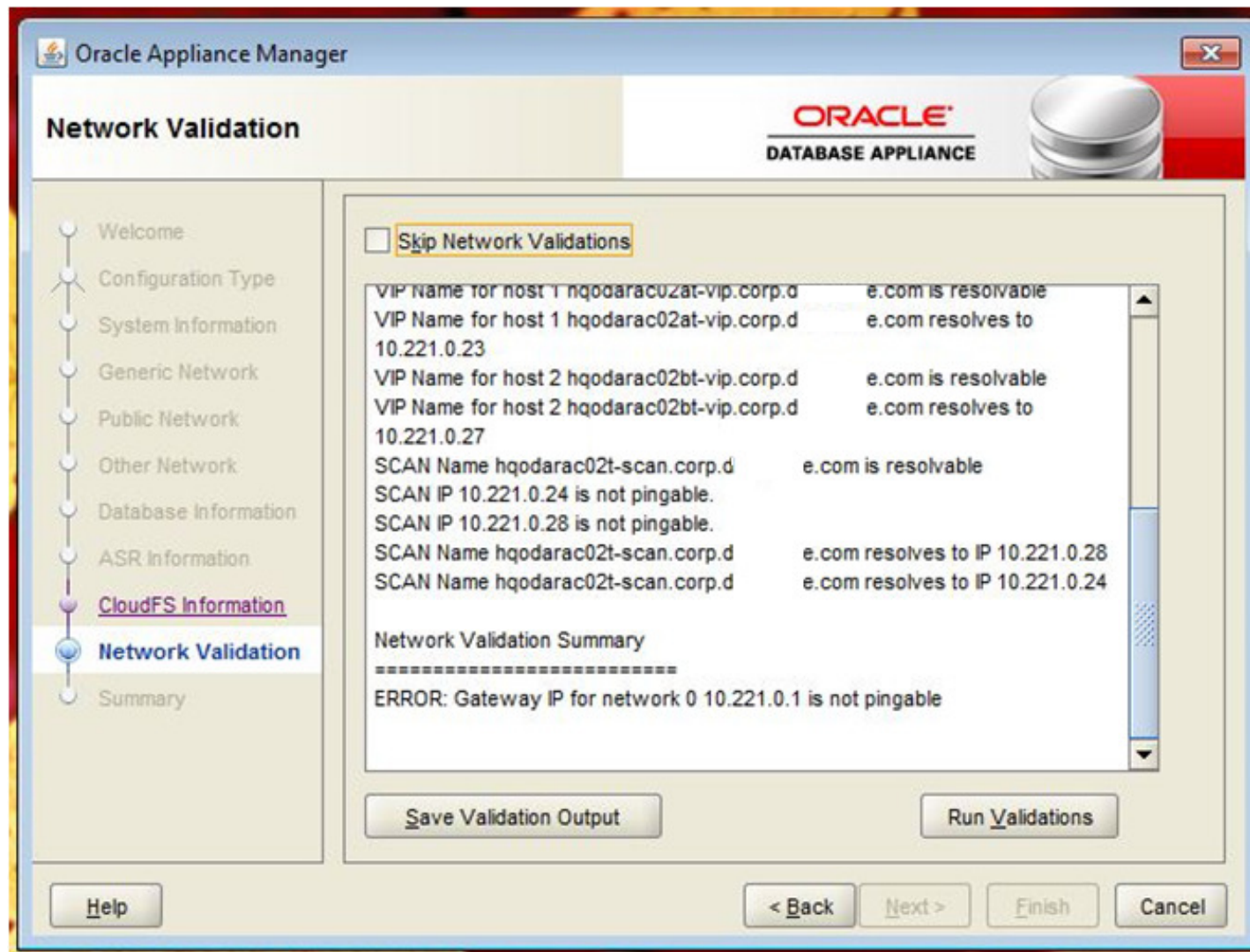
The screenshot shows the "Oracle Appliance Manager" window. The title bar says "Oracle Appliance Manager". The main window has a header with the "ORACLE" logo and "DATABASE APPLIANCE" text. On the left is a navigation pane with a list of steps: Welcome, Configuration Type, System Information, Generic Network, Public Network, Other Network, Database Information, ASR Information (highlighted), CloudFS Information, Network Validation, and Summary. The main content area is titled "ASR Information" and contains a checkbox labeled "Configure Oracle Auto Service Request (ASR)". Below this are three text input fields: "Proxy Server Name:", "Oracle Online Account Username:", and "Oracle Online Account Password:". At the bottom of the window are four buttons: "Help", "< Back", "Next >", and "Finish", followed by a "Cancel" button.

# Install Screens: 9



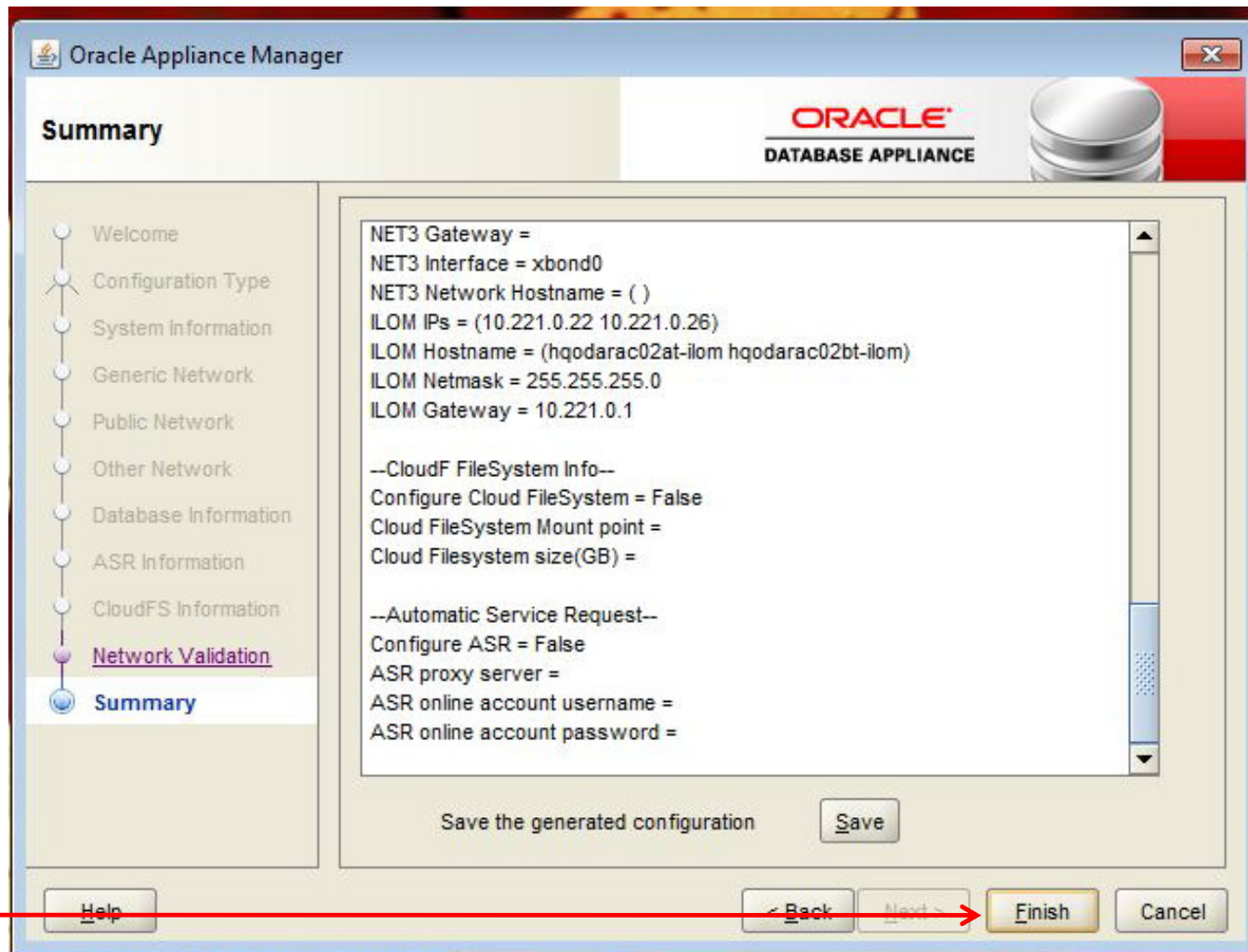
The screenshot shows the "Oracle Appliance Manager" window. The title bar says "Oracle Appliance Manager". The main window has a header with the "ORACLE" logo and "DATABASE APPLIANCE" text. On the left is a navigation pane with a tree view containing the following items: Welcome, Configuration Type, System Information, Generic Network, Public Network, Other Network, Database Information, ASR Information, **CloudFS Information** (highlighted), Network Validation, and Summary. The main content area is titled "CloudFS Information" and contains a checkbox labeled "Configure Cloud FileSystem". Below this are two input fields: "Mount Point:" and "File System Size (GB):". At the bottom of the window are four buttons: "Help", "< Back", "Next >", and "Finish". A "Cancel" button is also present to the right of the "Finish" button.

# Install Screens: 10





# Install Screens: 11





# Value Adds

# ILOM: System Information: Overview



Oracle(R) Integrated Lights Out Manager - Windows Internet Explorer

https://192.0.2.101/iPages/suntab.asp Certificate Error Yahoo! Search

Webroot File Edit View Favorites Tools Help

Oracle(R) Integrated Lights Out Manager

ABOUT 1 Warning REFRESH LOG OUT

User: root Role: auro SP Hostname: orclsys2-ilom

**Oracle® Integrated Lights Out Manager** Java™

System Information	System Monitoring	Power Management	Storage	Configuration	User Management	Remote Control	Maintenance
Overview	Components	Fault Management	Identification Information	Banner Messages	Session Timeout	Versions	

### System Overview

View system summary information. You may also change power state and view system status and fault information.

Product Name: SUN FIRE X4370 M2 SERVER

Part/Serial Number: 30102851+1+1 / 1146FMW00R

Host Power: On [Change...](#)

System Status: Normal [View...](#)

BIOS Version: 12010304

SP Hostname: orclsys2-ilom

Uptime: 0 days, 00:40:38

IP Address: 192.0.2.101

ILOM Version: v3.0.14.13.a r70764

# ILOM: System Monitoring: Sensor Readings



Oracle(R) Integrated Lights Out Manager - Windows Internet Explorer

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Oracle(R) Integrated Lights Out Manager

ABOUT 1 Warning REFRESH LOG OUT

User: root Role: auro SP Hostname: ordsys2-ilom

**Oracle® Integrated Lights Out Manager**

System Information System Monitoring Power Management Storage Configuration User Management Remote Control Maintenance

Sensor Readings Indicators Event Logs

**Sensor Readings**

View readings for system sensors. Click on a sensor name for more information, including threshold values.

834x740

**Sensor Readings**

Filter: All Sensors

Name	Type	Reading
/SYS/PEER/PRSNT	Entity Presence	Present
/SYS/PEER/HOST_POWER	OEM	State Asserted
/SYS/PEER/FAN_FAULT	Fan	State Deasserted
/SYS/PEER/V_+5_V_FAULT	Voltage	State Deasserted
/SYS/PEER/SERVICE	OEM	State Deasserted
/SYS/PEER/SP_FAULT	OEM	State Deasserted
/SYS/MB/HBA/PRSNT	Entity Presence	Present
/SYS/MB/P0/D0/PRSNT	Entity Presence	Present
/SYS/MB/P0/D1/PRSNT	Entity Presence	Present
/SYS/MB/P0/D2/PRSNT	Entity Presence	Present
/SYS/MB/P0/D3/PRSNT	Entity Presence	Present

Internet 100%

# ILOM: System Monitoring: Event Logs



The screenshot shows the Oracle(R) Integrated Lights Out Manager (ILOM) web interface in a Windows Internet Explorer browser. The address bar shows the URL <https://192.0.2.101/iPages/suntab.asp>. The page title is "Oracle(R) Integrated Lights Out Manager". The user is logged in as "root" with the role "aucro" and the SP Hostname is "orcdsys2-ilom". The page displays a "Warning" icon and a "1 Warning" message. The main navigation bar includes tabs for System Information, System Monitoring, Power Management, Storage, Configuration, User Management, Remote Control, and Maintenance. The "System Monitoring" tab is selected, and the "Event Logs" sub-tab is active. The "Event Log" section displays a table of events. The table has columns for Event ID, Class, Type, Severity, Date/Time, and Description. The events listed are:

Event ID	Class	Type	Severity	Date/Time	Description
961	Audit	Log	minor	Tue Jul 3 20:42:01 2012	root : Close Session : object = "/SP/session/type" : value = "www" : success
960	Sensor	Log	minor	Tue Jul 3 20:36:36 2012	OEM : /SYS/PEER/HOST_POWER : State Asserted
959	Audit	Log	minor	Tue Jul 3 20:36:11 2012	root : Close Session : object = "/SP/session/type" : value = "www" : success
958	Audit	Log	minor	Tue Jul 3 20:34:17 2012	KCS Command : Clear Message Flags : success
957	Audit	Log	minor	Tue Jul 3 20:34:17 2012	KCS Command : Set BMC Global Enables : enable flags = 0x0 : success
956	IPMI	Log	minor	Tue Jul 3 20:28:50 2012	ID = 206 : 07/03/2012 : 20:28:50 : System Firmware Progress : BIOS : System boot initiated : Asserted
955	IPMI	Log	minor	Tue Jul 3	ID = 205 : 07/03/2012 : 20:28:42 : System Firmware Progress : BIOS : Option ROM



# ILOM: User Management: Active Sessions



Oracle(R) Integrated Lights Out Manager - Windows Internet Explorer

https://192.0.2.101/iPages/suntab.asp Certificate Error Yahoo! Search

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Oracle(R) Integrated Lights Out Manager

ABOUT 1 Warning REFRESH LOG OUT

User: root Role: aucro SP Hostname: orcdsys2-ilom

**Oracle® Integrated Lights Out Manager**

System Information System Monitoring Power Management Storage Configuration User Management Remote Control Maintenance

Active Sessions User Accounts LDAP LDAP/SSL RADIUS Active Directory

**Active Sessions**

View the users currently logged in to ILOM, and the type of session they initiated.

User Name	Role	Start Time	Type	Mode
root	Admin, User Management, Console, Reset and Host Control, Read Only (aucro)	Tue Jul 3 20:20:50 2012	web	normal
root	Admin, User Management, Console, Reset and Host Control, Read Only (aucro)	Tue Jul 3 20:25:51 2012	web	normal
host_root	Admin, User Management, Console, Reset and Host Control, Read Only (aucro)	Tue Jul 3 20:35:35 2012	-	normal

# ILOM: User Management: LDAP / SSL



The screenshot shows the Oracle Integrated Lights Out Manager (ILOM) web interface in a Windows Internet Explorer browser. The address bar shows the URL <https://192.0.2.101/Pages/suntab.asp>. The browser displays a "Certificate Error" warning. The ILOM interface has a top navigation bar with tabs for System Information, System Monitoring, Power Management, Storage, Configuration, User Management, Remote Control, and Maintenance. The "User Management" tab is selected, and within it, the "LDAP/SSL" sub-tab is active. The main content area is titled "LDAP/SSL Management" and contains instructions for configuring LDAP/SSL settings. Below the instructions are expandable sections for Settings, Certificate Information, Admin Groups, Operator Groups, Custom Groups, User Domains, and Alternate Servers. The "Settings" section is expanded, showing options for State (Enabled/Disabled), Roles (None (server authorization), Admin (a), User Management (u), Console (c), Reset and Host Control (r), Read Only (o), Service (s)), and Address (0.0.0.0).

Oracle(R) Integrated Lights Out Manager - Windows Internet Explorer

https://192.0.2.101/Pages/suntab.asp Certificate Error Yahoo! Search

Webroot File Edit View Favorites Tools Help

Oracle(R) Integrated Lights Out Manager

ABOUT 1 Warning REFRESH LOG OUT

User: root Role: auro SP Hostname: orclsys2-ilom

Oracle® Integrated Lights Out Manager

System Information System Monitoring Power Management Storage Configuration User Management Remote Control Maintenance

Active Sessions User Accounts LDAP LDAP/SSL RADIUS Active Directory

**LDAP/SSL Management**

Configure LDAP/SSL settings on this page. Select default roles for all LDAP users, either Administrator, Operator, Advanced or none(server authorization). Enter the Hostname or IP address of your server. To change the port used to communicate with your server, uncheck *Autoselect*. Enter a timeout value in seconds. Use the log detail levels to control the amount of debug information sent to the log. To load a certificate, fill in the Certificate File Upload information and click Load Certificate to complete the process.

Settings Certificate Information Admin Groups Operator Groups Custom Groups User Domains Alternate Servers

**Settings**

State: ☐ Enabled

Roles: None (server authorization) Admin (a) User Management (u) Console (c) Reset and Host Control (r) Read Only (o) Service (s)

Address: 0.0.0.0 IP Address or Hostname

# Remote Control: Host Control: Remote Console

A screenshot of the Oracle(R) Integrated Lights Out Manager Remote Console window. The window has a title bar with the text "Oracle(R) Integrated Lights Out Manager Remote Console" and standard window controls. Below the title bar is a menu bar with "Redirection", "Devices", "Keyboard", "Video", and "Help". A tab labeled "192.0.2.101" is active. The main area displays a black terminal window with white text showing system boot logs. The logs include messages about swap, root device creation, filesystem recovery, journaling, and SELinux status, ending with a "Welcome to Enterprise Linux Server" prompt.

```
Oracle(R) Integrated Lights Out Manager Remote Console
Redirection Devices Keyboard Video Help
192.0.2.101
..No suspend signature on swap, not resuming.
Creating root device.
Mounting root filesystem.

EXT3-fs: INFO: recovery required on readonly filesystem.
EXT3-fs: write access will be enabled during recovery.
....
kjournald starting. Commit interval 5 seconds
EXT3-fs: recovery complete.
EXT3-fs: mounted filesystem with ordered data mode.
Setting up other filesystems.
Setting up new root fs
no fstab.sys, mounting internal defaults
Switching to new root and running init.
unmounting old /dev
unmounting old /proc
unmounting old /sys
SELinux: Disabled at runtime.
SELinux: Unregistering netfilter hooks
.
type=1404 audit(1341398105.123:2): selinux=0 auid=4294967295 ses=4294967295
INIT: version 2.86 booting
       Welcome to Enterprise Linux Server
       Press 'I' to enter interactive startup.
Starting udev
```

# ILOM Warning Message



From: ilom-alert@10.102.2.125  
To: DSDBA  
Cc:  
Subject: dcdarac01bp-ilom:Log:ActDir:critical

Sent: Thu 9/27/2012 2:50 PM

(ActDir) \_BindAUser: bind error. -1:-1, Can't contact LDAP server. Check cert-file, network connectivity, local date/time



# Full Support for High Availability

---



- RAC
- Data Guard
- RMAN
- Streams
- OEM Cloud Control 12c
  - Diagnostic Pack
  - Tuning Pack
  - Data Masking Pack

# One Button Solutions

---



- Fully scripted, one button, solutions, for
  - Build
  - Secure
  - Migration
  - Bare Metal Restore
  - Data Guard
  - GoldenGate
  - RMAN Backup

# Support Center



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Document Display

Search: ODA STIG

1 - 2 Back to Results

- Place holder for STIG Implementation Script for Oracle Database Appliance
- Information Center: Oracle Database Appliance

Information Center: Oracle Database Appliance [ID 1449552.2]

Content Refreshed: 27 Jun 2012

**Information Centers**

- Overview
- Hot Topics
- Resources
- Sun System Handbook
- Hardware Compatibility Lists

**Refine Search By Task**

- Use Product
- Troubleshoot
- Patching And
- Maintenance
- Install And Configure
- Upgrade
- Optimize Performance

**Alerts**

View the most up-to-date high impact and urgent issues for your product.?

- o ALERT - ODA (Oracle Database Appliance) Mandatory OAK Patch 2.1.0.3.1 [Document 1452085.1 Updated: 04/23/2012]

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Read recently published news and announcements about your product.

No Results

**New Knowledge Documents**

Read recently published documents about your product

- o Oracle Database Appliance FAQ [Document 1463638.1 Updated: 06/05/2012]
- o How to use a separate Linux machine as your RPM repository to download and apply RPM's

**New Troubleshooting and Problem-Solution Documents**

Read recently published Troubleshooting and Problem-Solution documents about your product

- o NEW ODA SETUP: FAILS WITH DOMAINNAME OF "EXAMPLE", NOT EXAMPLE.COM [Document 1455719.1 Updated: 05/04/2012]
- o DBUA (DataBase Upgrade Assistant) failing with "Cannot find the ORACLE\_HOME for the database" on ODA (Oracle Database Appliance)

# STIG Download



## ☆ Oracle Database Appliance DoD C&A STIG [ID 1456609.1]

⬇ To Bottom

Modified: Jul 18, 2012   Type: README   Status: PUBLISHED   Priority: 3

💬 Comments (0)



### In this Document

[Main Content](#)

[References](#)

### Applies to:

Oracle Database Appliance  
Generic Linux

### Main Content

The Department of Defense(DoD) DISA Information Assurance Process includes Certification and Accreditation(C&A) including the Security Technical Implementation Guides(STIGs). These are guidelines and scripts that are run to advise on securing and locking down database, operating system, application servers, and other system components.

Currently, DoD customers are running various Oracle products that go through the DoD C&A process including the STIG process. General STIG Information is available at: - <http://iase.disa.mil/stigs/>

The Oracle Database Appliance(ODA) is a fully integrated system of software, servers, storage, and networking in a single box that delivers high-availability database services. Oracle engineered Oracle Database Appliance for simplicity. Accordingly, Oracle aims to provide a more simplified configuration and patching process.



# STIG Script



- **STIG Script Syntax**
  - The script logs its actions in the `"/opt/oracle/oak/log//hostname/stig/"` directory
  - **-check** checks the system for guideline violations
  - **-force** re-runs the script even if there are no violations
  - **-fix** used to implement guideline recommendations
  - lock and unlock options can be used to enable or disable direct ssh logging as root. Direct ssh login as root is required for Patching and therefore before patching, the unlock needs to be executed.

## Sample usage

```
#./stig.sh -fix
```

# STIG Script Output: Category 1



```
2012-06-28 01:18:12 : Running stig script version: '1.0'
2012-06-28 01:18:12 : Executing script : ./stig.sh -check
2012-06-28 01:18:12 : Checking for stig violations on system 'orclsys1'
```

## 2012-06-28 01:18:12 : List of Category-1 stig violation found by script

```
2012-06-28 01:18:12 : [STIG ID : LNX00140] : [CHECK] : Password for grub not enabled : FOUND
2012-06-28 01:18:12 : [STIG ID : GEN004640] : [CHECK] : sendmail decode command is not commented in /etc/aliases : FOUND
2012-06-28 01:18:12 : [STIG ID : LNX00320] : [CHECK] : Privilege account 'shutdown' is present : FOUND
2012-06-28 01:18:12 : [STIG ID : LNX00320] : [CHECK] : Privilege account 'halt' is present : FOUND
2012-06-28 01:18:12 : [STIG ID : LNX00580] : [CHECK] : Ctrl-Alt-Del combination to shutdown system is enabled : FOUND
2012-06-28 01:18:13 : [STIG ID : 2006-T-0013] : [CHECK] : RealVNC rpm is installed on system : FOUND
2012-06-28 01:18:13 : [STIG ID : LNX00040] : [CHECK] : Support for usb device found in kernel : FOUND
```

## 2012-06-28 01:18:13 : List of Category-2 stig violation found by script

```
2012-06-28 01:18:13 : [STIG ID : GEN000020] : [CHECK] : Single user mode boot is enabled without a password : FOUND
2012-06-28 01:18:13 : [STIG ID : GEN000340] : [CHECK] : Non privileged account oprofile found on system : FOUND
2012-06-28 01:18:13 : [STIG ID : GEN000340] : [CHECK] : Non privileged account avahi-autoipd found on system : FOUND
2012-06-28 01:18:13 : [STIG ID : GEN000460] : [CHECK] : pam_tally not used to lock account after 3 consecutive failed logins : FOUND
2012-06-28 01:18:13 : [STIG ID : GEN000800] : [CHECK] : remember not used in PAM configuration files : FOUND
2012-06-28 01:18:13 : [STIG ID : GEN000600] : [CHECK] : Force of at least one lower case character is not set for password : FOUND
2012-06-28 01:18:13 : [STIG ID : GEN000600] : [CHECK] : Force of at least one upper case character is not set for password : FOUND
2012-06-28 01:18:13 : [STIG ID : GEN000620] : [CHECK] : Force of at least one numeric character is not set for password : FOUND
2012-06-28 01:18:13 : [STIG ID : GEN000640] : [CHECK] : Force of at least one special character is not set for password : FOUND
2012-06-28 01:18:13 : [STIG ID : GEN000480] : [CHECK] : Login delay is not enabled in /etc/pam.d/system-auth : FOUND
2012-06-28 01:18:13 : [STIG ID : GEN000700] : [CHECK] : Maximum age for a password change is more than 60 days : FOUND
2012-06-28 01:18:13 : [STIG ID : GEN000540] : [CHECK] : Password can be changed more than once in 24 hours : FOUND
2012-06-28 01:18:13 : [STIG ID : GEN000580] : [CHECK] : Password length is less than 8 characters : FOUND
2012-06-28 01:18:13 : [STIG ID : GEN001120] : [CHECK] : Direct login as root is enabled from ssh : FOUND
2012-06-28 01:18:13 : [STIG ID : GEN002100] : [CHECK] : ekshell supported by the pam.rhost : FOUND
2012-06-28 01:18:13 : [STIG ID : GEN002960] : [CHECK] : Access to cron is not through cron.allow and cron.deny : FOUND
2012-06-28 01:18:13 : [STIG ID : GEN003080] : [CHECK] : Permission of file /etc/crontab is more permissive than octal 600 : FOUND
2012-06-28 01:18:13 : [STIG ID : GEN003200] : [CHECK] : Permission of file /etc/cron.deny is more permissive than octal 600 : FOUND
2012-06-28 01:18:13 : [STIG ID : GEN005400] : [CHECK] : Permission of file /etc/syslog.conf is more permissive than octal 640 : FOUND
2012-06-28 01:18:13 : [STIG ID : GEN000920] : [CHECK] : Permission of directory /root is more permissive than octal 700 : FOUND
2012-06-28 01:18:13 : [STIG ID : GEN003865] : [CHECK] : tcpdump rpm is installed on system : FOUND
2012-06-28 01:18:13 : [STIG ID : GEN004000] : [CHECK] : Permission of file /bin/traceroute is more permissive than octal 700 : FOUND
2012-06-28 01:18:13 : [STIG ID : LNX00340] : [CHECK] : Unnecessary account ftp found on system : FOUND
```

## 2012-06-28 01:18:35 : List of Category-3 stig violation found by script

```
2012-06-28 01:18:35 : [STIG ID : GEN004560] : [CHECK] : sendmail version is not hidden. : FOUND
```



---

# However

# However



- We MAY want to preserve the 4TB ASM disk for data
- We may want more storage for
  - FRA, Flashback DB files, RMAN files ...
  - Clone
  - Data Masking
  - Real Application Testing
  - Staging
  - Logs
  - And so on



# Data Masking Pack

---



- Offers the ability to mask regulated or confidential data on test and development systems
- Mask format libraries
- Mask definitions
- Masking techniques
  - Condition-based masking
  - Compound masking
  - Deterministic masking
- Application masking templates import or export
- Mask format library import or export
- Masking script generation
- Clone and Mask workflow

Source: Linux Today: 2009

# Choices

---



- ASM
  - Raw devices
- Clustered Storage
  - Which one? OCFS2, VxFS, ...
- Non-Clustered Storage
  - Non-blocking visibility on both nodes
  - dNFS, CIFS ...

# ASM?

---



- Excellent decision for database storage
- Perhaps not optimal as a file system
  - ACFS?
- Requires raw disk to be presented to ODA
- Traditional HBA discussion

# Clustered File System?

---



- Several CFS available for Linux
  - Need expertise
  - Wire it yourself
  - Tech concerns
    - File sizes
    - File counts
- Still traditional HBA discussion

# Non-clustered File System?

---



- Local File System
  - May be suitable for some applications,
    - But we have two separate hosts in ODA
  - Standard Linux-oriented
    - Still traditional HBA discussion
  
- [d]NFS
  - Vendor: NetApp, Oracle ZFS Appliance
  - OpenFiler?



# Additional concern – silent corruption



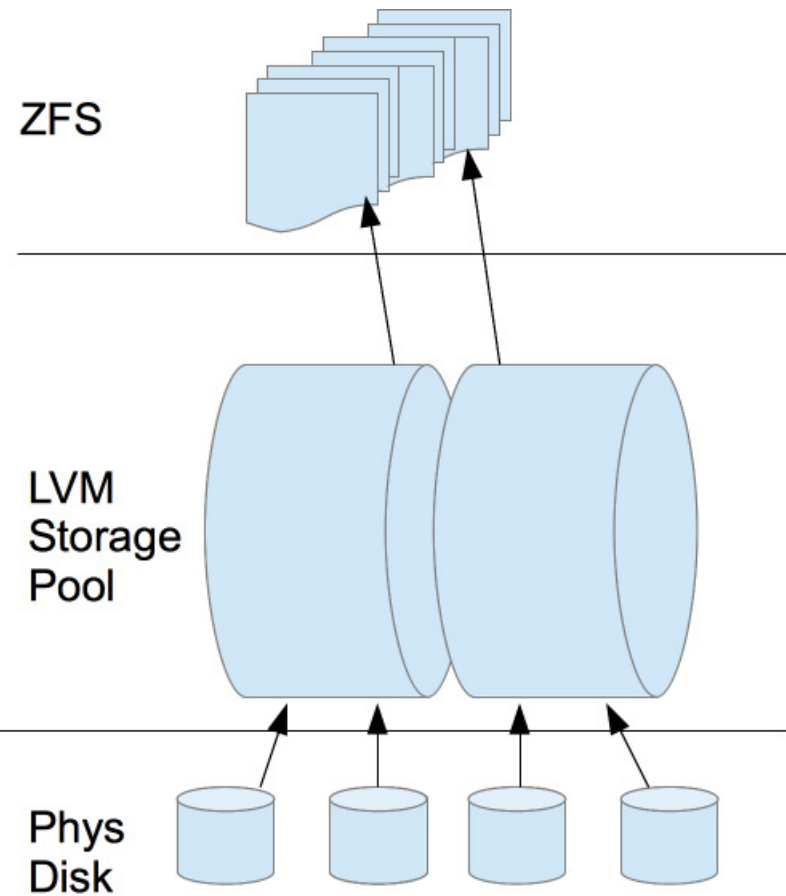
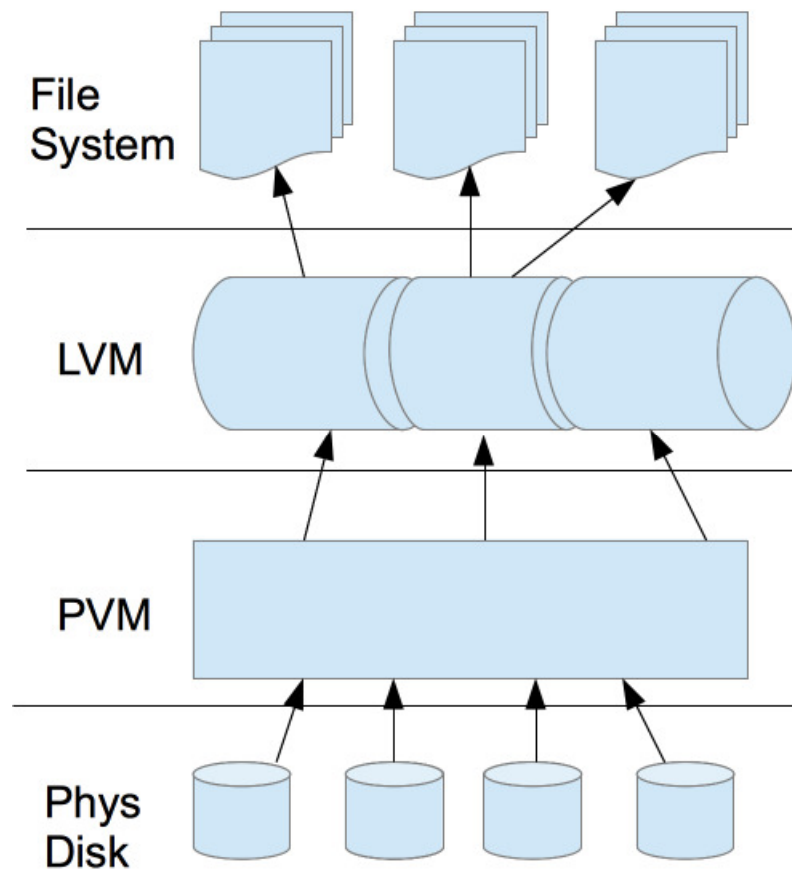
- An undetected or uncorrectable error can occur on average once every 10-20 TB of data storage OR transfer
  - In modern systems that could mean a corruption in a little as 15 minutes
- ZedFS was designed to combat this challenge
  - Checksum on all blocks
  - Copy on Write (preserve original block, not write in place)
  - Hot spares in pool
  - Auto-healing from ZFS mirror
  - Scrub instead of fsck
    - Monthly (or weekly for consumer disks)

# Additional concern – silent corruption



- An undetected or uncorrectable error can occur on average once every 10-20 TB of data storage OR transfer
  - In modern systems that could mean a corruption in a little as 15 minutes
- ZFS was designed to combat this challenge
  - Checksum on all blocks
  - Copy on Write (preserve original block, not write in place)
  - Hot spares in pool
  - Auto-healing from ZFS mirror
  - Scrub instead of fsck
    - Monthly (or weekly for consumer disks)

# Traditional File System stack vs ZFS



# Quick Notes

---



- RAID
  - ZFS cannot fully protect the user's data when using a hardware RAID controller, as it is not able to perform the automatic self-healing unless it controls the redundancy of the disks and data.
  - Instead, ZFS provides its own RAID counterparts within the Storage Pool
- ZFS provides a hot-spare storage pool manager and a 128-bit, Copy on Write File System
- Capacity
  - Single file: 16 exabytes
  - Files in a pool: 264
  - Disks in a pool: 264
  - Pools in a system: 264

# Where do you want to invest your time and treasure?

---



- Reinventing the wheel?
- Designing physical architecture?
- Applying one-off patches?
- Becoming Linux security experts?
- Writing shell scripts?

or would you rather be ...

- Managing your applications, users, and data?
- Optimizing your applications to maximize customer satisfaction?





# ZFS Storage Appliance

# ZFS Storage Appliance

---



- ZFS file system with advanced error detection and self-healing capabilities
- Integrated with Oracle Engineered Systems
- Both ZFS Deduplication and Compression or Hybrid Columnar Compression
- Hybrid Storage Pools
- Simultaneous multiprotocol support across multiple network interconnects, including GbE, 10 GbE, fibre channel and InfiniBand
- Integrated with OEM Grid Control
- Web-based storage management
- Integrated real-time storage analytics

# What is a ZFS Appliance?



- Enterprise class Network Attached Storage (NAS)
- Choose the size that meets your needs
- Hybrid Columnar Compression (w/o an Exadata)
- Hybrid storage pools for DRAM and Flash caches
- DTrace storage analytics
- Use for
  - Backup and Restore
  - Cloning
  - Data Masking



# ZFS Configurations



Sun ZFS Storage Appliance Configurations						
	Key Requirement	Maximum Storage Capacity	Space (Rack Units)	Write Optimized Flash	Read Optimized Flash	Cluster Option
Sun ZFS Storage 7120	Low-priced entry-level system with all software features	177 TB	2U/controller, 4U/disk shelf	73 GB	N	N
Sun ZFS Storage 7320	Entry-level cluster option for high availability	432 TB	1U/controller, 4U/disk shelf	Up to 1.2 TB	Up to 2 TB per controller	Y
Sun ZFS Storage 7420	Best price/performance	1.73 PB	3U/controller, 4U/disk shelf	Up to 7.0 TB	Up to 2 TB per controller	Y

# ZFS Specifications



Sun ZFS Storage Appliance Specifications			
	Sun ZFS Storage 7120	Sun ZFS Storage 7320	Sun ZFS Storage 7420
<b>Architecture</b>			
Processor	1x 4-core 2.4 GHz Intel® Xeon® Processor	2x 4-core 2.4 GHz Intel® Xeon® Processor, per controller	4x 8-core 2.0 GHz or 10-core 2.4GHz Intel® Xeon® Processors per controller
Main memory	48 GB	Up to 144 GB per controller	Up to 1 TB per controller
<b>Base Configurations</b>			
Configuration options	<ul style="list-style-type: none"> <li>• 3.3 TB to 177 TB using either high-speed (15,000 RPM) or high-capacity (7,200 RPM) SAS-2 disks</li> <li>• Controller contains 11 HDDs and one SSD cache, supports up to two additional disk shelves with 24 disks each (300 GB, 600 GB, 2 TB, or 3 TB)</li> </ul>	<ul style="list-style-type: none"> <li>• 6 TB to 432 TB using either high-speed (15,000 RPM) or high-capacity (7,200 RPM) SAS-2 disks</li> <li>• Supports up to six disk shelves with 20 or 24 disks each (300 GB, 600 GB, 2 TB, or 3 TB) and up to four optional write-optimized SSDs per shelf</li> </ul>	<ul style="list-style-type: none"> <li>• 6 TB to 1.73 PB using either high-speed (15,000 RPM) or high-capacity (7,200 RPM) SAS-2 disks</li> <li>• Supports up to 24 disk shelves with 20 or 24 disks each (300 GB, 600 GB, 2 TB, or 3 TB) and up to four optional write-optimized SSDs per shelf</li> </ul>



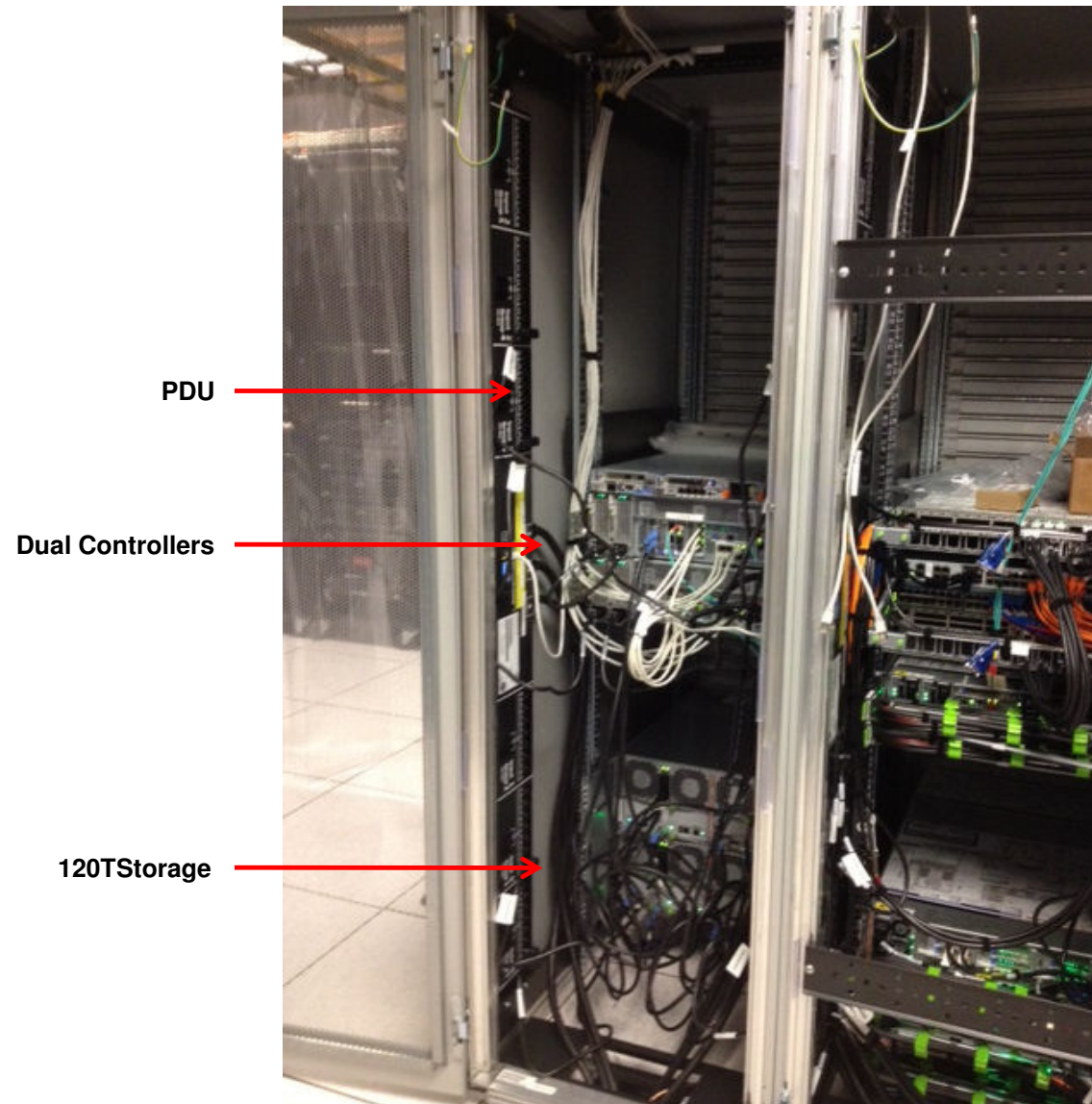
# ZFS In The Data Center



# ZFS 7420



# ZFS Internals





# ZFS BUI: Config Services



Sun ORACLE SUN ZFS STORAGE 7420 The cluster peer has rejoined the cluster. LOGOUT HELP Dismiss

Configuration Maintenance Shares Status Analytics

SERVICES STORAGE NETWORK SAN CLUSTER USERS PREFERENCES ALERTS

Services

### Data Services

NFS	Online	2012-10-10 09:28:04	⚙️ ⏻
iSCSI	Disabled	2012-9-25 16:19:08	⚙️ ⏻
SMB	Disabled	2012-9-25 16:19:15	⚙️ ⏻
FTP	Disabled	2012-9-20 17:49:03	⚙️ ⏻
HTTP	Disabled	2012-9-20 17:49:03	⚙️ ⏻
NDMP	Disabled	2012-9-25 16:19:21	⚙️ ⏻
Remote Replication	Online	2012-9-20 17:49:50	⚙️ ⏻
Shadow Migration	Online	2012-9-20 17:49:50	⚙️ ⏻
SFTP	Online	2012-9-21 18:50:18	⚙️ ⏻
SRP	Disabled	2012-9-20 17:49:03	⚙️ ⏻
TFTP	Disabled	2012-9-20 17:49:54	⚙️ ⏻
Virus Scan	Disabled	2012-9-20 17:49:03	⚙️ ⏻

### Directory Services

NIS	Disabled	2012-9-25 16:12:36	⚙️ ⏻
LDAP	Online	2012-9-25 16:12:36	⚙️ ⏻
Active Directory	Online	2012-9-25 15:59:30	⚙️ ⏻
Identity Mapping	Online	2012-9-25 15:56:16	⚙️ ⏻

### System Settings

DNS	Online	2012-9-25 16:12:36	⚙️ ⏻
IPMP	Online	2012-9-20 17:49:51	⚙️ ⏻
NTP	Online	2012-9-24 14:23:46	⚙️ ⏻
Phone Home	Disabled	2012-9-20 17:49:50	⚙️ ⏻
Dynamic Routing	Online	2012-10-8 14:53:10	⚙️ ⏻
Service Tags	Online	2012-9-20 17:49:50	⚙️ ⏻
SMTP	Online	2012-9-25 16:12:36	⚙️ ⏻
SNMP	Online	2012-9-21 18:39:52	⚙️ ⏻
Syslog	Online	2012-9-21 18:20:47	⚙️ ⏻
System Identity	Online	2012-9-20 17:52:32	⚙️ ⏻

### Remote Access

SSH	Online	2012-9-20 17:52:33	⚙️ ⏻
-----	--------	--------------------	------

# ZFS BUI: Config Storage



SUN ZFS STORAGE 7420

The cluster peer has rejoined the cluster.

LOGOUT HELP  
Dismiss

Confirm that all devices are present and minimally functional, and allocate them to a storage pool.

ABORT COMMIT

Verify and allocate devices Step 1 of 2

Devices may be added on a per-device basis, however SATA devices in SAS-1 enclosures may be added in half- or whole-chassis units only. While affected devices may be allocated, they will not be available for use and cannot be added later without reconfiguring the pool; for best results, defer configuring storage until any problems can be repaired. Mixing devices of differing speeds within a storage pool is strongly discouraged.

NAME	MODEL	RPM	DATA	LOG	CACHE
c0zfs742001p	Sun ZFS Storage 7420	--	-	-	-
1235FMD003	Sun Disk Shelf (SAS-2)	7200	5 (49.1T)	-	-
1235FMD002	Sun Disk Shelf (SAS-2)	7200	18 (49.1T)	-	-

0  
1  
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4  
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7  
8  
9  
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12  
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15  
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17  
18



# ZFS BUI: Config Storage



SUN ZFS STORAGE 7420

The cluster peer has rejoined the cluster.

LOGOUT HELP  
Dismiss

Confirm that all devices are present and minimally functional, and allocate them to a storage pool.

ABORT COMMIT

## Choose Storage Profile

Step 2 of 2

Configure available storage into a pool by defining its underlying redundancy profile. Carefully read the profile descriptions to understand how each balances the inherent trade-offs between availability, performance, and capacity, and select the profile that best fits your workload. If available, NSPF indicates no single point of failure, which affords certain profiles the ability for a pool to survive through loss of a single disk shelf.

### Storage Breakdown

Data	18.8T
Parity	5.46T
Reserved	306G
Spare	2.73T

### Data Profile

TYPE ^	NSPF	AVAILABILITY	PERFORMANCE	CAPACITY	SIZE
Double parity	No	<div><div></div><div></div><div></div><div></div><div></div></div>	<div><div></div><div></div><div></div><div></div><div></div></div>	<div><div></div><div></div><div></div><div></div><div></div></div>	18.8T
Mirrored	Yes	<div><div></div><div></div><div></div><div></div><div></div></div>	<div><div></div><div></div><div></div><div></div><div></div></div>	<div><div></div><div></div><div></div><div></div><div></div></div>	10.7T
Mirrored	No	<div><div></div><div></div><div></div><div></div><div></div></div>	<div><div></div><div></div><div></div><div></div><div></div></div>	<div><div></div><div></div><div></div><div></div><div></div></div>	10.7T
Single parity, narrow stripes	No	<div><div></div><div></div><div></div><div></div><div></div></div>	<div><div></div><div></div><div></div><div></div><div></div></div>	<div><div></div><div></div><div></div><div></div><div></div></div>	16.1T
Striped	No	<div><div></div><div></div><div></div><div></div><div></div></div>	<div><div></div><div></div><div></div><div></div><div></div></div>	<div><div></div><div></div><div></div><div></div><div></div></div>	26.9T
Triple mirrored	Yes	<div><div></div><div></div><div></div><div></div><div></div></div>	<div><div></div><div></div><div></div><div></div><div></div></div>	<div><div></div><div></div><div></div><div></div><div></div></div>	8.06T
Triple mirrored	No	<div><div></div><div></div><div></div><div></div><div></div></div>	<div><div></div><div></div><div></div><div></div><div></div></div>	<div><div></div><div></div><div></div><div></div><div></div></div>	8.06T
Triple parity, wide stripes	No	<div><div></div><div></div><div></div><div></div><div></div></div>	<div><div></div><div></div><div></div><div></div><div></div></div>	<div><div></div><div></div><div></div><div></div><div></div></div>	16.1T

### Disk Breakdown

Data + Parity	9 disks
Spare	1 disks
Log	0 disks
Cache	0 disks

### Data profile: Double parity

Each array stripe contains two parity disks, yielding high availability while increasing capacity over mirrored configurations. Double parity striping is recommended for workloads requiring little or no random access, such as backup/restore.

# ZFS BUI: Config Network Config



The screenshot shows the Sun ZFS Storage 7420 Network Configuration interface. The top navigation bar includes tabs for Configuration, Maintenance, Shares, Status, and Analytics. Below this is a sub-navigation bar with tabs for SERVICES, STORAGE, NETWORK (selected), SAN, CLUSTER, USERS, PREFERENCES, and ALERTS. The main content area is titled "Network" and includes a "Configuration" tab, "Addresses" tab, and "Routing" tab. A "REVERT" and "APPLY" button are present. The interface displays three main sections: Devices (12 total), Datalinks (4 total), and Interfaces (4 total). The Devices section is divided into Built-in (igb0, igb1, igb2, igb3) and PCIe (3, 6, 7, 2) sections. The Datalinks section shows connections between devices. The Interfaces section shows network interfaces with their respective IP addresses and MTU settings.

Section	Item	Status	
Devices (12 total)	<b>BUILT-IN</b>		
	igb0	1Gb (full)	
	igb1	1Gb (full)	
	igb2	link down	
	igb3	link down	
	<b>PCIe 3</b>		
	ixgbe0	10Gb (full)	
	ixgbe1	link down	
	<b>PCIe 6</b>		
	ixgbe2	10Gb (full)	
	ixgbe3	link down	
	<b>PCIe 7</b>		
ibp2	port down		
ibp3	port down		
<b>PCIe 2</b>			
ibp0	port down		
ibp1	port down		

Section	Item	Status
Datalinks (4 total)	igb0	via igb0
	igb1	via igb1
	ixgbe0	Custom MTU(9000), via ixgbe0
	ixgbe2	Custom MTU(9000), via ixgbe2

Section	Item	Status
Interfaces (4 total)	head1 net0	IPv4 static, 192.168.40.248/22, via igb0
	head2 net1	IPv4 static, 192.168.40.249/22, via igb1
	private10gb	IPv4 static, 10.221.112.49/24, via ixgbe0
	private10gb2	IPv4 static, 10.221.112.50/24, via ixgbe2

# ZFS BUI: Configuration Services LDAP



The screenshot shows the Sun ZFS Storage 7420 BUI interface. At the top, the Sun and Oracle logos are on the left, and the user "Super-User@c0zfs742001p" with "LOGOUT" and "HELP" links is on the right. A navigation bar contains tabs for "Configuration", "Maintenance", "Shares", "Status", and "Analytics". Below this is a sub-navigation bar with "SERVICES", "STORAGE", "NETWORK", "SAN", "CLUSTER", "USERS", "PREFERENCES", and "ALERTS". The "Services" tab is selected, showing a "LDAP" service status as "Online" with a timestamp of "2012-10-11 12:30:32". A "Back to Services" link and "REVERT" and "APPLY" buttons are present. The "LDAP Directory Service" section includes a description and links for "See Also", "Help: LDAP", and "Wikipedia: LDAP". The configuration fields are as follows:

- Protect LDAP traffic with SSL/TLS: ☐
- Base search DN:
- Search scope: ☐ One-level (non-recursive), ☒ Subtree (recursive)
- Authentication method:
- Bind credential level: ☒ Anonymous, ☐ Proxy
- DN:
- Password:
- Self: ☐
- Schema definition: [Edit...](#)

Below the configuration fields is a "Servers" section showing "1 Total". A table lists the servers:

SERVER	CERTIFICATE	EXPIRES
perrito3.m1ib.com:389		



# ZFS BUI: Maintenance Logs



		Configuration	Maintenance	Shares	Status	Analytics
		HARDWARE		SYSTEM	PROBLEMS	LOGS
				WORKFLOWS		
<b>Alerts</b> 119 Total				100-119		
<b>ALERTS</b>		<b>FAULTS</b>		<b>SYSTEM</b>		
				<b>AUDIT</b>		
				<b>PHONE HOME</b>		
TIME	EVENT ID	DESCRIPTION				TYPE
2012-9-24 15:29:46	63714813-695f-c125-f88e-e434ebd2f7d	The system has finished scrubbing the ZFS pool 'GENERIC'.				Minor Alert
2012-9-24 15:29:46	a6838d57-8ee4-43d2-e42f-c695e62ccb0e	The system has begun scrubbing the ZFS pool 'GENERIC'.				Minor Alert
2012-9-24 15:14:54	4ada53dd-7124-cfc6-dbd1-c279f717d381	The system has finished scrubbing the ZFS pool 'RMANBACK'.				Minor Alert
2012-9-24 15:14:53	8e22aee9-a6b4-4c79-cbf9-f61bb1b5fe8d	The system has begun scrubbing the ZFS pool 'RMANBACK'.				Minor Alert
2012-9-24 14:23:44	2d5106de-ee58-c299-c247-8882df53fb7	Network connectivity via datalink ixgbe0 has been established.				Minor alert
2012-9-24 14:23:44	0a2e7265-49b1-cb50-e280-d1812ff449d1	Full IP connectivity via interface ixgbe0 has been established.				Minor alert
2012-9-24 14:23:44	cd81ccf9-8ee1-eb79-f46e-9e86513c2ad3	Network connectivity via port ixgbe0 has been established.				Minor alert
2012-9-24 14:23:30	985892eb-6a10-653d-c73a-d901f91f5443	Network connectivity via datalink ixgbe0 has been lost.				Major alert
2012-9-24 14:23:30	0d81abd7-c431-e3b4-835f-cfcc01170dac	IP connectivity via interface ixgbe0 has been lost due to link-based failure.				Major alert
2012-9-24 14:23:30	b979b7b9-9129-e2d5-ae44-b5bc6bc3c1ae	Network connectivity via port ixgbe0 has been lost.				Minor alert
2012-9-24 14:23:16	78d4a9b8-5664-44a9-afd7-d8eab505b33a	Full IP connectivity via interface ixgbe2 has been established.				Minor alert
2012-9-24 14:23:15	d8a8d18b-346c-665e-c9af-acef6acdd23c	Network connectivity via datalink ixgbe2 has been established.				Minor alert
2012-9-24 14:23:15	b55569fb-330b-496a-a619-cd30001473de	Network connectivity via port ixgbe2 has been established.				Minor alert
2012-9-24 14:23:10	9022ff22-7be1-e65c-f929-da96173fa21f	IP connectivity via interface ixgbe2 has been lost due to link-based failure.				Major alert
2012-9-24 14:23:10	d70af351-ca2a-cb6d-8a54-b6e9f1366c8b	Network connectivity via datalink ixgbe2 has been lost.				Major alert
2012-9-24 14:23:10	01c8f48b-06a9-c95c-d560-efe98a944f39	Full IP connectivity via interface ixgbe2 has been established.				Minor alert
2012-9-24 14:23:10	2246e904-22ad-4a40-ca2c-d5f5b2d357ec	Network connectivity via port ixgbe2 has been lost.				Minor alert
2012-9-24 14:23:10	ddcc68fb-eaef-4b7f-83a4-9ca3e75d0543	Network connectivity via datalink ixgbe2 has been established.				Minor alert
2012-9-24 14:23:10	de514e43-5839-6b58-92a3-e31a44caeb06	Network connectivity via port ixgbe2 has been established.				Minor alert
2012-9-24 14:23:10	68f550f6-d4f2-c76e-ea2b-babf8d03c455	IP connectivity via interface ixgbe2 has been lost due to link-based failure.				Major alert

# ZFS BUI: Configuration Alerts



**Sun ORACLE** SUN ZFS STORAGE 7420 Super-User@c0zfs742001p LOGOUT HELP

**Configuration** Maintenance Shares Status Analytics

SERVICES STORAGE NETWORK SAN CLUSTER USERS PREFERENCES ALERTS

**Alert actions** Threshold alerts

**About Alerts**  
Configure how the system responds to alert events: sending email, sending SNMP traps, suspending and resuming Analytics. Threshold alerts are posted in response to observed changes in Analytics statistics.

No alert actions defined.  
Click the + button above to add an alert action.

**Add alert action** CANCEL ADD

**Events**

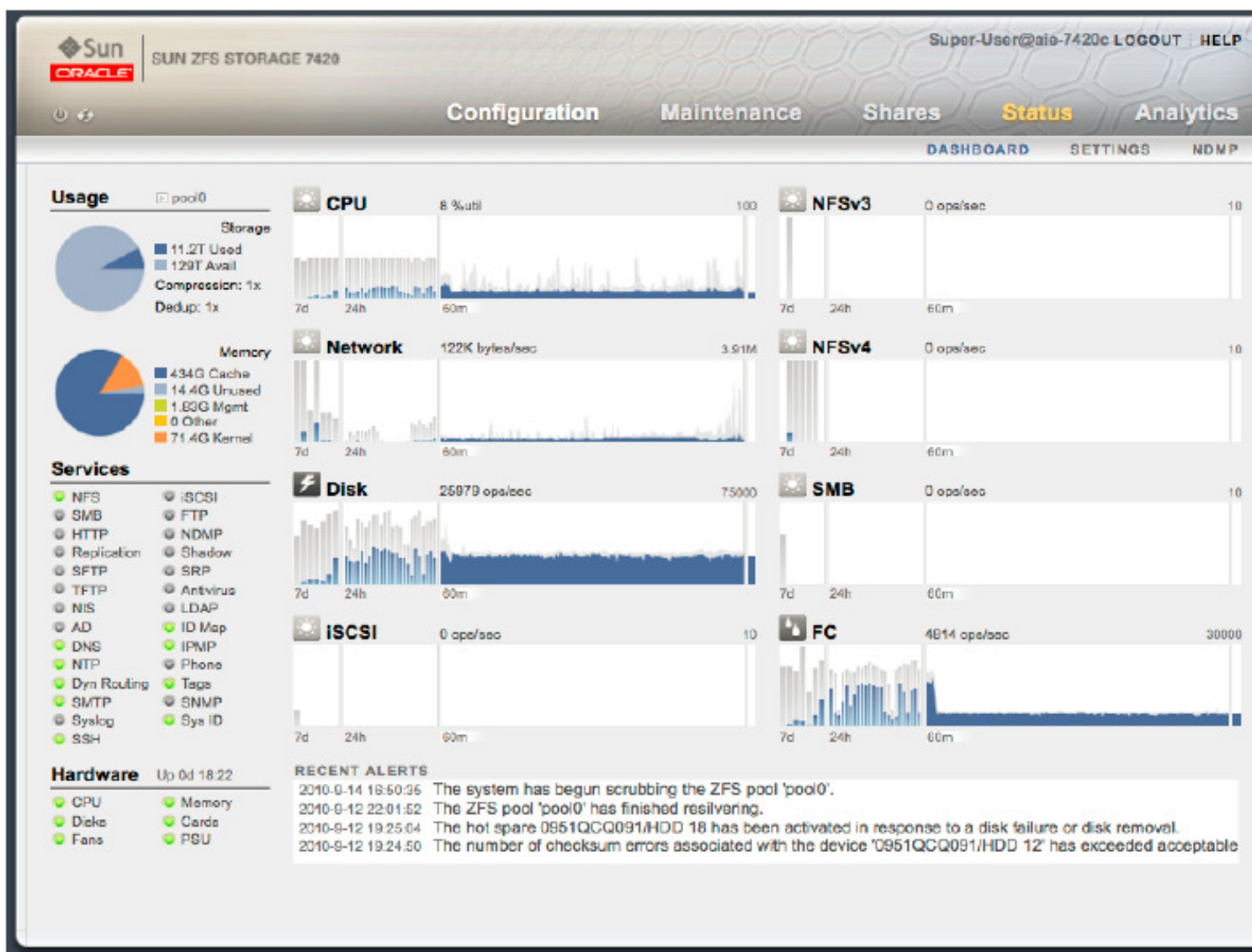
Category: Active Directory

Events: Active Directory, All events, Appliance Software, Cluster, Custom, Hardware events, Hardware faults, NDMP operations, NDMP: backup only, NDMP: restore only, Network, Phone home, Remote replication, Remote replication: source only, Remote replication: target only, Service Failures, Shadow migration events, Thresholds, ZFS pool

**Alert actions**

Send email TEST Send to Subject

# ZFS Storage Appliances



Daniel Morgan | [damorgan12c@gmail.com](mailto:damorgan12c@gmail.com) | [morganslibrary.org](http://morganslibrary.org)

Integrating Oracle Database Appliance with Sun ZFS Appliance to Achieve HA Security Presented: Ottawa Oracle User Group - 20 November, 2012



# How Does This Change Our Jobs?



Job Title	Loses	Gains
Storage Admins	Time wasted monitoring competing loads on the storage appliance balancing competing need to read/write cache, and allocation of disk.	More efficient storage environment as it is all file system.
Network Admins	Pain and suffering	Time to devote to troubleshooting, security monitoring, and other value-added tasks.
System Admins	<ul style="list-style-type: none"><li>▪ Gives up appliance root password</li><li>▪ Gives up 2:00am support calls</li></ul>	
Database Admins		Patching operating system, firmware, and database as a single unit with patches previously tested for compatibility

**Your ODA is not a general purpose computer, will not be hosting files, applications, middleware, etc.**

# How Does This Change Our Jobs?

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- Storage Admin
  - No longer required
- Network Admin
  - Only required for public network interface
- System Admin
  - Advise on configuration
  - Install backup agent (ie NetWorker)
  - Install security software (ie TripWire)
- DBA
  - Just like with ASM ... assumes broader responsibility for deployment and patching
  - Gives up large amounts of unproductive time debugging configurations

# Questions

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**ERROR at line 1:  
ORA-00028: your session has been killed**



Thank you