

# High Availability and OEM GRID Control

Rob Zoetewei  
Zoetewei Consulting

# HA and OEM GRID Control

## ▶ Agenda

- High Availability – What's that?
- System monitoring and detection of errors
- Monitoring of Database Health
- Wrap Up
- Q & A

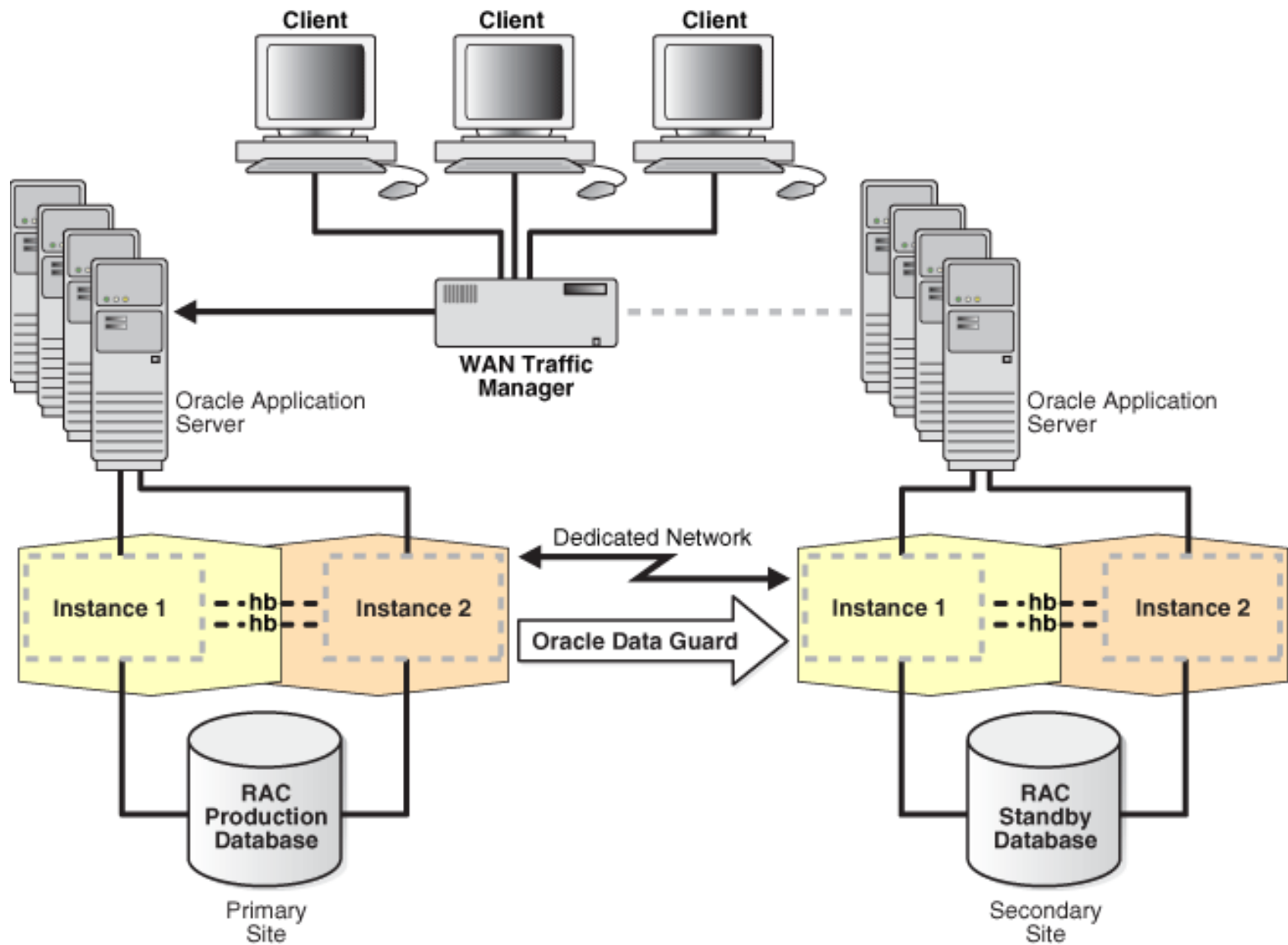
# High Availability

- ▶ What is High Availability?
  - Degree to which an application, service or functionality is available upon user demand
  - Measured by the perception of an application's end user!

# High Availability

## ▶ Primary characteristics

- Reliability
  - Hardware, Software – Database, Webserver etc.
- Recoverability
  - Does your architecture provide the ability to recover in the time specified in a SLA?
- Timely error detection
  - Fast detection is an essential component in recovering from a possible unexpected failure
- Continuous operations
  - Continuous access to your data is essential when very little or no downtime is acceptable



Heartbeat - - - hb - - -

# High Availability

- ▶ Oracle Maximum Availability Architecture (MAA)
- ▶ Best Practices (An Example)
  - Identically configured primary and secondary sites
  - Primary Site – Multiple application servers and a production database using RAC
  - Secondary Site – Similarly configured application servers and a physical standby database kept synchronized with the primary database by Oracle Data Guard.

# High Availability

- ▶ Oracle Maximum Availability Architecture – MAA
  - <http://www.oracle.com/technology/deploy/availability/htdocs/maa.htm>
  - HA Best Practices for Oracle Database
  - HA Best Practices for Oracle Enterprise Application Server
  - HA Best Practices for Oracle Applications
  - HA Best Practices for Oracle Beehive
  - HA Best Practices for Grid Control
  - HA Best Practices for Oracle VM

# HA and OEM GRID Control

Monitoring of Systems and  
detection of errors



# HA - OEM GRID Control

**ORACLE Enterprise Manager 10g** Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

Page Refreshed 02-Nov-2009 15:08:34 CET

### Overview

View: All Targets

Total Monitored Targets **34**

All Targets Status

■ Down(5)  
■ Up(28)

### All Targets Alerts

Critical ✖ 17  
 Warning ⚠ 17  
 Errors ⓘ 10

### All Targets Policy Violations

Critical ✖ 91  
 Warning ⚠ 311  
 Informational ⓘ 21

### All Targets Jobs

Problem Executions (last 7 days) ✖ 8  
 Action Required Executions (last 7 days) ✓ 0  
 Suspended Executions (last 7 days) ✓ 0

### Target Search

Search: All

### Security Policy Violations

Critical ✖ 90  
 Warning ⚠ 310  
 Informational ⓘ 10  
 New in Last 24 Hours 16

### Critical Patch Advisories for Oracle Homes

Patch Advisories **0**

⚠ Patch Advisory information may be stale.  
My Oracle Support credentials are not configured.

Affected Oracle Homes **0**

My Oracle Support Credentials Not Configured

### Deployments Summary

View: Database Installations

Database Installations <span style="color: blue;">△</span>	Targets	Installations	Interim Patches Applied
Oracle Database 10g 10.2.0.4.0	<u>4</u>	<u>3</u>	<u>No</u>
Oracle Database 11g 11.1.0.7.0	<u>1</u>	<u>5</u>	<u>No</u>

### Resource Center

[Enterprise Manager Support Workbench](#)  
[Enterprise Manager Command Line Interface](#)  
[Enterprise Manager Release Notes](#)

[My Oracle Support](#)  
[Oracle Technology Network](#)

# HA – OEM GRID Control

- ▶ Monitoring of Systems and detection of errors
  - Monitoring Templates – Metrics
    - Detect Database down or events like: corrupted blocks, missing data files, etc.
  - Systems and Services
    - If a Business Service application has very bad performance, the user might consider the Service as unavailable, even if Databases, Application Server etc. are Up and Running!

# HA – OEM GRID Control

ORACLE Enterprise Manager 10g Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

Enterprise Manager Configuration | Management Services and Repository | Agents

Monitoring Templates >

**Edit Monitoring Template: ST - Database Instance**

Cancel OK

General **Metric Thresholds** Policies Access

View Metrics with thresholds

Remove Metrics from Template Add Metrics to Template

Select All Select None

Select Metric	Comparison Operator	Warning Threshold	Critical Threshold	Corrective Actions	Collection Schedule	Edit
<input type="checkbox"/> Archiver Hung Alert Log Error	Contains		ORA-	None	Every 15 Minutes	
<input type="checkbox"/> Archiver Hung Alert Log Error Status	>	0		None	Every 15 Minutes	
<input type="checkbox"/> Database Vault Configuration Issues Count - Command Rules	>		0	None	Every 1 Hour	
<input type="checkbox"/> Data Block Corruption Alert Log Error	Contains		ORA-	None	Every 15 Minutes	
<input type="checkbox"/> Data Block Corruption Alert Log Error Status	>	0		None	Every 15 Minutes	
<input type="checkbox"/> Dump Area Used (%)	>	95		None	Every 15 Minutes	
<input type="checkbox"/> Free Dump Area (KB)	<	2000		None	Every 15 Minutes	
<input type="checkbox"/> Generic Alert Log Error	Matches	ORA-0*(		None	Every 15 Minutes	
<input type="checkbox"/> Generic Alert Log Error Status	>	0		None	Every 15 Minutes	
<input type="checkbox"/> Global Cache Average CR Block Request Time (centi-seconds)	>	1	2	None	Every 5 Minutes	
<input type="checkbox"/> Global Cache Average Current Block Request Time (centi-seconds)	>	1	2	None	Every 5 Minutes	
<input type="checkbox"/> Global Cache Blocks Corrupt	>	0	0	None	Every 5 Minutes	
<input type="checkbox"/> Global Cache Blocks Lost	>	1	3	None	Every 5 Minutes	
<input type="checkbox"/> Instance Status	=		0	None	Every 15 Seconds	

# HA - OEM GRID Control

ORACLE Enterprise Manager 10g Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

Hosts | Databases | Web Applications | Services | Systems | Groups | All Targets

Logged in As SYS

Database Instance: orcl1.base1.mycorpcomain.com

Home Performance Availability Server Schema Data Movement Software and Support

Page Refreshed 06-Apr-2009 10:21:47 o'clock CEST Refresh View Data Automatically (60 sec)

**General**

Shutdown Black Out

Status **Up**

Up Since 06-Apr-2009 09:26:36 o'clock CEST

Instance Name **orcl1**

Version 10.2.0.4.0

Host base1.mycorpcomain.com

Listener LISTENER\_base1.mycorpcomain...

[View All Properties](#)

**Host CPU**

100% 75 50 25 0

Other orcl1

Load 0.15 Paging 0.00

**Active Sessions**

1.0 0.5 0.0

Wait User I/O CPU

Core Count 1

**SQL Response Time**

1.0 0.5 0.0

Reference collection is empty.

SQL Response Time (%) Unavailable

[Reset Reference Collection](#)

**Diagnostic Summary**

ADDM Findings 0

Alert Log 02-Apr-2009 21:43:04

**Space Summary**

Database Size (GB) 1.162

Problem Tablespaces 1

Segment Advisor Recommendations 0

Dump Area Used (%) 17

**High Availability**

Console Details

Instance Recovery Time (sec) 40

Last Backup n/a

Usable Flash Recovery Area (%) 100

Flashback Database Logging Disabled

**Alerts**

Category All Go Critical 0 Warning 3

Severity	Category	Name	Message	Alert Triggered
Warning	User Audit	Audited User	User SYS logged on from oem.mycorpcomain.com	03-Apr-2009 14:31:17
Warning	User Audit	Audited User	User SYS logged on from base1.mycorpcomain.com	06-Apr-2009 10:06:30
Warning	Tablespaces Full	Tablespace Space Used (%)	Tablespace USERS is 58 percent full	06-Apr-2009 09:56:46

# HA – OEM GRID Control

ORACLE Enterprise Manager 10g Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports




Hosts | Databases | Middleware | Web Applications | **Services** | Systems | Groups | All Targets

**Web Application: EM Website**

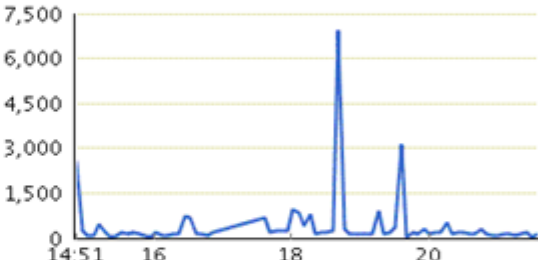
Home Charts Test Performance Page Performance Request Performance System Topology Monitoring Configuration

Page Refreshed 22-Sep-2009 21:44:49 CEST

### General


**Status Up** Black Out  
 Up Since **22-Sep-2009 17:36:10**  
 Last Calculated **22-Sep-2009 21:41:01**  
 Availability (%) **93.2**  
(Last 24 Hours)  
 Performance   
 Usage   
 Actual Service Level (%) **98.1412**  
(Last 24 Hours)  
 Expected Service Level (%) 85.0000




### Performance




22-Sep-2009

Perceived Time per Page (ms)

### Key Component Summary

System **EM Website System** [\(Topology\)](#)  
 Status  **3**  
 Alerts  **0**  **1**

### Key Test Summary

Test	Test Type	Status	Alerts
<a href="#">homepage</a>	Web Transaction		0 0

### All Service Alerts

View All Service Alerts

Target Name	Target Type	Severity	Alert Triggered	Message
(No alerts)				

# HA – OEM GRID Control

- ▶ Recommended events to monitor
  - Status
    - Up/Down
  - Space
    - Tablespace Space used (%)
    - Archive Hung Alert Log Error
    - Archive Area used (%)
    - Dump Area used (%)
  - Alert Log
    - Alert – ORA-6XX, ORA-1578 (database corruption), or ORA-0060 (deadlock detected)
    - Database Block Corruption ORA-01157 and ORA-27048

# HA – OEM GRID Control

- ▶ Recommended events to monitor (cont)
  - Processing Capacity
    - Process Limit
    - Session Limit
  - Think Availability!

# HA and OEM GRID Control

Monitoring of Database Health



# HA and OEM GRID Control

- ▶ Database Health
  - Status
  - Performance
  - Configuration
    - Archivelog Mode
    - Backup
    - Standby Database
    - Etc.
  - Vulnerability
    - Storage / Configuration / Security
    - Patching

# HA and OEM GRID Control

**ORACLE Enterprise Manager 10g** Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

Hosts | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets

Cluster: RACCL01 > Cluster Database: DEMO2\_01 >

**Cluster Database: DEMO2\_01**

Home Performance Availability Server Schema Data Movement Software and Support Topology

Latest Data Collected From Target 24-Sep-2009 15:30:51 o'clock CEST Refresh View Data Automatically (60 sec) ▼

**General**

↑ Shutdown Black Out

Status Up

Instances 2 (↑ 2)

Availability (%) 100  
(Last 24 hours)

Cluster RACCL01

Database Name DEMO2\_01

Version 10.2.0.4.0

[View All Properties](#)

**Host CPU**

Load 5.80

**Active Sessions**

Maximum CPU 2

**Diagnostic Summary**

Interconnect Alerts ✓ 0

**Space Summary**

Database Size (GB)	<u>0.825</u>
Problem Tablespaces	<u>0</u>
Segment Advisor Recommendations	<u>0</u>

**High Availability**

Console	<a href="#">Details</a>
Last Backup	<u>n/a</u>
Flashback Database Logging	<u>Disabled</u>

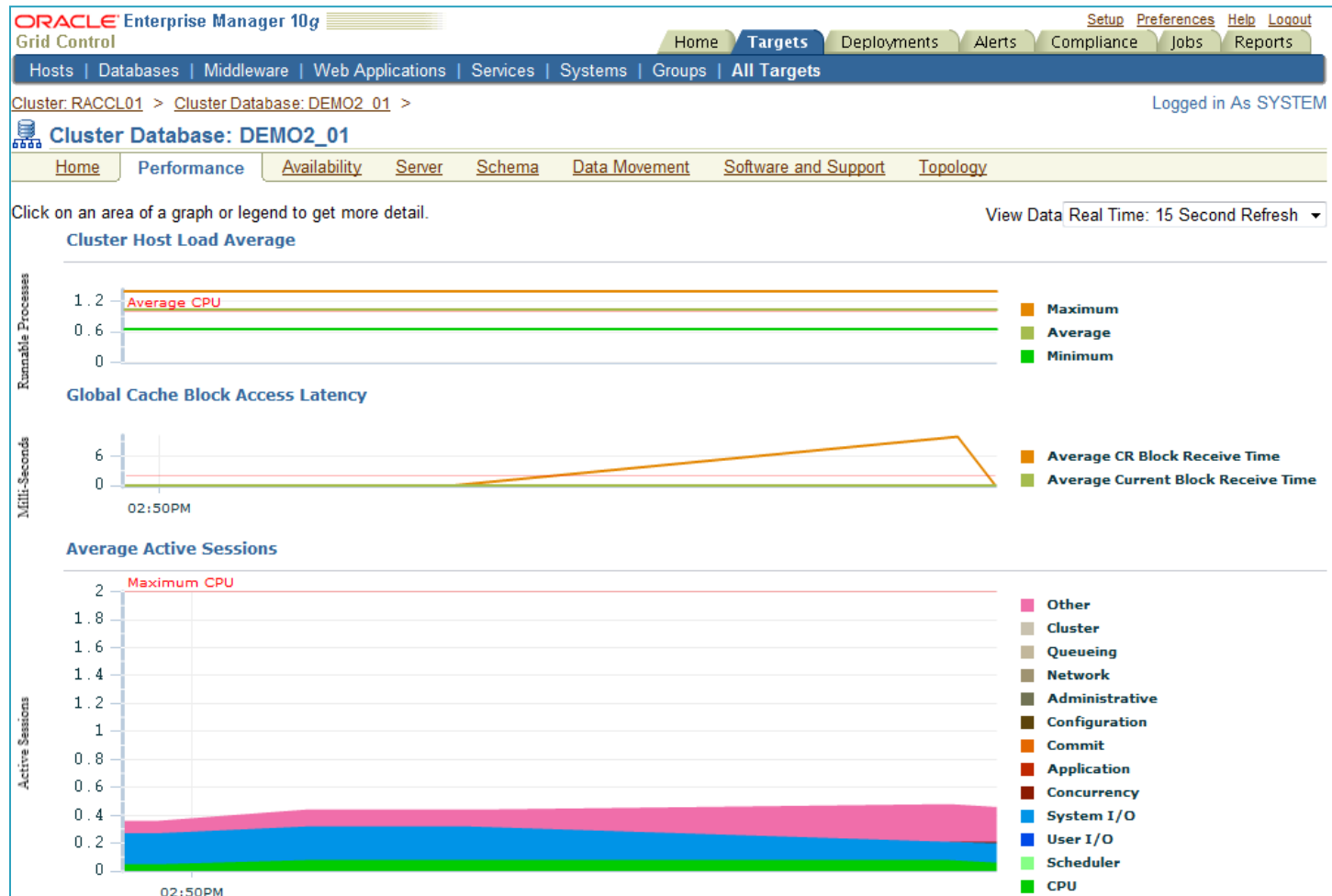
▼ Alerts

Category All ▼ Critical 0 Warnings 0

Severity	Target Name	Target Type	Category	Name	User Impact	Message	Alert Triggered
(No Alerts!)							

► Related Alerts

# HA and OEM GRID Control Performance



# HA and OEM GRID Control

**ORACLE** Enterprise Manager 10g  
Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

Hosts | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets

Cluster: RACCL01 > Cluster Database: DEMO2\_01 > Logged in As SYSTEM

**Cluster Database: DEMO2\_01**

Home Performance Availability Server Schema Data Movement Software and Support Topology

High Availability Console  
Maximum Availability Architecture (MAA) Advisor

**Backup/Recovery**

**Setup**

- [Backup Settings](#)
- [Recovery Settings](#)
- [Recovery Catalog Settings](#)

**Manage**

- [Schedule Backup](#)
- [Manage Current Backups](#)
- [Backup Reports](#)
- [Manage Restore Points](#)
- [Perform Recovery](#)
- [View and Manage Transactions](#)

**Data Guard**  
[Add Standby Database](#)

**Services**  
[Cluster Managed Database Services](#)

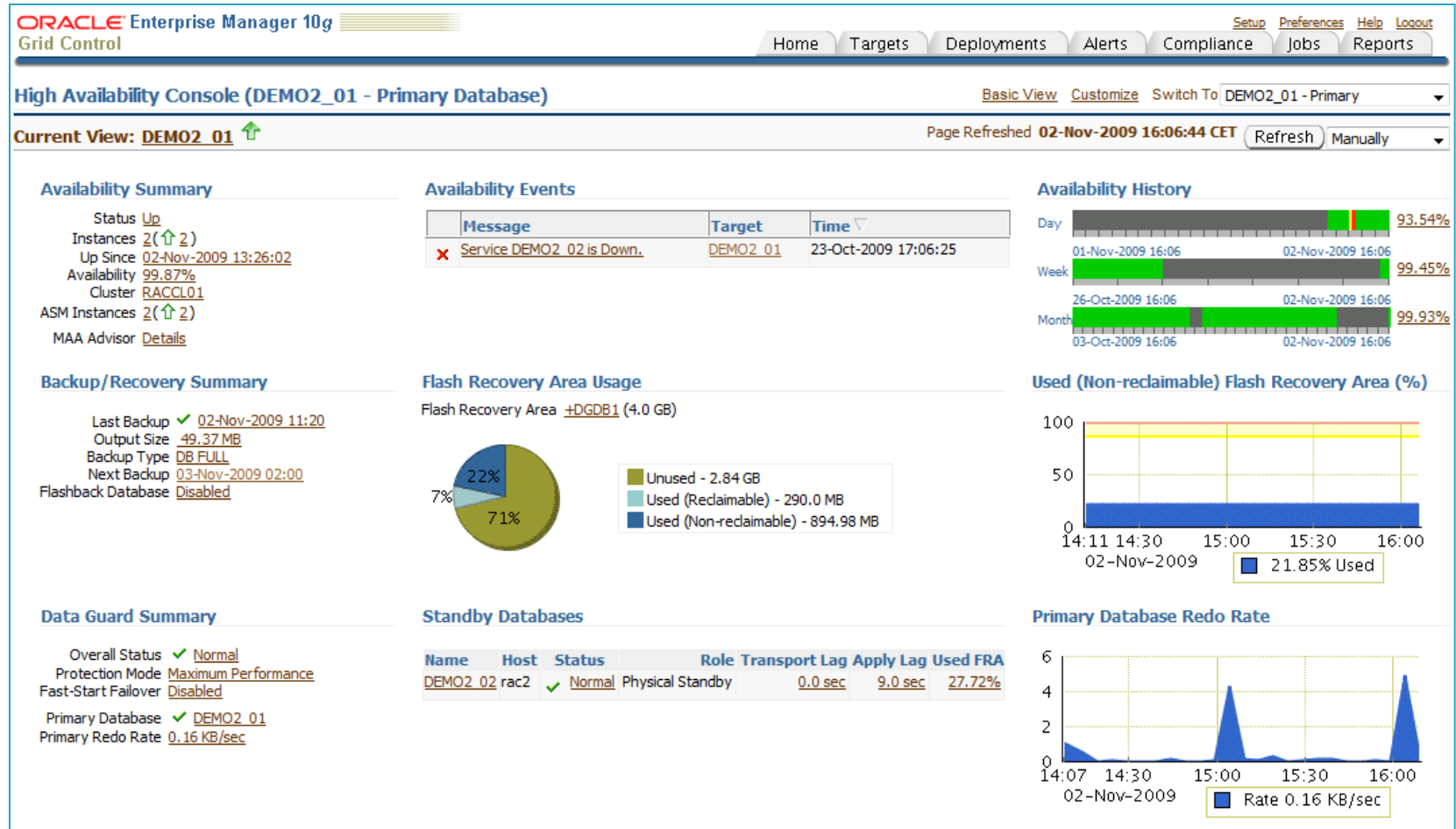
**Instances**

Name	Status	Host Name	Alerts	Policy Violations	Compliance Score (%)	ASM Instance	ADDM Findings	Sessions: CPU	Sessions: I/O	Sessions: Other	Instance CPU (%)
DEMO2_01_DEMO21		rac1.mycorpdomain.com	0 0	5 41 3	93	+ASM1_rac1.mycorpdomain.com	0 0	0	✓	✓	
DEMO2_01_DEMO22		rac2.mycorpdomain.com	0 0	5 41 3	93	+ASM2_rac2.mycorpdomain.com	0 0	0	✓	✓	

# HA and OEM GRID Control

- ▶ High Availability Console
  - Availability Summary
  - Backup/Recovery Summary
  - Flash Recovery Area
  - Service (RAC) Summary
  - Data Guard Summary

# High Availability Console



# HA and OEM GRID Control

- ▶ Maximum Availability Architecture (MAA) Advisor
  - Summary of possible Oracle solutions to optimize the availability of a Database
  - Provides Short Cuts to implement each of the suggested Oracle Solutions

# Maximum Availability Architecture (MAA) Advisor

ORACLE Enterprise Manager 10g Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

Maximum Availability Architecture (MAA) Advisor (DEMO2\_01)

Refresh OK

Maximum Availability Architecture (MAA) is Oracle's High Availability (HA) blueprint. MAA provides a fully integrated and validated HA architecture with operational and configuration best practices that eliminate or reduce downtime. This table describes the configuration status and Enterprise Manager link for various HA solutions for each outage type.

MAA Summary Recommendation **This configuration is not protected for some outage types: Human Errors, Data Corruptions, Site Failures**  
**Configure at least one recommended solution for each outage type to ensure maximum availability**

Outage Type	Oracle Solution	Recommendation Level	Configuration Status	Benefits
All Failures	<a href="#">Schedule Backups</a>	High	-	Fully managed database recovery and disk-based backups.
All Failures	<a href="#">Configure ARCHIVELOG Mode</a>	High	-	Enables online database backup and is necessary to recover the database to a point in time later than what has already been restored. Features such as Oracle Data Guard require that the production database run in ARCHIVELOG mode.
Computer Failures	<a href="#">Configure Oracle Data Guard</a>		-	Fast-start Failover and fast application notification with integrated Oracle clients.
Computer Failures	<a href="#">Configure Oracle Real Application Clusters and Oracle Clusterware</a>		✓	Automatic recovery of failed nodes and instances. Fast application notification with integrated Oracle client failover.
Computer Failures	<a href="#">Configure Oracle Streams</a>		-	Online replica database resumes processing. Whole database replication is recommended for protection.
Human Errors - Erroneous Transactions	<a href="#">Configure Flashback Query or Flashback Table</a>		✓	Fine-grained query or rewind of specific tables.
Human Errors - Accidentally Dropped Tables	<a href="#">Configure Flashback Drop</a>		✓	Ability to quickly restore a dropped table.
Human Errors - Database Wide Impact	<a href="#">Configure Flashback Database</a>	High	-	Database-wide rewind to a point-in-time in the past.
Storage Failures	<a href="#">Configure Oracle Data Guard</a>		-	Fast-start Failover and fast application notification with integrated Oracle clients.
Storage Failures	<a href="#">Migrate Storage to Automatic Storage Management</a>		✓	ASM redundancy allows for redundant copies of the data in separate failure groups spanning different disk, controllers or storage arrays. Automatic, online rebalancing provides zero downtime.
Storage Failures	<a href="#">Configure Oracle Streams</a>		-	Online replica database resumes processing. Whole database replication is recommended for protection.
Data Corruptions	<a href="#">Configure DB_BLOCK_CHECKING and DB_BLOCK_CHECKSUM Initialization Parameters</a>	High	-	Comprehensive database block corruption prevention and detection.



# MAA Advisor Schedule Backup

**ORACLE** Enterprise Manager 10g  
Grid Control

Setup Preferences Help Logout

Home Targets Deployments Alerts Compliance Jobs Reports

Hosts | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets

Cluster: RACCL01 > Cluster Database: DEMO2\_01 >

## Schedule Backup

Oracle provides an automated backup strategy based on your disk and/or tape configuration. Alternatively, you can implement your own customized backup strategy.

### Oracle-Suggested Backup

Schedule a backup using Oracle's automated backup strategy. **Schedule Oracle-Suggested Backup**

This option will back up the entire database. The database will be backed up on daily and weekly intervals.

### Customized Backup

Select the object(s) you want to back up. **Schedule Customized Backup**

☒ Whole Database  
You may only perform an offline backup of the entire database. If the database is OPEN at the time of backup, the database will be shut down and mounted before the backup. The database will be opened after the backup.

☐ All Recovery Files on Disk  
Includes all archived logs and disk backups that are not already backed up to tape.

### Host Credentials

To perform a backup, supply operating system login credentials to access the target database.

\* Username

\* Password

☐ Save as Preferred Credential

### Backup Strategies

Oracle-suggested:

- Provides an out-of-the-box backup strategy based on the backup destination
- Sets up recovery window for backup management
- Schedules recurring and immediate backups
- Automates backup management

Customized:

- Specify the objects to be backed up
- Choose disk or tape backup destination
- Override the default backup settings
- Schedule the backup

# MAA Advisor Schedule Backup

ORACLE® Enterprise Manager 10g  
Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

Hosts | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets

Destination Setup Schedule Review

---

### Schedule Oracle-Suggested Backup: Destination

Database DEMO2\_01  
Backup Strategy Oracle-Suggested Backup

Cancel Step 1 of 4 **Next**

---

Select the destination media for this backup.

- ☒ Disk  
Use disk as the only storage for backups.
- ☐ Tape  
Use tape as the only storage for backups.
- ☐ Both Disk and Tape  
Use disk to store the most recent database backups so you can always restore to the previous backup quickly. Use tape to store older backups for extended recovery window.

# MAA Advisor Schedule Backup

ORACLE Enterprise Manager 10g   
Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

Hosts | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets

Destination Setup Schedule Review

---

### Schedule Oracle-Suggested Backup: Setup

Database DEMO2\_01  
Backup Strategy Oracle-Suggested Backup

Cancel Back Step 2 of 4 **Next**

---

#### Daily Backup

A full database copy will be performed during the first backup. Subsequently, an incremental backup to disk will be performed every day. The backups on disk will be retained so that you can always perform a full database recovery or a point-in-time recovery to any time within the past day.

#### Disk Settings

Flash Recovery Area +DGDB1  
☒ **TIP** Disk backups that are necessary for a recovery to any time within the past day are retained.

#### ► Encryption

# MAA Advisor Schedule Backup

**ORACLE** Enterprise Manager 10g  
Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

Hosts | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets

Destination Setup **Schedule** Review

---

### Schedule Oracle-Suggested Backup: Schedule


Database DEMO2\_01  
Backup Strategy Oracle-Suggested Backup

Cancel Back Step 3 of 4 **Next**

---

#### Daily Backup Time

Specify a date to start the backup. The first backup could be time consuming as it is a whole database backup. Consider starting the backup when the database is least active.

Start Date    
(example: 24-Sep-2009)

Specify a time to start the backup. Consider starting the backup when the database is least active during the day.

Time Zone

Daily Backup Time   ☒ AM ☐ PM

---

#### Backup Mode

You may only perform an offline backup of the entire database. If the database is OPEN at the time of backup, the database will be shut down and mounted before the backup. The database will be opened after the backup.

# MAA Advisor Schedule Backup

ORACLE Enterprise Manager 10g  
Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

Hosts | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets

Destination Setup Schedule **Review**

---

### Schedule Oracle-Suggested Backup: Review

Database DEMO2\_01  
Backup Strategy Oracle-Suggested Backup

Cancel Back Step 4 of 4 **Submit Job**

---

#### Settings

Destination	Disk
Daily Backup	A full database copy will be performed during the first backup. Subsequently, an incremental backup to disk will be performed every day. The backups on disk will be retained so that you can always perform a full database recovery or a point-in-time recovery to any time within the past day.
Flash Recovery Area	+DGDB1

---

#### RMAN Script

The RMAN script below is generated based on previous input.

Daily Script:

```
run {
  allocate channel oem_disk_backup device type disk;
  recover copy of database with tag 'ORA$OEM_LEVEL_0';
  backup incremental level 1 cumulative copies=1 for recover of copy with tag 'ORA$OEM_LEVEL_0' database;
}
```

# MAA Advisor Schedule Backup

The screenshot displays the Oracle Enterprise Manager 10g Grid Control interface. At the top, the title bar reads "ORACLE Enterprise Manager 10g Grid Control". To the right of the title are links for "Setup", "Preferences", "Help", and "Logout". Below the title bar is a navigation menu with tabs for "Home", "Targets", "Deployments", "Alerts", "Compliance", "Jobs", and "Reports". The "Targets" tab is currently selected. Underneath the navigation menu is a sub-menu with links for "Hosts", "Databases", "Middleware", "Web Applications", "Services", "Systems", "Groups", and "All Targets". The main content area shows a message: "Cluster: RACCL01 > The job has been successfully submitted." Below this message is a section titled "Status" with the text: "The job has been successfully submitted. You can view the status of the job by clicking on the View Job button." At the bottom right of the status section are two buttons: "View Job" and "OK". The "OK" button is highlighted with a red border.

ORACLE Enterprise Manager 10g  
Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

Hosts | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets

Cluster: RACCL01 >


**The job has been successfully submitted.**

**Status**

The job has been successfully submitted.  
You can view the status of the job by clicking on the View Job button.

View Job OK

# Maximum Availability Architecture (MAA) Advisor

**ORACLE** Enterprise Manager 10g   
Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

**Maximum Availability Architecture (MAA) Advisor (DEMO2\_01)** Refresh OK


Maximum Availability Architecture (MAA) is Oracle's High Availability (HA) blueprint. MAA provides a fully integrated and validated HA architecture with operational and configuration best practices that eliminate or reduce downtime. This table describes the configuration status and Enterprise Manager link for various HA solutions for each outage type.

MAA Summary **This configuration is not protected for some outage types: Human Errors, Data Corruptions, Site Failures**  
Recommendation **Configure at least one recommended solution for each outage type to ensure maximum availability**

Outage Type	Oracle Solution	Recommendation Level	Configuration Status	Benefits
All Failures	<a href="#">Schedule Backups</a>		✓	Fully managed database recovery and disk-based backups.
All Failures	<a href="#">Configure ARCHIVELOG Mode</a>	High	-	Enables online database backup and is necessary to recover the database to a point in time later than what has already been restored. Features such as Oracle Data Guard require that the production database run in ARCHIVELOG mode.
Computer Failures	<a href="#">Configure Oracle Data Guard</a>		-	Fast-start Failover and fast application notification with integrated Oracle clients.
Computer Failures	<a href="#">Configure Oracle Real Application Clusters and Oracle Clusterware</a>		✓	Automatic recovery of failed nodes and instances. Fast application notification with integrated Oracle client failover.
Computer Failures	<a href="#">Configure Oracle Streams</a>		-	Online replica database resumes processing. Whole database replication is recommended for protection.
Human Errors - Erroneous Transactions	<a href="#">Configure Flashback Query or Flashback Table</a>		✓	Fine-grained query or rewind of specific tables.



# Maximum Availability Architecture (MAA) Advisor

**ORACLE® Enterprise Manager 10g**  [Setup](#) [Preferences](#) [Help](#) [Logout](#)

**Grid Control** [Home](#) [Targets](#) [Deployments](#) [Alerts](#) [Compliance](#) [Jobs](#) [Reports](#)

## Maximum Availability Architecture (MAA) Advisor (DEMO2\_01)

[Refresh](#) [OK](#)

**Maximum Availability Architecture (MAA)** is Oracle's High Availability (HA) blueprint. MAA provides a fully integrated and validated HA architecture with operational and configuration best practices that eliminate or reduce downtime. This table describes the configuration status and Enterprise Manager link for various HA solutions for each outage type.

**MAA Summary** **This configuration is not protected for some outage types: Human Errors, Data Corruptions, Site Failures**

**Recommendation** **Configure at least one recommended solution for each outage type to ensure maximum availability**

Outage Type	Oracle Solution	Recommendation Level	Configuration Status	Benefits
All Failures	<a href="#">Schedule Backups</a>		✓	Fully managed database recovery and disk-based backups.
All Failures	<a href="#">Configure ARCHIVELOG Mode</a>	High	-	Enables online database backup and is necessary to recover the database to a point in time later than what has already been restored. Features such as Oracle Data Guard require that the production database run in ARCHIVELOG mode.
Computer Failures	<a href="#">Configure Oracle Data Guard</a>		-	Fast-start Failover and fast application notification with integrated Oracle clients.
Computer Failures	<a href="#">Configure Oracle Real Application Clusters and Oracle Clusterware</a>		✓	Automatic recovery of failed nodes and instances. Fast application notification with integrated Oracle client failover.
Computer Failures	<a href="#">Configure Oracle Streams</a>		-	Online replica database resumes processing. Whole database replication is recommended for protection.
Human Errors - Erroneous Transactions	<a href="#">Configure Flashback Query or Flashback Table</a>		✓	Fine-grained query or rewind of specific tables.



# MAA Advisor

## Configure ARCHIVELOG Mode

ORACLE Enterprise Manager 10g  
Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

Hosts | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets

Cluster: RACCL01 > Cluster Database: DEMO2\_01 > Logged in As SYS

### Recovery Settings

Show SQL Revert **Apply**

#### Instance Recovery

The fast-start checkpointing feature is enabled by specifying a non-zero desired mean-time to recover (MTTR) value, which will be used to set the FAST\_START\_MTTR\_TARGET initialization parameter. This parameter controls the amount of time the database takes to perform crash recovery for a single instance. When fast-start checkpointing is enabled, Oracle automatically maintains the speed of checkpointing so that the requested MTTR is achieved. Setting the value to 0 will disable this functionality.

Current Estimated Mean Time To Recover (seconds) 0  
Maximum value across all instances.

Desired Mean Time To Recover 0 Minutes

#### Media Recovery

The database is currently in NOARCHIVELOG mode. In ARCHIVELOG mode, hot backups and recovery to the latest time are possible, but you must provide space for archived redo log files. If you change the database to ARCHIVELOG mode, you should perform a backup immediately. In NOARCHIVELOG mode, only cold backups are possible and data may be lost in the event of database corruption.

☒ ARCHIVELOG Mode\*

Log Archive Filename Format\* %t\_%s\_%r.dbf

Number	Archived Redo Log Destination	Quota (512B)	Status	Type
1	+DGDB1	0	VALID	Local

Add Another Row

☒ TIP It is recommended that archived redo log files be written to multiple locations spread across the different disks.  
☒ TIP You can specify up to 10 archived redo log destinations.

# MAA Advisor

## Configure ARCHIVELOG Mode

The screenshot shows the Oracle Enterprise Manager 10g interface. The top navigation bar includes links for Setup, Preferences, Help, and Logout. Below this is a secondary navigation bar with tabs for Home, Targets, Deployments, Alerts, Compliance, Jobs, and Reports. A third navigation bar lists various database components: Hosts, Databases, Middleware, Web Applications, Services, Systems, Groups, and All Targets. The breadcrumb trail indicates the current location: Cluster: RACCL01 > Cluster Database: DEMO2\_01 >. The user is logged in as SYS. A confirmation dialog box is displayed, titled 'Confirmation', with the message: 'The changes have been successfully applied. However, you must restart the database to implement the changes. Do you want to restart the database now? Oracle recommends that you make a whole database backup immediately after the database is restarted'. At the bottom right of the dialog are two buttons: 'No' and 'Yes'. The 'Yes' button is highlighted with a red rectangle.

ORACLE® Enterprise Manager 10g  
Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

Hosts | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets

Cluster: RACCL01 > Cluster Database: DEMO2\_01 > Logged in As SYS


**Confirmation**

The changes have been successfully applied. However, you must restart the database to implement the changes. Do you want to restart the database now? Oracle recommends that you make a whole database backup immediately after the database is restarted

No Yes

# MAA Advisor

## Configure ARCHIVELOG Mode

**ORACLE** Enterprise Manager 10g   
Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

Hosts | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets

Cluster: RACCL01 > Cluster Database: DEMO2\_01 > Recovery Settings >

### Startup/Shutdown: Specify Credentials

Specify the following credentials in order to change the status of the database. Cancel Continue

#### Cluster Credentials

Specify the user name and password to log in to the cluster that hosts the cluster database.

\* Username

\* Password


#### Database Credentials

Specify the credentials for the cluster database.

\* Username

\* Password

Database

\* Connect As  

☐ Save as Preferred Credential

# Maximum Availability Architecture (MAA) Advisor

ORACLE Enterprise Manager 10g  
Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

Setup Preferences Help Logout

## Maximum Availability Architecture (MAA) Advisor (DEMO2\_01)



Refresh OK

Maximum Availability Architecture (MAA) is Oracle's High Availability (HA) blueprint. MAA provides a fully integrated and validated HA architecture with operational and configuration best practices that eliminate or reduce downtime. This table describes the configuration status and Enterprise Manager link for various HA solutions for each outage type.

MAA Summary Recommendation **This configuration is not protected for some outage types: Human Errors, Data Corruptions, Site Failures**  
**Configure at least one recommended solution for each outage type to ensure maximum availability**

Outage Type	Oracle Solution	Recommendation Level	Configuration Status	Benefits
All Failures	<a href="#">Schedule Backups</a>		✓	Fully managed database recovery and disk-based backups.
All Failures	<a href="#">Configure ARCHIVELOG Mode</a>		✓	Enables online database backup and is necessary to recover the database to a point in time later than what has already been restored. Features such as Oracle Data Guard require that the production database run in ARCHIVELOG mode.
Computer Failures	<a href="#">Configure Oracle Data Guard</a>		-	Fast-start Failover and fast application notification with integrated Oracle clients.
Computer Failures	<a href="#">Configure Oracle Real Application Clusters and Oracle Clusterware</a>		✓	Automatic recovery of failed nodes and instances. Fast application notification with integrated Oracle client failover.
Computer Failures	<a href="#">Configure Oracle Streams</a>		-	Online replica database resumes processing. Whole database replication is recommended for protection.
Human Errors - Erroneous Transactions	<a href="#">Configure Flashback Query or Flashback Table</a>		✓	Fine-grained query or rewind of specific tables.
Human Errors - Accidentally Dropped Tables	<a href="#">Configure Flashback Drop</a>		✓	Ability to quickly restore a dropped table.
Human Errors - Database Wide Impact	<a href="#">Configure Flashback Database</a>	High	-	Database-wide rewind to a point-in-time in the past.
Storage Failures	<a href="#">Configure Oracle Data Guard</a>		-	Fast-start Failover and fast application notification with integrated Oracle clients.

# Maximum Availability Architecture (MAA) Advisor

**ORACLE** Enterprise Manager 10g  

Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

Setup Preferences Help Logout

## Maximum Availability Architecture (MAA) Advisor (DEMO2\_01)

Refresh OK

Maximum Availability Architecture (MAA) is Oracle's High Availability (HA) blueprint. MAA provides a fully integrated and validated HA architecture with operational and configuration best practices that eliminate or reduce downtime. This table describes the configuration status and Enterprise Manager link for various HA solutions for each outage type.

MAA Summary **This configuration is not protected for some outage types: Human Errors, Data Corruptions, Site Failures**  
 Recommendation **Configure at least one recommended solution for each outage type to ensure maximum availability**

Outage Type	Oracle Solution	Recommendation Level	Configuration Status	Benefits
All Failures	<a href="#">Schedule Backups</a>		✓	Fully managed database recovery and disk-based backups.
All Failures	<a href="#">Configure ARCHIVELOG Mode</a>		✓	Enables online database backup and is necessary to recover the database to a point in time later than what has already been restored. Features such as Oracle Data Guard require that the production database run in ARCHIVELOG mode.
Computer Failures	<a href="#">Configure Oracle Data Guard</a>		-	Fast-start Failover and fast application notification with integrated Oracle clients.
Computer Failures	<a href="#">Configure Oracle Real Application Clusters and Oracle Clusterware</a>		✓	Automatic recovery of failed nodes and instances. Fast application notification with integrated Oracle client failover.
Computer Failures	<a href="#">Configure Oracle Streams</a>		-	Online replica database resumes processing. Whole database replication is recommended for protection.
Human Errors - Erroneous Transactions	<a href="#">Configure Flashback Query or Flashback Table</a>		✓	Fine-grained query or rewind of specific tables.
Human Errors - Accidentally Dropped Tables	<a href="#">Configure Flashback Drop</a>		✓	Ability to quickly restore a dropped table.
Human Errors - Database Wide Impact	<a href="#">Configure Flashback Database</a>	High	-	Database-wide rewind to a point-in-time in the past.
Storage Failures	<a href="#">Configure Oracle Data Guard</a>		-	Fast-start Failover and fast application notification with integrated Oracle clients.

# MAA Advisor

## Configure Oracle Data Guard

The screenshot displays the Oracle Enterprise Manager 10g Grid Control interface. At the top, the title bar reads "ORACLE Enterprise Manager 10g Grid Control". Navigation tabs include "Home", "Targets", "Deployments", "Alerts", "Compliance", "Jobs", and "Reports". A secondary navigation bar lists "Hosts", "Databases", "Middleware", "Web Applications", "Services", "Systems", "Groups", and "All Targets". The breadcrumb trail shows "Cluster: RACCL01 > Cluster Database: DEMO2\_01 >". The user is logged in as "SYS".

An "Information" section contains the text: "Use the Add Standby Database wizard to configure a Data Guard environment." Below this text, the link "Add Standby Database" is highlighted with a red rectangular box.

A "Data Guard" section follows, stating: "Enterprise Manager provides comprehensive Data Guard setup, management, and monitoring capabilities, including:"

- Easy creation and management of physical and logical standby databases
- Centralized control of primary and standby databases via Data Guard broker
- Built-in monitoring, alert, and control capabilities
- Automated switchover and failover operations
- Integrated support for Oracle Real Application Clusters

# MAA Advisor

## Configure Oracle Data Guard

**ORACLE** Enterprise Manager 10g  
Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

Hosts | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets

Cluster: RACCL01 > Cluster Database: DEMO2\_01 > Data Guard >

### Add Standby Database

This wizard creates a Data Guard configuration containing a primary database and a standby database. Select how to add the standby database.

☒ Create a new physical standby database  
A physical standby database is maintained as an exact copy of the primary database.

☐ Create a new logical standby database  
A logical standby database duplicates the data from the primary database at the SQL level.

☐ Manage an existing standby database with Data Guard broker  
The existing standby database must be already configured to function with the primary database.

☐ Create a primary database backup only  
Creates a primary database backup that can be used for a future standby database creation.

Cancel Continue

#### Standby Database Types

Physical standby database characteristics:

- Physically identical to the primary database
- Mounted (not open) when in recovery mode
- Can be opened read-only
- Supports all datatypes and DDL

Logical standby database characteristics:

- Not physically identical to primary database
- Open read-write when in recovery mode
- Can be used for data protection and reporting
- Does not support some datatypes, some DDL



# MAA Advisor

## Configure Oracle Data Guard

**ORACLE** Enterprise Manager 10g  
Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

Hosts | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets

Backup Type Backup Options Database Location File Locations Configuration Review

### Add Standby Database: Backup Type

Cancel Step 1 of 6 Next

Data Guard uses Oracle Recovery Manager (RMAN) to create the standby database from a new or existing backup of the primary database. Select the type of backup to use for the standby database creation.

- ☒ **Perform an online backup of the primary database**
- ☐ Use an existing primary database backup
  - ☒ RMAN backup  
A whole database backup performed typically as part of a regular backup strategy.
  - ☐ Backup from a previous standby database creation  
A backup performed by the Add Standby Database wizard.

#### Standby Database Creation Overview

The standby database creation process performs the following steps:

- Performs an online backup (or optionally uses an existing backup) of the primary database control file, datafiles, and archived redo log files
- Transfers the backup pieces from the primary host to the standby host
- Creates other needed files (e.g., initialization, password) on the standby host
- Restores the control file, datafiles, and archived redo log files to the specified locations on the standby host
- Adds online redo log files and other files to the standby database as needed
- Configures the recovered database as a physical or logical standby database





## Add Standby Database: Backup Options

Primary Database DEMO2\_01\_DEMO22  
Primary Host rac2.mycorpdomain.com

[Cancel](#) [Back](#) Step 2 of 6 [Next](#)

### Staging Area

Specify a location on the primary host where a directory can be created to store the primary database backup files.

☒ TIP The directory can optionally be retained for future standby database creations.

\* Staging Area Location /u01/app/oracle/product/10.2.0/db\_001/dbs

Subdirectory DEMO22\_3 will be created at this location.

☐ Compress the backup datafiles in the staging area

Compression reduces backup file size and transfer time, but it may also slow down datafile backup and restoration.

☒ Delete directory DEMO22\_3 after standby database creation. Minimum disk space required is 310 MB.

This option requires only enough disk space to contain a backup of the largest datafile.

☐ Retain directory DEMO22\_3 for a future standby database creation. Minimum disk space required is 1070 MB.

This option requires enough disk space to contain a full database backup.

### Primary Host Credentials

Enter the credentials of the user who owns the primary database Oracle server installation.

\* Username oracle

\* Password ••••••

☐ Save as Preferred Credential

### Primary Database Standby Redo Log Files

Several Data Guard features require standby redo log files. They will be added to the primary database.

☒ Use Oracle-managed files (OMF) for standby redo log files

Files will be created using OMF for all databases configured to use OMF. Deselect this option to override the default file locations. Overridden file locations for databases configured to use Automatic Storage Management (ASM) must be ASM disk groups.

Database	Host	Size (MB)	Log File Location
DEMO2_01_DEMO22	rac2.mycorpdomain.com	50.0	DGDB1
DEMO2_01_DEMO22	rac2.mycorpdomain.com	50.0	DGDB1
DEMO2_01_DEMO22	rac2.mycorpdomain.com	50.0	DGDB1

# MAA Advisor

## Configure Oracle Data Guard

ORACLE Enterprise Manager 10g  
Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

Hosts | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets

Backup Type Backup Options Database Location File Locations Configuration Review

### Add Standby Database: Database Location

Primary Database DEMO2\_01\_DEMO22  
Primary Host rac2.mycorpdomain.com

Cancel Back Step 3 of 6 Next

A discovered ASM instance will be required on the standby host you choose below. You will be prompted to login to the ASM instance if necessary.  
✓ TIP If there is no ASM instance running on the specified standby host, it must be created and discovered in order to proceed with standby database creation.

#### Standby Database Attributes

\* Instance Name DEMOT  
The instance name (also referred to as the SID) must be unique on the standby host.

#### Standby Database Location

Specify the host and Oracle Home where the standby database will be created. The host should be a discovered Enterprise Manager target and match the operating system of the primary database host. The Oracle Home should exist on the specified host and match the version of the primary database.

\* Host rac2.mycorpdomain.com  
\* Oracle Home /u01/app/oracle/product/10.2.0/db\_001

#### Standby Host Credentials

Enter the credentials of the user who owns the Oracle Home selected above.

\* Username oracle  
\* Password .....  
☐ Save as Preferred Credential

# MAA Advisor Configure Oracle Data Guard

**ORACLE Enterprise Manager 10g**  
Grid Control

Home | **Targets** | Deployments | Alerts | Compliance | Jobs | Reports

Hosts | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets

Backup Type | Backup Options | Database Location | **File Locations** | Configuration | Review

---

### Add Standby Database: File Locations

Primary Database: DEMO21\_DEMO22  
Primary Host: rac2.mycorpdomain.com

ASM Instance: +ASM2\_rac2.mycorpdomain.com  
Standby Host: rac2.mycorpdomain.com

Cancel | Back | Step 4 of 6 | **Next**

---

**Information**

After the standby database is created, it can be converted to a cluster database by using the Enterprise Manager Convert to Cluster Database function. Conversion of a physical standby database requires that all database files be pre-located on shared storage. If you intend to convert this standby database, ensure that all database file locations below specify shared storage that is accessible from all hosts in the cluster.

---

### Standby Database File Locations

Specify the disk groups to use for the database and recovery files.

**Database Area**

Specify the location where datafiles, tempfiles, redo log files, and control files will be created.

Total Disk Space Required: **1070 MB**

\* Database Area: **DGDB1**

Tablespace Storage Locations: **Default** | Customize

Redo Log and Control File Locations: **Default** | Multiplex

If multiplex locations are not specified, these files will be created in both the database and flash recovery areas.

**Flash Recovery Area**

☒ Use flash recovery area

To enhance data protection and performance, Oracle recommends that a flash recovery area be used.

Specify the location where recovery-related files (archived redo log files, RMAN backups, etc.) will be created.

Flash Recovery Area: **DGDB1**

Archived redo log files received from the primary database will be put in this location.

Flash Recovery Area Size (MB): **2441**

Limit on the total space used by files created in the flash recovery area. The default value is twice the database size.

☒ Automatically delete applied archived redo log files when space is needed

---

### Network Configuration File Location

Configuration information for the standby database will be added to the network configuration files in the specified directory on the standby host.

\* Configuration File Location: **/u01/app/oracle/admin/network/admin**

# MAA Advisor

## Configure Oracle Data Guard

ORACLE Enterprise Manager 10g  
Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

Hosts | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets

Backup Type Backup Options Database Location File Locations Configuration Review

---

### Add Standby Database: Configuration

Primary Database DEMO2\_01\_DEMO22  
Primary Host rac2.mycorpdomain.com

ASM Instance +ASM2\_rac2.mycorpdomain.com  
Standby Host rac2.mycorpdomain.com

Cancel Back Step 5 of 6 Next

---

#### Standby Database Parameters

☒ Database Unique Name DEMO2\_02  
Used to set the standby database DB\_UNIQUE\_NAME parameter, which must be unique within the enterprise.

\* Target Name DEMO2\_02  
The display name used by Enterprise Manager for the standby database. Oracle recommends that it be the same as the Database Unique Name.

---

#### Standby Database Monitoring Credentials

Specify the database user credentials that will be used by Enterprise Manager to monitor the standby database.

☐ Use non-SYSDBA monitoring credentials  
If non-SYSDBA monitoring credentials are used, Data Guard performance monitoring will not be available for a mounted physical standby database.

Username   
Password   
Confirm Password

☒ Use SYSDBA monitoring credentials  
The SYSDBA credentials supplied earlier when connecting to the primary database will be used by Enterprise Manager to monitor the standby database.

---

#### Data Guard Broker

☒ Use Data Guard Broker  
Data Guard broker will be used to manage the Data Guard configuration. (Deselecting this option will cause broker management to be disabled after the standby database is created. However, the broker will be enabled temporarily while the standby database is being created.)

# MAA Advisor

## Configure Oracle Data Guard

ORACLE Enterprise Manager 10g  
Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

Hosts | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets

Previous Configuration Review

### Add Standby Database: Review

Cancel Back Step 6 of 6 **Finish**


The standby database creation process runs as an Enterprise Manager job. Standby database DEMO2\_02 will be created by job DataGuardCreateStandby3 and added to the Data Guard configuration.

Primary Database		Standby Database	
Target Name	DEMO2_01_DEMO22	Target Name	DEMO2_02
Database Name	demo2	Database Name	DEMO2
Instance Name	DEMO22	Instance Name	DEMO2
Database Version	10.2.0.4.0	Oracle Server Version	10.2.0.4.0
Oracle Home	/u01/app/oracle/product/10.2.0/db_001	Oracle Home	/u01/app/oracle/product/10.2.0/db_001
Host	rac2.mycorpdomain.com	Host	rac2.mycorpdomain.com
Operating System	Enterprise Linux Enterprise Linux Server release 5.2 (Carthage) 2.6.18	Operating System	Enterprise Linux Enterprise Linux Server release 5.2 (Carthage) 2.6.18
Host Username	oracle	Host Username	oracle
Staging Area Location	/u01/app/oracle/product/10.2.0/db_001/dbs	Backup Type	New backup
Retain staging area	No	Database Unique Name	DEMO2_02
Compress Backup Files	No	Database Storage	Automatic Storage Management
		ASM Instance	+ASM2_rac2.mycorpdomain.com
		Standby Type	Physical Standby
		Database Area	DGDB1
		Flash Recovery Area	DGDB1
		Flash Recovery Area Size (MB)	2441M
		Automatically Delete Archived Redo Log Files	Yes

► Standby Database Storage

# MAA Advisor

## Configure Oracle Data Guard

**ORACLE** Enterprise Manager 10g   
Grid Control


Home Targets Deployments Alerts Compliance Jobs Reports

Hosts | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets


### Processing: Add Standby Database

The standby database creation process runs as an Enterprise Manager job.

The job will be submitted after completion of several preliminary steps. After all steps are complete, you will be returned to the Data Guard overview page.



- ➔ Creating Data Guard configuration
- Preparing standby database creation job
- Submitting standby database creation job
- Adding standby database target

 The process can be cancelled prior to submission of the standby database creation job.

Cancel



# MAA Advisor Configure Oracle Data Guard

**ORACLE Enterprise Manager 10g** Grid Control

Home **Targets** Deployments Alerts Compliance Jobs Reports

Hosts | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets

Cluster: RACCL01 > Cluster Database: DEMO2\_01 > Database Instance: DEMO2\_01 DEMO22 > Logged in As SYS

## Data Guard

Page Refreshed 25 September 2009 15:37:20 CEST View Data Real Time: 30 Second Refresh

### Overview

Data Guard Status **✓ Normal**  
 Protection Mode Maximum Performance  
 Fast-Start Failover Disabled

### Standby Progress Summary

Transport lag is the time difference between the primary last update and the standby last received redo. Apply lag is the time difference between the primary last update and the standby last applied redo.

Lag Type	Value (seconds)
Transport Lag	1
Apply Lag	15

### Primary Cluster Database

Name DEMO2\_01\_DEMO22  
 Cluster Unknown  
 Data Guard Status **✓ Normal**  
 Current Log Multiple Threads  
 Properties Edit

### Standby Databases

[Add Standby Database](#)

Select	Name	Host	Data Guard Status	Role	Last Received Log	Last Applied Log	Estimated Failover Time
<input checked="" type="radio"/>	DEMO2_02	rac2.mycorpdomain.com	<b>✓ Normal</b>	Physical Standby	<u>Multiple Threads</u>	<u>Multiple Threads</u>	2.6 seconds


### Performance

[Data Guard Performance](#)  
[Log File Details](#)

### Additional Administration

[Verify Configuration](#)  
[Remove Data Guard Configuration](#)

# Maximum Availability Architecture (MAA) Advisor

**ORACLE** Enterprise Manager 10g   
Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

Setup Preferences Help Logout

## Maximum Availability Architecture (MAA) Advisor (DEMO2\_01 - Primary Database)

Refresh OK

Maximum Availability Architecture (MAA) is Oracle's High Availability (HA) blueprint. MAA provides a fully integrated and validated HA architecture with operational and configuration best practices that eliminate or reduce downtime. This table describes the configuration status and Enterprise Manager link for various HA solutions for each outage type.

**MAA Summary** This configuration is not protected for some outage types: Human Errors, Data Corruptions  
**Recommendation** Configure at least one recommended solution for each outage type to ensure maximum availability

Outage Type	Oracle Solution	Recommendation Level	Configuration Status	Benefits
All Failures	<a href="#">Schedule Backups</a>		✓	Fully managed database recovery and disk-based backups.
All Failures	<a href="#">Configure ARCHIVELOG Mode</a>		✓	Enables online database backup and is necessary to recover the database to a point in time later than what has already been restored. Features such as Oracle Data Guard require that the production database run in ARCHIVELOG mode.
Computer Failures	<a href="#">Configure Oracle Data Guard</a>		✓	Fast-start Failover and fast application notification with integrated Oracle clients.
Computer Failures	<a href="#">Configure Oracle Real Application Clusters and Oracle Clusterware</a>		✓	Automatic recovery of failed nodes and instances. Fast application notification with integrated Oracle client failover.
Computer Failures	<a href="#">Configure Oracle Streams</a>		-	Online replica database resumes processing. Whole database replication is recommended for protection.
Human Errors - Erroneous Transactions	<a href="#">Configure Flashback Query or Flashback Table</a>		✓	Fine-grained query or rewind of specific tables.
Human Errors - Accidentally Dropped Tables	<a href="#">Configure Flashback Drop</a>		✓	Ability to quickly restore a dropped table.
Human Errors - Database Wide Impact	<a href="#">Configure Flashback Database</a>	High	-	Database-wide rewind to a point-in-time in the past.
Storage Failures	<a href="#">Configure Oracle Data Guard</a>		✓	Fast-start Failover and fast application notification with integrated Oracle clients.



# Maximum Availability Architecture (MAA) Advisor

**ORACLE Enterprise Manager 10g** [Setup](#) [Preferences](#) [Help](#) [Logout](#)  
**Grid Control** [Home](#) [Targets](#) [Deployments](#) [Alerts](#) [Compliance](#) [Jobs](#) [Reports](#)

---

**High Availability Console (DEMO2\_01 - Primary Database)** [Advanced View](#) [Customize](#) Switch To: DEMO2\_01 - Primary

**Current View: DEMO2\_01** Page Refreshed 25-Sep-2009 15:54:48 CEST [Refresh](#) Auto (60 sec)

### Availability Summary

Status [Up](#)  
 Instances [2 \(↑ 2\)](#)  
 Up Since [25-Sep-2009 14:15:17](#)  
 Overall Availability [98.30%](#)  
 Cluster [RACCL01](#)  
 ASM Instances [2 \(↑ 1 ↓ 1\)](#)  
 MAA Advisor [Details](#)

### Availability Events

Severity	Message	Target	Time
	The database status is MOUNTED.	DEMO2_02	25-Sep-2009 15:12:39
	The database has been started and is in mounted state.	DEMO2_02	25-Sep-2009 15:10:36

### Backup/Recovery Summary

Last Backup [✓ 24-Sep-2009 16:50:06](#)  
 Output Size [14.61 MB](#)  
 Backup Type [CONTROLFILE](#)  
 Next Backup [26-Sep-2009 02:00:00](#)  
 Flashback Database [Disabled](#)

### Flash Recovery Area Usage

Flash Recovery Area [+DGDB1 \(2.0 GB\)](#)

Category	Value
Unused	1.94 GB (3%)
Used (Non-reclaimable)	60.01 MB (97%)

### Data Guard Summary

Overall Status [✓ Normal](#)  
 Protection Mode [Maximum Performance](#)  
 Fast-Start Failover [Disabled](#)  
 Primary Database [✓ DEMO2\\_01](#)  
 Primary Redo Rate [0.21 KB/sec](#)

### Standby Databases

Name	Host	Status	Role	Transport Lag	Apply Lag	Used Flash Recovery Area
DEMO2_02	rac2	<a href="#">✓ Normal</a>	Physical Standby	<a href="#">23.0 sec</a>	<a href="#">31.0 sec</a>	<a href="#">17.16%</a>

### Services Summary

[Create Cluster Managed Database Services](#)

# HA and OEM GRID Control

**ORACLE Enterprise Manager 10g** Grid Control

Home **Targets** Deployments Alerts Compliance Jobs Reports

Hosts | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets


Cluster: RACCL01 > Cluster Database: DEMO2\_01 > Logged in As SYS

**Cluster Database: DEMO2\_01**

Home Performance Availability Server Schema Data Movement Software and Support Topology

Latest Data Collected From Target 25-Sep-2009 16:01:17 o'clock CEST Refresh View Data Automatically (60 sec) ▾

**General**

 Shutdown Black Out

Status Up

Instances 2 ( ↑ 2 )

Availability (%) 98  
(Last 24 hours)

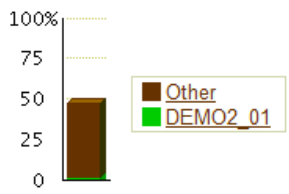
Cluster RACCL01

Database Name DEMO2\_01

Version 10.2.0.4.0

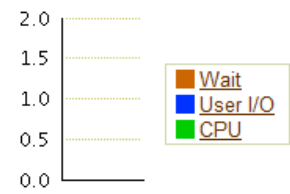
[View All Properties](#)

**Host CPU**



Load 3.78

**Active Sessions**



Maximum CPU 2

**Diagnostic Summary**

Interconnect Alerts ✓ 0

**Space Summary**

Database Size (GB)	<u>0.825</u>
Problem Tablespaces	<u>0</u>
Segment Advisor Recommendations	<u>0</u>

**High Availability**

Console	<u>Details</u>
Data Guard	<u>Primary</u>
Last Backup	<u>24-Sep-2009 16:50:06</u>
Usable Flash Recovery Area (%)	<u>97.07</u>
Flashback Database Logging	<u>Disabled</u>

# HA and OEM GRID Control

**ORACLE Enterprise Manager 10g** Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

Hosts | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets

Cluster: RACCL01 > Cluster Database: DEMO2\_01 > Logged in As SYS

## Data Guard

Page Refreshed 25 September 2009 16:12:43 CEST View Data Real Time: Manual Refresh

### Overview

Data Guard Status **✓ Normal**  
 Protection Mode Maximum Performance  
 Fast-Start Failover Disabled

### Standby Progress Summary

Transport lag is the time difference between the primary last update and the standby last received redo. Apply lag is the time difference between the primary last update and the standby last applied redo.

Category	Value (seconds)
Transport Lag	31
Apply Lag	45

### Primary Cluster Database

Name DEMO2\_01  
 Cluster RACCL01  
 Data Guard Status **✓ Normal**  
 Current Log Multiple Threads  
 Properties Edit

### Standby Databases

[Add Standby Database](#)

[Edit](#) [Remove](#) [Switchover](#) [Failover](#)

Select	Name	Host	Data Guard Status	Role	Last Received Log	Last Applied Log	Estimated Failover Time
<input checked="" type="radio"/>	DEMO2_02	rac2.mycorpdomain.com	✓ <u>Normal</u>	Physical Standby	<u>Multiple Threads</u>	<u>Multiple Threads</u>	6.5 seconds

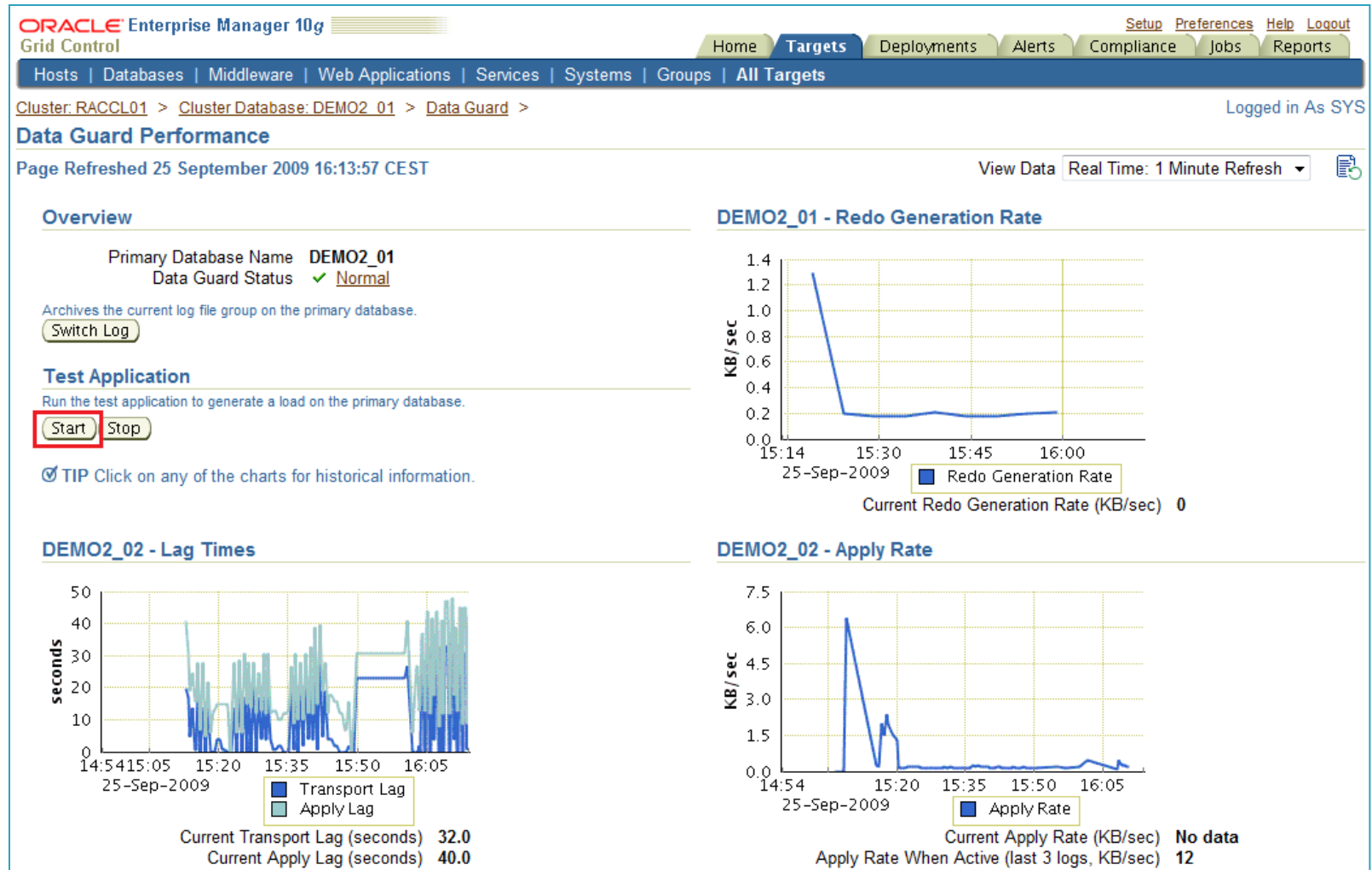
### Performance

Data Guard Performance  
Log File Details

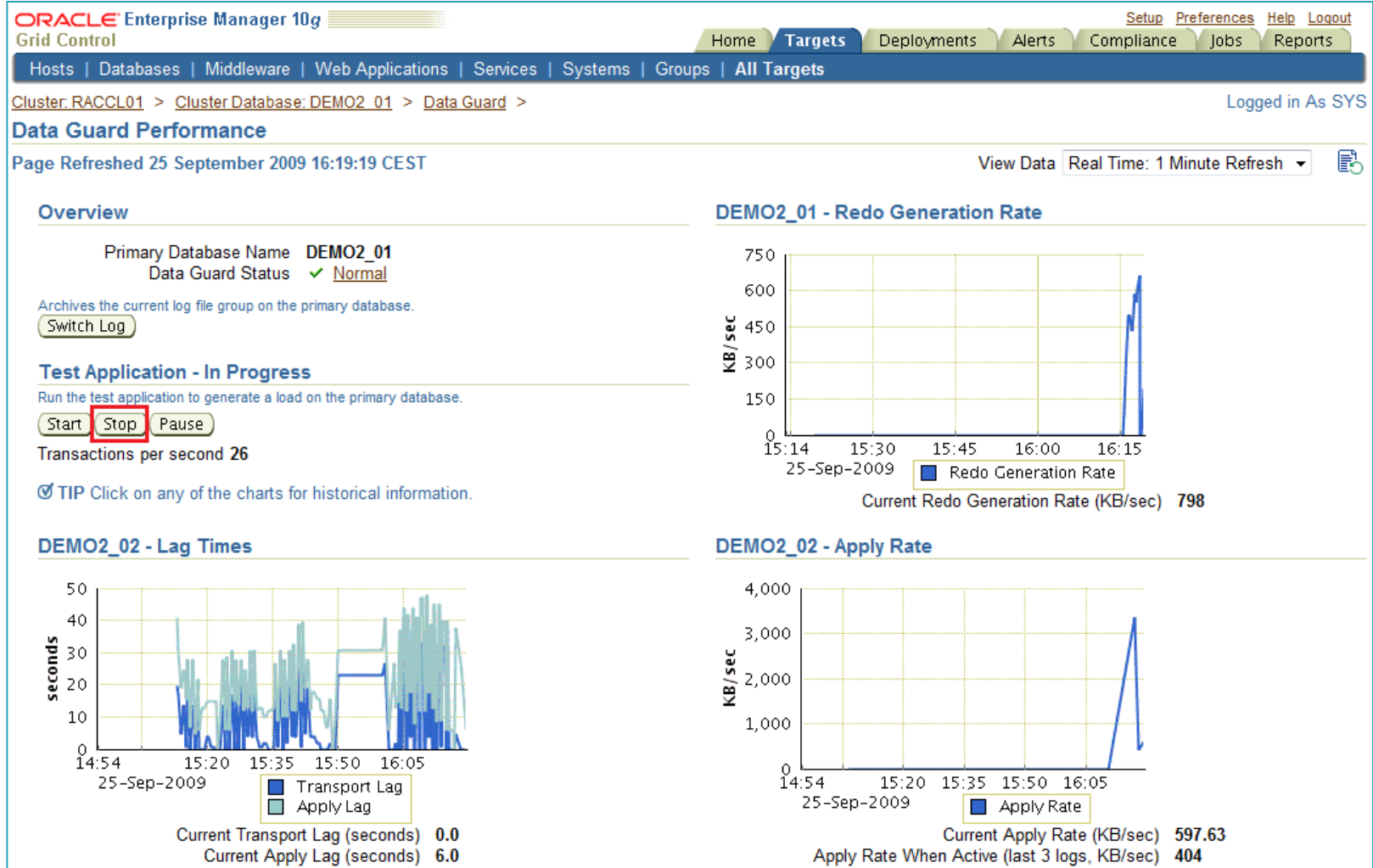
### Additional Administration

Verify Configuration  
Remove Data Guard Configuration


# HA and OEM GRID Control



# HA and OEM GRID Control



# HA and OEM GRID Control

**ORACLE Enterprise Manager 10g**  [Grid Control](#)


Home **Targets** Deployments Alerts Compliance Jobs Reports

Hosts | Databases | Middleware | Web Applications | Services | Systems | Groups | **All Targets**

Cluster: RACCL01 > Cluster Database: DEMO2\_01 > Data Guard > Logged in As SYS

View Data Real Time: Manual Refresh ▼

## Log File Details

Page Refreshed 25-Sep-2009 16:21:43 CEST 

A table is shown below for each standby database in the configuration, listing redo log files that have not been received by the standby database and redo log files that have been received but not applied to the standby database. Related redo transport and apply information is also displayed for diagnostic purposes.

### Primary Current Logs


Thread	Log
1	23
2	19

### DEMO2\_02

Redo Transport Services	On	Redo Apply Services	On
Redo Transport Status	Normal	Status	Normal
		Apply Delay (minutes)	0

Primary Thread	Log	Status	ResetLogs ID #	First Change # (SCN)	Last Change # (SCN)	Size (KB)	Time Generated	Time Completed
2	17	Partially Applied	691697666	392053	397307	51198	25-Sep-2009 16:23:27	25-Sep-2009 16:24:36
2	18	Not Applied	691697666	397307	402706	51198	25-Sep-2009 16:24:36	25-Sep-2009 16:26:33

# HA and OEM GRID Control

ORACLE Enterprise Manager 10g   
Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports


Hosts | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets

Logged in As SYS

## Processing: Verify

Verify checks various standby database settings.

The results of the verify will be shown upon completion. You can click Cancel to stop processing at any time.



- ✓ Initializing
- ✓ Switching current log
- ✓ Performing health check
- ✓ Updating Data Guard information
- ✓ Verifying protection mode
- ✓ Checking standby redo log files
- ✓ Checking Data Guard status
- ✓ Checking properties
- ➡ Verifying log switch

Saving detailed results

# HA and OEM GRID Control

**ORACLE Enterprise Manager 10g** Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

Hosts | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets

Logged in As SYS

**Processing: Verify Completed**

**Verify completed successfully.** Check the detailed results for more information.  
**Standby redo log files are recommended.** Click on OK to create standby redo log files.

**Detailed Results**

```
Initializing
Connected to instance rac2.mycorpdomain.com:DEMO22
Starting alert log monitor...
Updating Data Guard link on database homepage...

Data Protection Settings:
Protection mode : Maximum Performance
Redo Transport Mode settings:
  DEMO2_01: ASYNC
  DEMO2_02: ASYNC
Checking standby redo log files.....Done
(Standby redo log files needed : 9)

Checking Data Guard status
  DEMO2_01 : Normal
  DEMO2_02 : Normal
Checking Inconsistent Properties
```



# OEM GRID Control Standby Database – Switchover

ORACLE Enterprise Manager 10g  
Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

Hosts | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets

Cluster: RACCL01 > Cluster Database: DEMO2\_01 > Database Instance: DEMO2\_01 DEMO22 > Logged in As SYS

## Data Guard

Page Refreshed 25 September 2009 15:37:20 CEST View Data Real Time: 30 Second Refresh

### Overview

Data Guard Status **✓ Normal**  
Protection Mode **Maximum Performance**  
Fast-Start Failover **Disabled**

### Primary Cluster Database

Name **DEMO2\_01\_DEMO22**  
Cluster **Unknown**  
Data Guard Status **✓ Normal**  
Current Log **Multiple Threads**  
Properties **Edit**

### Standby Progress Summary

Transport lag is the time difference between the primary last update and the standby last received redo. Apply lag is the time difference between the primary last update and the standby last applied redo.

Category	Value (seconds)
Transport Lag	1
Apply Lag	15

### Standby Databases

Edit Remove Switchover Failover Add Standby Database

Select	Name	Host	Data Guard Status	Role	Last Received Log	Last Applied Log	Estimated Failover Time
<input checked="" type="radio"/>	DEMO2_02	rac2.mycorpdomain.com	✓ Normal	Physical Standby	Multiple Threads	Multiple Threads	2.6 seconds

### Performance

[Data Guard Performance](#)  
[Log File Details](#)

### Additional Administration

[Verify Configuration](#)  
[Remove Data Guard Configuration](#)

# OEM GRID Control Standby Database – Switchover


**ORACLE** Enterprise Manager 10g  
Grid Control

Setup Preferences Help Logout

Home Targets Deployments Alerts Compliance Jobs Reports

Hosts | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets

Logged in As SYS

 **Confirmation: Switchover to DEMO2\_02**

**Are you sure you want to switchover to DEMO2\_02?**

A switchover will cause the primary and standby databases to switch roles. Since DEMO2\_02 is a physical standby database, the primary and standby databases will be shut down and restarted. The switchover operation cannot be cancelled.

Any active sessions connected to the primary database will be closed automatically during the switchover operation.

[Browse Primary Database Sessions](#)


**Monitoring Settings and Jobs**

Monitoring settings and jobs can optionally be swapped between the primary and standby databases as part of the role change operation.

☒ **Swap Monitoring Settings**

The current Enterprise Manager monitoring settings (including metric thresholds) for the primary and standby databases will be swapped after the role change, overriding all settings for each database with the values from the other database. If more granular monitoring standard swapping is desired, de-select this option and use the Monitoring Standards interface to create monitoring templates prior to the role change and apply them afterwards.

☒ **Transfer Jobs**

 **Job Transfer Details**

**Primary Database Jobs**

The following jobs currently scheduled on the primary database can be transferred to the new primary database.

[Select All](#) | [Select None](#)

Select	Job Name	Scheduled Date	Job Owner	Job Type
<input checked="" type="checkbox"/>	BACKUP_DEMO2_01_000001	Sep 26, 2009 2:00:00 AM CEST	SYSMAN	Backup

**Standby Database Jobs**

The following jobs currently scheduled on the standby database can be transferred to the new standby database.

Select	Job Name	Scheduled Date	Job Owner	Job Type
	No items found			

NoYes


# OEM GRID Control Standby Database – Switchover

**ORACLE** Enterprise Manager 10g  
Grid Control

HomeTargetsDeploymentsAlertsComplianceJobsReports


Hosts | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets

Logged in As SYS


 **Processing: Switchover**

**Switching over to DEMO2\_02**

This process takes some time. The page automatically returns to the Data Guard overview page upon completion.  
Click on the alert log link to view progress details in a new browser window. View alert log: [DEMO2\\_01](#) [DEMO2\\_02](#)



- ✓ Performing role change
- ✓ Restarting databases
- ✓ Waiting for switchover to complete
- ✓ Transferring jobs
- ➡ Transferring monitoring settings

 **TIP** Switchover completed successfully. The job and monitoring settings transfer operations may take several more minutes. To end further process monitoring and allow the remaining operations to continue running in the background, click Return to Data Guard Overview.

Return to Data Guard Overview

# OEM GRID Control Standby Database – Switchover

ORACLE Enterprise Manager 10g  
Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

Hosts | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets

Cluster: RACCL01 > Cluster Database: DEMO2\_01 > Logged in As SYS

**Data Guard**

Page Refreshed 25 September 2009 17:33:19 CEST View Data Real Time: 30 Second Refresh

### Overview

Data Guard Status ✓ **Normal**  
 Protection Mode [Maximum Performance](#)  
 Fast-Start Failover [Disabled](#)

### Primary Database

Name [DEMO2\\_02](#)  
 Host [rac2.mycorpdomain.com](#)  
 Data Guard Status ✓ [Normal](#)  
 Current Log [33](#)  
 Properties [Edit](#)

### Standby Databases

[Edit](#) [Remove](#) [Switchover](#) [Failover](#) [Add Standby Database](#)

Select	Name	Cluster	Data Guard Status	Role	Last Received Log	Last Applied Log	Estimated Failover Time
<input checked="" type="radio"/>	<a href="#">DEMO2_01</a>	<a href="#">RACCL01</a>	<span style="color: green;">✓</span> <a href="#">Normal</a>	<b>Physical Standby Cluster Database</b>	<a href="#">Not available</a>	<a href="#">Not available</a>	<a href="#">Not available</a>

### Standby Progress Summary

Transport lag is the time difference between the primary last update and the standby last received redo.  
 Apply lag is the time difference between the primary last update and the standby last applied redo.

Category	Value (seconds)
Transport Lag	0
Apply Lag	6

# OEM GRID Control Standby Database – Switchover

ORACLE® Enterprise Manager 10g  
Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

Hosts | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets


Cluster: RACCL01 > Cluster Database: DEMO2\_01 > Logged in As SYS

Cluster Database: DEMO2\_01

Home Performance Availability Server Schema Data Movement Software and Support Topology

Latest Data Collected From Target 23-Oct-2009 16:46:39 o'clock CEST [Refresh](#) View Data Automatically (60 sec) ▼

### General

 [Shutdown](#) [Black Out](#)

Status [Up](#)  
Instances [2 \( ↑ 2 \)](#)  
Availability (%) [99.41](#)  
(Last 24 hours)  
Cluster [RACCL01](#)  
Database Name [DEMO2\\_01](#)  
Version [10.2.0.4.0](#)  
[View All Properties](#)

### Host CPU

1.0  
0.5  
0.0

No data is currently available.

Load [Unavailable](#)

### Active Sessions

1.0  
0.5  
0.0

No data is currently available.

Maximum CPU **Unavailable**

### Diagnostic Summary

Interconnect Alerts [✓ 0](#)

### Space Summary

Database Size (GB)	<a href="#">0.825</a>
Problem Tablespaces	<a href="#">0</a>
Segment Advisor Recommendations	<a href="#">0</a>

### High Availability

Console	<a href="#">Details</a>
Data Guard	<a href="#">Physical Standby</a>
Primary Database	<a href="#">DEMO2_02</a>
Last Backup	<a href="#">✓ 21-Oct-2009 11:15:10</a>
Usable Flash Recovery Area (%)	<a href="#">78.54</a>
Flashback Database Logging	<a href="#">Disabled</a>

# OEM GRID Control Standby Database – Switchover

**ORACLE Enterprise Manager 10g**  
Grid Control

Home **Targets** Deployments Alerts Compliance Jobs Reports


Hosts | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets

**Database Instance: DEMO2\_02**

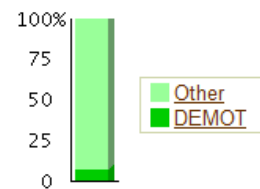
Home Performance Availability Server Schema Data Movement Software and Support

Page Refreshed 23-Oct-2009 16:55:29 o'clock CEST [Refresh](#) View Data Automatically (60 sec) ▾

**General** [Shutdown](#) [Black Out](#)

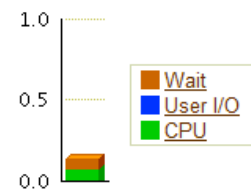

 Status [Up](#)  
 Up Since 23-Oct-2009 16:37:39 o'clock CEST  
 Instance Name **DEMOT**  
 Version 10.2.0.4.0  
 Host [rac2.mycorpdomain.com](#)  
 Listener [LISTENER\\_RAC2\\_rac2.mycorpdomain.com](#)  
 ASM [+ASM2\\_rac2.mycorpdomain.com](#)  
[View All Properties](#)

**Host CPU**




Load [8.44](#) Paging [0.02](#)

**Active Sessions**



Core Count 1

**SQL Response Time**



Latest collection is empty.  
SQL Response Time Unavailable (%)  
[Edit Reference Collection](#)

**Diagnostic Summary**

ADDM Findings 0  
 Alert Log [23-Oct-2009 16:29:48](#)

**Space Summary**

Database Size (GB)	<a href="#">Unavailable</a>
Problem Tablespaces	0
Segment Advisor Recommendations	0
Dump Area Used (%)	40

**High Availability**

Console	<a href="#">Details</a>
Data Guard	✓ <a href="#">Primary</a>
Instance Recovery Time (sec)	64
Last Backup	✓ <a href="#">24-Sep-2009 16:50:06</a>
Usable Flash Recovery Area (%)	70.92
Flashback Database Logging	<a href="#">Disabled</a>



# OEM GRID Control Vulnerability

- ▶ Policies – Policy Groups
  - Categories
    - Configuration
      - Insufficient Number of Control Files / Redo Logs
      - Not using Spfile, Automatic Undo Management
      - ...
    - Storage
      - Default Permanent Tablespace Set to a System Tablespace
      - Dictionary Managed Tablespaces
      - ...
    - Security
      - Default Passwords
      - Execute Privileges on UTL\_FILE To PUBLIC
      - ...

# OEM GRID Control Vulnerability

ORACLE Enterprise Manager 10g  
Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

Policies | Policy Groups | Security At a Glance

## Evaluation Results: Secure Configuration for Oracle Database


View All Results Filter By Target All Choose Target Clear Return

Secure Configuration for Oracle Database

- Post Installation
- Oracle Directory and File Permissions
- Oracle Parameter Settings
- Database Password Profile Settings
- Database Access Settings

### Policy Group: Secure Configuration for Oracle Database






Summary Trend Overview

Average Compliance Score (%)  66

Summary For this policy group, 5 Database Instance targets were evaluated resulting in 234 violations. There were 70 policies violated.

Description Ensures adherence with best-practice security configuration settings that help protect against database-related threats and attacks, providing a more secure operating environment for the Oracle database.

#### Results

Target	Compliance Score (%)	Violations	Policies			Last Evaluation
			Violated	Compliant	Not Evaluated	
DEMO2_01_DEMO22	 59	33	10	13	28	02-Nov-2009 12:06:18 CET
DEMO2_01_DEMO21	 59	33	10	13	28	02-Nov-2009 12:06:18 CET
orcl1_base1.mycorpdomain.com	 60	80	22	29	0	02-Nov-2009 12:06:18 CET
oemrep.mycorpdomain.com	 72	53	16	35	0	02-Nov-2009 12:06:18 CET
DEMO2_02	 80	35	12	39	0	02-Nov-2009 12:06:18 CET

**TIP** A policy will not be evaluated when one of the following conditions occurs: the target is managed by an older Management Agent, the policy is not applicable to the target, or the evaluation of the policy resulted in an error. To determine the version of the Management Agent monitoring the target, see [Management Agent](#). For a list of evaluation errors, see [Evaluation Errors](#).



# OEM GRID Control Vulnerability

- ▶ Patch Advisories
  - Based on connection with My Oracle Support
  - RefreshFromMyOracleSupport
  - Automatic download Patches
  - Automated Patching
    - Provisioning & Automated Patching

# OEM GRID Control Vulnerability

- ▶ Patch Procedures (Deployment Procedures)
  - Patch Standalone ASM
  - Patch Hosts Linux, Windows, Solaris
  - Application Server
  - Oracle Database
  - Clusterware
  - RAC Databases

# OEM GRID Control Vulnerability – Automated Patching

Previous

Credentials

Schedule

Review

Patch Oracle RAC Database - All Nodes : Review

Cancel Back Step 7 of 7 Finish

Software Updates

Staging Location %emd\_root%/EMStage

RAC Database Updates

Software Update Name	Patch ID	Created On	Type	Product	Platform	Release	Interim Patch Applicable On	Description	README
p6810189_10.2.0.4_226_9480	6810189		Patchset	Oracle Database	Linux x86-64	10.2.0.4		10.2.0.4.0 PATCH SET FOR ORACLE DATABASE SERVER	<a href="#">View</a>

**TIP** To lookup for the README, selected updates should be valid patch on My Oracle Support and require connection to My Oracle Support. To Setup or Update My Oracle Support credentials click on 'Setup' Link. The view button for README is not clickable in case of patches selected from software library.

Upgrade OPatch

OPatch Upgrade Not Enabled

Black Out Associated Targets

Black Out the associated targets.

Apply SQL Script

Apply Default SQL Script

Target List

RAC Database Targets to be patched

[Expand All](#) | [Collapse All](#)

Name	Target Type	Cluster Name	Host Name	Oracle Home	Status
Cluster Database Targets					
▶ OZTW1_01	Cluster Database				⬆
▶ OZTW2_01	Cluster Database				⬆
▶ OZTW3_01	Cluster Database				⬆

Credentials

Home Credentials

Credentials Type **Oracle Home Preferred Credentials**

Schedule

Scheduled **Immediately**

**Repository**

# HA and OEM GRID Control

Wrap Up

# High Availability Wrap Up

- ▶ Monitoring & Configuring of HA Databases
  - Monitoring Templates
  - Metrics / Policies
- ▶ Wizard based:
  - Creation of Standby Databases
  - Data Guard Role switch
  - Migration to ASM
  - Migration to RAC
  - Creation of additional Instances
- ▶ HA Console
- ▶ MAA (Advisor)
- ▶ Automated Patching – Provisioning

# High Availability Wrap Up

- ▶ [Rob.Zoeteweij@gmail.com](mailto:Rob.Zoeteweij@gmail.com)
- ▶ Blog: <http://oemgc.wordpress.com>
- ▶ LinkedIn Group: Oracle Enterprise Manager  
Grid Control  
[http://www.linkedin.com/groups?gid=1776007&trk=hb\\_side\\_g](http://www.linkedin.com/groups?gid=1776007&trk=hb_side_g)

# High Availability

Q & A