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Deploying Oracle Enterprise Manager in a Secure Maximum Availability Architecture

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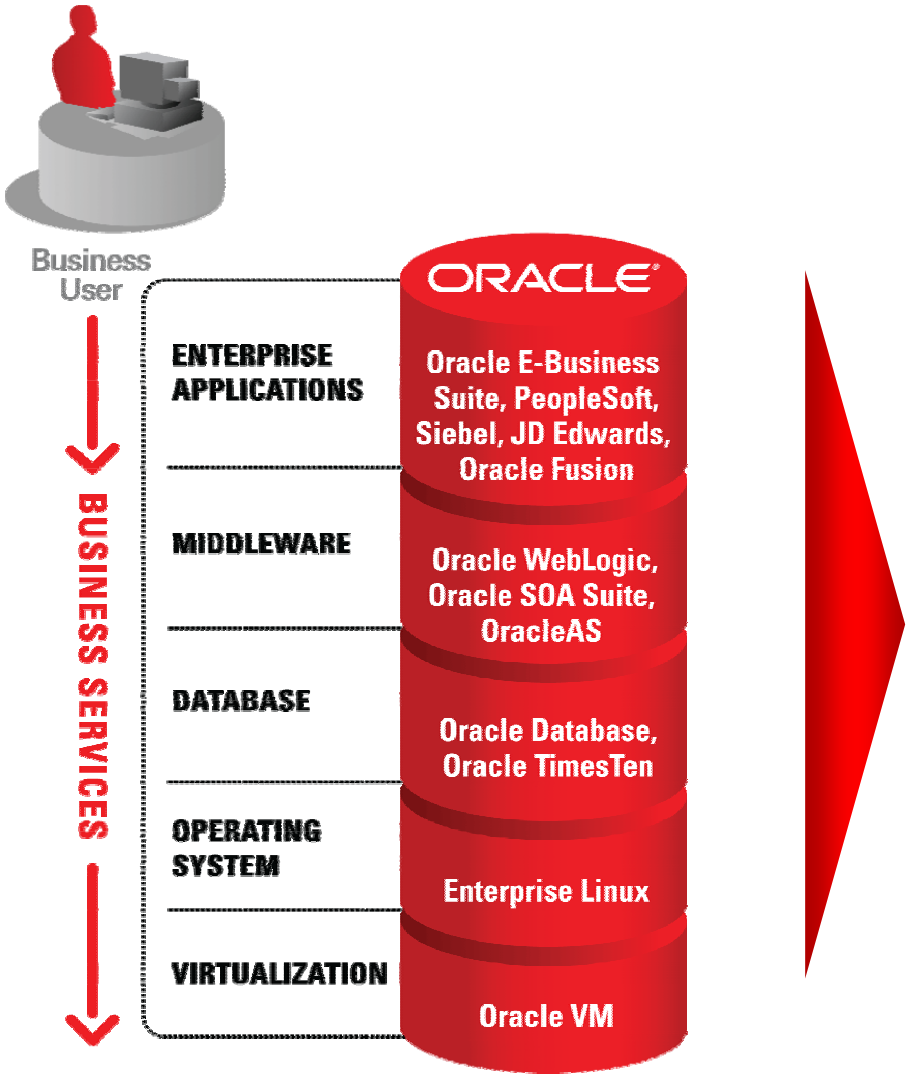
Why Oracle Enterprise Manager?

Oracle's Complete Enterprise Software Stack

Built-in & Integrated Manageability

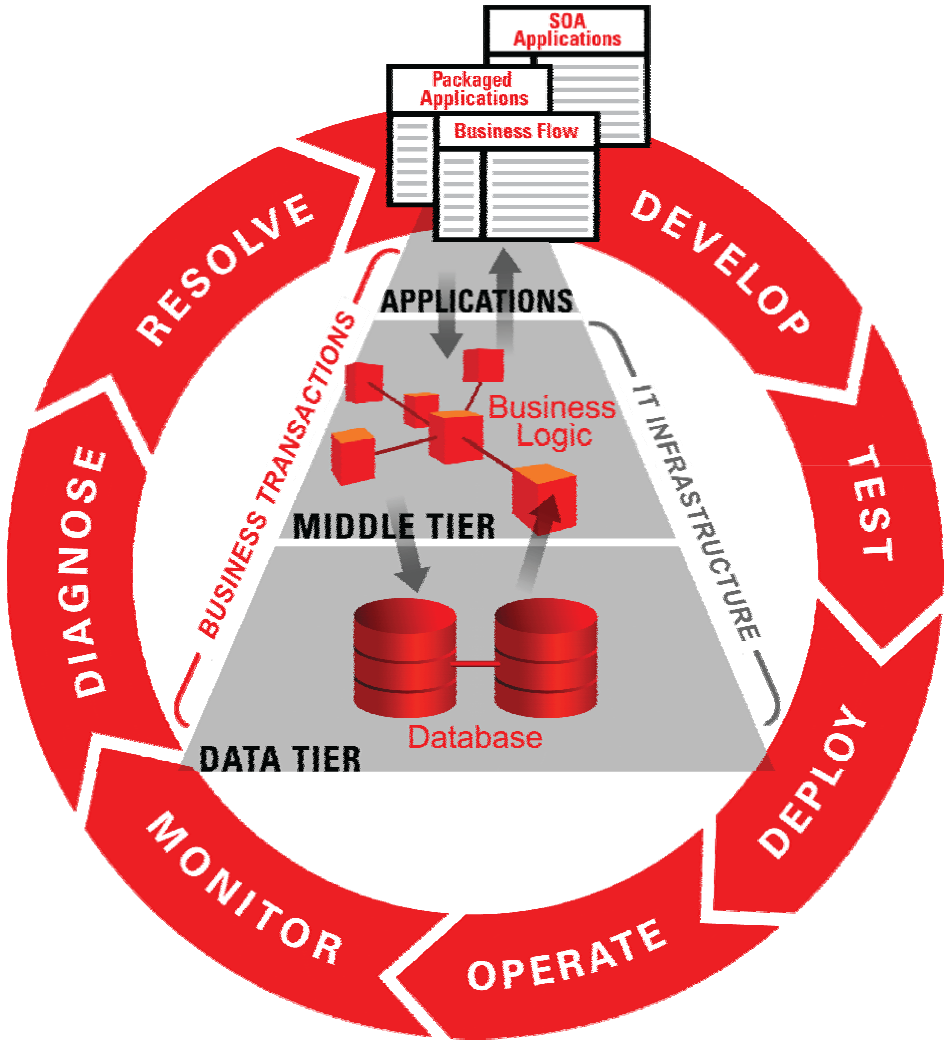


- Leader in the complete enterprise application stack
- Built-in manageability in every tier
- Integrated manageability across the entire stack

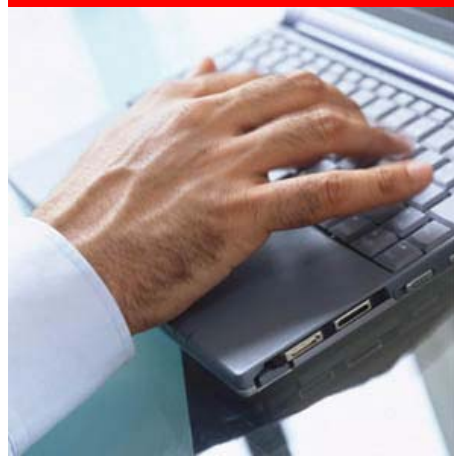
Oracle Enterprise Manager

Increases Business Efficiency

- **Manage applications top-down, from the business perspective** by understanding user experiences and business impact of IT issues
- **Manage entire application lifecycle to increase business agility** with comprehensive application quality management and compliance solutions
- **Reduce operational costs** through intelligent diagnostics and automated IT processes



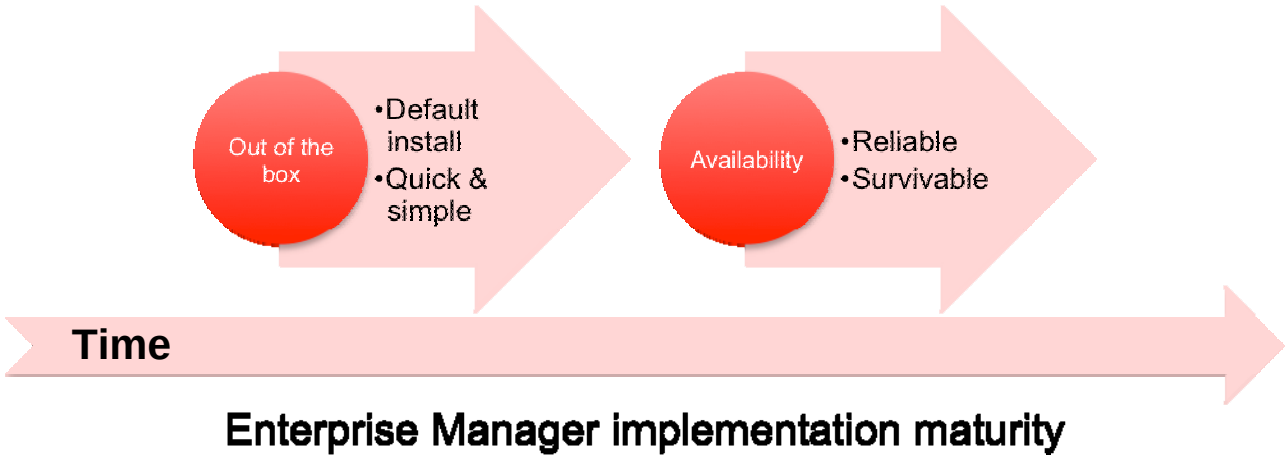
Agenda



- Oracle EM Maximum Availability Architecture (MAA) best practices
- Oracle EM security best practices
- Oracle EM A3 best practices
- Q&A

Best Practices: Deploying Oracle Enterprise Manager in Maximum Availability Architecture

Customer implementations



In this section we want to discuss the key design decisions and alternatives when deploying EM in a highly available manner

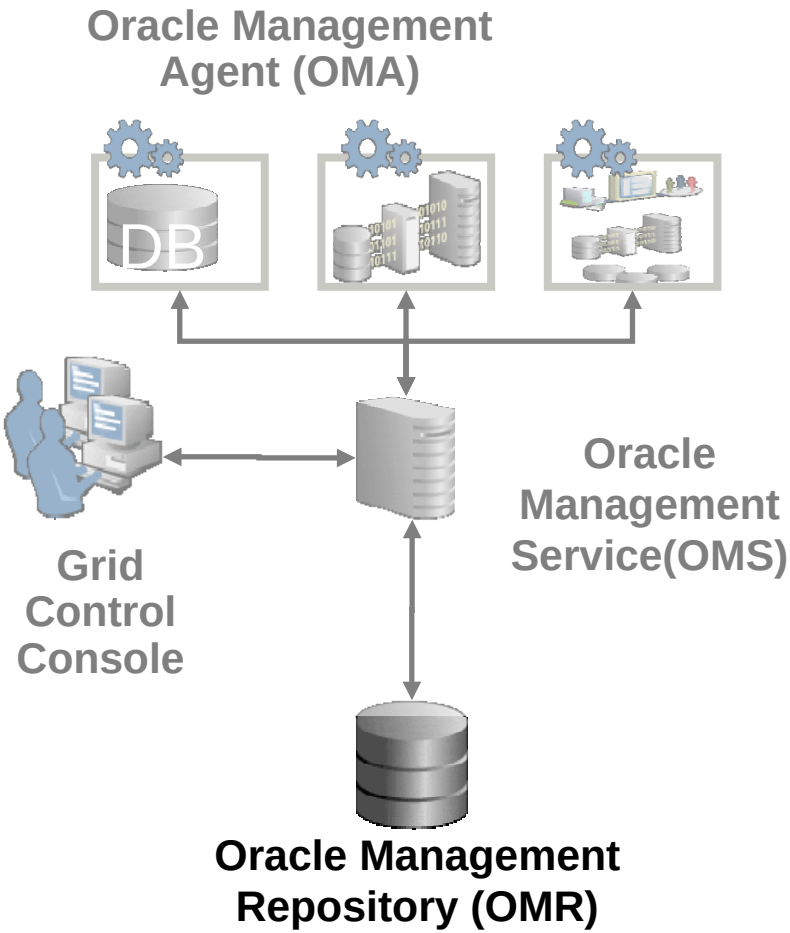
Oracle Enterprise Manager MAA Best Practices

- Degrees of protection
  - Backup and recovery
  - Active/Passive mode
  - Active/Active mode
  - Disaster recovery

MAA: Backup and Recovery

MAA: Backup And Recovery

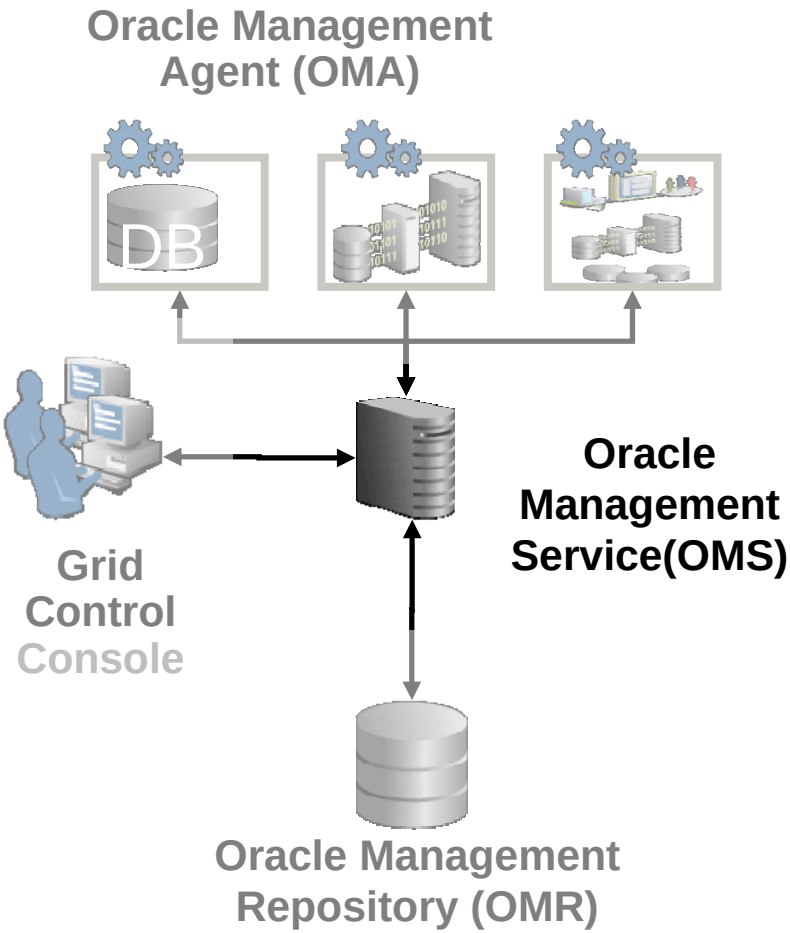
Oracle Management Repository



- Use standard database tools for any database backup and for recovery
- **Case 1:** Full recovery on same host -- No special consideration for EM
  - On new host, modify repository target
- **Case 2:** Partial/Point-in-time recovery – Agent will be the source of truth and state information to resynchronization
  - **emcli resync repos**

MAA: Backup And Recovery

Oracle Management Service



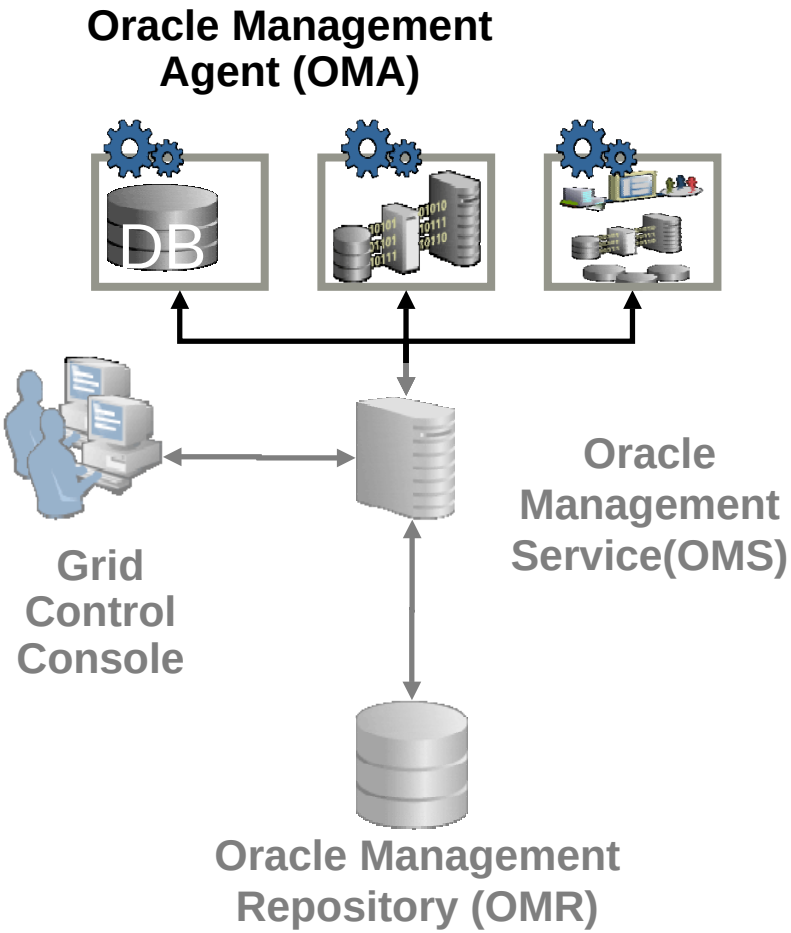
- Oracle Management Service is (mostly) stateless
- Protect /state and /upload directory with some forms of disk mirroring
- Backup OMS config with:
  - **emcli exportconfig**

- **Method 1:** Backup/Restore the software directory structure
  - restore that to the same directory path
- **Method 2:** Reinstall from the original media

- Restore OMS configuration
  - **emcli importconfig**

MAA: Backup And Recovery

Oracle Management Agent

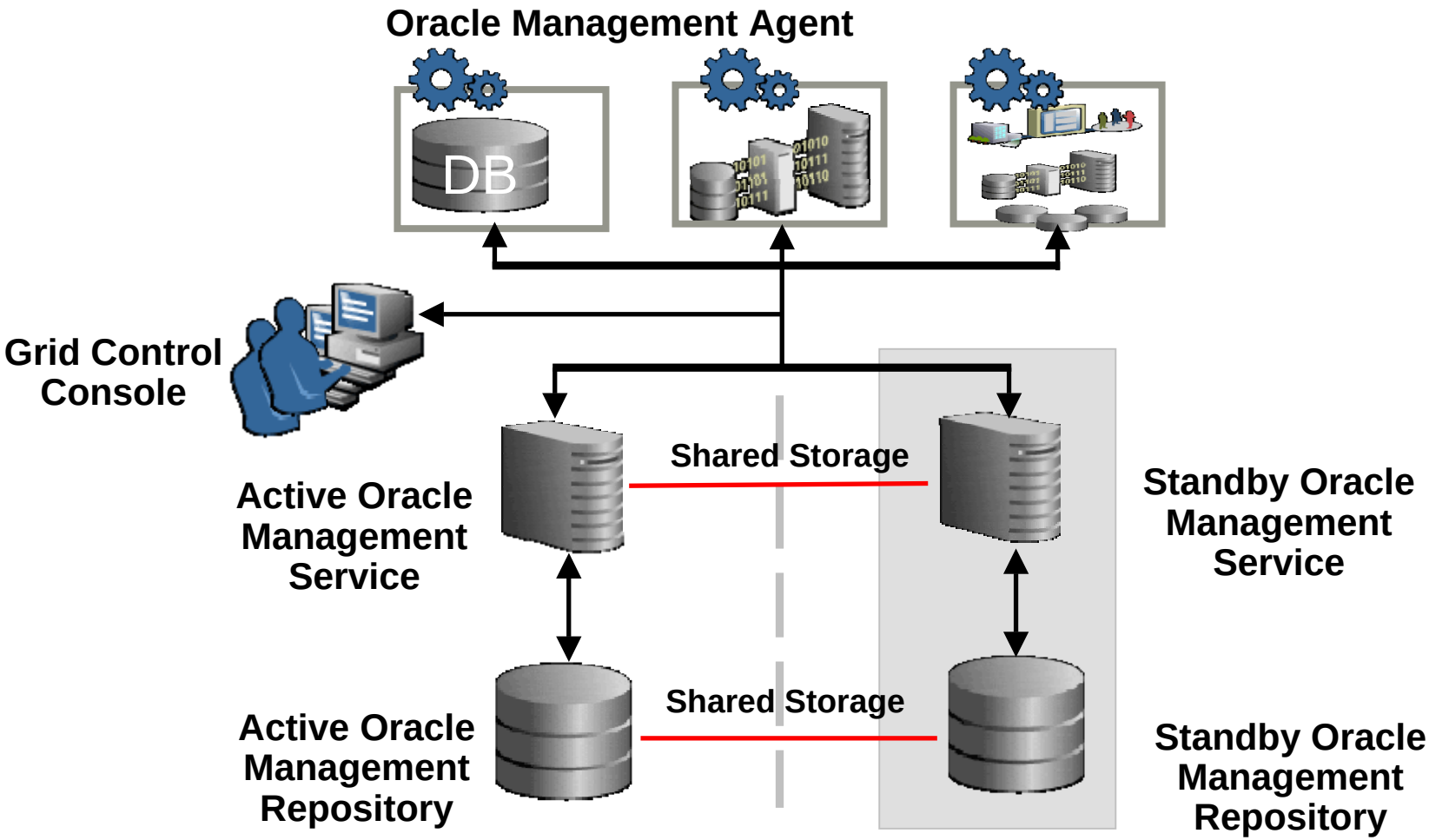


- **Method 1:** Disk backup and restore
- **Method 2:** Reinstall from the original media
- Repository will be considered as the source of truth
  - Rebuild state information from Repository
  - **Emcli resyncagent**

MAA: Active/Passive Mode

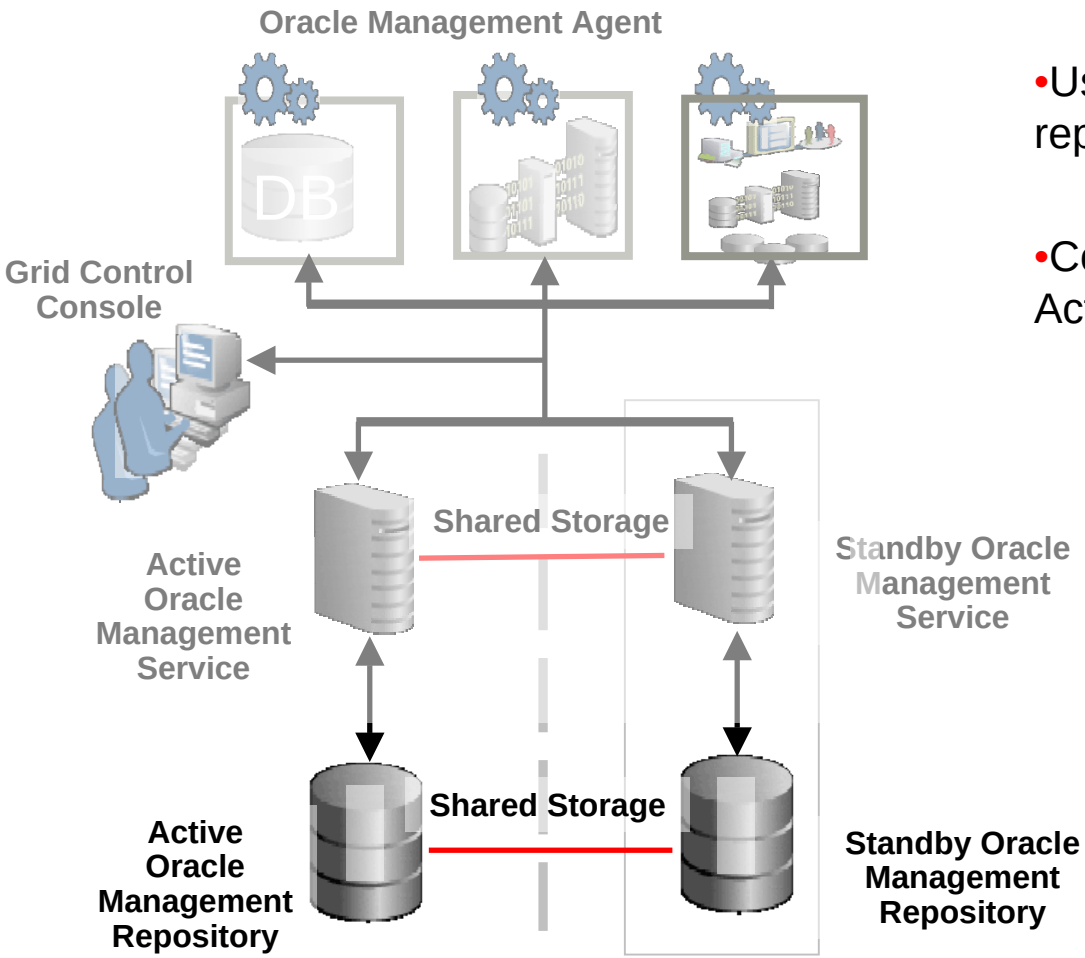
Maximum Availability Architecture

Active/Passive (*blackout* during failover)



MAA: Active/Passive Mode

Oracle Management Repository



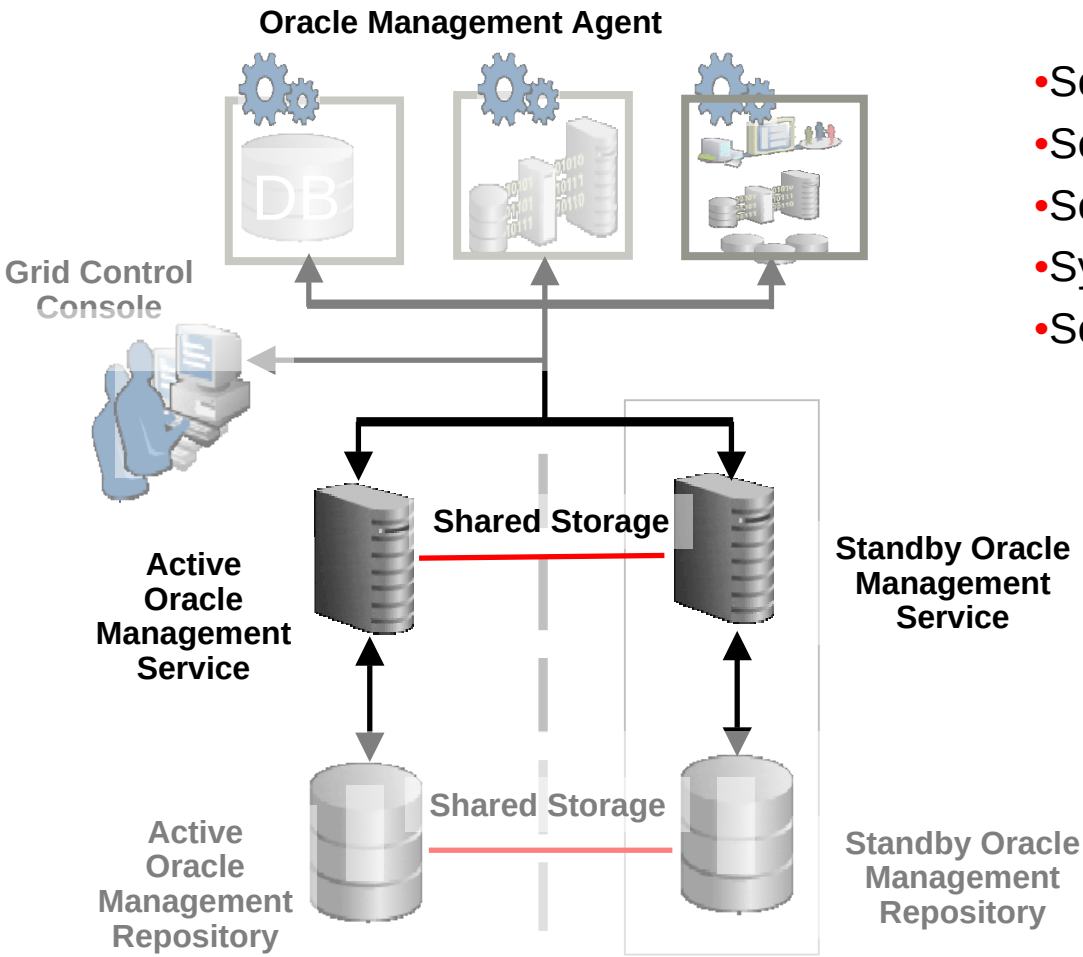
- Use Data Guard for passive repository

  Or

- Configure the database for Active/Passive failover

MAA: Active/Passive Mode

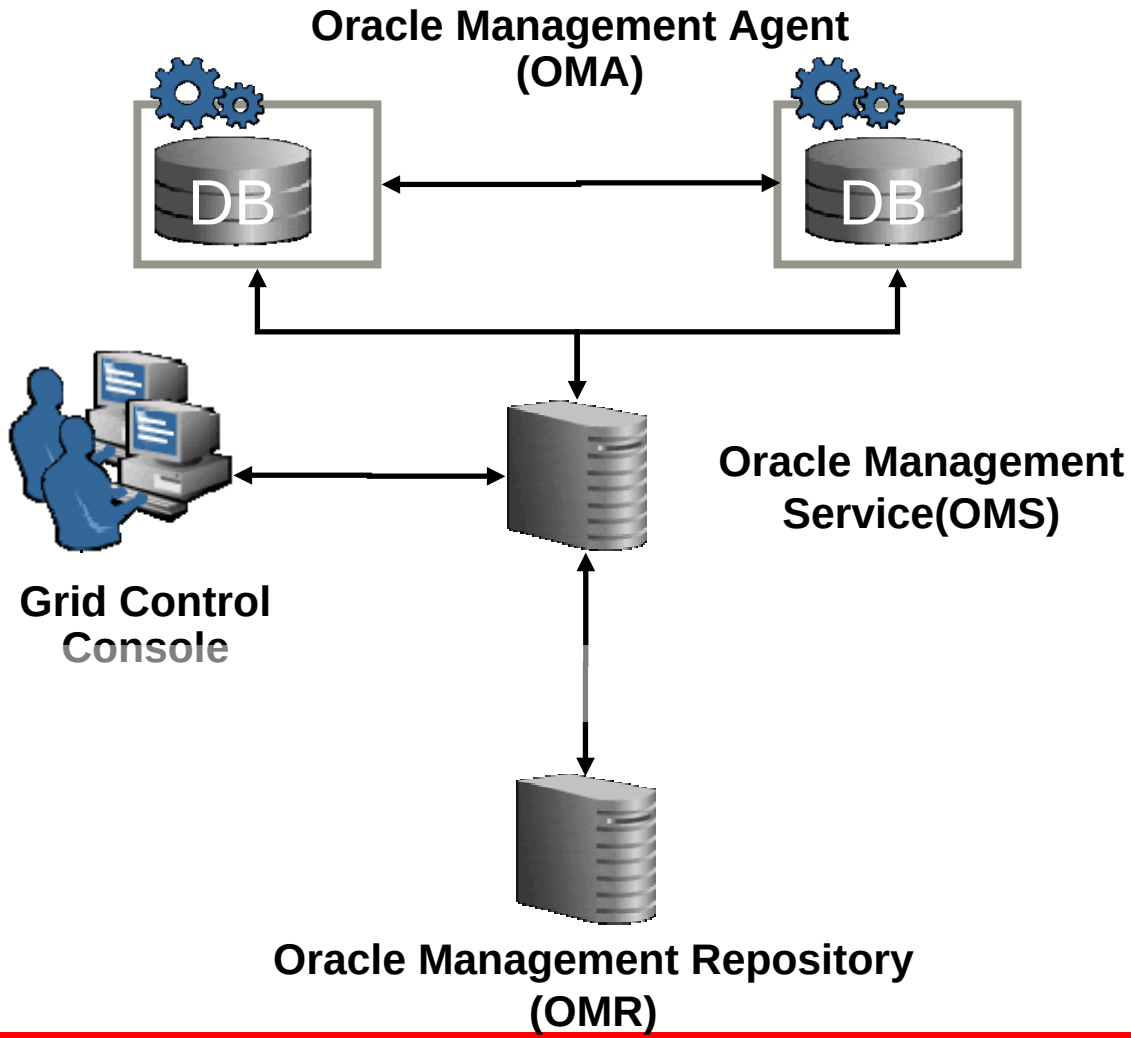
Oracle Management Service



- Setup the virtual hostname/VIP
- Setup shared storage
- Setup operating system
- Synchronize OS user IDs
- Setup shared inventory

MAA: Active/Passive Mode

Oracle Management Agent

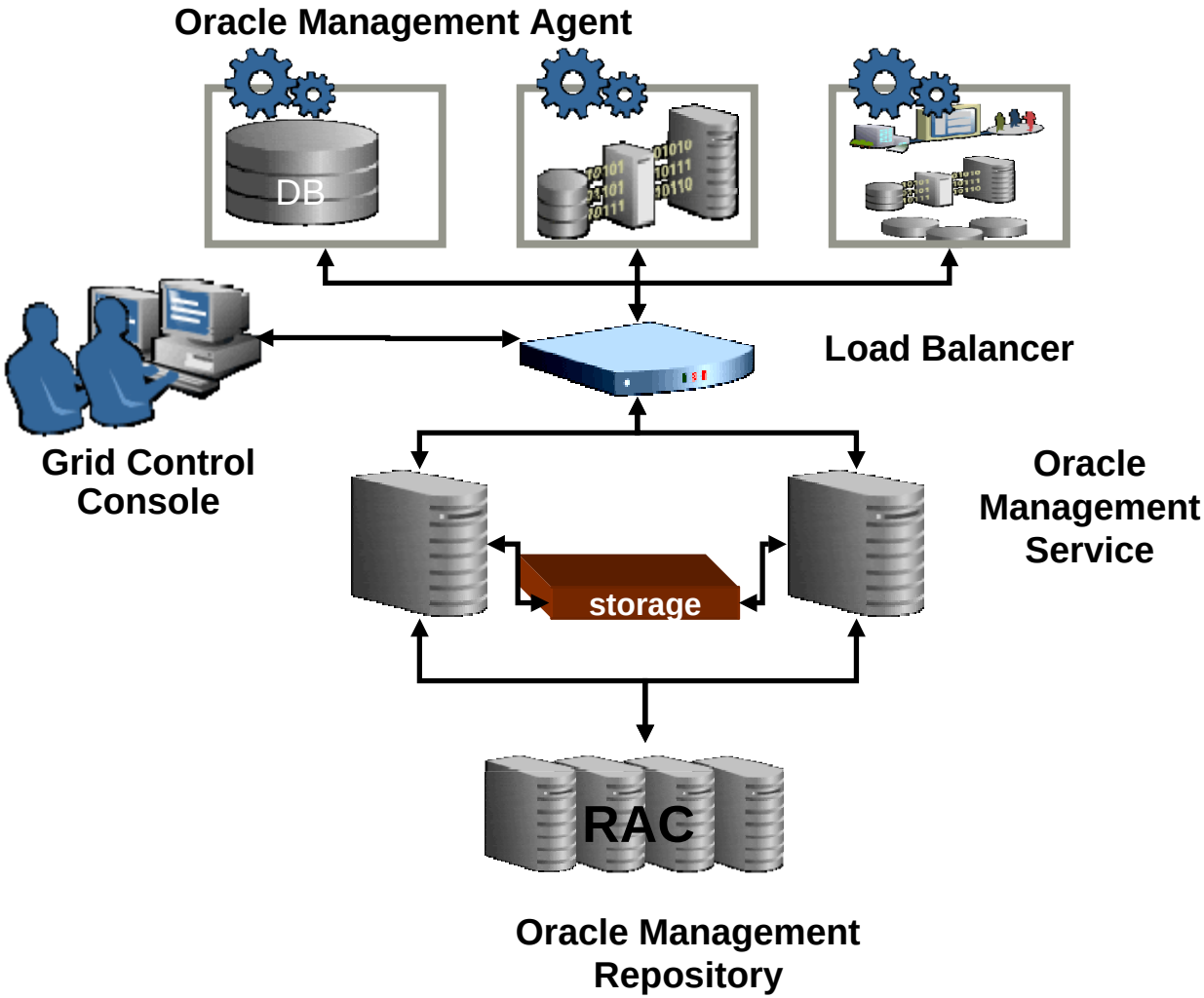


- Install 1 agent per host
- Install the EMCLI
- Install Active/Passive targets using shared storage and clusterware
- Discover targets as normal
- Use EMCLI command relocate target to moving monitoring between agents
- **emcli relocate target**

MAA: Active/Active Mode

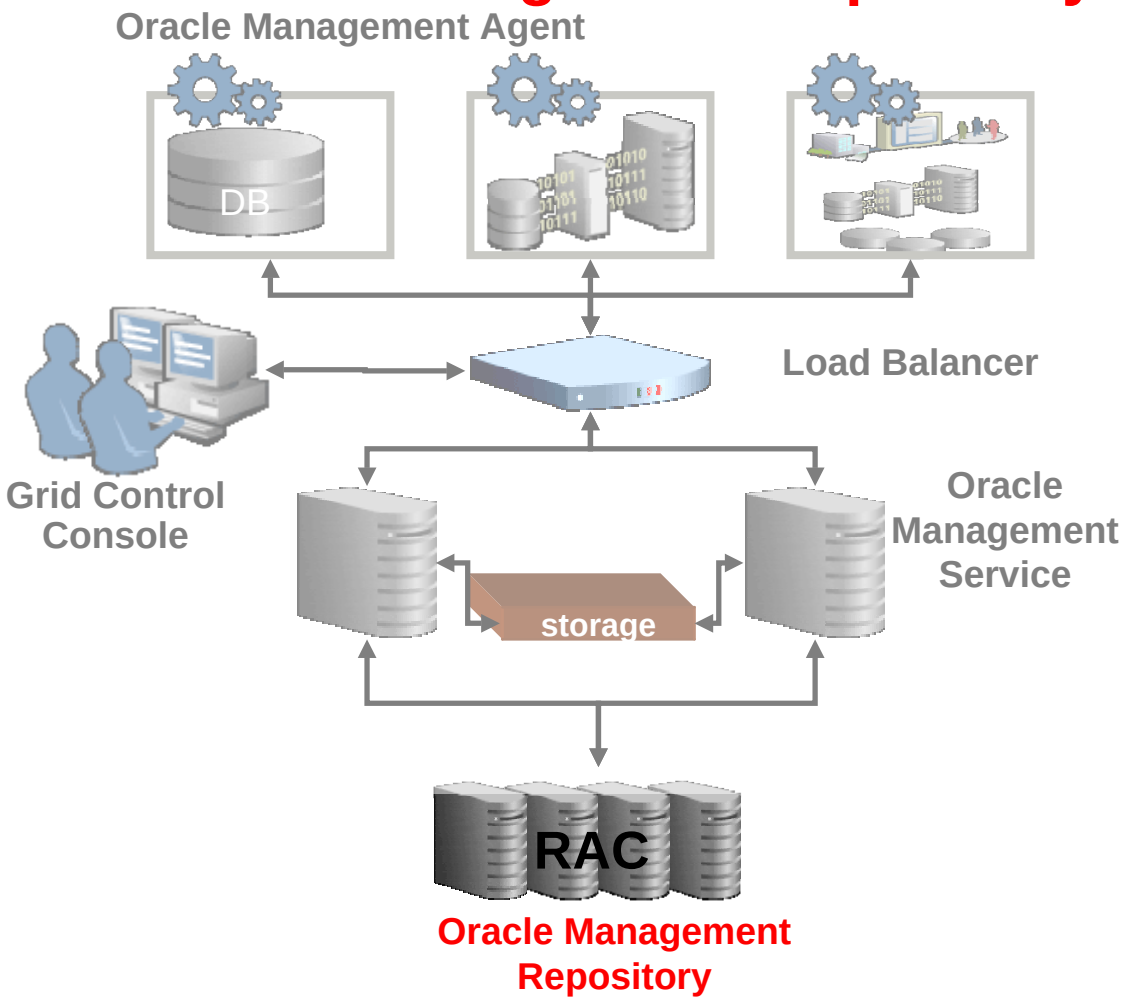
Maximum Availability Architecture

Active/Active Mode (*brownout* during failover)



MAA: Active/Active Mode

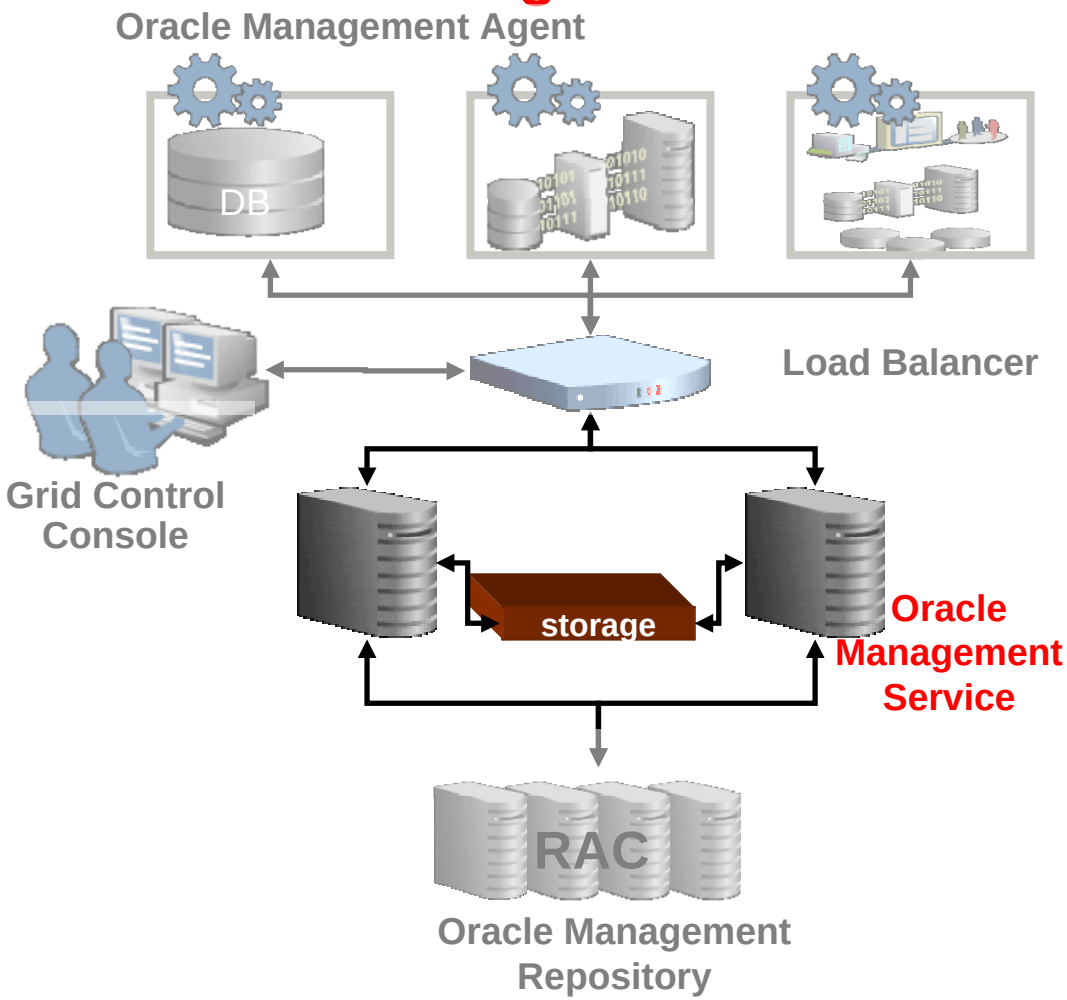
Oracle Management Repository



- Latest certified DB version with RAC
- ASM as storage technology
- Best practices for Database MAA
- Configure Fast Connection Failover

MAA: Active/Active Mode

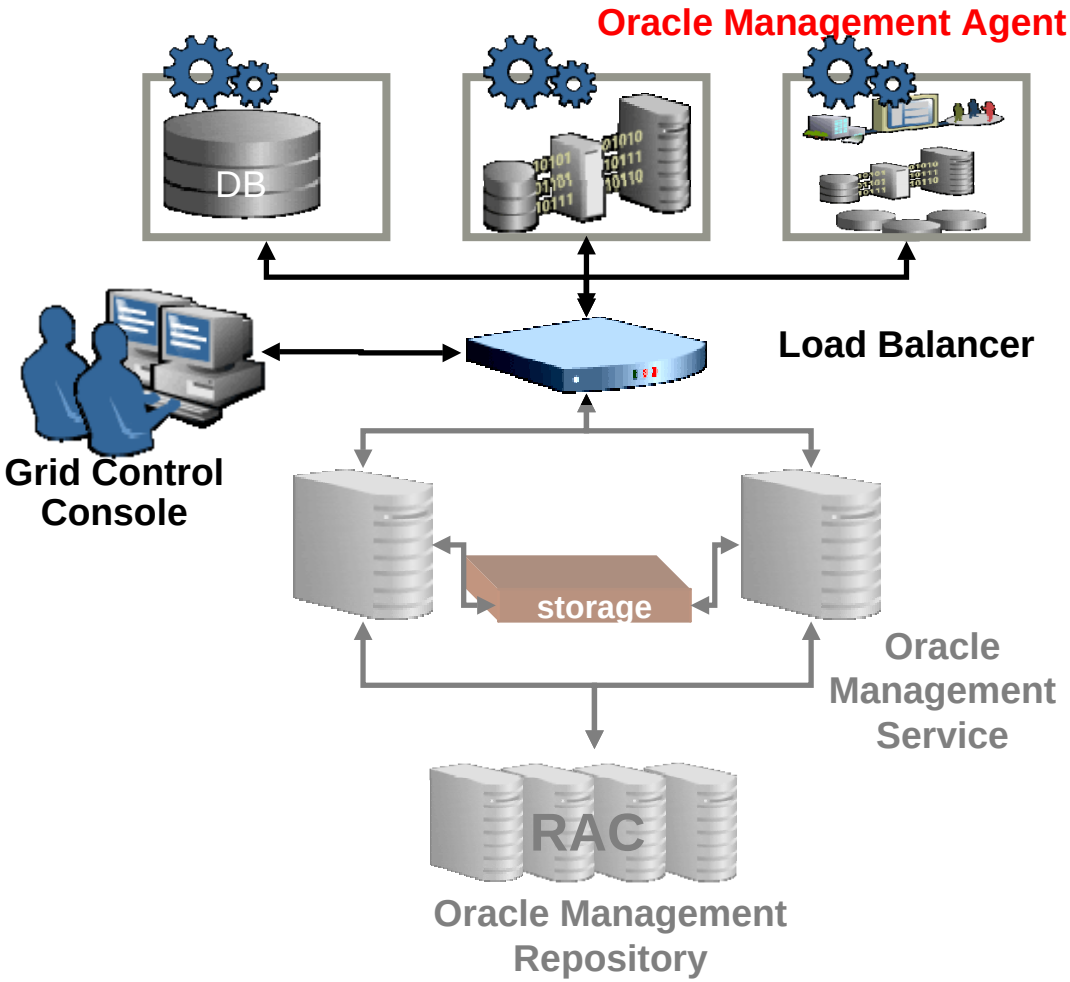
Oracle Management Service



- Appropriate OMS Installation Location (Network Latency)
- Best practices for Application Server MAA
- Configure the shared file system load directory
- Configure connection string

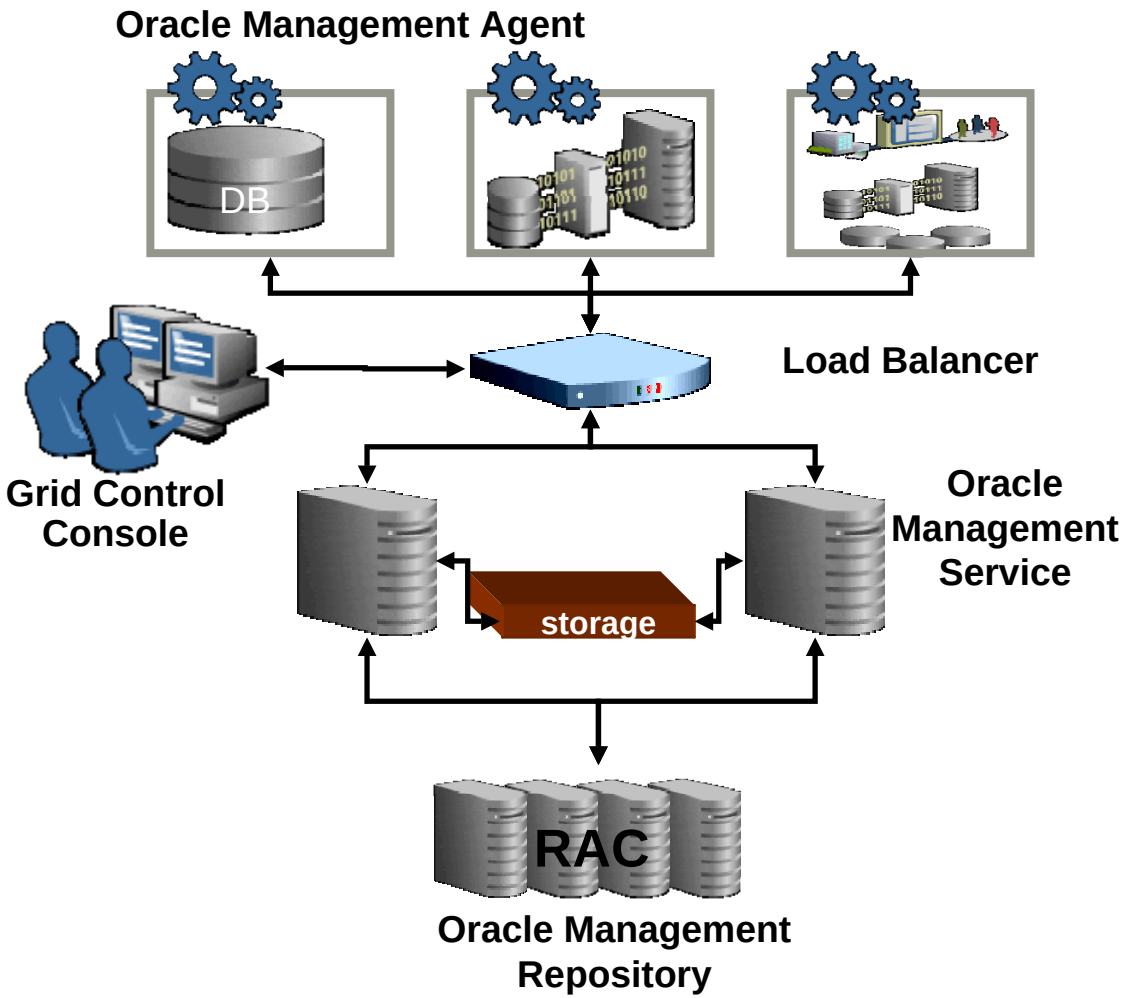
MAA: Active/Active Mode

Oracle Management Agent



- Agent HA feature: watchdog process
- Configure Agent to communicate through SLB
- Configure Agent to allow retrofitting SLB

Summary: Active/Active Mode

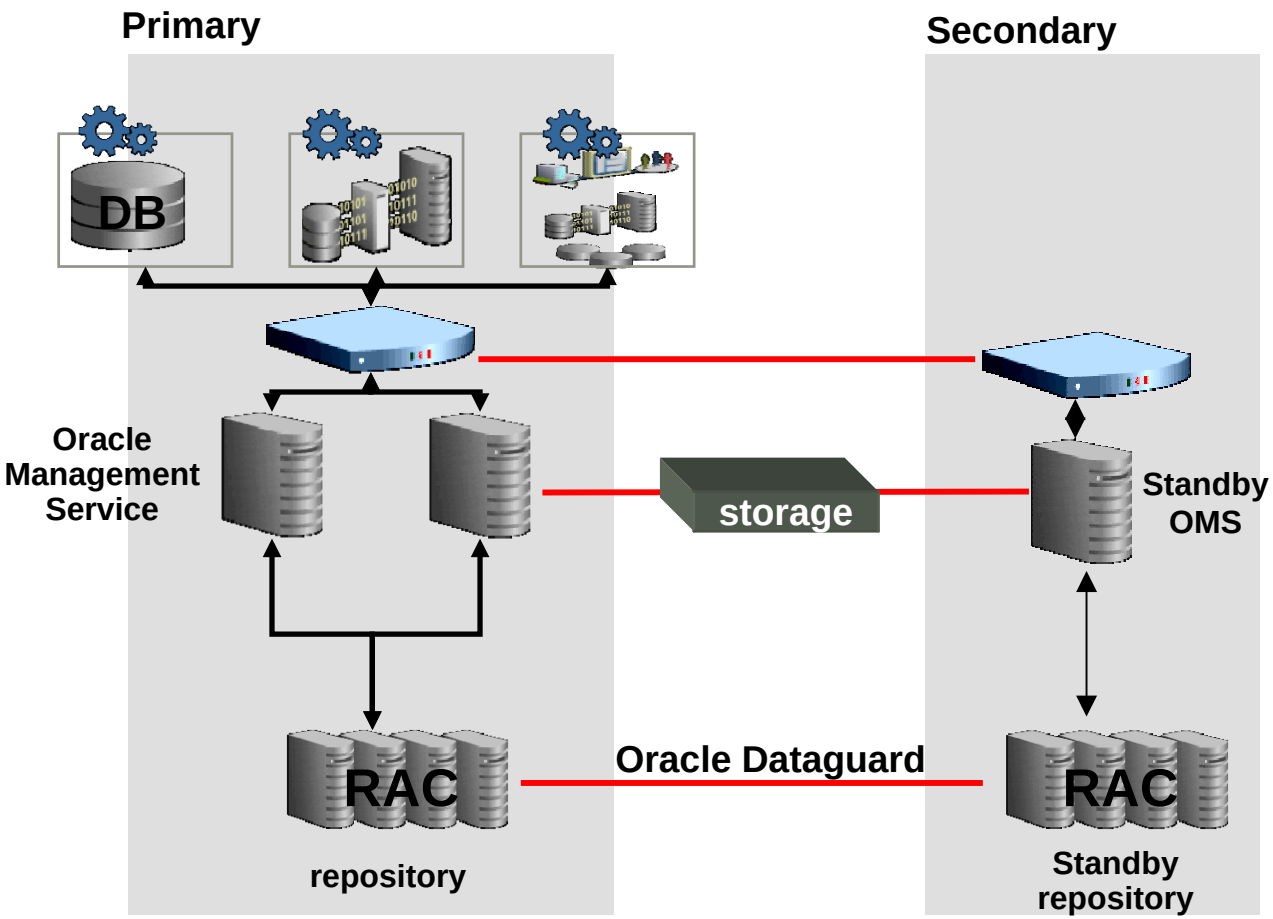


- MAA Solution combines redundancy at all tiers
  - Agent ←→ Multiple OMS using Load Balancer
  - OMS ←→ Multiple RAC Nodes using SQL*Net
  - Repository: RAC and Hardware
- Reliable and scalable
- Automated operations
- No perceived loss of service

MAA: Disaster Recovery

Maximum Availability Architecture

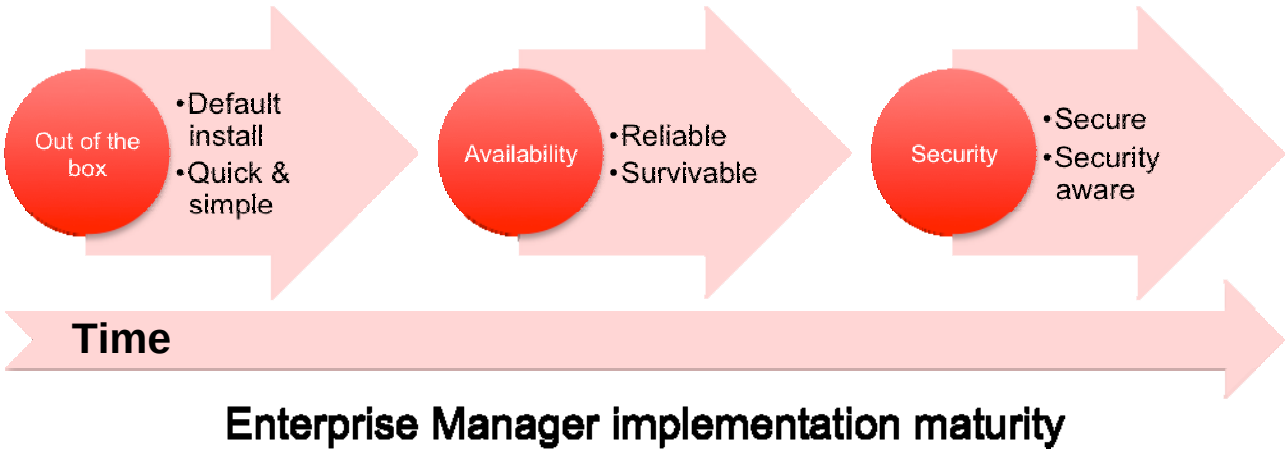
Disaster Recovery



- Physical standby database
- Fast Start Failover and the Oracle observer
- Data Guard Broker for management
- Redundant OMS
- Extend FCF/ONS to automate connection switchover

Best Practices: Deploying Oracle Enterprise Manager securely and/or in a secure environment

Customer implementations



In this section we want to discuss the key design decisions and alternatives when deploying EM in a secure way and in secured environments

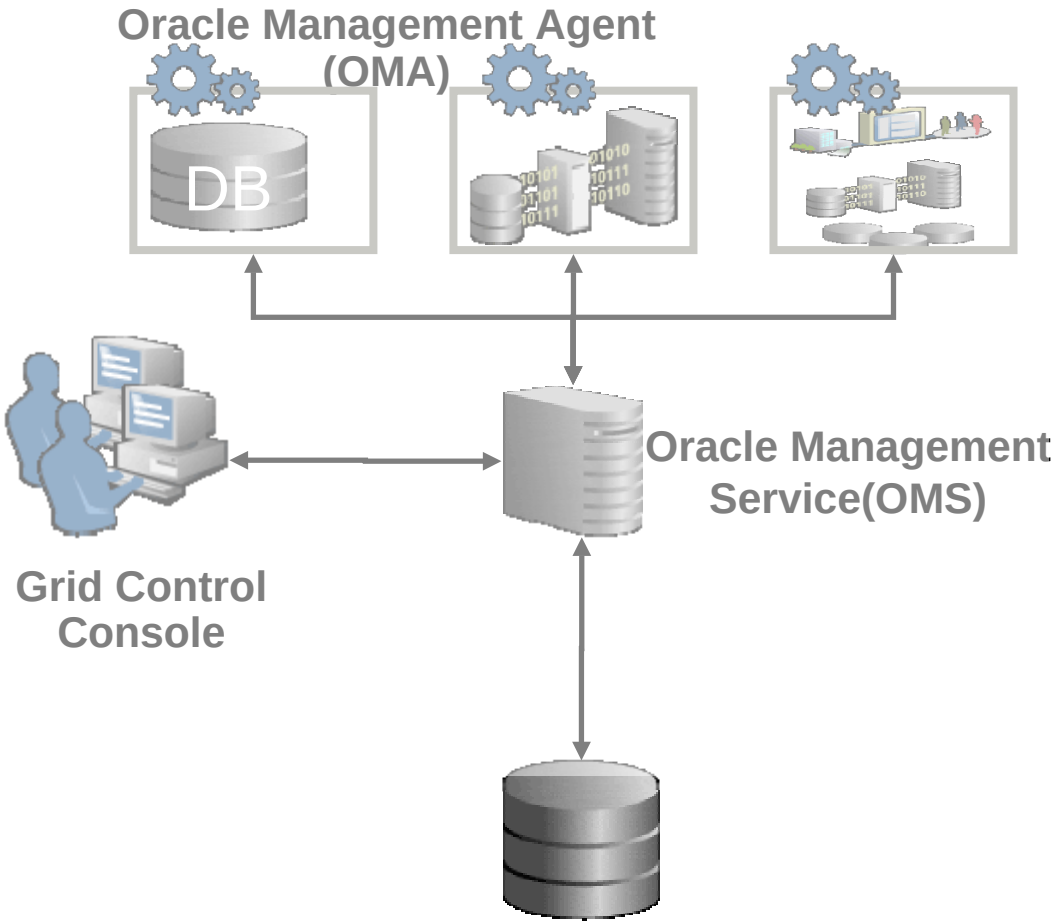
Oracle Enterprise Manager Security Best Practices

- Let’s break this wide ranging topic down into three areas
  - Secure individual Enterprise Manager components
  - Secure communication between Enterprise Manager components and managed targets
  - Firewalls, deploying EM in a secure environment

Security: Securing individual Oracle Enterprise Manager Components

Deploying Secure Enterprise Manager

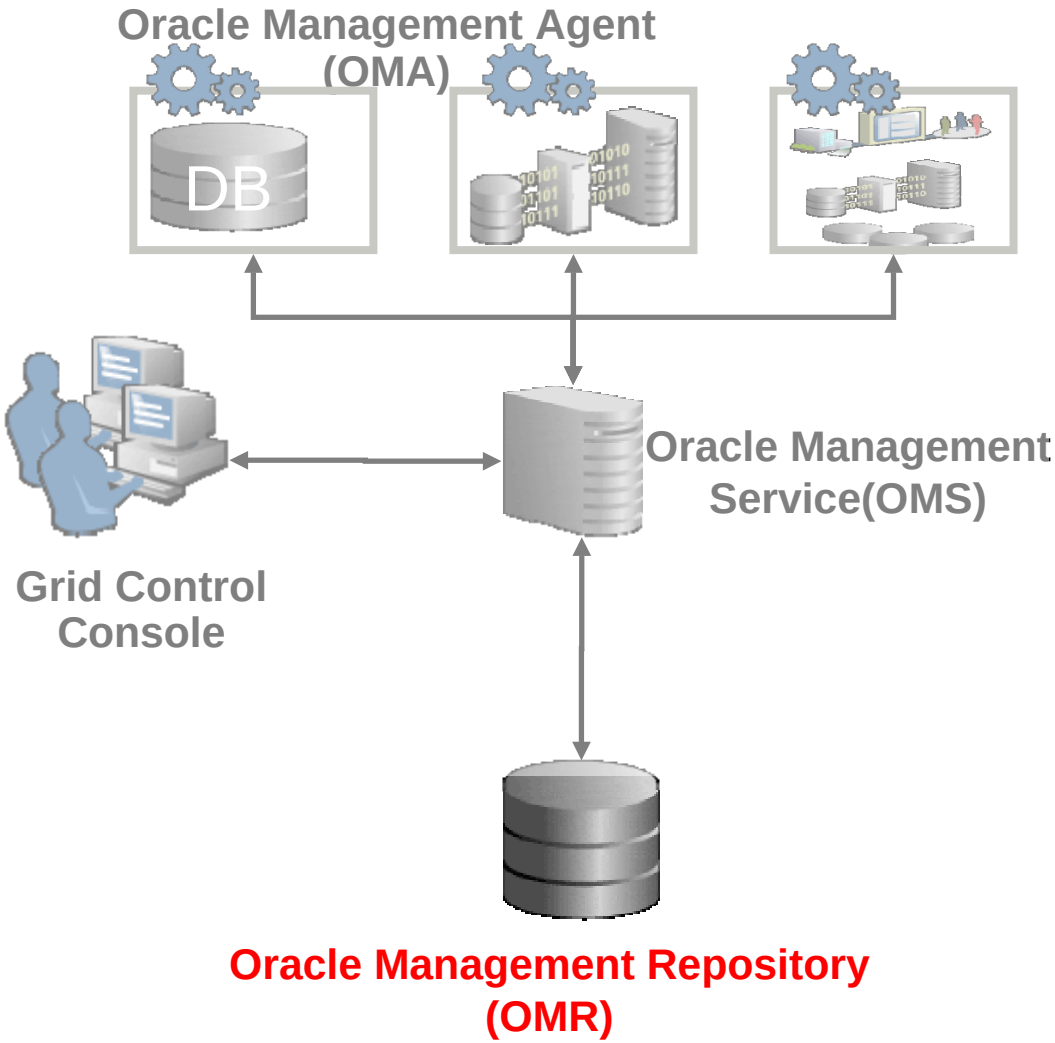
Oracle Management Repository



- Follow best practices for securing the Oracle Database (e.g. Oracle Database Security Guide)
  - Revoke EXECUTE on UTL_FILE, UTL_TCP, etc
  - Ensure well-known accounts locked down
  - Shut off XDB as it's not required
  - One exception is enforcement of resource limits !
- Enable password profile for EM users
  - enforce some complexity & ageing
  - MGMT_VIEW should be exempt
  - exercise caution with lock out !

Deploying Secure Enterprise Manager

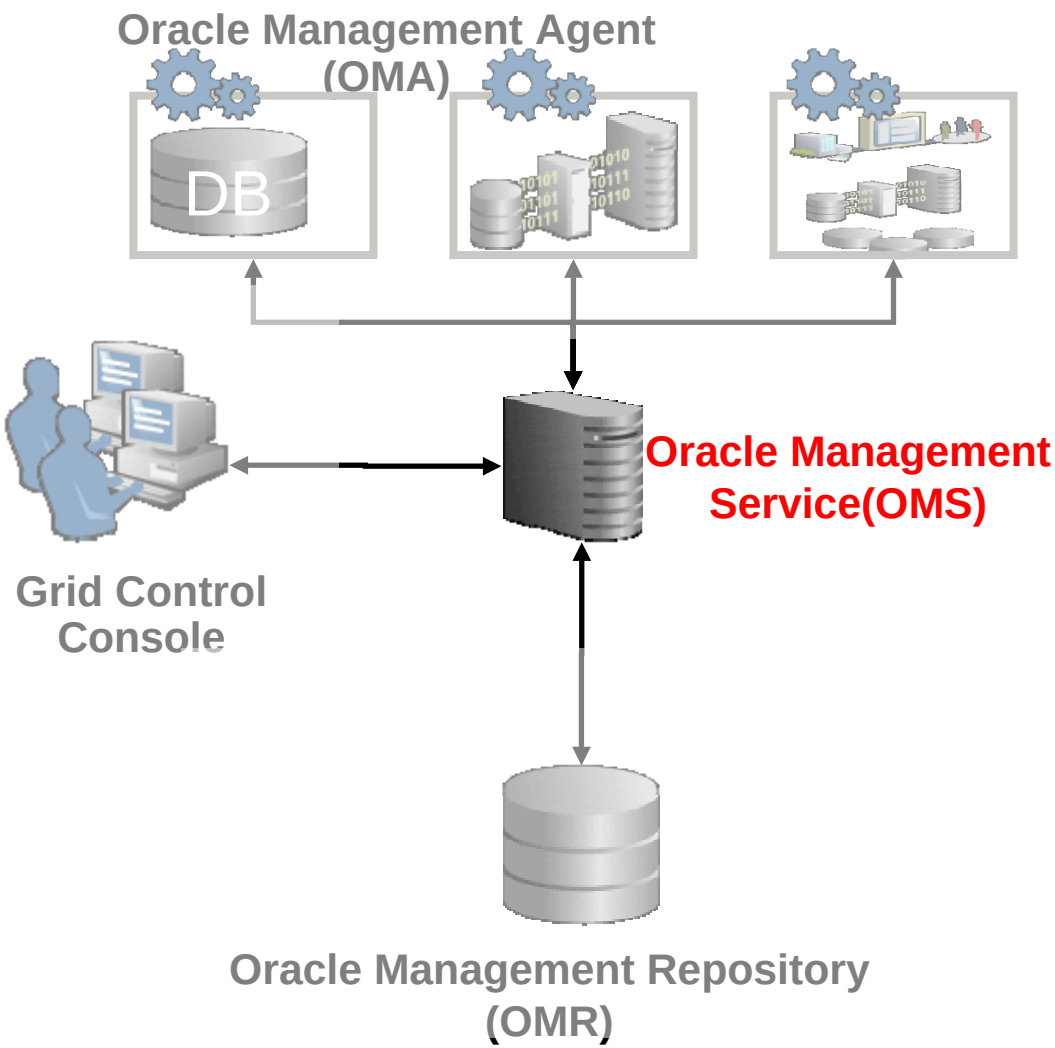
Oracle Management Repository



- Restrict access to the repository host
  - Restrict network access to the repository host
  - Disable remote login
  - For extra paranoia you can restrict listener in-bound connections on a defined IP range
- Enabled auditing
  - Ensure audit_file_dest has restricted permissions to prevent sys users from modifying audit data
  - Audit all SYS operations (audit_sys_operations=true)
  - Supplement this with application logging (more later)

Deploying Secure Enterprise Manager

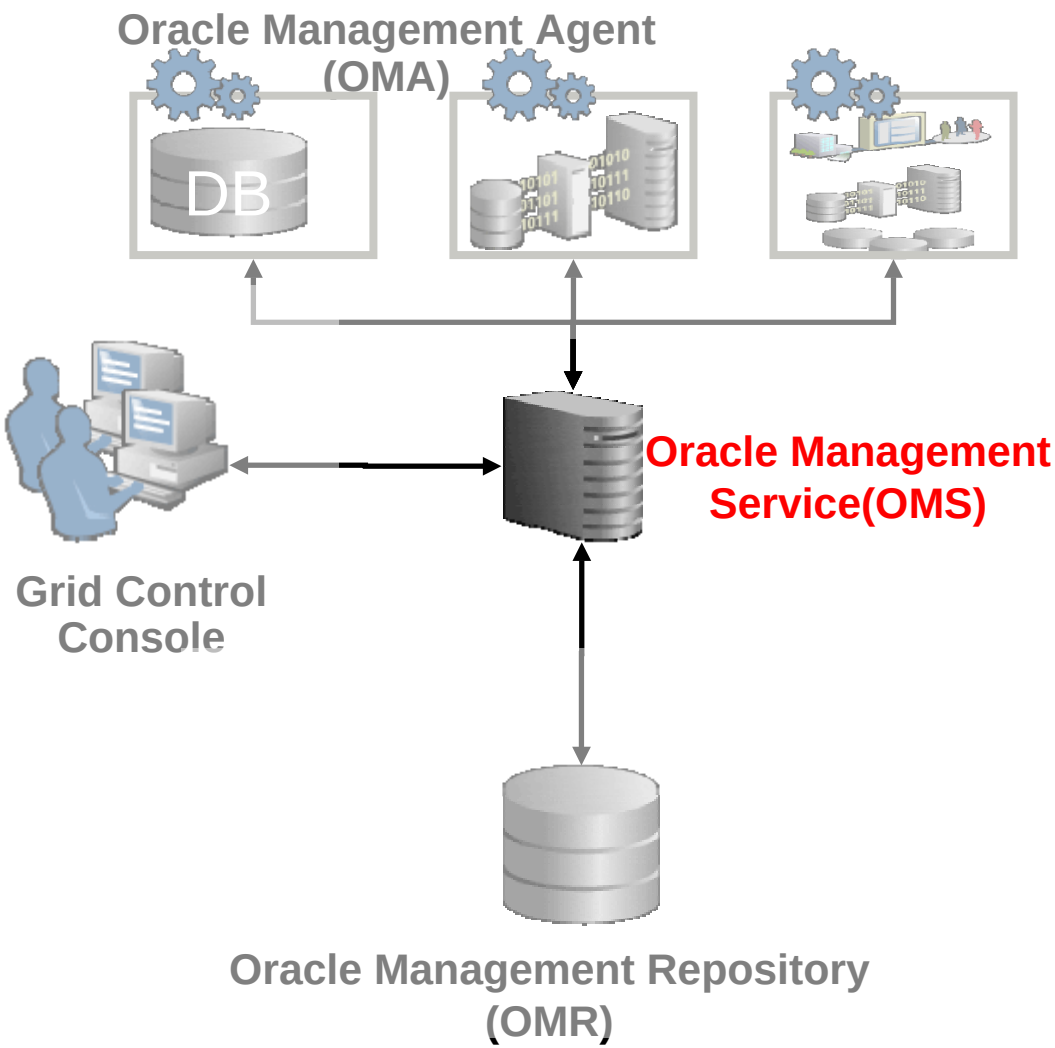
Oracle Management Service



- Follow best practices for securing Oracle Application Server
  - Stop non-essential services in the OMS home
  - Apply CPU patches to the OMS tier AS home
- Remove all un-secured services from OMS machines (httpd, portmap, etc)
- Restrict access to all un-secured console URLs
  - Ensure you run the OMS in 'secure lock' mode
  - Modify OHS configuration to prevent un-secure access to UI console through an OMS

Deploying Secure Enterprise Manager

Oracle Management Service



- Stop SYSMAN being the enterprise login for all DBA's !!
- Prevent SYSMAN from logging into the Console :

```
delete from
mgmt_created_users
where user_name =
'SYSMAN'
```

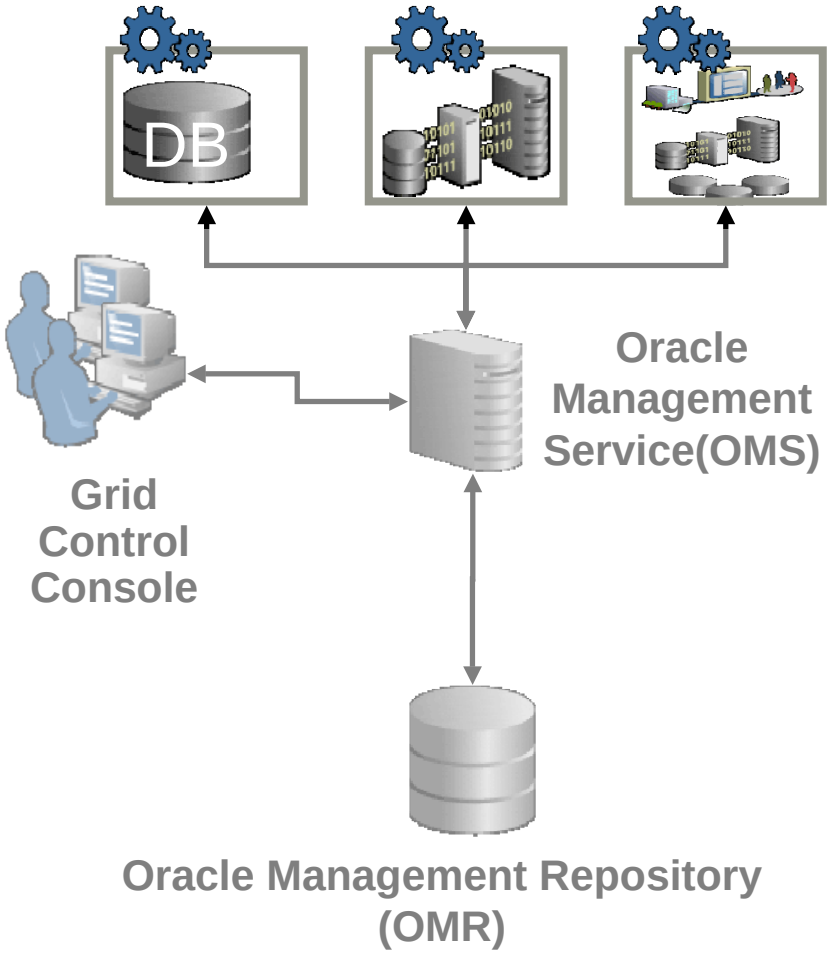
- Unlock the account using the following :

```
insert into
mgmt_created_users
(user_name,
system_user)  values
('SYSMAN', 1)
```

Deploying Secure Enterprise Manager

Oracle Management Agent

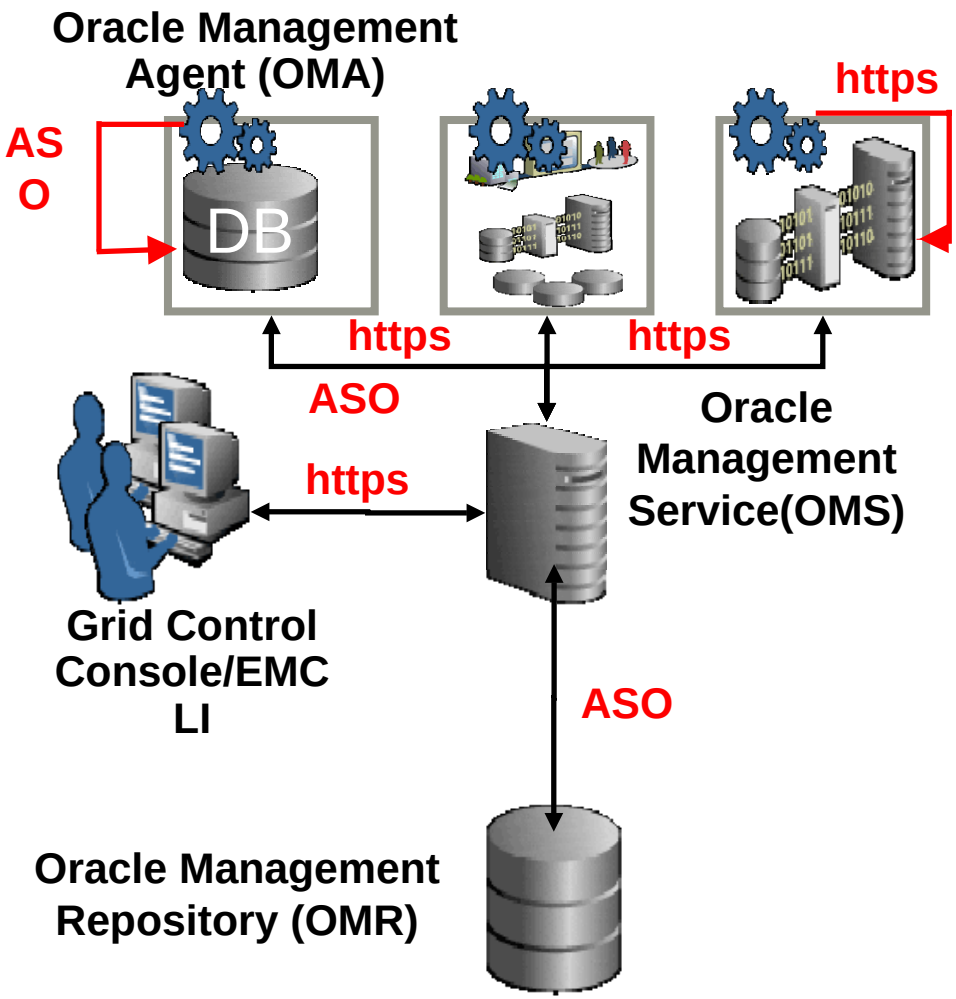
Oracle Management Agent (OMA)



- Use one-time registration passwords with a reasonable expiry date
  - Prevents un-authorised agents and systems being incorporated
- Ensure that agents are secured when communicating with the OMS
- Install the latest CPU when available
  - Agent homes are based on DB RSF's so may also be subject to published CPU's
- Support only impersonation based access to this account post-install
  - For patching this needs to be suspended
  - Next release addresses this in patch process

Deploying Secure Enterprise Manager

Securing communication between EM components



- Secure transport between OMS & Repository DB and OMS and managed targets
  - Enable Advanced Security Option(ASO) between OMS and OMR
  - Enable ASO between OMS and Oracle Database targets managed by EM
- All OMS-OMA communication should run in secure-lock mode
- Secure Grid Control Console communication with OMS
- Use a certificate from well-known CA(Certification Authority)
  - Be wary of certificate lifetime
  - Next release will also address certificate replacement

Security: Configure Enterprise Manager for Firewalls

Configuring Enterprise Manager for Firewalls

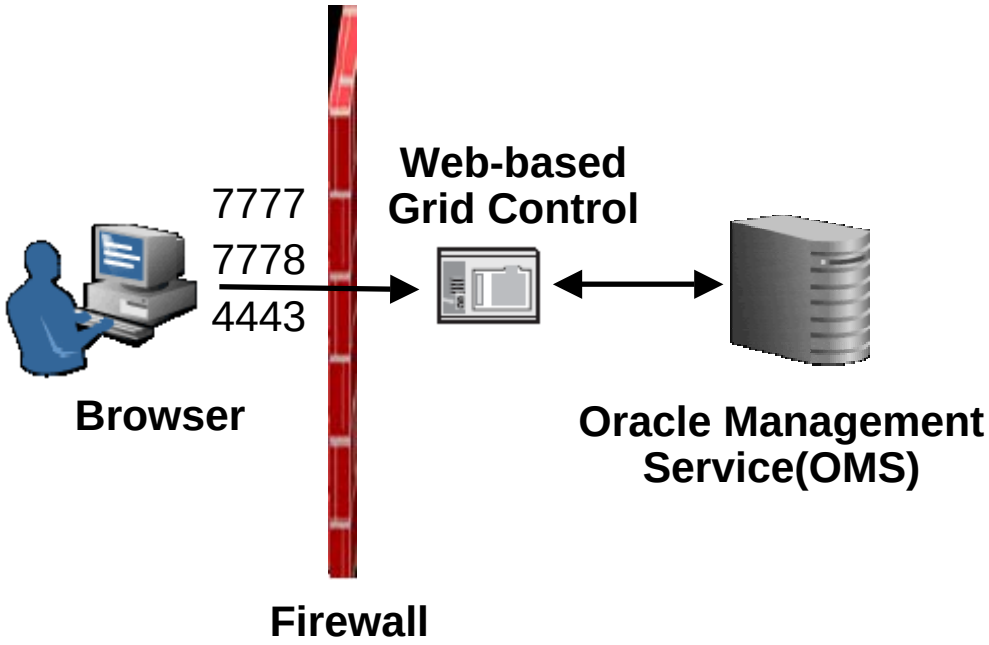
- Firewalls are commonplace in most mature and modern IT infrastructures
- Two areas where EM and Firewalls will interact
  - Enterprise Manager needs to navigate through them when EM components are separated by firewalls
  - Enterprise Manager needs to communicate with managed targets that are themselves behind or protected by firewall
- Enterprise Manager 10g is designed to cope with both these cases *but*….
- …this is one of the least understood areas when deploying EM in a secure environment

Configuring Enterprise Manager for Firewalls

- Lot's of different permutations with EM when dealing with Firewalls….
  - Firewall between your browser and the Grid Grid Control
  - Configuring OMA on a host protected by a firewall
  - Configuring OMS on a host protected by a firewall
  - Firewalls between OMS and OMR
  - Firewalls between the Grid Control and a managed database target
  - Firewalls used with multiple OMS
  - Configuring firewalls to allow ICMP and UDP for Beacons
  - …….
- Let's take a tour through some of these

Configure EM For Firewalls

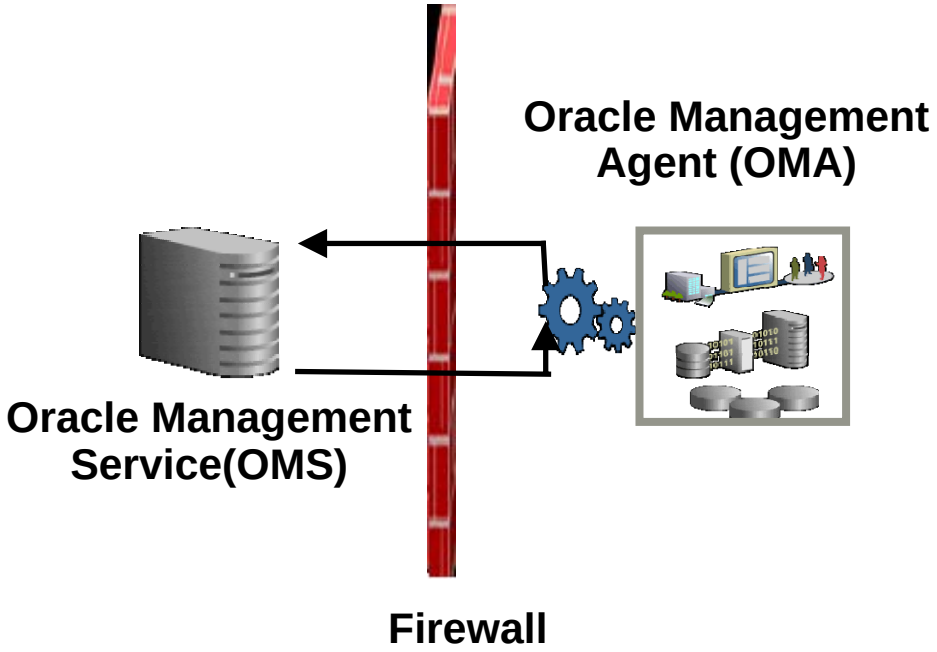
Firewall between browser and Grid Control Console



- Configure the firewall to allow the Grid Control Console to receive HTTP traffic over port 7778
  - Or 7777 if you're using the Web Cache in the OMS home
- If the EM Console has been secured (as mentioned earlier), configure the firewall to allow https traffic over port 4443

Configure EM For Firewalls

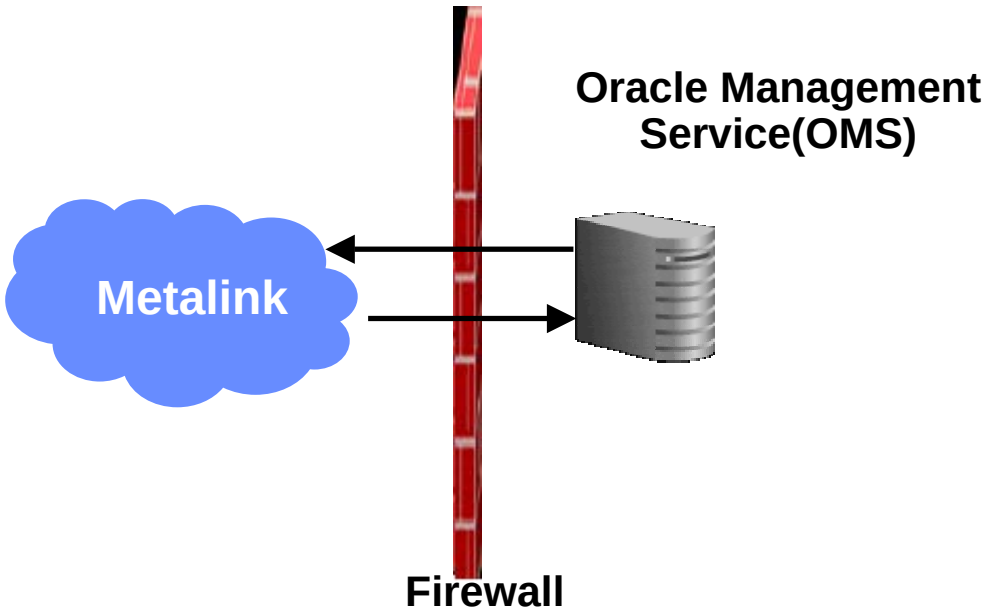
Configuring OMA on a host protected by a firewall



- Configure Oracle Management Agent to use a proxy server
  - Using settings in emd.properties
  - REPOSITORY_PROXYHOST
  - REPOSITORY_PROXYPORT, etc
- Configure the firewall to allow inbound communication from the OMA to the OMS
  - Port 1159 (by default)
  - Port range 4898-4989 (if non-default)
- Configure the firewall to allow outbound communications from the OMS to OMA
  - Port 3872 (default)
  - Port 1830-1849 (if non-default)

Configure EM For Firewalls

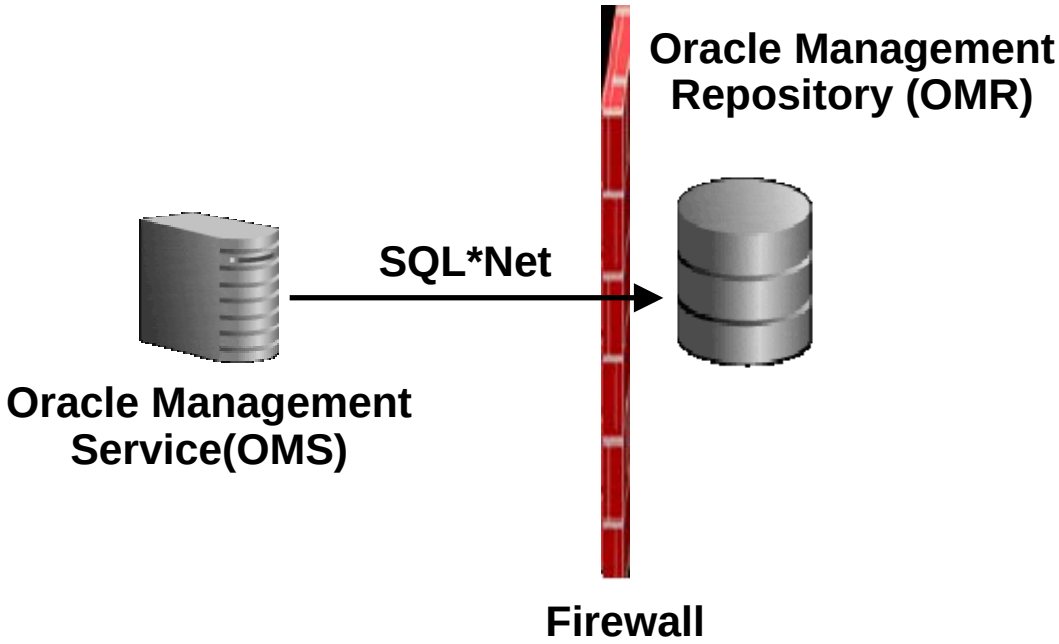
Configuring OMS on a host protected by a firewall



- Link out to Metalink is required to obtain critical patch updates or retrieve patches
- Configure Oracle Management Service to use a proxy server
  - Use settings in emoms.properties
  - PROXYHOST
  - PROXYPORT
- “DontProxyfor” property allows for a mix with some targets/agents behind a firewall and some not
- Configure the firewall to allow punch through to Metalink
- You’ll receive a warning on the EM Console homepage if Metalink data is stale

Configure EM For Firewalls

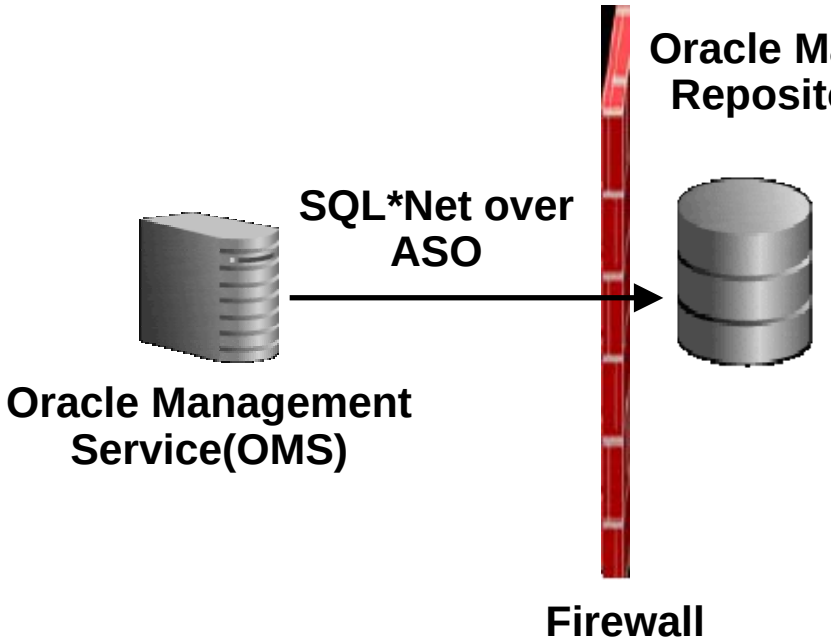
Firewall between OMS and OMR



- Configure the firewall to allow Oracle Net traffic flow
  - Some vendors firewalls can be configured to recognise Oracle*Net traffic
  - Otherwise, define an ACL that allows traffic flow between the subnet hosting the OMS and the subnet hosting the repository
- Secure connections by using features of ASO
  - DB side configuration using ASO in sqlnet.ora

Configure EM For Firewalls

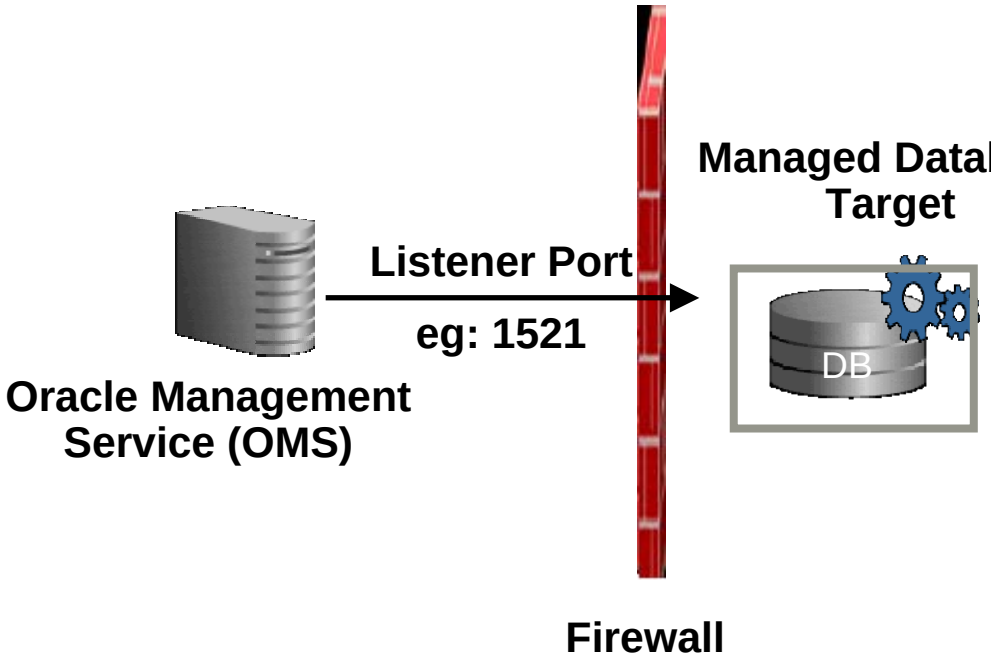
Firewall between OMS and OMR *with ASO*



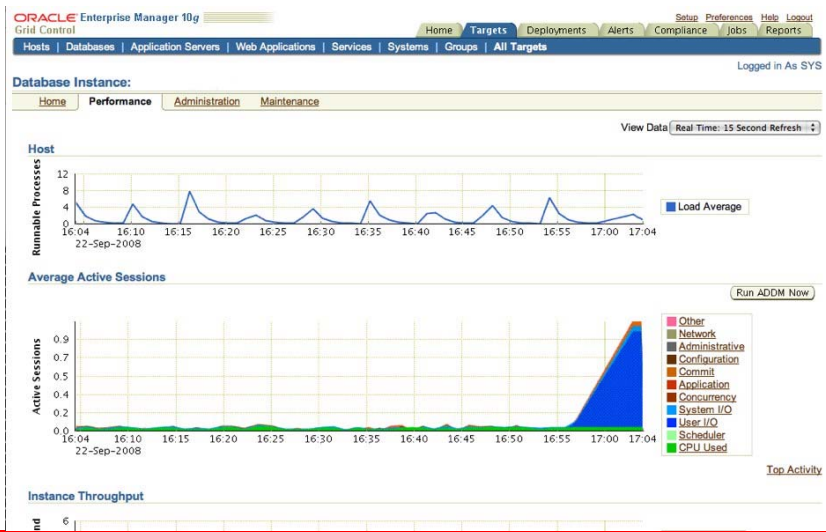
- Secure connections by using features of ASO
- DB side configuration using ASO in sqlnet.ora
  - sqlnet.encryption_server=requested
  - sqlnet.crypto_seed='abcdefg12345'
- OMS side configuration in emoms.properties
  - oracle.sysman.emRep.dbConn.\ enableEncryption=true
  - oracle.net.encryption_client=requested
- You'll know when it's got a typo :-
  - ORA-12645: Parameter does not exist

Configure EM For Firewalls

Firewall between Grid Control and DB Targets

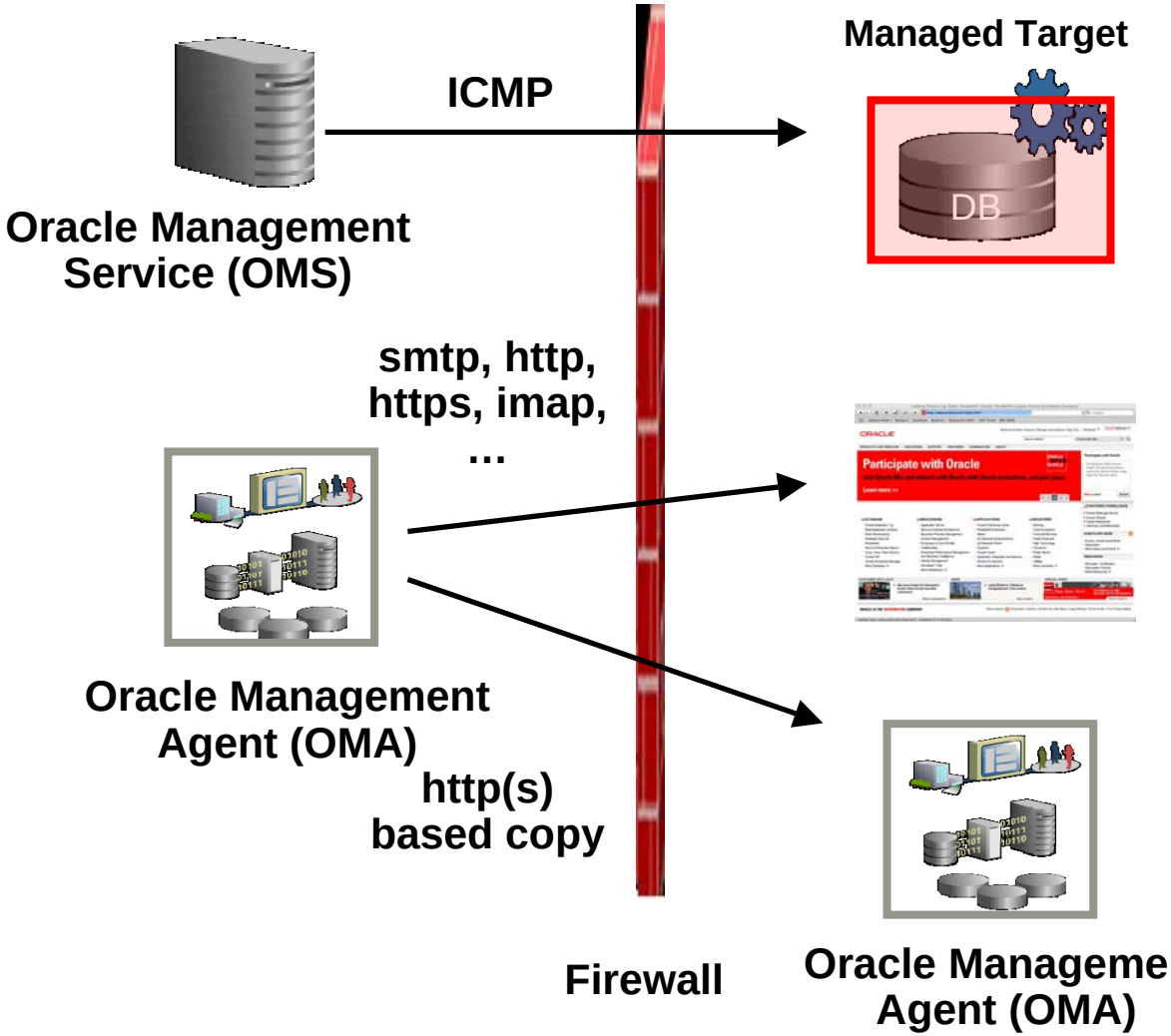


- For administrative operations, configure the firewall to allow the OMS to communicate with the database through Oracle Listener Port
  - Configure the firewall to allow Oracle Net firewall proxy access if allowed
  - Or again, configure the firewall with an ACL to allow this communication to take place



Configure EM For Firewalls

Some other requirements to cater for…



- Deterministic analysis of root of a target down state
- Any OMS may contact any Agent to determine availability
  - Important in multi-OMS environments
- Beacons can run service tests on 14 different protocols – cater for them in your design
- Cloning requires point-to-point communication between agents

Best Practices for Firewall implementations

- If at all possible, get firewalls into first design of the solution
  - Carefully analyse your protocol requirements between EM and the Managed Targets in your environment
  - Consider placement of OMS's when laying down your EM topology
- Work closely with the network team on design of groups and ACL's for groups of targets, it'll save both teams a resource headache

Security:
Authentication,Authorization and Audit

Deploying Secure Enterprise Manager

Authentication

- Complex password and periodical password change
- Reduce the number of super users
- Enable auditing for Logon and Logoff operations
- Do not set preferred credentials for group/common accounts
- Use impersonation based access to targets

Deploying Secure Enterprise Manager

Authentication

- Simplified SYSMAN/DBSNMP password change process
- Ability to change database target credentials on both target and Enterprise Manager simultaneously
- Special character support in username and password
- GUI support to change password during grace period or after password is expired.
- Support for SSO registration using osso.conf file
- Support for registering SSO authentication over https
- EMCLI Support for enabling SSO users as EM users
- GUI Support for sudo/PowerBroker setting
- sudo/PowerBroker support for UDM, Monitoring Template and Corrective Action

Deploying Secure Enterprise Manager

Authorization

- Make sure the privileges/roles are granted only when needed – Principle of Least Privileges
- Grant roles to users instead of granting privileges to enable Role Based Access Control (RBAC)
- Monitor the privileges grants on a regular basis and also keep track of which users exercise what privileges by enabling auditing.

- New fine-grained privileges
  - Blackout target
  - Configure target
  - Manage target metrics
- Enable the support of privilege propagation group

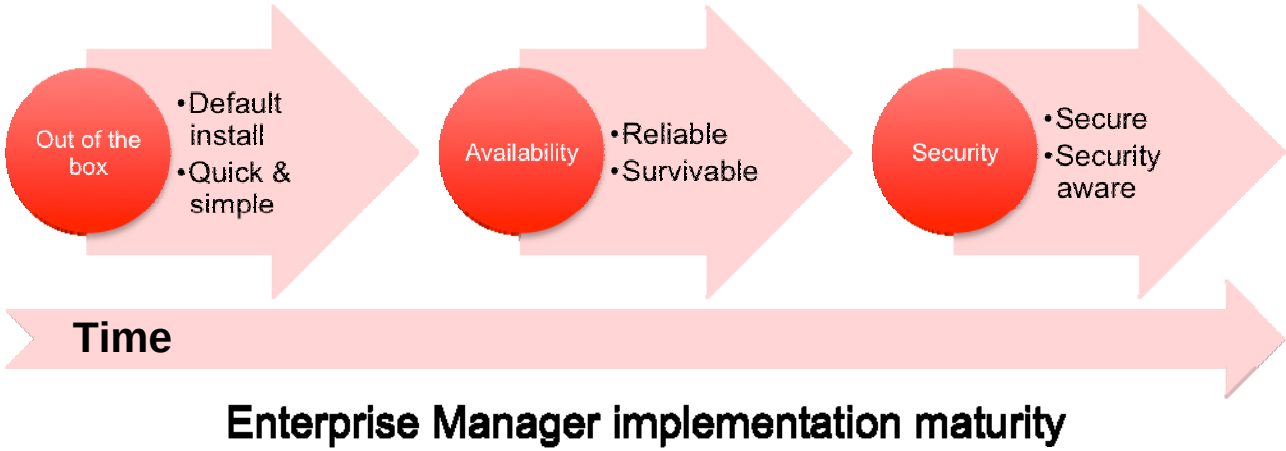
Deploying Secure Enterprise Manager

AUDIT

- Enable auditing all operations
- Monitor audit log and externalize the audit data from the repository to an external store

- Audit data
  - ODL Compliance
- EMCLI Verbs to Configure Oracle Enterprise Manager audit system
- Support for Audit externalization/export service

What you should take away from today



- An understanding of the options available when configuring EM in a highly available fashion
- An understanding of the many aspects of security that can affect an EM implementation

HA Sessions, Labs and Demos

Thu, Sep 25

- 9:00 am - Oracle Secure Backup, Moscone South 102
- 10:30 am - Streams Replication, Moscone South 102
- 12:00 pm - Rolling Database Upgrades, Moscone South 103
- 1:30 pm - Streams Performance, Moscone South 102
- 3:00 pm - Oracle Grid Computing, Moscone South 303
- 3:00 pm - E-Business Suite R12 MAA, Moscone West 2007
- 3:00 pm - Siebel MAA, Moscone South 308
- 3:00 pm - Fusion SOA HA & Scalability, Marriott Salon 14/15

Hands On Labs - Thu, Sep 25

- 10:30 - 11:30 am, 12:00 - 1:00 pm - Active Data Guard, Marriott Golden Gate A3

DEMOgrounds, Mon-Thu

- Active Data Guard, Streams, Oracle Secure Backup, RMAN/Flashback, MAA

Enterprise Manager Sessions, Labs, Demos

Thu, Sep 25

- 9:00 am – Oracle Database 11g Shock Upgrades, Moscone South 301
- 10:30 am – Integrating 40 Data Centers in Three Years, Moscone South 303
- 12:00 pm – Application Testing Best Practices, Moscone South 303
- 1:30 pm – Proactive Performance Monitoring with Baselines & Adaptive Threshold, Moscone South 303
- 3:00 pm - Oracle Grid Computing, Moscone South 303
- 3:00 pm – Coping with virtualization, Moscone South 301

Hands On Labs - Thu, Sep 25

- 12:00 - 1:00 pm, SOA Management and Java Application Diagnostics
- 1:30 – 2:30pm, Database Performance Diagnostics and Tuning
- 3:00 – 4:00 pm, Lowering Management Costs via Configuration Management and Provisioning Automation

DEMOgrounds, Mon-Thu, Moscone West Hall

- Complete Data Center Management
- Oracle Real Application Testing
- Self-Managing Database
- Changing Management and Data Masking for DBAs
- Application Quality Management
- Managing Configuration Complexity
- Complete Provisioning of The Oracle Software Stack

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