Manage the Manager: Tips on How to Best Manage Oracle Enterprise Manager 12c

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Total Cloud Control

Complete Cloud Lifecycle Management

Expanded Cloud Stack Management

Superior Enterprise-Grade Management

Agile, Automated | Optimized, Efficient | Scalable, Secure
Safe Harbor Statement

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Program Agenda

1. Architecture Overview of Enterprise Manager
2. Critical Subsystems and its monitoring with Self-monitoring features
3. High Availability and Disaster Recovery
Architecture Overview

Overall Architecture and Components
CRITICAL SUBSYSTEMS AND ITS MONITORING WITH SELF-MONITORING FEATURES
Critical Subsystems

1. Loader Subsystem
2. Job Subsystem
3. Console Subsystem
4. Agent Subsystem
5. Notification Subsystem
Loader Subsystem

- Responsible for processing the data collected by the agent and uploading it to the Repository
- Its efficiency greatly impacts performance and health of overall system
- Does synchronous uploading of data
- Under heavy load, OMS prioritizes uploading of data
  - Preference given to agents with higher agent priorities like Mission Critical and Production
  - Agents with lower priorities are asked to backoff by OMS for a specific time period
- Backlog accumulates at the agents
Loader Subsystem Monitoring

Checking Loader Performance

- Monitor the Loader performance charts in Setup > Manage Cloud Control > Management Servers

  ![Throughput Graph]
  
  Indicates the loader processing time
  Look for consistent increase over a time period

  ![Capacity Utilization Graph]
  
  Current loader CPU utilization
  Lower value indicates loader throughput is efficient

- Contact oracle support if the loader consistently running at more than 85% utilization capacity
Loader Subsytem Monitoring

Checking Agent Backlog

- Monitor the Upload Backlog and Backoff charts in Setup > Manage Cloud Control > Health Overview

- Incase of consistent increase in Back-off requests / Backlog
  - Check that load is evenly distributed across all OMS with Loader Statistics Report (Reports / Information Publisher)
Loader Subsystem Monitoring

Checking Agent Backlog

- Uneven load on specific Management Server: Check if SLB configuration is set to Round-Robin algorithm
- Permitted deviation tolerance: 10 – 20%

<table>
<thead>
<tr>
<th>Management Service</th>
<th>Channel</th>
<th>Total rows processed</th>
<th>Rows processed (per Sec)</th>
<th>Rows processed (per Sec per Thread)</th>
<th>Number of backoff requests</th>
<th>Number of agents backed off</th>
</tr>
</thead>
<tbody>
<tr>
<td>admnx1176.oracleoutsourcing.com:4889_Management_Service</td>
<td>D</td>
<td>1,165,312</td>
<td>1,557.571</td>
<td>38.939</td>
<td>259</td>
<td>1</td>
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<td>admnx1177.oracleoutsourcing.com:4889_Management_Service</td>
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<td>1,139,705</td>
<td>1,517.119</td>
<td>37.928</td>
<td>259</td>
<td>1</td>
</tr>
</tbody>
</table>

General Advice

- It is normal to have some amount of Agent being backed off
- Keep an eye on consistently growing large number of agents backed off

Deviation tolerance 10-20%
Anything that is scheduled and automated uses the job subsystem. Eg: Scheduling Blackouts, Template apply applications.

Very crucial sub-component

Critical processes in the Job System

- **Step Scheduler:**
  - Responsible for processing the job steps that are ready to run and marks it “Ready”

- **Job Dispatcher:**
  - Picks the steps marked “ready” for execution. Dispatches job steps to job worker threads

- **Workers threads:**
  - Take work from the Job Dispatcher and send it to the appropriate agent
  - Different thread pools for job types
Job Subsystem Monitoring
Setup > Manage Cloud Control > Health Overview

- Monitor Jobs Backlog(Steps)
  - Indicates number of Job steps past its scheduled execution time.
  - If this number is high and has not decreased for long period, it indicates job system is not functioning normally.
  - Indicates Job engine resources are unable to meet inflow or indicate abnormal processing of specific jobs because it is stuck for unusual periods.
  - Rate of change of backlog is more important than absolute backlog numbers.

![Job System Status](Click)
Job Subsystem Monitoring

Setup > Manage Cloud Control > Health Overview > Monitoring > All Metrics > Repository Job Scheduler Performance

- Problem Trend Analysis of ‘Job Step Backlog’ and ‘Overall Job Steps per Second’ metric

- If Job Step Backlog and Overall Jobs per Second shows increasing trend, indicates work load is high. Job engine resources are not able to keep with inflow. Increase the resources

- If Job Step Backlog is increasing but Overall Jobs per Second is not, it indicates abnormal processing of specific job
Job Subsystem Monitoring

Setup / Manage Cloud Control / Management Services > Job System (More Details...) > Job Dispatcher details

- Monitor Thread Pool Utilization if inflow of work is high, backlog is consistently high
  - If the Avg. Steps Dispatched/Min is HIGH and Avg. Threads Available is less than 50% of Configured Threads for a specific pool, increase the thread pool size for each of the OMS
  - If the Avg. Steps Dispatched/Min is LOW, Avg. Threads Available is also LOW, this typically means that either a thread is stuck/hung
- Refer to Appendix for Sizing Recommendations of thread pool size
- Contact Support for triaging stuck threads

![Job Dispatcher Table]

<table>
<thead>
<tr>
<th>Thread Pool</th>
<th>Configured Threads</th>
<th>Avg Steps Dispatched/Min</th>
<th>Avg Threads Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>User Short</td>
<td>25</td>
<td>0</td>
<td>25</td>
</tr>
<tr>
<td>User Long</td>
<td>12</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>System Critical</td>
<td>25</td>
<td>0.18</td>
<td>24.92</td>
</tr>
<tr>
<td>System Normal</td>
<td>10</td>
<td>0.09</td>
<td>9.07</td>
</tr>
<tr>
<td>Internal</td>
<td>10</td>
<td>0.82</td>
<td>10</td>
</tr>
</tbody>
</table>

![Work Inflow Diagram]
Console Subsystem Monitoring

- Setup>Manage Cloud Control>Health Overview>OMS and Repository >Monitoring > Page Performance

  ▪ Monitoring console performance

  ▪ General Advisories
    ▪ Proactively check that page access and session load is evenly distributed across OMS
      ▪ Check SLB configuration if not
    ▪ Check the presence of Symptom Analysis Icon in Overall Tab and use this feature to narrow down the cause of slow performing pages
      ▪ Icon appears only when metric “Page Processing Time (sec)” exceeds the threshold
    ▪ Symptom analysis can be done on overall page processing and individual pages
    ▪ Break-down of processing time by layers helps narrow down the issue
Agent Subsystem Monitoring With Partner Agent

- Partner agent is an agent which in addition to all of its regular functions, monitors the status of its assigned Management Agent and its host.
- Algorithm of automatic partner agent assignment by OMS:
  - Agent should be pingable from agent it is going to monitor.
  - Preference is given to agents belonging to the same subnet.
  - Agent should be a 12.1.0.4 Agent.
  - Agent should be monitoring less than 10 (Configurable) agents.
- One can change the partnership explicitly with emcli “manage_agent_partnership”.

![Diagram showing OMS, Partner Agent, Monitored Agent, and their interconnections.](image-url)
### Agent Subsystem Monitoring With Partner Agent

<table>
<thead>
<tr>
<th>SCENARIO</th>
<th>TARGETS</th>
<th>STATUS OF TARGETS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agent is shutdown gracefully and not under blackout</td>
<td>AGENT</td>
<td>Down</td>
</tr>
<tr>
<td></td>
<td>HOST</td>
<td>Up (Unmonitored)</td>
</tr>
<tr>
<td></td>
<td>MONITORED TARGET</td>
<td>Agent Down</td>
</tr>
</tbody>
</table>

- **Target statuses with partner agent mentioned in table**
- **Partner agent accesses the monitored agent and host with a proprietary protocol**
  - Can convey to the OMS whether the monitored agent goes DOWN
  - Can determine if the host of the monitored agent is UP or DOWN
- **Agent status detection done immediately (few seconds).**
- **Host status change detection when the agent is down done every minute**

### SCENARIO

<table>
<thead>
<tr>
<th>AGENT</th>
<th>HOST</th>
<th>MONITORED TARGET</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agent is shutdown gracefully and not under blackout</td>
<td>Down</td>
<td>Agent Down</td>
</tr>
<tr>
<td>If unexpectedly goes down and host is up (and not under blackout)</td>
<td>Agent Unreachable</td>
<td>Up (Unmonitored)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Agent Unreachable</td>
</tr>
<tr>
<td>If Partner Agent is not available (Host or Agent is down)</td>
<td>Agent Unreachable</td>
<td>Agent Unreachable</td>
</tr>
<tr>
<td></td>
<td>Agent Unreachable</td>
<td>Agent Unreachable</td>
</tr>
</tbody>
</table>
# Agent Subsystem-Agent Unreachable Troubleshooting

Sub status added to provide more diagnostic details

<table>
<thead>
<tr>
<th>Common Scenarios</th>
<th>Sub status Description</th>
<th>Troubleshooting Tips</th>
</tr>
</thead>
<tbody>
<tr>
<td>Down Agent Down</td>
<td>Agent was brought down in error /brought down as part of planned maintenance.</td>
<td>If agent was brought down in error, restart it from the agent homepage. If agent was brought down as part of planned maintenance, consider creating a blackout on the agent.</td>
</tr>
<tr>
<td>Up Unmonitored</td>
<td>Currently this sub status is set only for host target with real time partner agent deduction. Host is up but its agent is shutdown.</td>
<td>If agent is down, do “emctl start agent”. To triage agent issue, go to its agent homepage and run the Symptom Analysis tool located next to the Status field.</td>
</tr>
<tr>
<td>Cannot Write to File System</td>
<td>Agent cannot write to file system due to permission issue.</td>
<td>Check that OS user who owns the agent process has write access to agent instance directory.</td>
</tr>
<tr>
<td>Collections Disabled</td>
<td>Agent Collections have been disabled. The Agent will no longer collect any metric for the managed targets.</td>
<td>Check that Agent can upload to OMS with “emctl upload”. Check loader statistics report for loader health.</td>
</tr>
<tr>
<td>Disk Full</td>
<td>Agent file system is full.</td>
<td>Check that Agent can upload to OMS with “emctl upload”. Re-check the count of pending files using the command ‘emctl status agent’ to verify if they have reduced.</td>
</tr>
<tr>
<td>Post Blackout</td>
<td>Agent is unreachable as its first severity has not yet come after blackout end.</td>
<td>To triage agent issue, go to its agent homepage and run the Symptom Analysis tool located next to the Status field.</td>
</tr>
</tbody>
</table>
## Agent Subsystem-Agent Unreachable/Pending Diagnosis

Sub status added to provide more diagnostic details

<table>
<thead>
<tr>
<th>Common Scenarios</th>
<th>Sub status Description</th>
<th>Troubleshooting Tips</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blocked Manually</td>
<td>Agent has been blocked manually.</td>
<td>Unblock the Agent from console - Setup &gt; Manage Cloud Control &gt; Agents</td>
</tr>
<tr>
<td>Block (Plug-in Mismatch)</td>
<td>Agent has been blocked for communication with OMS due to Plug-in mismatch.</td>
<td>If Agent has been restored from a backup perform an Agent Resync ‘emcli resyncAgent’.</td>
</tr>
<tr>
<td>Block (Bounce Counter Mismatch)</td>
<td>Agent has been blocked for communication with OMS due to Bounce Counter mismatch.</td>
<td>If Agent has been restored from a backup perform an Agent Resync ‘emcli resyncAgent’.</td>
</tr>
<tr>
<td>Agent Misconfigured</td>
<td>Agent is configured for communication with another OMS or OMS Agent time skew is noticed or Consecutive metadata /severity upload failure</td>
<td>Check Agent configuration to ensure the Agent is communicating with the correct OMS. Re-secure the agent with ‘emctl secure agent’</td>
</tr>
<tr>
<td>Communication Broken</td>
<td>Agent is unreachable due to communication break between agent and the OMS.</td>
<td>Address the network latency, port being blocked or proxy related issue.</td>
</tr>
<tr>
<td>Under Migration</td>
<td>Agent is unreachable as it is under migration (2 system upgrade) from pre 12 to 12C.</td>
<td>Migrate the agent and then start the agent.</td>
</tr>
</tbody>
</table>

**Note:** Refer to Appendix for General Troubleshooting steps for Agent Unreachable
Notification Subsystem Monitoring

- Notification system allows you to notify Enterprise Manager administrators when specific incidents, events, or problems arise
- A backlog in notifications can cause a delay in alerts being sent, or a missing alert all together
- If notifications are not getting delivered
  - Check your external systems that are configured to receive notifications
    - For email/pager - Is the email gateway configured and working?
    - For OS Command and PLSQL, check the external systems that they may connect to
    - Contact Oracle Support if external systems are not working as expected.
  - Find the specific events in Incident Manager console for non-informational events
    - If it is not found, likely to be an event publishing issue.
    - If found in Incident Manager, verify the rule definition
Notification Subsystem Monitoring

Setup > Manage Cloud Control > Health Overview

- Check Notification delivery backlog
  - Look for consistent increase
  - Key Metrics to monitor
    - Notifications Processed (Last Hour)
    - Pending Notifications Count

- If **Pending Notifications Count** remains high over a period of time [such as an hour], check **Notifications Processed (Last Hour)**
  - If it is making good progress, there could be temporary load and it will resolve itself soon
  - If it is not making good progress, there could be stuck queues in notification system/out-of-date incident rules. Contact Oracle Support
Few Other Critical Subsystems (Appendix)

1. Events Subsystem
2. Repository Metrics Collection Jobs
3. Repository Health
4. Repository Scheduler Jobs
5. Metric Rollup Jobs
HIGH AVAILABILITY AND DISASTER RECOVERY
High Availability

- Critical components in Enterprise Manager infrastructure are:
  - **Repository** - Persistent store for all Enterprise Manager data
  - **OMS** - Central application accessed by Agents and end-users
  - **Software Library** - Filesystem repository used to store software entities

- All of the above should be configured for High Availability if availability of Enterprise Manager is critical
High Availability

Repository

- Oracle RAC provides a standard HA solution for the EM repository
  - Best Practice: Configure RAC prior to EM installation
  - Best Practice: Use SCAN and role–based DB Services for OMS to Repository connect strings

- Advantage of Role-based database services with Oracle RAC
  - Can automatically control the startup of database services on databases by assigning a database role - PRIMARY / PHYSICAL_STANDBY / LOGICAL_STANDBY / SNAPSHOT_STANDBY
  - Refer whitepaper Best Practises for Highly Available Oracle Databases for details
High Availability

- Additional OMSs can be deployed behind a Server Load Balancer (SLB) for OMS High Availability
- Agents and Users communicate with OMS via load balancer
High Availability End-To-End Topology

- All OMS, Repository and Software Library components are active within the same Data Center
- Software Library must be accessible Read/Write from all active OMSs
- Software library should be deployed on highly available storage
- Not a Disaster Recovery (DR) solution
Disaster Recovery

- Protects applications from catastrophic failures
- Keeps data on primary site synchronized with a standby
- Allows applications to failover to the standby site
Disaster Recovery

Repository

- Data Guard Physical Standby Database provides Disaster Recovery solution for Repository
- Use Data Guard Broker to manage switchover/failover of database
- Best Practise: Configure OMS connect descriptor with scan names and role-based services of primary and standby data centers
  
  (DESCRIPTION_LIST=
  (LOAD_BALANCE=off) (FAILOVER=on)
  (DESCRIPTION= (CONNECT_TIMEOUT=5)(TRANSPORT_CONNECT_TIMEOUT=3)(RETRY_COUNT=3)
  (ADDRESS_LIST= (LOAD_BALANCE=on)
  (ADDRESS=(PROTOCOL=TCP)(HOST=PRIM_SCAN)(PORT=1521)))
  (CONNECT_DATA=(SERVICE_NAME=DB_ROLE_SERVICE)))
  (DESCRIPTION= (CONNECT_TIMEOUT=5)(TRANSPORT_CONNECT_TIMEOUT=3)(RETRY_COUNT=3)
  (ADDRESS_LIST= (LOAD_BALANCE=on)
  (ADDRESS=(PROTOCOL=TCP)(HOST=STBY_SCAN)(PORT=1521)))
  (CONNECT_DATA=(SERVICE_NAME=DB_ROLE_SERVICE))))
Disaster Recovery

OMS

- Deploy Standby (Passive) OMSs on Standby Site
  - Standby OMS using Standby WebLogic Domain
  - Standby OMS using Storage Replication
- Use DNS / Global Traffic Manager to redirect
- Best Practice: Storage Replication is recommended method
  - No manual application of Plug-ins or OMS patches at Standby Site
  - No rebuild of Standby site needed after upgrades
Enterprise Manager High Availability Level 4 Solution

Recommended Solution for High Availability and Disaster Recovery with Storage Replication

- **Customer Browser**
- **DNS Lookup**
- **Server Load Balancer of Primary data center**
- **Server Load Balancer of Standby data center**
- **Primary OMS**
- **Additional OMS1**
- **Storage**
  - **OMS Share**
  - **OMS1 Share**
  - **Swlib Share**
- **Storage Continuous Replication**
- **Physical Standby**
- **EM Repository**

**Recommended Components**:
- DB Replication with Dataguard from Primary to Standby
- Server Load Balancer for Load Balancing
- EM Repository for Data Storage
- Storage Replication for Data Consistency
ACFS Replication
Alternate to using External Storage Appliances

- ACFS storage replication requires Grid Infrastructure to be installed for a Cluster
- ACFS Filesystem created for OMS install and software library on ACFS server and this is exported using NFS
- Filesystem mounted on another node (OMS server) and EM installed here
- Similar setup on second ACFS server with another ACFS filesystem to be used as a standby
- Established ACFS replication between the primary and standby ACFS servers
- Refer to Section 18.7 of Advanced Installation Guide for configuration details
BI Publisher High Availability

- With EM12c R4, BI Publisher is bundled and installed by default
  - BIP needs to be configured using the ‘configureBIP’ script
  - BIP supports Enterprise Manager HA scale out
    - BIP can be configured on all OMS nodes to increase reporting capacity
    - This does not provide failover, in case one of the BIP instances fails or is otherwise stopped [Fixed in future].

- Recommendations:
  - Configure BIP on the first OMS node, before cloning it
  - Always configure BIP on all OMS nodes, and ensure that BIP is always UP, when that node's OMS is also up
  - BI Publisher is supported only with storage replication based solution for Disaster Recovery. Not functional with Standby OMS with Weblogic Domain method
Appendix
Architecture Overview

Oracle Management Service (OMS)

- Central Enterprise Manager Application
  - Source of truth for all management
  - Receives and processes data from Agents
  - Uses repository as persistent store for information

- Comprises 2 Weblogic Server application deployments
  - **Console** – Provides UI and Target Specific Management
  - **Platform Background Services (PBS)** – A set of background services critical for monitoring and management

- Verify status of Console and PBS is marked as UP for each Management Service in Setup > Manage Cloud Control > Management Services
Architecture Overview

Repository

- Most critical part of EM system
  - Deploy with performance and availability in mind
- Persistent store for data collected from the managed Targets
  - Performance and Availability Metrics
  - Configuration and Compliance Information
- Used to store a variety of Enterprise Manager configuration information such as:
  - users and privileges
  - job definitions
Architecture Overview

Agents

- Collect monitoring and configuration data from the targets and store locally in XML files
  - Collected data uploaded at scheduled intervals to Management Service using HTTP/HTTPS
  - XML files are purged once data has been uploaded
- Execute tasks on behalf of Enterprise Manager users
  - Real-time data collections
  - Jobs
  - Deployment Procedures
Job Subsystem Monitoring

Sizing Recommendations of thread pool size

- Sizing Recommendations of pool size for Large Configuration with 2 or 4 OMS nodes
- Default pool size configuration for Small and Medium configuration
- Incase of major resource issues, contact Oracle Support for guidance on adding additional threads

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>oracle.sysman.core.jobs.shortPoolSize</td>
<td>50</td>
</tr>
<tr>
<td>oracle.sysman.core.jobs.longPoolSize</td>
<td>24</td>
</tr>
<tr>
<td>oracle.sysman.core.jobs.longSystemPoolSize</td>
<td>20</td>
</tr>
<tr>
<td>oracle.sysman.core.jobs.systemPoolSize</td>
<td>50</td>
</tr>
<tr>
<td>oracle.sysman.core.conn.maxConnForJobWorkers</td>
<td>144</td>
</tr>
</tbody>
</table>
Event Subsystem Monitoring

Setup / Manage Cloud Control / Health Overview / OMS and Repository Menu / Monitoring – All Metrics

- Responsible for processing the events published by different components in the system
- Key Metrics to check event backlog - Total Events Pending and Total Events Processed (Last Hour)
- If **Total Events Pending** remains high [over an hour].
  - Check metrics **Total Events Processed (Last Hour)**
    - If it is making good progress (count is high), there could be temporary load – ignore
    - When pending count continues to be high, it should sustain a minimum processing of 1000 events per every 10 minutes
    - If it is not making good progress, there could be stuck queues in event system
  - Check the queue statistics in “**Event Status**” metric group to detect problem in AQ
  - Contact Support for triaging issues in AQ / queues
Repository Metric Collection Jobs Monitoring

- Repository metric jobs are sub divided into long and short running tasks
  - Some collection workers (Default 1) process the short tasks and some (Default 1) process long tasks

- Key Indicators of its performance
  - Repository Collection Performance Chart
  - Repository collection performance metrics

- Key Metrics
  - Average Collection Duration (seconds)
  - Collections Processed
  - Repository Collection Task Performance
    - Run Duration (Seconds)
Repository Metric Collection Job Monitoring

- Average Collection Duration (seconds) - Indicator of the load on the repository collection subsystem
  - Two possible reasons - Number of collections have increased Or some of the metrics are taking a long time to complete
  - Check the Run Duration (Seconds) metric
    - To identify which metric is taking more than 2 mins of time (default) to execute. Threshold-able
    - If any metric is taking unusually long time, disable the specific metric to unblock.
  - Check the Collections Processed metric
    - Consistently high and backlog is continuous
    - Enable Collection Manager for one-off cases
    - Configure threads if backlogs are generally high
    - Maximum workers is 5
Repository Health Monitoring

### General guidelines for Maximum Availability to check in repository
- Regular Backups
- ARCHIVELOG mode ON
- FLASHBACK Mode ON
- Refer to Oracle Database High Availability Guidelines

### Compliance to Repository Database Setting as per Sizing guidelines

<table>
<thead>
<tr>
<th>Parameter Name</th>
<th>Current Value</th>
<th>Recommended Value</th>
<th>Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>open Cursors</td>
<td>400</td>
<td>300</td>
<td>✓</td>
</tr>
<tr>
<td>job_queue_processes</td>
<td>50</td>
<td>20</td>
<td>✓</td>
</tr>
<tr>
<td>db_block_size</td>
<td>8,192</td>
<td>8,192</td>
<td>✓</td>
</tr>
<tr>
<td>memory_target</td>
<td>5,368,709,120</td>
<td>5,637,144,576</td>
<td>✗</td>
</tr>
<tr>
<td>shared_pool_size</td>
<td>637,534,208</td>
<td>629,145,600</td>
<td>✓</td>
</tr>
<tr>
<td>processes</td>
<td>600</td>
<td>600</td>
<td>✓</td>
</tr>
<tr>
<td>redo log file size</td>
<td>2,515,582,400</td>
<td>629,145,600</td>
<td>✓</td>
</tr>
</tbody>
</table>

*memory_target of 5.25 GB can be used in place of sga_target and pga_aggregate_target*
Repository Scheduler Jobs Monitoring

Setup > Manage Cloud Control > Repository

- Monitor Repository Scheduler Jobs status and processing time

<table>
<thead>
<tr>
<th>DBMS Job Name</th>
<th>Status</th>
<th>Duration</th>
<th>Next Scheduled Run</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adaptive Threshold Jobs</td>
<td>✔️</td>
<td>0.01 s</td>
<td>Sep 16, 2014 2:00:00 PM GMT</td>
</tr>
<tr>
<td>Agent Ping</td>
<td>✔️</td>
<td>0.02 s</td>
<td>Sep 16, 2014 1:31:59 PM GMT</td>
</tr>
<tr>
<td>EM Audit Externalization Service</td>
<td>✔️</td>
<td>0.07 s</td>
<td>Sep 16, 2014 5:33:59 PM GMT</td>
</tr>
<tr>
<td>Beacon Service Availability</td>
<td>✔️</td>
<td>0.03 s</td>
<td>Sep 16, 2014 1:31:59 PM GMT</td>
</tr>
<tr>
<td>Change Activity Planner Task Job Monitor</td>
<td>✔️</td>
<td>0.11 s</td>
<td>Sep 17, 2014 12:00:00 AM GMT</td>
</tr>
</tbody>
</table>

- Tips to troubleshoot if the Status of these jobs are down
  - For the repository jobs to run, the DBMS_SCHEDULER must be enabled
  - Start these jobs with pl/sql command ‘exec emd_maintenance.submit_em_dbms_jobs’
Repository Scheduler Jobs Monitoring

- If a specific job is down i.e. broken state,
  - Query the mgmt_performance_names table as repository owner for the dbms_jobname and fetch the job id from all_jobs
  - Look for ORA-12012 messages for this job id in the database alerts log and trace files for the problem to fix. Re-start the job from console
  - Contact Oracle Support if fix cannot be easily identified

- Key Metrics to gauge its performance
  - Throughput per second
  - Processing Time (% of Last Hour)
  - If Processing Time is large and the Throughput is low
    - Check for errors in database-alert.log
Metric Rollup Jobs

**Setup > Manage Cloud Control > Repository**

- Aggregation mechanism: Both hourly and daily rollups are done from the raw data directly.
- Look out for consistently growing backlogs or prolonged execution time span.
  - Configure additional rollup worker threads using configure option in Metric Rollup Performance Chart.
  - If the RAC is configured in the database, to avoid RAC contention negating gain of additional threads.
    - Create database service and set affinity to it for the rollup job to only run on one RAC node.
Metric Rollup Jobs Monitoring

Setting affinity with RAC Configuration

- Create database service and set affinity to it for the rollup job to only run on one RAC node
  - Create database service “rollup” and set one of RAC instance as primary instance in “-r”
  - `srvctl add service -d <dbname>-s rollup -r <primary instance> -a <the the other instances> -y automatic`
  - `srvctl start service -d <dbname>-s rollup`
  - `srvctl status service -d <dbname>`
- As sys user, execute `DBMS_SCHEDULER.create_job_class(job_class_name => 'ROLLUP', service => 'rollup')`
- GRANT EXECUTE ON sys.ROLLUP TO sysman;
- As sysman user, execute `DBMS_SCHEDULER.SET_ATTRIBUTE(name => 'EM_ROLLUP_SCHED_JOB', attribute => 'job_class', value => 'ROLLUP')`
- As sysman user, execute `GC_SCHED_JOB_REGISTRAR.SET_JOB_CLASS('EM_ROLLUP_SCHED_JOB', 'ROLLUP')`
## Agent Subsystem-New Agent Unreachable sub-statuses

Sub status added to provide more diagnostic details

<table>
<thead>
<tr>
<th>Agent Unreachable And Status Pending Statuses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agent Unreachable</td>
</tr>
<tr>
<td>Down</td>
</tr>
<tr>
<td>Agent Down</td>
</tr>
<tr>
<td>Up Unmonitored</td>
</tr>
<tr>
<td>Under Migration</td>
</tr>
<tr>
<td>Cannot Write to File System</td>
</tr>
<tr>
<td>Collections Disabled</td>
</tr>
<tr>
<td>Disk Full</td>
</tr>
<tr>
<td>Blocked Manually</td>
</tr>
</tbody>
</table>
General Troubleshooting Steps for Agent Unreachable

Setup > Manage Cloud Control > Agents

- Target Status Diagnostics Report: Agent-based targets (Information Publisher report)
  - Check the Promote Status column and Broken Reason in Target Information
  - Check for latest “Clean Heartbeat UTC” time in “Agent Ping Status” table in the Report
- Ensure OMS is reachable from agent host and agent from OMS host
- Check “emctl status” for various configurations. Eg: Agent communicating with correct OMS
- Check agent upload with “emctl upload”
- Contact Oracle Support with these logs
  - gcagent.log from agent home
  - emoms_pbs.log, emoms.log
Safe Harbor Statement

The preceding is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, release, and timing of any features or functionality described for Oracle’s products remains at the sole discretion of Oracle.
Hardware and Software
Engineered to Work Together
Agenda

- Our company
- Overview of Oracle® EM HA
- Tips and tricks to reduce down time when a switchover or failover to disaster recovery (DR)
- Benefits of using a storage replication HA solution
Chevron is One of the Largest Integrated Energy Companies in the World

- **2nd largest** integrated energy company in the United States
- **12th largest** company in the world
- **64,500+** employees worldwide (includes service station personnel)
- **2.59** net million barrels of oil per day in 2012
- **$21.4 Billion** Net Income in 2013
- **$39.8 Billion** Capital and Exploratory budget for 2014
A Global Company Operating on Six Continents

- 180+ countries in which we operate
- 30+ countries with exploration and production activities
- 18 refineries and asphalt plants
- 35 chemical manufacturing facilities
- 3 retail brands (Chevron, Texaco and Caltex)
- 22,000+ retail outlets

* In some cases, one dot designates multiple locations
Overview of Oracle EM HA Architecture Components

- **Repository**
  - Local HA: Data Guard fast start failover with maximum availability protection mode
  - DR: Data Guard

- **Oracle® management system (OMS) Redundancy**: two primary OMS and two DR OMS

- **Network attached storage (NAS) Replication**: Application software bit and Oracle® Enterprise Manager Software Library

- **Global Traffic Manager and F5 Networks® BIG-IP®

- **Oracle® Access Manager (OAM)** – single sign on (SSO): Two primary servers and two local DR servers (required due to Kerberos SSO)

F5, F5 Networks, and BIG-IP are trademarks or registered trademarks of F5 Networks, Inc. in the U.S. and in certain other countries.
Did you know that you can incorporate standby database into the OMS configuration using a one-time configuration on the primary OMS?

- Command:

  emctl config oms -store_repos_details -repos_conndesc "(DESCRIPTION=(ADDRESS_LIST=(ADDRESS=(PROTOCOL=TCP)(HOST=host1)(PORT=1521))(ADDRESS=(PROTOCOL=TCP)(HOST=host2)(PORT=1521))(ADDRESS=(PROTOCOL=TCP)(HOST=host3)(PORT=1521)))(CONNECT_DATA =(SERVER=DEDICATED)(SERVICE_NAME=SID_DG)))" -repos_user sysman -repos_pwd password

  - Where:
    - Host1-2 are local primary database hosts – HA fast start failover
    - Host3 is a remote database host – DR
    - Note: For RAC, host1-2 would be replaced by SCAN-IP

- Benefits:
  - Reconfiguring the OMS to point to the new repository (after the Data Guard switchover/failover) is not required.
  - Reduce downtime, human errors and manual work when switchover/failover occurs.
Benefits of Setting Up Multiple Database Connections when Using Switchover or Failover to DR

- OMS was set up to connect to multiple hosts. In the DR situation, the process can be simplified without having to run any configuration changes.

- 6 simple steps to switchover to DR without having to run configuration changes:
  1. Stop the OMS
  2. Switch over the database to DR
  3. Disable f5 on the primary site and enable f5 on the DR site
  4. Break the NAS Mirror and set the DR site to RW
  5. Start up the OMS
  6. Configure the OMS to support Chevron logon standards
    - **Note**: Step 6 is NOT required if OAM/Kerberos SSO is not in place
Benefits of a DR Solution with NAS Replication

Patching/Plugin Deployment steps without NAS replication:
1. Stop the OMS
2. Patch or deploy new plugins on Primary
3. Switch the database to Standby
4. Start up the OMS on Standby
5. Patch or deploy new plugins to the OMS on Standby
6. Switch the database back to primary
7. Start up the OMS

Patching /Plugin Deployment steps with NAS replication:
1. Stop the OMS
2. Patch or deploy new plugins on the primary OMS
3. Start up the OMS

Benefits:
- Prior to storage replication, standby OMS recreation is required when upgrading
- Reduce down time by half or more when patching or deploying plugins
- Reduce human errors and simplify the EM infrastructure
Enterprise Manager at CERN

Andrei Dumitru
IT Department / Database Services / openlab
European Organization for Nuclear Research

Founded in 1954
Research: Finding answers to questions about the Universe
Technology, International collaboration, Education

21 Member States
7 Observer States
European Commission, USA, Russian Federation, India, Japan, Turkey, UNESCO

Associate State
Serbia

Candidate State
Romania

People
2500 Staff, 560 Fellows, 500 Students, 10600 Users, ...
Grand Total ~ 15000
The largest particle accelerators & detectors

- 27km (17 miles) long tunnel
- Thousands of superconducting magnets
- Ultra vacuum: 10x emptier than on the Moon
- Coldest place in the Universe: -271°C/1.9K/-456°F
At the heart of CERN, LHC and Experiment Operations

http://cern.ch/it-dep/db/

Streams

Experiment Offline Databases

Data

Experiment Online Databases

RAW Data

LHC Experiments

LHCb

CMS

ATLAS

ALICE

PARTNERS:

CERN

openlab

ORACLE

Credit: Mariusz Piorkowski
Deployment

Agents version: 12.1.0.4
Linux x86-64
Secure agent upload
AD accounts for user login

2-node RAC OMS+OMR
OMS version: 12.1.0.4
Linux RHEL 5 x86-64
8 CPU @ 2.53GHz
48 GB RAM

RDBMS version 11.2.0.4
Size: ~200GB
NAS storage

Databases
- 200 Oracle Database Instances
- 80 RAC Databases

Middleware
- 370 WebLogic Servers
- 340 Java Virtual Machines
- over 1000 App Deployments
- Apache Tomcat & HTTP Servers

Hosts
- 270 Red Hat Enterprise Linux 5 & 6

Total
- 5200 targets
Case Study: OMS Troubleshooting

1. Launched Agent Upgrade job
2. Started receiving many alerts
   Agent is unable to communicate with OMS
   Agents not yet upgraded to R4: no enhanced agent health status available
3. Looking into the new self monitoring features (Loader):
   Throughput was dropping
   Backoff (no of files rejected) increasing
   Utilized Capacity increasing
Case Study: OMS Troubleshooting

4. Diagnosing the Repository Database
   High Load on the OMR host
   Row lock contention in SYSMAN schema caused by Agent Upgrade

5. Oracle Support provided patch

6. OMR issue fixed
   Throughput rate back to normal
   Everything working
Agents Overview

- Check agent status
- Symptom Analysis
- Control agent
- Properties
Partner Agent

Agents monitor one another

Faster downtime detection

Separate alerts

gagent down event

host down event

Host=hostname.cern.ch
Target type=Agent
Target name=hostname.cern.ch:1234
Message=Agent has stopped monitoring.
The following errors are reported:
agent shutdown.

Host=hostname.cern.ch
Target type=Host
Target name=hostname.cern.ch
Message=Host Down – Detected by Partner Agent
Repository

Out of the box checks based on OMS size

Change the schedule for Repository Jobs
Repository Metrics

Top 25 Metric Data Loading Target Types

- Cluster Database
- Number of Collections: 991.1K
- Number of Rows Loaded: 15.38M
- Volume Of Data Loaded (MB): 1,022

Top 25 Metric Data Loading Target Types In Last 30 Days

- Group By Metric (Top 25) Target (Top 25)
- Number Of Collections: 62.23K
- Number Of Rows Loaded: 1,482K
- Volume Of Data Loaded (MB): 100.4
### Page Performance Analysis

#### Page Performance

**Overview:** Page Level Performance

<table>
<thead>
<tr>
<th>View</th>
<th>Set Page Display name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Performance Correlation

**Page Processing Time**

- **Page Processing Time (sec):** The time taken by the server to process the request.
- **Page Processing Time in OMS (sec):** The time taken by the system to process the request in OMS.
- **Page Processing Time in Repository (sec):** The time taken by the repository to process the request.
- **Page Processing Time in Browser/Network for Multi-Requests Page (sec):** The time taken by the browser/network to process the request for a page with multiple requests.
- **Requests per Page:** The number of requests processed per page.
- **SQL/JSON executions per page:** The number of SQL or JSON executions per page.
- **Max Page Processing Time (over last 7 days):** The maximum page processing time over the last 7 days.
- **Max Page Accesses per 10 min (over last 7 days):** The maximum page accesses per 10 minutes over the last 7 days.

### Data

- **Current Severity:** Indicates the severity of the issue.
- **Platform:** Information about the platform on which the request was processed.
- **Duration:** The duration of the request.
- **Request Time:** The time when the request was received.
- **Response Time:** The time when the response was sent.

### Diagram

- **Data and instances:** Overviews and timelines showing performance metrics for different pages.

### Note

- **Processing Time in OMS:** The time taken by the system to process the request in OMS for all the requests of the page.
- **Processing Time in Repository:** The time taken by the repository to process the request for all the requests of the page.
- **Processing Time in Browser/Network for Multi-Requests Page:** The time taken by the browser/network to process the request for a page with multiple requests.

---

*Above chart will not render if the selected page was accessed only once in the last 24 hours.*
Advantages of new EM12c R4 self-monitoring features

- Quickly spot infrastructure problems
- Fast host down detection - partner agent
- New agent health sub statuses
- Change schedule for repository jobs from UI
- Performance diagnosis of UI pages
- Detailed diagnosis of different sub-systems
- Repository recommendations and checks