14648 – Oracle Exadata Management Fundamentals: New features for Monitoring, Tuning and More

Deba Chatterjee : Senior Product Manager, Oracle
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Total Cloud Control

Complete Lifecycle Management

Integrated Cloud Stack Management

Business-Driven Application Management

Self-Service IT | Simple and Automated | Business Driven
Management Challenges

Challenges

- Reduce deployment cost and errors—rapid time to value
- Migrate application while ensuring business continuity
- Proactively monitor all components
- Maximize availability
- Ensure quality of service

Oracle Enterprise Manager Release 12.1

- Manages all stages of Exadata lifecycle from deployment to maintenance
- Automates deployment reducing cost and effort
- Mitigates migration risk
- Maximizes performance, availability and service quality
Exadata Management

Setup & Monitor
- Discovering Exadata for monitoring
- Monitoring the Database machine

Test
- Consolidate on Exadata
- Validate Application Performance

Manage
- Performance Diagnostics
- Application SQL Tuning

Maintain
- Configuration Compliance
- Patch Automation
Discovering Exadata in Enterprise Manager 12.1

- Wizard driven guided discovery now significantly faster (10x) than 11g
- Exadata Cell and the Infiniband components discovered out-of-the-box
- Exadata Plug-in bundled for all other targets (viz. KVM, PDU, Cisco Switch)
- Option to Discover New DB Machine or rediscover – Add DB Machine Members
<table>
<thead>
<tr>
<th>Exadata Monitoring</th>
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<tbody>
<tr>
<td><img src="image" alt="Exadata System" /></td>
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<table>
<thead>
<tr>
<th>Layer</th>
<th>Description</th>
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<tbody>
<tr>
<td></td>
<td><strong>KVM, PDU, ILOM, CISCO SWITCH</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Infiniband Network</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Storage Server</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Database</strong></td>
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</tbody>
</table>
Exadata Management
Integrated View of Hardware and Software

• Hardware view
  • Schematic of cells, compute nodes and switches
  • Hardware components alerts

• Software/system view
  • Performance, availability, usage by databases, services, clusters
  • Software alerts db, cluster, ASM
  • Topology view of DB systems/clusters

• Configuration view
  • Version summary of all components along with patch recommendations
Storage Cell Management

- **Storage Cell monitoring and administration support**
  - Cell Home page and performance pages
  - Actions supported: Start/stop Cell, verify connectivity, setup SSH

- **Automatic discovery of Exadata cells**

- **Management by Cell Group**
  - All cells used by a database automatically placed in a group
  - Cell Group level administration operations
Storage Cell Management

- Perform Cell Administration tasks
  - Execute Cellcli commands on a set of cells or all cells
- Setup IORM for database targets
## Infiniband Network Management

### Infiniband network and switches as GC targets
- Automatic discovery

### Network home page and performance page
- Real time and historical

### Topology view of Network with switch and port level details

<table>
<thead>
<tr>
<th>Switches</th>
<th>Status</th>
<th>Type</th>
<th>Port Details</th>
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<td><code>switch1</code></td>
<td>Normal</td>
<td></td>
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<tr>
<td><code>switch2</code></td>
<td>Normal</td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>switch3</code></td>
<td>Spine</td>
<td></td>
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</tr>
</tbody>
</table>

### Full monitoring
- Alerts (switch generated and EM generated)
- Performance metrics
- Configuration metrics – detect and notify configuration changes/best practice violations

### Nodes

<table>
<thead>
<tr>
<th>Nodes</th>
<th>Status</th>
<th>Type</th>
<th>HCA</th>
<th>IP Address</th>
<th>Port Details</th>
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<tbody>
<tr>
<td><code>node1</code></td>
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<td>Oracle Exadata Storage Server</td>
<td>HCA-1</td>
<td>192.168.10.111</td>
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<td>Oracle Exadata Storage Server</td>
<td>HCA-1</td>
<td>192.168.10.120</td>
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<tr>
<td><code>node3</code></td>
<td></td>
<td>Oracle Exadata Storage Server</td>
<td>HCA-1</td>
<td>192.168.10.114</td>
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<tr>
<td><code>node4</code></td>
<td></td>
<td>Host</td>
<td>HCA-1</td>
<td>192.168.10.107</td>
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</tbody>
</table>
Infiniband Network Management

- Perform Infiniband Administration tasks
  - Enable Port
  - Disable Port
  - Clear Performance counters
  - Clear Error Counters
Common metrics monitored
- Power supply failure
- Fan failure
- Temperature out of range

Specific metrics monitored
- Cisco Switch
  - Configuration change tracking and reporting
  - Unauthorized SNMP access
- Keyboard, Video, Mouse (KVM)
  - Server connected to KVM added/removed, powered on/off
Monitoring: Power Distribution Unit (PDU)

- Measures power consumption used by Exadata components and provides early warning of impending thresholds
- Monitors electric current being used by equipment connected in Exadata rack
Exadata Service Dashboards

- Service dashboard for executives and business owners
- Many components reporting up to one Exadata Service
Exadata Management

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Deploying Applications on Exadata

- Migrating applications to Exadata can be a very time consuming
- Three step process
  - Identify which applications to be migrated to Exadata
  - Create test environment on Exadata
  - Validate application performance
Deployment Challenges

- Deploying application to Exadata involves multiple changes:
  - O/S migrations
  - Storage subsystem changes
  - Database upgrades
  - Single database instance to RAC
- Proper testing required for risk mitigation.

Will performance improve?

What are the risks?

How long will it take?

Which apps to consolidate?

Applications

Database

Storage

OS
Consolidation Planner

- Target resource utilization and configuration data extracted from Enterprise Manager repository
  - CPU, memory, storage, network

- Administrator specifies servers and constraints for workload migration
  - Physical/virtual servers
  - Existing/planned servers
  - Business/technical constraints

- Reports detail how consolidated workloads would perform on target servers
Secure Test System Deployment

• Deploy secure test system by masking sensitive data
• Sensitive data never leaves the database
• Extensible template library and policies for automation
• Sophisticated masking: Condition-based, compound, deterministic
• Integrated masking and cloning
• Leverage masking templates for common data types
• Masking of heterogeneous databases via database gateways
• Command line (EMCLI) support for data masking actions

<table>
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<tr>
<th>LAST_NAME</th>
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<th>SALARY</th>
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<td>203-33-3234</td>
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<tr>
<td>BENSON</td>
<td>323-22-2943</td>
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<th>SSN</th>
<th>SALARY</th>
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<td>SMITH</td>
<td>111-23-1111</td>
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<tr>
<td>MILLER</td>
<td>222-34-1345</td>
<td>40,000</td>
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</table>
Validate Application Performance

- **SQL Performance Analyzer**
  - SQL unit testing for response time
  - Identify and tune regressed SQL
  - Integrated into SQL Tuning Advisor and SQL Plan Baseline

- **Database Replay**
  - Load, performance testing for throughput
  - Remediate application concurrency problems
  - Integrated with Oracle Application Testing Suite for superior comprehensive testing solution

- Seamless integration with Data Masking to preserve data sensitivity compliance
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Integration with the Database Performance Page

- Drill down from database Performance page
  - Provides composite view of all health indicators of a cell or cell group
- Helps triage
  - Load imbalance
  - ASM related problems
  - Cell software or hardware failures
  - Cell configuration issues
  - Network related failures
Performance Diagnostics and Tuning

- Oracle Database 11g’s Automatic Performance Diagnostics helps maximizes Exadata performance
- Top-down performance analysis using Automatic Workload Repository
- Real-time performance analysis with Automatic Database Diagnostic Monitor
- Resolve performance issues faster with drill-down root-cause analysis
- Classification tree based on Oracle performance tuning expertise
- Fully automates database performance diagnostics
Performance Diagnostics and Tuning

- Automatic SQL Tuning
  - Analyze high-load SQL → tune using SQL Profiles → implement improved SQL plans (optional)
- Comprehensive SQL analyses across 6 dimensions: statistics, SQL profiling, index, alternate plan, parallelization and SQL structure
- SQL Profiles tunes execution plan without changing SQL text
- Enables transparent tuning for packaged applications
Exadata Aware SQL Monitoring

- Real time monitoring of application SQL
- I/O performance graphs with Exadata information
  - Cell offload efficiency
  - Cell smart scan
- Rich metric data
  - CPU
  - I/O requests
  - I/O throughput
  - PGA Usage
  - Temp Usage
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Root Cause Analysis of Hardware Problems

- Topology View of all Exadata components by
  - Uses
  - Used By
  - System Members
  - DB Machine Software
- Enables out of the box root cause analysis of issues.
Defect Diagnostics

• Support Workbench
  – Exadata integrated with Database defect diagnostic framework
  – Support Workbench provides viewing and packaging of incidents
  – Correlated packaging from DB through ASM to Exadata

• Incident Management
  – Software and hardware incidents tracked via Incident Console
  – Track, manage and resolve critical incidents
    – Hardware alerts (temperature, cell down, power supply, etc.)
    – Hardware failures come with picture indicating failed part location
  – Best practice violations automatically alerted
Configuration Management

Automated Configuration Management

- Enforcement of Exadata configurations using Policies
- Detection of configuration drifts and changes
  - From defined golden standards
  - Between storage servers and between database machines
- Detect database targets that do not have required patches
Configuration Management

Compare between Oracle Database Machines
- Gold Image Comparison
- Baseline vs. Current
- Multiple DB Machines
• Ability to compare current configuration vs. saved configurations
  • Within cells
  • Across multiple cells
Automating Database Infrastructure Patching
Fully Integrated with My Oracle Support

- Proactive advisories, recommendations, and analysis
  - One-off patches, patch set updates, and critical patch updates
- Zero downtime for patching
- Integrated patch management & deployment automation
- Patch intelligence and community
- Streamlined conflicts and merge patch process
- “Patchmgr”, a command line tool, is used to patch the Storage Cells from the Compute Nodes.
OPS Center: OS Patch Management

- Central Repository for iso images
- Unique knowledge base, analysis and how-to-install
- Uses plans, profiles and policy based patch management
- Track and audit change history
- Audit patch and configuration compliance
- Protect RPM by blacklisting
- Only for use on the Compute Nodes
OPS Center: Firmware Management

- Automatically downloads required firmware from Oracle
- Run compliance reports to see if the environment is up to date
  - Take action only if it is the Compute Node
- Ops Center uses both Service Processor and OS level APIs to determine disk health
  - Leverages and installs the *hwmgmt* daemon
  - *hwmgmt* sends event information to Ops Center via the Service Processor
Maintain
Fault Diagnostics: ASR Flow

Customer Data Center
- Fault occurs
- Product’s auto-diagnosis facility sends SNMP trap to ASR Manager
- SR creation email notification to customer
- Fault telemetry securely transmitted to Oracle
- FRU replaced by Field Engineer

Oracle Support Services
- FRU dispatched by Support Engineer
- Service Request created
- SR routed to Support Engineer
- ASR Service

Comprehensive Fault Coverage
- CPU
- Disk controllers
- Disks
- Flash Cards
- Flash modules
- InfiniBand
- Cards
- Memory
- System Board
- Power supplies
- Fans
Oracle Exadata Database Machine
Extreme ROI Platform

- Fast Predictable Performance
- Lower Ongoing Costs
- Fastest Time to Value at Lowest Risk

Maximize database performance with automated diagnostics & tuning

Drive down IT operational costs with automated change and configuration mgmt

Automate testing of patches, changes and upgrades while keeping data secure
<table>
<thead>
<tr>
<th>Company</th>
<th>Benefit Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meridian</td>
<td>Saves weeks on application testing time</td>
</tr>
<tr>
<td>Nokia</td>
<td>Saves 80% time and effort for managing Databases</td>
</tr>
<tr>
<td>China Mobile</td>
<td>Ensures seamless user experience for 50,000,000 users</td>
</tr>
<tr>
<td>Colorcon</td>
<td>90% of IT issues addressed before they impact users</td>
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<tr>
<td>Commonwealth Bank</td>
<td>Drives asset utilization up by 70%</td>
</tr>
<tr>
<td>Cummins</td>
<td>Cuts configuration management effort by 90%</td>
</tr>
<tr>
<td>Telstra</td>
<td>Saves $1.9 million with Oracle Enterprise Manager</td>
</tr>
<tr>
<td>Samsung</td>
<td>Saves $170,000 per year with Oracle Enterprise Manager</td>
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<tr>
<td>City University London</td>
<td>Replaces manual tools with automation; saves time by 50%</td>
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<tr>
<td>Starwood</td>
<td>Reduces Database testing time by 90%</td>
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<tr>
<td>Bayer</td>
<td>Reduces provisioning effort by 75%</td>
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<tr>
<td>NetApp</td>
<td>Deploys SOA infrastructure 92% faster</td>
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<tr>
<td>Cumis</td>
<td>Cuts application testing from weeks to hours</td>
</tr>
<tr>
<td>APL</td>
<td>Reduces critical patching time by 80%</td>
</tr>
<tr>
<td>City of Evanston</td>
<td>Delivers 24/7 uptime with Oracle Enterprise Manager</td>
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</table>
Questions
## Additional Oracle Enterprise Manager Sessions

**Wednesday, October 5, 2011**

<table>
<thead>
<tr>
<th>TIME</th>
<th>TITLE</th>
<th>LOCATION</th>
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<tbody>
<tr>
<td>10:15 am – 11:15 am</td>
<td>Day in the Life of a DBA: Cloud-Ready Management Solutions for Any IT Shop</td>
<td>Moscone S, Rm 309</td>
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<tr>
<td>10:15 am – 11:15 am</td>
<td>Oracle Exadata Management Fundamentals: New Features for Monitoring, Tuning, and More</td>
<td>Moscone S, Rm 305</td>
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<tr>
<td>11:45 am – 12:45 am</td>
<td>An Inside Look at Oracle Enterprise Manager: New Framework and Architecture Overview</td>
<td>Moscone S, Rm 305</td>
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<td>11:45 am – 12:45 am</td>
<td>Make Upgrades Uneventful with Oracle Enterprise Manager and My Oracle Support</td>
<td>Moscone S, Rm 309</td>
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<tr>
<td>11:45 am – 12:45 am</td>
<td>Roadmap to Enterprise Cloud Computing</td>
<td>Moscone S, Rm 310</td>
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<tr>
<td>11:45 am – 12:45 am</td>
<td>SQL Tuning Expert Roundtable</td>
<td>Moscone S, Rm 103</td>
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<tr>
<td>1:15 pm – 2:15 pm</td>
<td>Consolidation Planning and Chargeback: Cloud Implementation Essentials</td>
<td>Moscone S, Rm 309</td>
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<tr>
<td>1:15 pm – 2:15 pm</td>
<td>Scalable, Smarter Monitoring with Oracle Enterprise Manager: Expert Tips</td>
<td>Moscone S, Rm 305</td>
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<tr>
<td>5:00 pm – 6:00 pm</td>
<td>Oracle Enterprise Manager Deployment Best Practices</td>
<td>Moscone S, Rm 305</td>
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<tr>
<td>5:00 pm – 6:00 pm</td>
<td>Oracle Enterprise Manager Upgrade Best Practices</td>
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Oracle Enterprise Manager Demogrounds and Hands On Labs

• For further information, visit the Enterprise Manager Demo Grounds in Moscone West and South
  – See detailed demos of Enterprise Manager functionality

• For hands on practice with Enterprise Manager, visit the Hands On Labs at the Marriott Hotel, Marquis Salon 14 / 15
  – “Test Drive” (1 hour) and “Grand Tour” Labs featuring Oracle Enterprise Manager 12c running Tuesday – Thursday
Scan the QR code to get the latest demos, sessions, hands-on labs, and more!

Join the conversation on twitter #em12c

Join us for Enterprise Manager 12c Launch Monday, Oct 3rd 5:00 p.m., Novellus Theater