Total Cloud Control

Database Lifecycle Management Pack
Combined Configuration, Change, Provisioning and Patch Mgmt
Enterprise Manager 12.1: Database Lifecycle Mgmt

Agenda

• Lifecycle Management 12.1 Features
  • Initial Provisioning
  • Ongoing Configuration and Compliance Management
  • Change Management
• Early Adopters
• Licensing
EM 12.1: Database Lifecycle Management

Discovery and Initial Provisioning

- Discover Assets and Provision Software on them

Ongoing Change Management

- End to End Management of patches, upgrades, and schema changes

Continuous Configuration and Compliance Management

- Track inventory, configuration drifts and compliance
EM 12.1: Database Lifecycle Management

- **Discovery and Initial Provisioning**: Discover Assets and Provision Software on them
- **Ongoing Change Management**: End to End Management of patches, upgrades, and schema changes
- **Continuous Configuration and Compliance Management**: Track inventory, configuration drifts and compliance
Discovery

- Auto-discovery of servers, virtual servers and services using IP scan (NMAP, agent-less)
- Integrated workflow for agent deployment and target discovery on selected auto-discovered hosts
- Promote the targets from “Unmanaged” to “Managed”
Agent push is fully integrated with target discovery
  • ‘Add host’ not ‘push agent’
  • Promoting a host from unmanaged to managed integrates seamlessly with agent push workflow

Multi-platform agent push in a single deployment session

Approved patches can be pushed to the agent during initial deployment

Sudo/Powerbroker integrated for locked accounts

Recommendations provided in cause of failure

Agent cloning also supported

Simpler manual deployment
  • Generate agent zip or RPM from EM and deploy
EM 12.1: Software Provisioning
Framework Enhancements

• Separation of Designer and Operator Roles
  • Designer can modify Deployment Procedures
  • Operators can only execute Deployment Procedures
• Input lock-down for end operators
  • Enforces standard deployments, minimizes errors
• Fine grained privileges
• Integration with new Credential Model
• Extensibility
  • User-defined Deployment Procedures
    • For custom software deployments
    • EMCLI and web services interfaces for integration with other tools
• Integration with Self Update
  • Update Deployment Procedures out-of-major-release cycles
• Improved diagnosability
  • Integration with Incident framework
  • ‘Debug’ mode
  • Better error messages
EM 12.1: Software Library
Distributed and Scalable across data centers

- Single console for entity types like components, directives, assemblies, etc.
- Integrated with Self Update
- Enhanced support for Storage types
  - File System
    - Shared between OMS
    - Agent served file system
      - Referenced locations – http, nfs, read-only agent file system – ideal for multi-location data centers
- Support attachments and notes for software library entities
  - Attach Readme to patch component
- Improved search e.g., search by vendor and version
- Fine grained privileges for entities
User-defined Deployment Procedures (UDDP)

Automate Custom Deployment Processes

- Create Deployment Procedures from scratch
- Use scripts and payload uploaded to software library
- Add global variables to UDDP to obtain user inputs during launch
- Add steps to UDDP that execute host commands, scripts from software library, transfer files to destination targets, etc
EM 12.1: Database Provisioning

Feature Summary

- Mass Deployment of Oracle Software (Database, Real Application Cluster stack, Fusion Middleware)
- Supports all versions up to 11.2 / Grid Infrastructure Architecture
- Standardized software deployment via Provisioning Profiles
- Lock down access for controlled and error free deployments
- Pre-requisite checks and Fix up’s
- Support for Group based operations
- For Exadata Database machine
  - Initial setup performed through “onecommand”
  - Ongoing database provisioning performed through Enterprise Manager Grid Control
EM 12.1: Provisioning Profiles
Standardization and Simplification

- Enables gold image cloning
  - Standard image with specific patches, configuration, tuning

- Create and store reference image in software library
  - Flexibility to include binaries, config, data

- Use profiles to provision new components
  - Different instance level properties than gold image like directory paths, host names, ports, storage
EM 12.1 – Database Provisioning
Provisioning Designer to Operator Workflow

1. Select Reference DB Host
2. Create Profile
3. Use Profile to populate Procedure Inputs
4. Publish to Operator
5. Lock down inputs and save Procedure
6. Best Practise Procedure
EM12.1 – Database Provisioning
Provisioning Profiles and Lockdowns

Capturing Provisioning Profiles

Locked values shown in read only mode
EM 12.1: Database Lifecycle Management

- Discovery and Initial Provisioning
  - Discover Assets and Provision Software on them

- Ongoing Change Management
  - End to End Management of patches, upgrades, and schema changes

- Continuous Configuration and Compliance Management
  - Track inventory, configuration drifts and compliance
Data comparison fills a critical gap to allow:

- Application vendors to compare seed data
- Application customers to compare configuration data between different sites
- DBA’s to determine how seed data customizations will be affected by application upgrades
Data comparison and convergence provides a GUI interface to access the DBMS_COMPARISON package

- Compares data between a local and a remote database
  - Requires a database link between the two databases
  - Local and remote can instead be the same database
- Can be used for different types of data
  - Seed data – provided with an application on installation
  - Configuration data – parameters for the application that are set up by the user
  - Master data – data families that are of interest to the business (e.g. customers, suppliers, products, employees etc.)
  - Transaction data – records the operation of business processes
Usage guidelines

- Local database must be version 11.1 or later, remote database must be version 10.1 or later
- Database character sets must be the same
- Data can be compared for tables, single-table views, and materialized views
- Data cannot be compared for some datatypes (e.g. LONG, LONG RAW, ROWID, CLOB, BLOB etc.)
  - These columns can, however, be excluded from the comparison
Change plans allow users to specify, group and package object metadata changes

- Create change plans from
  - Ad hoc changes
  - Comparison-based differences
  - Developer tools
- Role-based workflow
  - Developer – create and submit change plan via SQLDeveloper
  - DBA – review/apply change plan
- Apply change to multiple targets
A change plan contains change requests for one or more metadata objects. A change request can be a request to:

- Create an object
- Drop an object
- Modify one or more attributes of an object

When a change plan is deployed

- The change is analyzed in the context of the database being deployed to
- A relevant PL/SQL script is generated, based on the metadata at the target database
EM 12.1: Patch Management
Feature Summary

• End to End Patch Management support patching Single Instance Databases and Real Application Cluster stack
• Supports all versions up to 11.2 / Grid Infrastructure Architecture
• Reduced Downtime, Recoverable and Flexible patching via Out-Of-Place Patching method (Available only for Single Instance DB)
• Simple, Integrated Patching process through Patch Plans
• Enable workflows across Designer and Operator
• Introducing Patch Templates to handle patch rollout cycles
• Integrated with Compliance Standards for ongoing monitoring of patches
• For Exadata Database machine
  • Cell patching done through “patchmgr”
  • Ongoing database patching automated through Enterprise Manager Grid Control
EM 12.1: Patch Management
Simplified, Linear Patching Process

1. General Information
2. Patches
3. Deployment Options
4. Validation
5. Review & Deploy

• Step 1: Select Patches and Targets
• Step 2: Choose options for Deployment (Deployment Procedures are auto picked)
  • (In-Place, Out-of-Place, Rolling, Non-Rolling)
• Step 3: Run Validations – Comprehensive Analysis for Patch conflicts and Target level sanity
• Step 4: Review -> Pre Deploy -> Deploy
  • Pre-Deploy or Prepare ahead of Downtime for cases like Cloning and Patching cloned Oracle Homes
**EM 12.1: Out-of-Place patching**
Minimum downtime Patching for single instance databases

1. Multiple Databases running from an Oracle Home

2. > Clone Oracle Home
   > Patch Cloned Oracle Home

3. Switch instances to newly cloned Oracle Home
   Apply SQLs (as needed) to the instances
EM 12.1: Patch Management
User Profiles tailored for data centers

- Maintains Grid Control infrastructure
- Creates users and assigns appropriate roles and privileges

Site Administrator

- Senior DBA (Designer Role)
- Identifies Patches for the patch cycle
- Creates Patch Plan Templates
- Provides Template access to Operators

Patching Designer

- Junior DBA / Application DBA (Operator Role)
- Creates Patch Plans from Templates
- Executes/Schedules patch rollouts on the designated targets

Patching Operator
EM 12.1: Database Upgrade

- Mass Upgrade of Oracle Databases
- Supports Single Instance Database in first release
- RAC (Upcoming)
- Upgrade from 10.2.0.x, 11.1.0.x -> 11.2.0.x
- Upgrade Software & Instances combined or separate
- Integrated with MOS Upgrade Planner (post MOS 5.4 release)
EM 12.1: Database Upgrade
EM 12.1: Database Lifecycle Management

- **Discovery and Initial Provisioning**: Discover Assets and Provision Software on them.
- **Ongoing Change Management**: End to End Management of patches, upgrades, and schema changes.
- **Continuous Configuration and Compliance Management**: Track inventory, configuration drifts and compliance.
EM 12.1: Configuration Management

Key Themes and Goals

INTEGRATED

DISCOVERY AND ASSET TRACKING

COMPARISON, HISTORY, AND REPORTING

CONFIGURATION COMPLIANCE

REAL-TIME CONFIG CHANGE DETECTION

EXTENSIBLE

CLOUD READY

APPLICATIONS

APPLICATION SERVERS

DATABASES

HOSTS AND OS

APPLICATIONS/SYSTEM CENTRIC

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APPLICATIONS

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APPLICATIONS/SYSTEM CENTRIC
### EM12.1: Configuration Management

**Feature Summary: Leveraging Acquisitions and Innovation**

<table>
<thead>
<tr>
<th>12.1 Key Features</th>
<th>New or Enhanced From GC 11.1</th>
<th>Application Configuration Console</th>
<th>Configuration Change Console</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Agentless Auto-Discovery of Servers</td>
<td>✓</td>
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<tr>
<td>✓ Inventory Reporting</td>
<td>✓</td>
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<tr>
<td>✓ Extensibility</td>
<td>✓</td>
<td></td>
<td></td>
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<tr>
<td>• Custom Targets &amp; Collections</td>
<td>✓</td>
<td></td>
<td></td>
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<tr>
<td>✓ Topology with Ability to Add Targets/Relationships</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>✓ Complex Search Spanning Relationship</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>✓ Configuration Comparison</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>• Across Life-cycle Environments</td>
<td>✓</td>
<td></td>
<td></td>
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<tr>
<td>• Ignore known differences</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• System Comparison</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>✓ Configuration History</td>
<td>✓</td>
<td></td>
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<tr>
<td>✓ Compliance</td>
<td>✓</td>
<td></td>
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<tr>
<td>• Out Of Box Frameworks &amp; Dashboards</td>
<td>✓</td>
<td></td>
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</tr>
<tr>
<td>• Real-time Change Detection</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>• Change Reconciliation (Authorized, Unauthorized)</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>• User Created Rules, Standards and Frameworks</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>✓ Integrated Systems Management and Support</td>
<td></td>
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<td>✓</td>
</tr>
</tbody>
</table>
EM 12.1 Configuration Management
Collection and Extensibility

- Rich and enhanced collection of target specific information for database, Fusion Apps, Middleware, etc
  - Collected information uploaded to My Oracle Support to aid problem resolution
- Allow customers to augment configuration data collected by EM
  - UI driven definition utilizing rich set of out-of-box parsers
  - All configuration management features (search, history, etc) available for custom configuration collections

<table>
<thead>
<tr>
<th>Sample Components collected for Exadata</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RAC Instances</strong></td>
</tr>
<tr>
<td>Instance Information, Rollback Segments, Tablespaces, Control Files, License Info, Redologs, Database Options, HA General Info, DB Files, RMAN, Init Params..</td>
</tr>
<tr>
<td><strong>ASM</strong></td>
</tr>
<tr>
<td>Instance Name, Version, Host, Oracle Home, Serviced Databases, Serviced ASM CFS, Disk Groups, Configuration Params, Disk Disc Path, Auto Mount Disk Groups, Rebalance Power..</td>
</tr>
<tr>
<td><strong>Host</strong></td>
</tr>
<tr>
<td>CPU, Memory, Kernel Parameters, Shell Parameters, Mount Points..</td>
</tr>
<tr>
<td><strong>Basic Cell Configuration</strong></td>
</tr>
<tr>
<td>Name, Realm Name, ID, Make/Model, BMC Type, IP Block, Fan Count, Power Count, SNMP Subscriber, SMTP Server/Port, IP Addresses 1-4, Kernel Version, Cell Version, Interconnect Count, CPU Count</td>
</tr>
<tr>
<td><strong>Grid Disk</strong></td>
</tr>
<tr>
<td>Name, Cell Name, Realm Name, Status, Size, Creation Time, Cell Disk, Lowest Offset, Error Count, AVAILABLETO</td>
</tr>
<tr>
<td><strong>Cell Disk</strong></td>
</tr>
<tr>
<td>Name, Cell Name, Realm Name, Status, Size, LUN, Error Count, Free Space, Device Partition</td>
</tr>
<tr>
<td><strong>LUN</strong></td>
</tr>
<tr>
<td>Name, Cell Name, Realm Name, Status, ID, Cell Disk, Error Count, Raid Level, Device Name, Size, UID, Auto Create, Physical Drives</td>
</tr>
<tr>
<td><strong>Physical Disk</strong></td>
</tr>
<tr>
<td>Name, Cell Name, Realm Name, Status, ID, Make Model, Lun’s Error Count, Controller Firmware, Controller HW Version, Physical Interface, Physical Firmware, Size, Serial, Usage Type, Port, Insert Time</td>
</tr>
<tr>
<td><strong>IORM</strong></td>
</tr>
<tr>
<td>Name, Cell Name, Realm Name, Status, Directive Type, Database Name, Priority Level 1, Level 2-8, Role, BIOS Manufacturer, BIOS Part Num, BIOS Version, Manufacturer, Part Number, Product Name, Serial Number, UUID</td>
</tr>
</tbody>
</table>
New UI for generic search capabilities
  – Search for configuration attributes within a target as well as follow relationships to other targets
  – Previous release allowed only pre-defined searches
  – Utilize Target properties

End users and integrators can create and save new configuration search definitions

Integrators can include out-of-box common/useful searches

Inventory reporting
  – Distribution of Operating systems, database and middleware product versions
  – Trend report to indicate growth of assets and possible sprawl
Use Existing Relationships And Properties

Build Search criteria for Ad-hoc Search
EM 12.1 Configuration Management

Topology Viewer

- Represent relationships visually
- Manage at system level, rather than component level
- Understand dependencies and analyze impacts
- Support relationships:
  - Out-of-box systems
  - ‘Depends On’
  - ‘Used By’
- Create custom view to add new targets to predefined systems
EM 12.1 Configuration Management
Comparison enriched by mValent (ACC)

- Configuration Comparison and Drift detection (Mvalent integration)
- Comparison with running systems as well as saved gold standards
- 1-1 as well as 1-n comparisons
- Comparison across Database Lifecycles: Dev, Test, Production
- Comparison using Templates
  - Supports custom as well as Out-of-box templates for Oracle products
  - Ability to ignore certain diffs
- Useful in comparing multi-component systems
  - Database machines
  - Exadata cells
  - Weblogic Managed Servers
  - Fusion Apps
  - ……
- Ad-hoc as well as Scheduled comparisons
- Automatic notification on drift detection

Ignore obvious differences to prevent noise
Notify on Diff
Use pre-existing template
Apply constraints on configuration value
EM 12.1 Configuration Management – Exadata Compare
Oracle Database Machine to Oracle Database Machine
EM 12.1 Configuration Management – Exadata Compare
Storage Cell to Storage Cell
EM 12.1 Configuration Management

Compliance

- Multiple hierarchies
  - **Compliance Framework**
    Conceptual “folders” that map configuration standards to real-world structure of compliance frameworks (PCI, COBIT, HIPAA, CIS, etc)
  - **Compliance Standard**
    Collection of rules that gets associated to multiple targets
  - **Compliance Rule**
    Checks/Tests that are performed against specific target types

- Rich set of compliance reporting for Administrators and Security Auditors

- Self-Update features:
  - Notify new content availability
  - Assist in downloading new content
EM 12.1 Configuration Management
Compliance Concepts

Compliance Framework Result Detail
Filter By Targets

- PCI DSS 1.2 - Company X
  - Build and Maintain a Secure Network (PCI 1.2)
    - Establish firewall and router configuration standards (PCI 1.1)
    - Restrict untrusted network access to Cardholder Data environment (PCI 1.2)
    - Restrict internet network access to Cardholder Data environment (PCI 1.3)
    - Do not use default configurations (PCI 2.1)
  - Security configuration standards for all components (PCI 2.2)
    - DWW_DB_Comp1
      - DWW_Test_DB_Rule1
  - Encrypt all administrative access using SSH, VPN, or SSL/TLS (PCI 2.3)
  - Protect Cardholder Data (PCI3)
    - Mask account numbers when shown (PCI 3.3)
    - Render account numbers unreadable when stored (PCI 3.4)
    - Protect crypto keys (PCI 3.5)
    - Follow processes with managing keys (PCI 3.6)
  - Maintain a Vulnerability Management Program (PCI5, PCI6)
    - Deploy anti-virus software on all systems (PCI 5.1)
    - Ensure anti-virus software is up-to-date, running and capable of reporting violations (PCI 5.1)
    - Ensure all software is at latest patch level (PCI 6.1)
    - Address threats and vulnerabilities for public-facing web applications (PCI 6.6)
  - Implement Strong Access Control Measures (PCI7, PCI8)
    - Regularly Monitor and Test Networks (PCI10, PCI11)
      - Link all administrative access to individual users (PCI 10.1)
      - Implement automated audit trails (PCI 10.2)
      - Record many attributes of audit trail entries for reconstruction (PCI 10.3)
      - All clocks must be synchronized (PCI 10.4)
      - Secure audit trails (PCI 10.5)
      - Retain audit history for one year, three months immediately available (PCI 10.6)
      - Deploy file integrity monitoring for all critical files (PCI 11.5)
EM 12.1 Configuration Management

Compliance Rules

- Checks / tests that are performed against the environment, e.g.: is a parameter value set properly as per best practice guidelines?
  - Rich set of out-of-box rules mapped to out-of-box standards and frameworks
    - For Exadata configuration, CIS, PCI, etc
  - Is a change that happened authorized by a change request?
    - Target-type specific, not target-specific

- Three types
  - Repository Rule
    - Evaluated against repository data
    - Repository browser to aid in rule creation
  - Real-time Rule
    - Detection of real time activities (file actions, schema actions, process actions)
    - Detection of “unauthorized” changes through automated correlation against Change Management Systems
  - Weblogic Rule
    - BEA Guardian health checks integrated in Enterprise Manager
EM 12.1 Configuration Management
Key Take-Aways

✓ Comprehensive solution for Configuration Management and Compliance within a single framework
✓ Automated discovery mechanism to know what’s out there
✓ Integrated console for acquired products like ACC and CCC
✓ Rich out-of-box content with ease of customization and extensibility
✓ Application centricity with topology views and relationships
<table>
<thead>
<tr>
<th>Sample Use case</th>
<th>Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>My organization has merged with another and now we have 1000 more servers with databases running on some of them. How do I make them manageable?</td>
<td>Automatic Discovery</td>
</tr>
<tr>
<td>I want to find all databases running on Linux that are part of Fusion application</td>
<td>Configuration Search</td>
</tr>
<tr>
<td>My production application is producing more logs than my test. What's the diff between production and test? Can I ignore the obvious diffs?</td>
<td>Configuration Drift analysis</td>
</tr>
<tr>
<td>My PLSQL procedure executes in my Test environment, but fails in Production. Can I find the diff and synchronize them?</td>
<td>Database Change Management</td>
</tr>
<tr>
<td>If I shutdown my database for patching what applications will be impacted</td>
<td>Topology Viewer</td>
</tr>
<tr>
<td>•Can I check if my organization is complying with the patch baselines?</td>
<td>Configuration Compliance (Compliance standard)</td>
</tr>
<tr>
<td>•Is my Exadata configured as per best practice guidelines?</td>
<td>Configuration Compliance (Real time change detection)</td>
</tr>
<tr>
<td>Someone changed the initialization parameter of my production payroll database yesterday. Who did it and when?</td>
<td>Configuration Compliance (Compliance Framework)</td>
</tr>
<tr>
<td>My auditor wants to have a single report for all my databases on PCI compliance. Is there a way I can get it from EM</td>
<td>Configuration Compliance (Compliance Framework)</td>
</tr>
<tr>
<td>I want to generate a complete snapshot of my Grid Infrastructure and RAC and provision it in one-shot. Can I do do it?</td>
<td>Provisioning Profiles</td>
</tr>
<tr>
<td>I want my operators to provision 15 database instances for the next testing cycle and I do not want them to change/choose the Oracle Home path. How can I enforce the same value across all deployments</td>
<td>Provisioning Lock down</td>
</tr>
<tr>
<td>I have the next patching downtime next Saturday. How can I make sure that my targets are ready for patching and how can I apply all the important patches in one single downtime with only one reboot per instance?</td>
<td>Patch Plans Patch Analysis</td>
</tr>
</tbody>
</table>
EM 12.1 Lifecycle Management Feature Synergies
How do all these come together

- Discover
  - Hosts & Applications
  - Dependencies and Relationships
  - Inventory
- Collect
  - Deep configuration data
  - Parsed Configuration Files
  - Patches installed

- Advise
  - Patch Advisories via MOS
  - Upgrade Advisories from MOS
  - Configuration Policy Violations

- Audit
  - Real-Time Monitoring – Who/When
  - Compliance Score
  - Best Practices
  - Oracle Recommendations
  - Regulatory (PCI, Cobit)
  - Report
    - Inventory & Trend
    - Automatic Change Reconciliation
    - Authorization vs Unauthorized

- Analyze
  - Topology guided Impact Analysis
  - Config Comparison for Drift Analysis
  - To Gold & Baseline
  - 1 to 1, 1 to N
  - Target and System
  - DB Change Management
    - Data Comparison
    - Change Plans
    - Patch Conflict and PreReq Analysis

- Act
  - Change/Patch Plans
  - Mass deployment
  - Schema Synchronization
  - Settings, Drift & Policy Actions
  - Configuration Changes
EM12.1: Lifecycle Management
Key Use cases/Plays

• Consolidation and Cloud initiatives – Exadata
  • Use Discovery and Consolidation Planner for qualifications
  • Greenfield: Lead in with Cloud Mgmt and sell Lifecycle Mgmt
  • Brownfield: Lead in with Lifecycle Mgmt and upsell Cloud Mgmt

• Standardization Projects – Eliminating complexity
  • Focus on end-to-end solution: Provisioning, Drift Control, Standards

• Automating Patching and Compliance Efforts
  • Keep it simple, leverage existing references

• Complement Testing/Quality Management Products
  • Demonstrate how Provisioning can complement Quality Mgmt
## Lifecycle management Pack Licensing

<table>
<thead>
<tr>
<th>Pack Name</th>
<th>Named User Plus ($/NUP)</th>
<th>Process License ($/Processor)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oracle Database Lifecycle Management Pack</td>
<td>240.00</td>
<td>$12,000.00</td>
</tr>
</tbody>
</table>

- Combined SKU for erstwhile Config, Provisioning and Change Management Packs
  - Existing owners of the packs get a net-net migration
- **Pre-requisite** for Oracle Cloud Management Pack for Oracle Database *

*Except in pure IaaS cases*
Enterprise Manager 12.1 Beta: Early Adopters

- Total 40 Customers and Partners, plus Oracle IT
Questions