Enterprise Manager 13c
Infrastructure Management
Safe Harbor Statement

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Current Approach for managing the Oracle stack

- Enterprise Manager Cloud Control manages operating system, database, middleware and applications
- Enterprise Manager Ops Center manages operating system, virtualization, server and storage
Unification of Hardware and Software Management

- Single pane of glass for hardware and software management
- Ease of diagnostics with drill down from application
- Unified
  - Agent and Management Server
  - Security Framework
  - Software Library
  - Incident Management
  - Job System
  - Extensibility
Single Pane of Glass for Complete Stack Management

- Enable cross-tier management, examples:
  - Top-down diagnostics: drill down into storage issues in context of database
  - Bottom-up impact analysis: what applications will be impacted if the storage is patched
- Support for Exa, Supercluster, T5-8, M5-6, ZFS Storage Appliance, LDOMs, Zones, etc
- Engineered Systems Patching
- Infrastructure Management to benefit from unified security, software library, job system

Enhanced in EM 13c
Infrastructure Management

• Enterprise Manager System Infrastructure (EMSI) Plug-in
  – Everything new
  – New target types for granular management
  – Enables async release

• Support for broad set of targets

• Support
  – Monitoring of all targets
  – Management – configuration, compliance, incidents and metrics
  – Provisioning and Patching of Exadata systems, Linux targets
13c Supported Targets

Engineered Systems:
- Super Cluster
- Exadata
- Exalytics
- Exalogic
- ODA, BDA

SPARC T-Series:
- T4-1, T4-2, T4-4, T5-2,
- T5-4, T5-8, T7

SPARC M-Series:
- M5, M6, M7-8

x86 X-Series:
- X2-2, X3-2, X3-2L,
- X4-2, X4-2L, X4-4,
- X4-8, X5-2, X5-2L

ZFS Appliance:
- 7110, 7120, 7320, 7420,
- ZS3-ES, ZS3-1, ZS3-2,
- ZS3-4, ZS4-4

Ethernet & InfiniBand

Solaris 10, 11.x

Oracle Linux

Solaris Zones

SPARC LDOM

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Targets Discovery

• Auto Discovery
  – Scan unmanaged/new hosts in the datacenter & deploy management agent
  – Oracle Solaris & Linux targets

• Guided Discovery
  – Scan and discover specific target & deploy management agent
  – Non-host targets like Servers, Storage, Network, PDUs & Racks
Monitoring

1. Health Monitoring
   - Monitor overall health of all active targets
   - Performance & configuration metrics monitoring
   - Metric Thresholds: out-of-box and customized

2. Incidents Monitoring
   - 3 types of incidents monitoring
   - Identify potential issues

3. Resource Utilization
   - Track and show resource allocation amongst guests
   - Track comprehensive set of resources of all targets
Infrastructure Monitoring

Target Home Page

Target Summary

Target Details

Photo Realistic View
Infrastructure Management: SuperCluster Management

- Discovery Prerequisites
  - Discover Precheck Script
  - Available as part of EM agent bundle

- Discovery pre-check
  - Execution env and network
  - Network configuration
  - Detailed hardware & software check
  - Correct ILOM versions
  - PDU firmware version
  - SuperCluster version
  - IPMI tool version
Infrastructure Management: SuperCluster Management

System Information:
- Oracle Supercluster slci04
  - Racks: 1
  - Servers: 4
  - Storage cells: 6
  - Switches: 4
  - ZFS Controllers: 2
  - Disk Shelves: 1
  - CPU Cores: 416
  - Memory Total: 52TB

Incident Summary:
- Open Incidents: 68
  - Critical: 0
  - Warning: 68

Change History:
- Last Configuration Change: Sep 17, 2015 8:42:02 AM EDT
- Last Reported Incident: Sep 30, 2015 7:10:47 PM EDT
Infrastructure Management: SuperCluster Management

- **Photo realistic view**
  - Realistic picture of system
  - Graphics of all components

- **Schematic view**
  - Data oriented layout
  - Displays most important information
    - Locator light
    - Temperature
    - Hostname/IP address
    - Empty slots

- **Table view**
  - Tabular list of physical view
Infrastructure Management: SuperCluster Management

• Component Details
  – Component name
  – Manufacturer
  – Serial number
  – Part number
  – Memory size

• Incident Alert

• Incident Manager Integration
  – Incidents outlined in red
  – Context specific incident
Infrastructure Management: SuperCluster Management

Target Navigation Tree
Infrastructure Management: Server Management


• Discover
  – As part of host discovery
  – Standalone discovery
• ILOM based: UI or CLI
• Discover w/UI (Guided Process)
  – Name of target ILOM Server
  – Server ILOM DNS Name
  – Monitoring Agent URL
    • ILOM SSH Credentials
  – Add

• Discover w/CLI
  – Automation with EMCLI command line tool
  – Login onto host where OMS is running
  – Login into EMCLI
    • emcli login [username]
  – Discover Server
    • emcli add_target [options]

• View Server Hardware Components
• View Server’ Configuration
• View Server’ Resource Utilization
Infrastructure Management: Server Management

System Information

Incident Summary

Resource Usage

Component Details

Tabs

Photo Realistic View

Incident Manager Integration
Infrastructure Management: Server Management

Monitoring
- Logical View
- CPU
- Memory
  - Total installed storage
  - Installed disk
- Storage
- Power
  - Power supply information
- Fan
  - Cooling & fan information
- Disk Controllers
  - Available disk controllers
Infrastructure Management: Server Management

Metrics Management
- Enable/Disable
- Threshold limits
- Collection schedule
- Corrective actions

Suspend/Resume Monitoring for Maintenance (Blackout)
Infrastructure Management: Host Management

- **Host Summary**
  - System information, Incidents, Resource utilization
- **Metrics**
  - CPU: Utilization, I/O Wait, Load
  - Host Memory: Utilization, Virtual Mem
  - Storage: Filesystems, Zpool Usage
- **Boot Environment**
  - Displays available alternate boot env
  - Boot env snapshots for Solaris OS
- **Host Management**
  - Comparison & drift management
  - Topology view
  - Blackouts & brownouts
Infrastructure Management: Host Metrics

**Memory Details**
- Kernel Memory: 19.5GB
- Free Memory: 2.3GB
- Used Memory: 5.17GB
- ZFS Arc Cache Memory
- Last known...

**CPU Utilization**
- October 22, 2015
- CPU Utilization

**Filesysterm distributions**
- ZFS: 11
- ZFS:
- zfs:
- autofs:
- tmpfs:
- objfs:
- sharefs:
- dev:
- ctps:
- dev:
- tmpfs:
- autofs:
- proc:

**Boot Environments**
- s11.1sr19.6
  - Active
  - Size: 34.2GB
- s11.1sr19.6@2015-04-08-17:56:35
  - Size: 2MB
- s11.1sr19.6@2015-04-08-17:47:49
  - Size: 1MB
- s11.1sr19.6@install
  - Size: 11MB
Infrastructure Management: Solaris Zones

• Discover
  – Relies on host discovery
  – Host on global zone when promoted triggers discovery of zones

• Virtualization Platform

• Virtual Server
Infrastructure Management: Oracle VM Server for SPARC

- Discover
  - Relies on host discovery
  - Host control domain when promoted triggers discovery of domains

- Virtualization Platform

- Virtual Server

- Supported Versions
  - OVM for SPARC Control Domain
    - Oracle Solaris 11.1 or later
    - OVM for SPARC 3.1 or later
  - OVM for SPARC Guest Domain OS
    - Oracle Solaris 10 1/13
    - Oracle Solaris 11.1 and later
  - Oracle Solaris Zones (SPARC & x86)
    - Oracle Solaris 10 1/13
    - Oracle Solaris 11.1 and later
Infrastructure Management: Oracle VM Server for SPARC

- Target Navigation Tree
  - Domain and Guest VMs
  - Top consumers of resources

- Resource Monitoring
  - Domain and Guest VMs
  - Top consumers of resources

- Incident Management
  - Monitor across Domain and Guest VMs
  - Diagnose using incidents and performance metrics
Infrastructure Management: Oracle VM Server for SPARC

- Guest Monitoring
  - Pie charts showing vCPUs and memory configured for each guest

- Guest Management
  - Type of guest - Control, Guest, Root, IO, and Service domains
  - Incidents Management
  - Resource Utilization
Infrastructure Management: Storage Management

Supported Targets: 7110, 7120, 7320, 7420, ZS3-ES, ZS3-1, ZS3-2, ZS3-4, ZS4-4

• Discovery:
  – Discovers both ZFS Storage Server & Diskshelf Storage
  – UI or CLI based

• Discover w/UI (Guided Process)
  – Select "Systems Infrastructure ZFS Storage Appliance Controller"
  – Name of target ILOM Server
  – ZFS Storage Server DNS Name
  – Monitoring Agent EMD URL
    • SSH Credentials
  – Add

• Discover w/CLI
  – Automation with EMCLI command line tool
  – Login onto host where OMS is running
  – Login into EMCLI
    • emcli login [username]
  – Discover ZFS Server
    • emcli add_target [options]

• ZFS Storage Appliance Cluster
  – Auto-discovered when two appliance nodes setup as cluster nodes are added
Infrastructure Management: Storage Appliance
Infrastructure Management: Storage Appliance Monitoring

- Pie Chart for Storage Pool Distribution
- Center Node
  - Storage Appliance Summary
  - Storage Utilization Graph
- Pool Node
  - Storage Pool Summary
  - ZFS Storage Pool Utilization Graph
Infrastructure Management: Storage Appliance

Monitoring

• Projects Tab
  – Shows information about the storage space used by the filesystems and LUNs
  – Indicates the Storage Services which are active for the particular file system or LUN, such as NFS, SMB, HTTP, FTP, TFTP, and SFTP

• Charts Tab
  – Shows the Resources, Devices, SAN Usage, NAS Usage, and ZFS Storage Pool(s) tabs
Infrastructure Management: PDU Management

- **Discovery Prerequisites**
  - Empty row for monitoring agent in NMS table & Trap Hosts Setup table
  - (optional) Empty slot for backup agent, if used

- **Discover w/UI (Guided Process)**
  - Name of target
  - PDU DNS Name/IP Address
  - Monitoring Agent EMD URL
  - In HTTP Monitoring Credentials
    - Credential Type: **SNMPV1 Creds**
    - Enter SNMP Community String
  - Add

- **Discover w/CLI**
  - Automation with EMCLI command line tool
  - Login onto host where OMS is running
  - Login into EMCLI
    - emcli login [username]
  - Discover PDU
    - emcli add_target [options]
Single Pane of Glass Management: Use Case Scenario

Database | Zpool | ZFS Storage Appliance | Disk Shelf

LUN | ZFS Storage pool - zpool
Single Pane of Glass Management

Use Case 1: Diagnose Database Performance Issue

Problem Description

Database CPU utilization suddenly goes up
Database Home Page

CPU Utilization (disk fault)
CPU Utilization (No Fault)
CPU Utilization (disk fault)
Database Incidents

Oracle Enterprise Manager Cloud Control 13c

12.1.0.2.0
Version
1 (1)
Pluggable Databases
14 days, 0 hrs
Up Time
100%
Availability for Last 7 Days
N/A
Last Backup

Load and Capacity
0.06 Average Active Sessions
2.49 Used Space (GB)

Incidents and Problems

Fault found in HCD 9 @ 2015-10-15 20:20:23. Description: The device configuration for JBD '1313FMD04D' is invalid...

Incidents and Compliance

Updated in the last 31 days
Disk Fault Incident Details

Fault found in HDD 9 @ 2015-10-16 20:20:23. Description: The device configuration for JBOD 1313FMD04D is invalid. Correct the configuration to conform to a valid configuration. Data devices found at: 'HDD 0, HDD 1, HDD 2, HDD 3, HDD 4, HDD 5, HDD 6, HDD 7, HDD 8, HDD 9, HDD 10, HDD 11, HDD 12, HDD 13, HDD 14, HDD 15, HDD 16, HDD 17, HDD 18, HDD 19', Log devices found at: 'HDD 20, HDD 21, HDD 22, HDD 23', Cache devices found at: ''. Empty bay slots found: 'HDD 9'. Please refer to the customer service manual for valid device configurations.

ID: 321
Metric: Open Problem Status
Metric Group: Component Faults
Target: db04-h1-storadm.us.oracle.com/diskshelf/chassis-001 (ZFS Diskshelf Storage)

Incident Created: Oct 16, 2015 1:22:00 PM GMT-07:00
Last Updated: Oct 16, 2015 1:22:00 PM GMT-07:00

Internal Event Name: ComponentFaults:OpenProblemStatus
Event Type: Metric Alert
Category: Fault
Target Component: disk-009
Source Owner: SYSMAN

Show internal values for attributes...
ZFS SA/Disk Shelf Target Home Page

Faulted Disk
Use Case 1: Diagnosis Summary

1. Admin notified of CPU utilization spike on the DB home page
2. Incident is generated around the same time, click on the incidents link on the DB home page
3. On the incidents list page, click on the disk fault incident to go to the incident details page
4. Look at the incident description, time of the incident and the target
5. Click on the target link of the incident details page to drop down to the home page of the target
6. On the home page of the target, the photo realistic view will have the faulted component/disk highlighted in red. Note the location of the disk, serial number, part number and vendor for service
Single Pane of Glass Management:
Use Case 2: Diagnose Database Failure Issue

Problem Description

Database goes down
Database Home Page

Oracle Database ▼ Performance ▼ Availability ▼ Security ▼ Schema ▼ Administration ▼

Version: 12.1.0.2.0
Up Time: 1 days, 16 hrs
Availability for Last 7 Days: 100%
Last Backup: N/A

Performance:
- Activity Class: Services

Recommendations:
- 0 ADDM Findings

Incidents and Compliance:
- Compliance Not Configured

Resources:
- Wait
- User I/O
- CPU
- CPU Cores


Oracle Database Control 13c
# Database Incidents and Problems List

## Incident Details

### Incidents and Problems

<table>
<thead>
<tr>
<th>Summary</th>
<th>Target</th>
<th>Status</th>
<th>Type</th>
<th>Time Since Last Update</th>
<th>Created</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pool status for pool is SUSPENDED</td>
<td></td>
<td>✗ New</td>
<td>Incident</td>
<td>0 days 2 hours</td>
<td>Oct 22, 2015 11:14:45 AM PDT</td>
</tr>
<tr>
<td>Failed to connect to database instance. Failed to connect: java.sql</td>
<td></td>
<td>✗ New</td>
<td>Incident</td>
<td>0 days 2 hours</td>
<td>Oct 22, 2015 11:08:12 AM PDT</td>
</tr>
<tr>
<td>The database status is UNKNOWN.</td>
<td></td>
<td>✗ New</td>
<td>Incident</td>
<td>0 days 2 hours</td>
<td>Oct 22, 2015 11:07:29 AM PDT</td>
</tr>
<tr>
<td>Volume status for ssc/p_osc2cn01-d0/dialin is offline</td>
<td></td>
<td>✗ New</td>
<td>Incident</td>
<td>0 days 2 hours</td>
<td>Oct 22, 2015 11:05:00 AM GMT</td>
</tr>
</tbody>
</table>

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LUN Failure: Incident Details

Volume status for ssc/p_osc2cn01-d3/dblun is offline

Unassigned. Not acknowledged

General Events Notifications My Oracle Support Knowledge All Updates Related Events Related Metrics

Incident Details

ID 345
Metric State
Metric Group LUN Statistics
Target osc2cn01.psc.us.oracle.com (Oracle ZFS Storage Server)
Incident Created Oct 22, 2015 11:05:00 AM GMT-07:00
Last Updated Oct 22, 2015 11:05:00 AM GMT-07:00
Summary Volume status for ssc/p_osc2cn01-d3/dblun is offline

Tracking
Escalated No
Owner -
Priority None
Acknowledged No
Status New

Incident created by rule (Name: Incident management rule set for all targets. Create incident for critical metric alerts [System generated rule],) on Oct 22, 2015 11:05:00 AM GMT-07:00

Guided Resolution
Diagnostics
Problem Analysis View Metric Help
Actions Reevaluate Alert Edit Thresholds
Corrective Actions Add corrective action

More
### Open Incidents

<table>
<thead>
<tr>
<th>Target</th>
<th>Summary</th>
<th>Last Updated</th>
<th>Acknowledged</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>osc2sn01 osc 01</td>
<td>Single fault on HDD 3 @ 2015-10-21 08:51:16. Description: The device configuration for JBD0 &quot;1143FMDO2E&quot; is invalid. Correct the...</td>
<td>Oct 28, 2015 5:22</td>
<td>No</td>
<td>New</td>
</tr>
<tr>
<td>osc2sn01 osc 01</td>
<td>Volume status for pool_osc2sn01-x58:000000000 offline</td>
<td>Oct 22, 2015 5:03</td>
<td>No</td>
<td>New</td>
</tr>
</tbody>
</table>

---

![ZFS SA/Disk Shelf Home Page - Incident List](image-url)
Use Case 2: Diagnosis Summary

1. Admin notified of database going down and the incidents
2. Go to the incidents list form the database page
3. On the incidents page, notice LUN going offline, failure to connect to database and the database going into UNKNOWN status in this order
4. Click on the LUN offline incident to see the details of the incident and the target this LUN is being exported from
5. Click on the target link of the incident details page to drop down to the home page of the target
6. Service/Fix by logging into the appropriate target
## Deployment Recommendation

<table>
<thead>
<tr>
<th>Currently Deployed Product</th>
<th>Primary Use Cases</th>
<th>13c Enterprise Manager CC</th>
<th>Enterprise Manager Ops Center</th>
</tr>
</thead>
<tbody>
<tr>
<td>12c Enterprise Manager Ops Center</td>
<td>Infrastructure Monitoring</td>
<td>Infrastructure Monitoring</td>
<td>SPARC/Solaris Provisioning SPARC/Solaris Patching</td>
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<td>12c Enterprise Manager Ops Center</td>
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<td>x86/Linux Provisioning x86/Linux Patching</td>
</tr>
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<td>12c Enterprise Manager Ops Center</td>
<td>x86/Linux &amp; SPARC Provisioning x86/Linux &amp; SPARC/Solaris Patching</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12c Enterprise Manager CC</td>
<td>Want to start monitoring infrastructure targets in addition to applications</td>
<td>One management tool for entire stack; single-pane of glass view</td>
<td></td>
</tr>
<tr>
<td>12c Enterprise Manager CC</td>
<td>Want to start monitoring, provisioning and patching of infrastructure targets</td>
<td>Infrastructure Monitoring x86/Linux Provisioning x86/Linux Patching</td>
<td>SPARC/Solaris Provisioning SPARC/Solaris Patching</td>
</tr>
</tbody>
</table>
Integrated Cloud
Applications & Platform Services