Database Fleet Maintenance
Standardization at Scale

October, 2016
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Program Agenda

1. Business Challenges
2. Fleet Maintenance – Overview
3. Licensing
4. Customer Case Studies
5. Summary
Business Challenges

- Applications face business and security risks
  - Slow to uptake new database features
  - Databases are NOT at recommended patch level
  - Fail compliance requirements

- Spiraling maintenance costs
  - Long testing cycle for Upgrade process - depriving resources for application development
  - More experienced DBAs needed – lack of automation, reliability and scalability

- Longer downtimes for applications leading to revenue losses

...Managers report that their departments and resources still tend to be mired in low-level database administration tasks, such as performing upgrades, fixes and patches, ..... Data management departments need to increase their output and productivity. ...IT and data managers need to make innovation a larger part of their jobs.

- IOUG IT Resources Survey, 2014
Oracle Database Patching

What are our customers looking for?

• **Patch and Upgrade** complete Database product family including Data Guard, DBs on ODA and Exadata

• **Scale** - Patch large number of Databases with **minimal downtime**

• **Mass automation** - multiple targets with multiple patches in a single downtime

• **Flexibility** for Application owners and **Centralized Control** for Administrators
Database **Fleet** Maintenance

Simplified software configuration standardization at scale

**Complete Automation**
- End to end, covers Patching, Upgrades

**Scalability**
- Mass deployment, reduced downtime

**Total Control**
- Centralized, Self service maintenance

**Full Support**
- Support all DBs (Multitenant & Cloud Ready)
Database **Fleet** Maintenance

**Simplified Software Configuration Standardization at Scale**

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**Scan the Fleet**
- Discover Configuration Pollution
  - a. Run Advisor to analyze the database estate
  - b. Identify required standard configurations
  - c. Prepare Reference environments for each standard configuration

**Create New Image and Subscribe**
- Create Gold Image
  - a. List available images
  - b. List versions of an image
  - c. Make a version “Current”
- Subscribe Databases to a Gold Image
  - a. List subscriptions of an image
  - b. Validate subscriptions

**Push Image and Switch**
- Deploy Image
  - a. Shadow Home is created
- Switch Database
  - a. Migrate Listener
  - b. Update Database: SI, GI, RAC, Standby

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Database Fleet Maintenance

1. Detect “Configuration Pollution”

Advisor scans the fleet for configuration variations provides recommendations to standardize.

You can use images to manage your database software

- Reduce the number of different software versions and patches across enterprise
- Streamline and automate software upgrades and patching
- Keep current with software versions and patches available from Oracle

Analysis of Your Enterprise (2693 database installations)

Current Software Configurations (295)  Recommended Software Configurations (8)

Analysis: 1 in every 6 Oracle Home are different

Criteria Used: Platform, Release, Product

To get started, use Database Image Advisor. The database image advisor helps you group database and define an image for each group.
Database Fleet Maintenance

2. Create Images and Subscribe

A. Define end states for software as Images and Versions.

Software “End State”
Image – Versioning

* Current / Latest version
Database **Fleet** Maintenance

2. Create Images and Subscribe

B. Subscribe targets/pools to the images

- **Image A**
  - Ver. 3*
  - Ver. 2
  - Ver. 1
  - DB_12102_Linux 64

- **Image B**
  - Ver. 3*
  - Ver. 2
  - Ver. 1
  - DB_11204_Solaris 64

- **Image C**
  - Ver. 3*
  - Ver. 2
  - Ver. 1
  - DB_11204_Linux 64_EBiz

* Current / Latest version

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Database Fleet Maintenance

3. Propagate Changes and Switch with Ease

Push Image as Shadow Home

Activated Homes

Inactive Homes

Ver. 3*
Ver. 2
Ver. 1

Software “End State” Image – Versioning

Switch / Update

* Current / Latest version

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Database Fleet Maintenance

Manage Exceptions and Emergencies

• Allows emergency, ad-hoc patching.

• Ad-hoc is more an exception than a norm, it's tracked as ‘Drifter’

• Reconcile the Drifters either by rolling the changes to a new version of the image or override it with the latest version.

Drifter Target

Update to new version or rollback to older

Oracle Database

Image Name: DB 12.1.0.2.0 with DBPSU
Compliance: 46%
Database Targets: 91

Version Distribution:
- JULY2016PSU (42)
- JAN2016PSU (36)
- Drifter (13)

Current Version: JULY2016PSU
Database Fleet Maintenance

emcli Verbs: db_software_maintenance & db_cloud_maintenance

Prepare Gold Image:
- createSoftwareImage: Create/Update a Gold Image
- getImages: Lists all available images
- getVersions: Lists all Versions
- updateVersionStatus: Makes a Version “current”

Subscribe:
- subscribeTarget: Subscribes list of DB targets to a Gold Image
- getImageSubscriptions: for Verification of subscription

Stage/Deploy:
“purpose=DEPLOY_GI_SOFTWARE/DEPLOY_RAC_SOFTWARE”: Deploys software in shadow Oracle Home for list of provided targets

Switch/Update:
“purpose=UPDATE_GI/UPDATE_RAC”: Switches databases and Grid Infra to shadow Oracle Home for list of provided targets
“dataguard_role=standby/primary”

Switch Back/Rollback:
“purpose=ROLLBACK_GI/ROLLBACK_RAC”: Switches back to old Oracle Home

Cleanup:
“purpose=CLEANUP_GI_SOFTWARE/CLEANUP_RAC_SOFTWARE”: Cleans up unused Oracle Homes to release space back
Database **Fleet** Maintenance

**Self service enabled maintenance for Database Cloud**

**Process**

1. Pools subscribe to images
2. New images automatically get deployed to servers in the pool
3. Activate the image
4. Self Service users or Admin can choose to migrate DBs over to the new home

**Isolation & Flexibility**: Users to move to new software version on their terms

**Track** real time compliance

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Database Fleet Maintenance

New! Simplified software configuration standardization at scale

Propagate & Activate New Images, Switch Databases at leisure

Create Shadow Homes with new images for all participating Pools, Activate the New Homes. Schedule database services to switch to new Oracle Home Images.

Update all together to new version
Deploy across subscribed environments
Update to new version at convenience

JAN 2016 | APR 2016 | JUL 2016
JAN PSU + 2 patches | APR PSU + 5 patches | JUL PSU + 2 patches*
## Oracle Database Patching

### Solution Summary

<table>
<thead>
<tr>
<th>Process</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>•Numerous manual steps</td>
<td>•Low success rate and error prone</td>
</tr>
<tr>
<td>•Patch recommendations from MOS</td>
<td>•One DB at a time</td>
</tr>
<tr>
<td>•Patch Plans for distinctive configurations</td>
<td>•Longer Maintenance windows</td>
</tr>
<tr>
<td>•Analyze to identify conflicts &amp; request MLRs</td>
<td>•Example: 2 weeks for 10 clusters</td>
</tr>
<tr>
<td>•Execution using OPatch / OPlanDB</td>
<td>•Multiple steps in execution</td>
</tr>
<tr>
<td>•Patch Reference Environment</td>
<td>•Longer Maintenance windows</td>
</tr>
<tr>
<td>•Upload as Gold Image</td>
<td>•Example: 4 Days for 4 distinct configurations –</td>
</tr>
<tr>
<td>•Subscribe DB to Image</td>
<td>Total 10 clusters</td>
</tr>
<tr>
<td>•Push image and Switch</td>
<td>Fewer Steps</td>
</tr>
<tr>
<td></td>
<td>Concurrent Execution</td>
</tr>
<tr>
<td></td>
<td>Shorter Maintenance Windows</td>
</tr>
<tr>
<td></td>
<td>Easily Scalable</td>
</tr>
<tr>
<td></td>
<td>Example: &lt; 4 hours for patching 10 clusters</td>
</tr>
</tbody>
</table>

### Conventional Patching

- OPatch / Scripting
- Conventional Patching
- Oracle Enterprise Manager 12c
- Fleet Maintenance

### Fleet Maintenance

- OPatch / Scripting
- Oracle Enterprise Manager 13c

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Database **Fleet** Maintenance for Exadata

- Exadata Patching [EM 13c] for firmware
  - UI driven firmware patching introduced in 13.1
  - Quarterly Full Stack Patches

- Database patching
  - Fleet Maintenance is applicable to Exadata, similar to non-Exadata platforms

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**Firmware Patching**
- Compute Nodes
- Storage Server Cells
- InfiniBand Network Switches

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# Fleet Maintenance Licensing

Database Lifecycle Management and Cloud Management Pack for DB

<table>
<thead>
<tr>
<th>Feature</th>
<th>DBLM</th>
<th>CMP4DB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create an Image</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Deploy an Image</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Admin Driven Switchover to Image</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Image Compliance / Reporting</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Image Subscription</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Fleet Operations - Administrative</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Fleet Operations – Self Service enabled</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Self Service enabled Database Update</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>
Database Fleet Maintenance

Simplified software configuration standardization at scale
Customer Overview

Key Pains & Challenges

• Varied Cluster configurations and Version proliferation
• Severe Patching delays: 60 minutes per database
• Low Success factor (80%) when the required is 99.99%

Solution / Benefits

• Fleet Maintenance Patching
  • CLI based implementation
  • Scalable / concurrent patching enables shorter maintenance windows
  • Reliable patching with less reliance on experienced DBAs

Customer Thumbnail

• Insurance, Investments, Banking
• Revenue: US$ 40.2 billion
• Employees: 34,000
## Nationwide
### Out of Place Patching with Fleet Maintenance

<table>
<thead>
<tr>
<th></th>
<th>Deploy Homes</th>
<th>Switch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>60+ Minutes + Patching Time 1 Home at a time</td>
<td>60 Minutes 1 DB at a time Experienced DBA Required</td>
</tr>
</tbody>
</table>
| Scripted Patching | **20 Minutes** with all patches  
Scalable  
Concurrency Possible | 30 Minutes 1 DB at a time  
Experienced DBA Required |
| Fleet Maintenance | **7-15 Minutes**  
Scalable  
Concurrency Possible |                                      |

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 “…the payoff will be significant ... instead of dedicating the entire DBA staff to constantly patch and coordinate schedules you will be able to patch more in less time with less risk.”
Customer Overview

Key Pains & Challenges

- Quarterly patching cadence
- Patching 1,600 Hosts and 2,500 Databases & 50 DBAs, takes 66 days
- Overlay/Merge/Interim patching
- Varied configuration caused by conventional patching

Solution / Benefits

- Fleet Maintenance based Patching
- Known end-state driven (Gold Image)
- Homogenous environment
- All Homes on latest PSU
- Cluster patching is 5x faster

Customer Thumbnail

- Healthcare Information Technology
- Revenue: US$ 4.4 billion
- Associates: 22,000
Cerner
Out of Place Patching with Fleet Maintenance

<table>
<thead>
<tr>
<th>Process</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>Patching success/failure depends on start-state of the Home</td>
</tr>
<tr>
<td></td>
<td>DBAs need to maintain history of each home</td>
</tr>
<tr>
<td></td>
<td>2500 DBs with 50 DBAs ➞ 66 days</td>
</tr>
<tr>
<td>Fleet Maintenance</td>
<td>2 weeks</td>
</tr>
<tr>
<td></td>
<td>1280 Hours saved per quarter</td>
</tr>
<tr>
<td></td>
<td>2-Node cluster patched in 25 minutes</td>
</tr>
</tbody>
</table>
Customer Overview

Customer Thumbnail

- E-Commerce
- Revenue: US$ 9.24 billion
- Customers can accept payments in 100 currencies!

Key Pains & Challenges

- Standards enforcement
- Increasing internal and external Compliance audits
- Patching breaks uptime requirements

Solution / Benefits

- Fleet Maintenance based Patching
  - Known end-state driven (Gold Image)
  - Compliance tracking
  - Granular control
  - Centrally executed through EMCLI
## PayPal

### Out of Place Patching with Fleet Maintenance

<table>
<thead>
<tr>
<th>Process</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>DBA needs to have super user privileges</td>
</tr>
<tr>
<td></td>
<td>Experienced DBA Required</td>
</tr>
<tr>
<td>Patch Plans</td>
<td>Less error prone</td>
</tr>
<tr>
<td></td>
<td>Cannot combine multiple patches</td>
</tr>
<tr>
<td></td>
<td>End-state is different for each home</td>
</tr>
<tr>
<td>Fleet Maintenance</td>
<td>Concurrent patching</td>
</tr>
<tr>
<td></td>
<td>Configuration standardization through Gold Image</td>
</tr>
<tr>
<td></td>
<td>10 Minutes per Node</td>
</tr>
<tr>
<td></td>
<td>Downtime within contract</td>
</tr>
</tbody>
</table>
Database **Fleet** Maintenance

**Benefits**

**Reduced Downtime**
Quarterly PSU patching now takes *hours* in stead of weeks
Patch most no of databases in least amount of downtime!

**Flexible**
Self Service maintenance
Ability to choose What to patch and When

**Automation at Scale**
Mass deploy and make changes in bulk using EMCLI to patch 2000+ Production Homes

**Transparent & Simple Administration**
Dashboards, real time tracking, maintenance via clicks
References

• [Enterprise Manager Page on O.com](#)

• [Cloud Management Page on OTN](#)

• [Cloud Administration Guide (Documentation)](#)

• **MOS Note**: EM12c Recommended Plug-Ins and Patches for DBaaS (1549855.1)
Integrated Cloud
Applications & Platform Services