Oracle OpenWorld 2019
SAN FRANCISCO
Safe Harbor

The following 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, timing, and pricing of any features or functionality described for Oracle’s products may change and remains at the sole discretion of Oracle Corporation.

Statements in this presentation relating to Oracle’s future plans, expectations, beliefs, intentions and prospects are “forward-looking statements” and are subject to material risks and uncertainties. A detailed discussion of these factors and other risks that affect our business is contained in Oracle’s Securities and Exchange Commission (SEC) filings, including our most recent reports on Form 10-K and Form 10-Q under the heading “Risk Factors.” These filings are available on the SEC’s website or on Oracle’s website at http://www.oracle.com/investor. All information in this presentation is current as of September 2019 and Oracle undertakes no duty to update any statement in light of new information or future events.
Database Self Service Patching
using EM 13c Fleet Maintenance

CON5186: Achieve Enterprise Scale for Database Patching: Customer Case Study

Sep 16, 2019

Sujit Dhawalkar – Principal Solutions Architect
Amit Patel – Principal Solutions Architect
Agenda

- Company Overview
- Evolution of Oracle Enterprise Manager at Comcast
- Traditional Database Patching Strategy and need for automation
- EM13c DB Patching Orchestration overview
- Automated Database Patching Strategy using fleet maintenance
- Overview of Comcast’s homegrown self service portal
Comcast’s Level-4 HA-DR OEM Architecture
OEM Evolution at Comcast: One Tool, Many Usage

- **#1 Performance Troubleshooting tool** for troubleshooting Oracle database performance issues
- **Monitoring and Alerting** of 12,000 targets using monitoring templates, metric extensions and notifications
- **Analytics & Reporting** ability of OEM helps in compliance, capacity management and problem management
- **DBaaS** self service portal is used to provision pluggable databases on private cloud
- **Automation** capability of OEM simplifies some of the complex activities such as patch management, agent deployment etc.
Why do we need Database Patching?

- Compliant with Rules & Regulations
- Legal consequences = Loss Revenue
- Unauthorized access blocked
- Data Breach = Loss Revenue
- Business Continuity
- DB Outages = Loss Revenue
Why do we need Database Patching Automation?

Configuration Pollution
- 10.2.0.4.6
- 11.2.0.3.5
- 11.2.0.3.2
- Multiple DB Versions
- 11.2.0.4.6
- 12.1.0.2.0
- 12.2.0.2.0

Growing Inventory
- 2400+ DBs
- Real Application Clusters
- Multitenant (PDBs)
- Database Cloud (DBaaS)
- Standalone Databases
- Data Guard
- Exadata

Quarterly Patching
- PSU
- 90 Day
- One-offs
- SPU

Configuration Pollution + Growing Inventory = Struggle catching up quarterly patching cycle
DB Patching Automation Considerations

**POSSIBLE SOLUTION**

- **PATCH BINARIES**

**CONS:**

1. NOT RAC AWARE.
2. EXTENSIVE SCRIPTING.
3. CODE MAINTENANCE.
EM13c DB Patching Orchestration – Fleet Maintenance

**STEP 1: Create Gold Image**
- Identify standard Configurations: SI, GI, RAC, Standby etc.
- Prepare reference environment and apply desired patches to each standard configuration
- Create GI image for each standard configuration

**STEP 2: Subscribe Targets to GI**
- Subscription based model
- Subscribe multiple targets of same configuration for mass deployment

**STEP 3: Push GI to Targets**
- Shadow home or Inactive home will be provisioned using specific Gold Image on desired target host(s).
- Databases will be still running from the Active Oracle home which will remain un-affected

**STEP 4: Switch Home**
- Switch associated targets from Active Oracle Home to Newly Provisioned Oracle Home
- Requires minimum downtime

**STEP 5: Cleanup Inactive Home**
- Cleanup old oracle home once the database is switched to newly provisioned oracle home

© Comcast All Rights Reserved
Automated Database Patching Strategy

Non Production DB Patching Cycle

1. New Patch Released
2. Test & Certify patch for specific config
3. Create Gold Image
4. Subscribe Targets to GI
5. Push GI to Targets
6. Patch Ready Status
7. Schedule Downtime
8. Switch Home

Production DB Patching Cycle

1. Subscribe Prod Targets to GI
2. Push GI to Prod Targets
3. Patch ready status
4. Business Approval
5. Schedule Maintenance
6. Switch Home Standby
7. Switch Home Home Prod

Evaluation:

1-2 Hours

App Owner

App teams can manage their own patch schedule
Prerequisites for fleet – Inventory Standardization

Reality

Solve
Configuration Pollution

Expectations

Enforce
DB Version Standards
Prerequisites for fleet – Infrastructure Readiness

OEM Readiness
- Duplicate Target Cleanup

OEM Readiness
- SSH Credentials

Target Readiness
- Storage Provisioning
### 90 Days (N-1) Database Patching Strategy

#### 30 Day

<table>
<thead>
<tr>
<th>RDBMS Version</th>
<th>Current Certified Patch</th>
<th>Gold Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.2.0.1</td>
<td>12.2.0.1.190115 SI</td>
<td>668F61823828CE0539C181BACB2D4</td>
</tr>
<tr>
<td></td>
<td>12.2.0.1.190115 GI</td>
<td>68F36398E3E553DAE0539F181BAC5A78</td>
</tr>
<tr>
<td></td>
<td>12.2.0.1.190115 RAC</td>
<td>68F277AE0B1F2924E0539F181BAC06D2</td>
</tr>
<tr>
<td>12.1.0.2</td>
<td>12.2.0.1.190115 SI</td>
<td>66A59726E9DB188E0539F181BAC2E00</td>
</tr>
<tr>
<td></td>
<td>12.2.0.1.190115 GI</td>
<td>632FB6AE15057F4E0539F181BAC4F69</td>
</tr>
<tr>
<td></td>
<td>12.2.0.1.190115 RAC</td>
<td>690274A526F3F7E053A51B1ACA7B9</td>
</tr>
<tr>
<td>11.2.0.4</td>
<td>12.2.0.1.190115 SI</td>
<td>66A487CF77C36D2E053A51B1ACA3C88</td>
</tr>
<tr>
<td></td>
<td>12.2.0.1.190115 GI</td>
<td>6258863D010C1889E0539F181BACF7B8</td>
</tr>
<tr>
<td></td>
<td>12.2.0.1.190115 RAC</td>
<td>69010FDA22DE01839E0539C181BAC7019</td>
</tr>
</tbody>
</table>

#### 60 Day

- **Switch Home**
- **Rollback (if required)**
- **Cleanup**

---

© Comcast All Rights Reserved
Extending Self Service functionality to DevOps Team

Empower 300+ Application team to manage their own patching schedule

Self service functionality extended to Application teams using common interface/tools to maintain familiar user experience

Push button functionality to submit database patching requests

Role based access to submit patching request

60 Days window to switch home to newly provisioned oracle home to satisfy our 90 Day (N-1) patching standard
Patching Workflow for Self Service Portal

1. Retrieve App Names
2. Display App Names
3. Selects App
4. ITRC
5. Query OEM for SCAN/Host Names
6. Selects Host
7. One Portal
8. Displays SCAN/Host
9. Selects Cluster/HAS/DB
10. One Portal

OEM Repo
- Query OEM for Cluster/HAS/DB Targets
- Displays Cluster/HAS/DB
- DB should be displayed but greyed if Cluster/HAS is not patched

OEM Fleet Validate job
- Allow only one job per cluster at any time

OEM Fleet Switch job
Self Service Portal – How Patch Status is determined?

1. Database record
   - Patch - API

2. All Target Patch version is Up to Date?
   - Yes
     - Patch status: Already applied (GREEN smiley)
   - No

3. Is Target Type is rac_database?
   - Yes
     - Cluster Patched?
     - Yes
       - Patch status: Not Ready for patching (GREY smiley)
     - No
   - No
     - Target Type is oracle_database

4. Is Database have Standby?
   - Yes
     - Patch status: Ready for Patching (RED smiley)
   - No

5. Is Standby DB Patch?
   - Yes
   - No
Self Service Portal – Patch Status Example

API WORKFLOW

<table>
<thead>
<tr>
<th>APPLICATION</th>
<th>TARGET_NAME</th>
<th>PATCH_VERSION</th>
<th>DATABASE_ROLE</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBA Tools and Automation</td>
<td>OEMPGYZCS2</td>
<td>11.2.0.4.0</td>
<td>PHYSICAL STANDBY</td>
<td>Ready for Patching</td>
</tr>
<tr>
<td>DBA Tools and Automation</td>
<td>TEST</td>
<td>12.2.0.1.180717</td>
<td>PRIMARY</td>
<td>Patch version is up to Date</td>
</tr>
<tr>
<td>DBA Tools and Automation</td>
<td>TESTRACS1</td>
<td>12.2.0.1.180717</td>
<td>PRIMARY</td>
<td>Patch version is up to Date</td>
</tr>
<tr>
<td>DBA Tools and Automation</td>
<td>cdeclbhoaasgrd</td>
<td>12.2.0.1.180717</td>
<td>PRIMARY</td>
<td>Patch version is up to Date</td>
</tr>
<tr>
<td>DBA Tools and Automation</td>
<td>orclprmy</td>
<td>12.2.0.1.171017</td>
<td>PRIMARY</td>
<td>Ready for Patching</td>
</tr>
</tbody>
</table>

© Comcast All Rights Reserved
### Database Patcher

#### Database Flavor
- Oracle

#### ITRC Component
- DBA Tools and Automation

<table>
<thead>
<tr>
<th>Application</th>
<th>Target Name</th>
<th>Target Type</th>
<th>Role</th>
<th>FQDN</th>
<th>Patch Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>11496</td>
<td>OEMPGYZCS1</td>
<td>oracle_database</td>
<td>PRIMARY</td>
<td>dbatest-dcl.test.net</td>
<td></td>
</tr>
<tr>
<td>11496</td>
<td>OEMPGYZCS2</td>
<td>oracle_database</td>
<td>PHYSICAL STANDBY</td>
<td>dbatest-dcl.test.net</td>
<td></td>
</tr>
<tr>
<td>11496</td>
<td>TEST</td>
<td>rac_database</td>
<td>PRIMARY</td>
<td>dbatest-dcl.test.net</td>
<td></td>
</tr>
<tr>
<td>11496</td>
<td>TESTRACCS1</td>
<td>oracle_database</td>
<td>PRIMARY</td>
<td>dbatest-dcl.test.net</td>
<td></td>
</tr>
<tr>
<td>11496</td>
<td>ciecdnbhoasgrd</td>
<td>cluster</td>
<td></td>
<td>dbatest-dcl.test.net</td>
<td></td>
</tr>
<tr>
<td>11496</td>
<td>orclpmy</td>
<td>rac_database</td>
<td>PRIMARY</td>
<td>dbatest-dcl.test.net</td>
<td></td>
</tr>
</tbody>
</table>

© Comcast All Rights Reserved
### Database Patcher

**Database Flavor**: Oracle

<table>
<thead>
<tr>
<th>Target Name</th>
<th>Progress</th>
<th>Last Operation</th>
<th>Last Operation Status</th>
<th>Jira Ticket</th>
</tr>
</thead>
<tbody>
<tr>
<td>orcliprmy</td>
<td>17</td>
<td>COPY FILES</td>
<td>Running</td>
<td></td>
</tr>
</tbody>
</table>

**DB Patching Jobs**

<table>
<thead>
<tr>
<th>Job Id</th>
<th>User</th>
<th>Job Start Time</th>
<th>Status</th>
<th>Job Finish Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>5c6459ec2d1b4e6edc9eb4838</td>
<td>appuser100</td>
<td>Wed Feb 13 2019 11:54:51</td>
<td>RUNNING</td>
<td>---</td>
</tr>
</tbody>
</table>
### Database Patcher

#### Database Flavor
- Oracle

**Target Name** | **Progress** | **Last Operation** | **Last Operation Status** | **Jira Ticket**
--- | --- | --- | --- | ---
orcipmy | 62% | START BLACKOUT ROLLING | Running | 

#### DB Patching Jobs

<table>
<thead>
<tr>
<th>Job Id</th>
<th>User</th>
<th>Job Start Time</th>
<th>Status</th>
<th>Job Finish Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>5c6459ec2d1b4eedc9eb4838</td>
<td>appuser100</td>
<td>Wed Feb 13 2019 11:54:51 GMT-0600 (Central Standard Time)</td>
<td>RUNNING</td>
<td>---</td>
</tr>
</tbody>
</table>
Self Service Portal – Patch Status Example
Self Service Portal – Patch Status Example

Database Patcher

**Database Flavor**: Oracle

**Target Name**: OEMPGYZCS2

**Progress**: 100%

**Last Operation**: MASSDBPROVPOSTPROCESSINGSTEP

**Last Operation Status**: Succeeded

**DB Patching Jobs**

<table>
<thead>
<tr>
<th>Job Id</th>
<th>User</th>
<th>Job Start Time</th>
<th>Status</th>
<th>Job Finish Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>5c6c391e2d1b4edc9fa4e39</td>
<td>appuser100</td>
<td>Tue Feb 19 2019 11:13:01 GMT-0600 (Central Standard Time)</td>
<td>COMPLETED</td>
<td>Tue Feb 19 2019 11:28:06 GMT-0600 (Central Standard Time)</td>
</tr>
</tbody>
</table>
Benefits of Self Service Database Patching portal

- 2000 + databases getting patched every quarter
- 80% Reduced resource overhead for patching activities
- Total database downtime requirement for patching reduced drastically
- Push button automation empowered App teams to manage their own patching schedule
- Complete database patching orchestration reduced the human error
- Inventory standardization
Thank You!

COMCAST
Why this matters

Secure data and application ensures business integrity and continuity.
Our Goal

Database Patching is **critical**, our goal is to enable all DB DevOps to incorporate patching as a cyclic automated activity.
Recommendations for adoption

- Focus on Standardization
- Onboarding needs PoC/Testing
- Fleet Maintenance Pre/Post scripts for customizations and automation
- Ask for help – Oracle Support & Product Management

High Returns for efforts
What’s Ahead

Monday

10:00 10:45  Patch and Upgrade Oracle Multitenant with Fleet Maintenance [Room 205]

1:45 2:30  Achieving Database Patching Success: Fleet Maintenance Best Practices[Room 212]

2:30 3:30  HOL5264: Stay Protected, Patch Often with Oracle Enterprise Manager Fleet Maintenance[West 3022A]

Thursday

9:00 10:00  HOL5264: Stay Protected, Patch Often with Oracle Enterprise Manager Fleet Maintenance

Demo Grounds: OMC-002 - Database Lifecycle Management, DBaaS, and Snap Cloning with Oracle Enterprise Manager 13c

Mon-Wed
Thank You

Product Management Team

Oracle Enterprise Manager
Database Lifecycle Management & Cloud Management Pack
Q&A