Everything a DBA needs to know about Database and Cluster Maintenance with Gold Images

NoCOUG Winter Conference 2018

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22 February 2018

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Program Agenda

1 ▶ Gold Images and Out-of-Place operations

2 ▶ Rapid Home Provisioning and Maintenance 18c

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What is the best way to apply maintenance?

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  - Complex build process repeated for each node
  - Error prone
  - Longest down-time and maintenance window
  - No built-in fallback plan

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  - **Build gold image once, use everywhere**
  - **Built-in standardization**
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  - No built-in fallback plan

- Build new home **out-of-place**
  - Complex build process repeated for each node
  - Error prone
  - **Shorter down-time and maintenance window**
  - **Built-in fallback**

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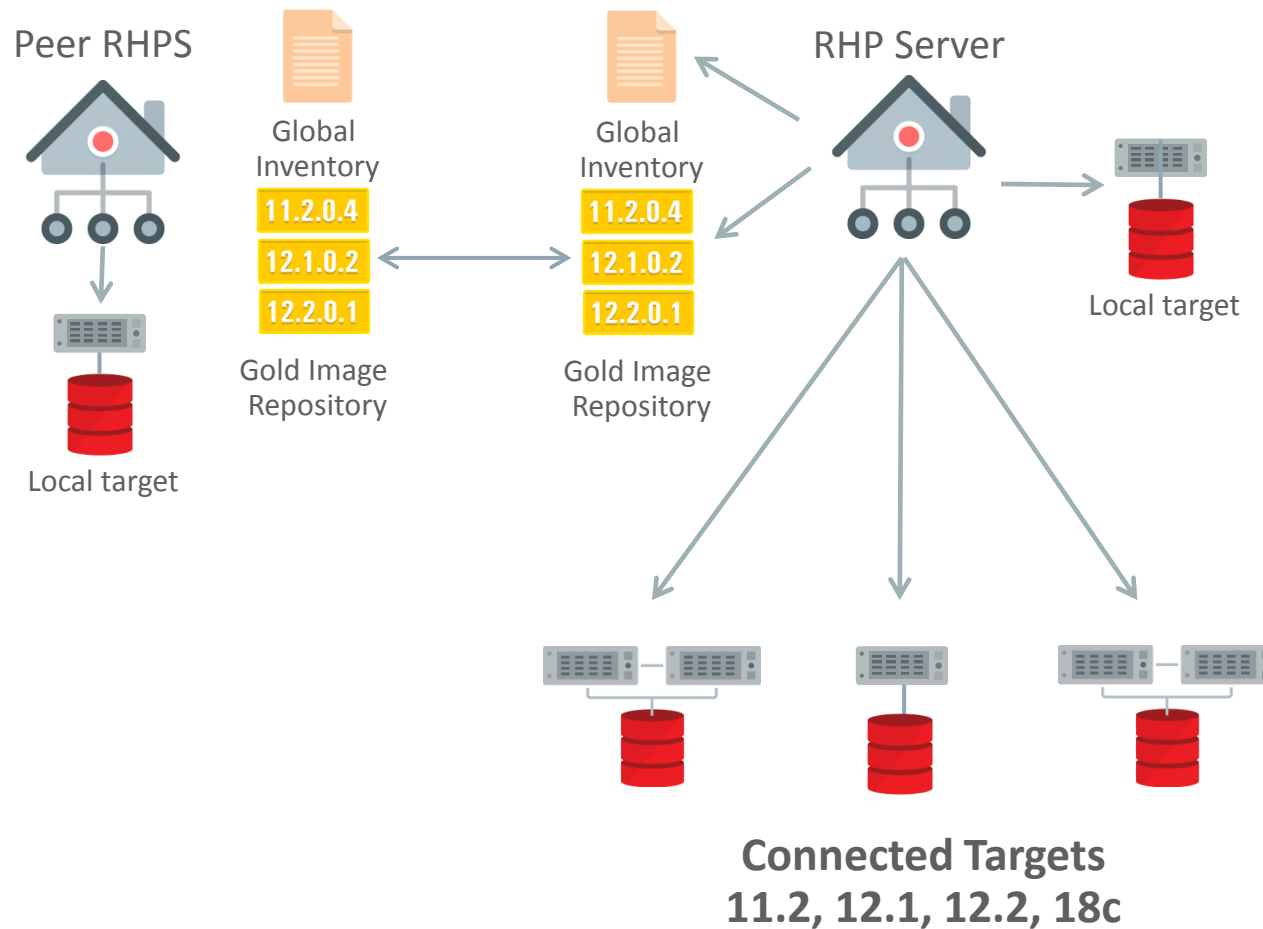# What is the best way to apply maintenance?

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- **Gold Image deployed out-of-place** ✓
  - **Build gold image once, use everywhere**
  - **Automation-friendly: fewest steps, simplest process**
  - **Shortest down-time and maintenance window**
  - **Built-in Fallback**
  - **Built-in standardization**

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Rapid Home Provisioning and Maintenance 18c Overview

http://www.oracle.com/goto/rhp

Peer RHPS

Global Inventory

11.2.0.4
12.1.0.2
12.2.0.1

Gold Image Repository

Local target

Global Inventory

11.2.0.4
12.1.0.2
12.2.0.1

Gold Image Repository

RHP Server

Local target

**Connected Targets
11.2, 12.1, 12.2, 18c**

**Unconnected
Targets 18c**

- **Efficient Gold Image inventory and Series management**

- **Synchronize images across enterprise**

- **Provision, scale, patch, upgrade**

- **Zero-Downtime Database Upgrade**

- **Manage existing estate as-is – no agents or prereqs**

- **Local-mode 'switch home' for 18c DB and Grid**

- **Monitor estate for configuration drift, advise resolution**

- **Customizable**

Supported targets and environments

Manage existing and **create new** Pools, Homes, and Databases

- Patch and Upgrade existing deployments
  - **No** pre-requisites (~~config, agent, daemon~~...) for targets
  - Database and Grid Infrastructure 11.2.0.3, 11.2.0.4, 12.1.0.2, 12.2.0.1, 18c

- Provision, Scale, Patch and Upgrade new Clusters and Databases
  - 11.2.0.4, 12.1.0.2, 12.2.0.1, 18c

- Bare metal, VMs, CDBs, non-CDBs

- SI (standalone, Restart, Grid Infr), RAC One, RAC

- Linux, Solaris, AIX

- Generic software homes

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Build Inventory of Gold Images
Create once for RHP Service

RHP Service

11.2.0.4.1

GRID
11.2.0.4.3

12.1.0.2
Custom

WLS
12.2.1

DB

Grid

Installed homes

- **Uptake current estate by promoting existing homes to gold images**

- **Create new homes and promote to gold images after validation**

- **Assign states to images for lifecycle management**

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Organize Gold Images into Series
Define series to suit your operational model

RHP Service

WLS

WLS 12.2.1

WLS 12.1.3

GRID

11.2.0.4 PSU3

12.1.0.2

12.2.0.1

Generic DB

11.2.0.4 PSU1

11.2.0.4 PSU2

11.2.0.4 PSU3

EBS DB

11.2.0.4 EBS-1

11.2.0.4 EBS-2

Generic DB

12.1.0.2

12.1.0.2 PSU1

12.1.0.2 PSU2

- **Each series contains images validated for a class of users**

- **Space-efficient, delta-based storage and distribution**

- **Users can subscribe to updates**

- **Synchronize among peer RHP Services**

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Patching

Provision new Homes from Gold Images
Maintain lineage to gold images, deploy out-of-place

RHP Service

WLS
- WLS 12.2.1
- WLS 12.1.3

GRID
- 11.2.0.4 PSU3
- 12.1.0.2
- 12.2.0.1

Generic DB
- 11.2.0.4 PSU1
- 11.2.0.4 PSU2
- 11.2.0.4 PSU3

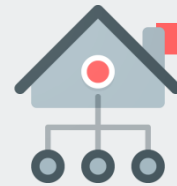**EBS DB**
- 11.2.0.4 EBS-1
- 11.2.0.4 EBS-2

Generic DB
- 12.1.0.2
- 12.1.0.2 PSU1
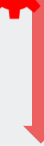- 12.1.0.2 PSU2

RHP Targets

Grid 11.2.0.4 PSU1   11.2.0.4 PSU1

11.2.0.4 PSU3   11.2.0.4 PSU3

Patch Database and Grid Infrastructure
Single command (just one bounce), or separately, rolling, built-in fallback

RHP Service

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Generic DB
- 12.1.0.2
- 12.1.0.2 PSU1
- 12.1.0.2 PSU2

Grid 11.2.0.4 PSU1

11.2.0.4 PSU1

11.2.0.4 PSU3

11.2.0.4 PSU3

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RHP Service

WLS

WLS 12.2.1

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GRID

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Generic DB

11.2.0.4 PSU1

11.2.0.4 PSU2
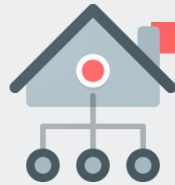
11.2.0.4 PSU3

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RHP Targets

Grid 11.2.0.4 PSU1

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11.2.0.4 PSU3

11.2.0.4 PSU3

Flexible Database Patching
Advanced capabilities for consolidated, clustered environments

- Switch subset of DB instances to new home

- Drain services before stopping Database on each node

- Preserve placement of services

- Customizable

- Patch GI and DB in same operation
  - Patch all or subset of Database Homes

- Process cluster nodes in batches
  - Shorten maintenance window
  - RHP computes batches to maintain specified service availability levels
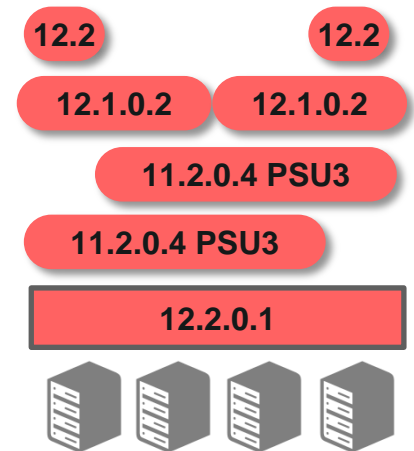
12.2			12.2
12.1.0.2		12.1.0.2	
		11.2.0.4 PSU3	
11.2.0.4 PSU3			
12.2.0.1			

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Additional capabilities

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Additional Capabilities (1)

Create

- Provision, configure and start new cluster
- Provision, configure and start new Databases
- Extensible to any software type

Upgrade

- Database and Grid Infrastructure Homes
- Similar to patching
  - Provision Gold Image out-of-place
  - Single command
  - Resumable, restartable, recoverable
  - GI is rolling by default

Grow / shrink

11.2.0.4 PSU3

12.2.0.1
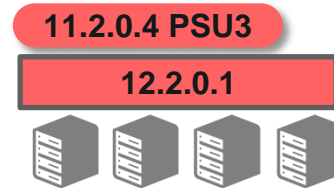
- Single command to add node to a cluster, RAC Database
- Single command to remove node
- Enables server-level capacity on demand

Additional Capabilities (2)

Customizable Workflows

- Insertion points at start and end of built-in workflows
- Create workflows for middleware, apps, etc.

Auditing

- All commands and their outcomes recorded
- Query on several dimensions
- Manage contents

Administrative Roles

- Overall, Local Admins
- Gold Image creation and management
- Home distribution and management
- Custom roles possible

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18c Rapid Home Provisioning & Maintenance

NEW IN 18ᶜ

- Workflows
  - Zero-Downtime Database Upgrade
  - Adaptive OJVM Patching
  - Command evaluation: dry-run option
  - Automated recovery options
  - Independent mode for DB, Grid patching

- Engineered Systems
  - Exadata Storage Cells, DB Nodes, IB switch

- Global Fleet Standardization
  - Automated Peer-to-Peer Gold Image sharing
  - Collect and report configuration drift
  - Compute Gold Image profiles

- Flexibility and Extensibility
  - RESTful API
  - Authentication plug-in
  - Firewall support
  - Command scheduling and bulk operations

Zero-Downtime Database Upgrade (ZDU)

- DB Upgrade Paths
  - 11.2.0.4 -> 12.1.0.2 / 12.2.0.1
  - 12.1.0.2 -> 12.2.0.1

- All operations within host – no extra hardware needed

- Complete Upgrade Automation or prompt step-by-step

- Space-efficient Database snapshot or Full clone

- GoldenGate or Data Guard TLS replication coordinated by ZDU

- Fall back and failover capability

- Customizable workflow

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Adaptive OJVM Patching

- OJVM patches are marked non-rolling, but there are scenarios where they can be applied rolling with little or no impact

- When directed to apply OJVM patch in rolling mode, RHP will evaluate the scenario and
  - Roll in "no impact" case
  - Ask user what action to take in other cases

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Automated Peer-to-Peer Gold Image Sharing

- Facilities large-scale standardization across multiple estates

- Establish peer relationship between two RHP Servers

- Updates to Gold Image inventory synchronized automatically based on policy
  - All images
  - Specific image(s)
  - Specific image series
  - Specific image type(s)

Compute Gold Image Profiles

- Provisioned copies of a Gold Image might drift from the Gold Image, i.e., one-offs applied post-provisioning

- Different copies may drift differently

- When preparing the next version of the Gold Image (e.g. new PSU available), ideally it will account for all one-offs in all copies, so we can get everyone back to a standard configuration

- New option in 'query image' reports list of all one-offs in all provisioned copies of that image

- Facilities building a new Gold Image that includes all fixes needed to update all copies

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Gold Images for DB and Grid Maintenance

More Information

- **http://www.oracle.com/goto/rhp**
  - White paper and cookbook
  - Recorded demos
  - Additional topics related to private database clouds

- **https://docs.oracle.com/en/database/oracle/oracle-database/18/cwadd/index.html**
  - Chapter 5

- **bernard.clouse@oracle.com**

Integrated Cloud
Applications & Platform Services

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