

OpenWorld 2016

Suffering from Chronic Patching Pain?
Get Relief with Fleet Maintenance



September 18–22, 2016
San Francisco

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September 19, 2016

A decorative graphic consisting of several overlapping circles in shades of white and light orange, with a large white cloud shape in the center. The circles have a 3D effect with a gradient from white to light orange.

Accelerate Your
Digital Transformation
in the Cloud

Safe Harbor Statement

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, and timing of any features or functionality described for Oracle's products remains at the sole discretion of Oracle.

Session Abstract

CON6979: Whether you are patching a handful or even thousands of databases, long downtimes and multiple maintenance windows can cause pain for DBAs and application owners. Ease the suffering and improve the quality of life for DBAs by using Oracle Enterprise Manager's fleet maintenance. It allows administrators to patch and upgrade database software with minimal downtime, as well as updates at scale across your entire database estate, significantly reducing the time required for maintenance activities. Now available for both traditional database estates as well as cloud implementations, fleet maintenance is a must-have for managing databases at scale. Attend this session to learn more.

Complete Lifecycle Management

ORACLE®
ENTERPRISE MANAGER **13^c**

- Automatic Discovery
- Mass Provisioning/Cloning*
- Patch Management*
- Upgrades*
- Change Activity Planner
- Schema Changes
- Inventory Tracking
- Configuration Drift Mgmt
- Topology Visualization
- Enterprise Data Governance
- Compliance Reporting



* Includes Rapid Home Provisioning (RHP)

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Business Challenges

- 1 Applications face business and security risks
 - Slow to uptake new database features
 - Databases are NOT at recommended patch level
 - Fail compliance requirements
- 2 Spiraling maintenance costs
 - Long testing cycle for Upgrade process - depriving resources for application development
 - More experienced DBAs needed – lack of automation, reliability and scalability
- 3 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)



Standalone Databases



Real Application Clusters



Data Guard



Multitenant (PDBs)



Database Appliance (ODA)*



Exadata*



Database Cloud (DBaaS)**

Database **Fleet** Maintenance

New! Simplified Software Configuration Standardization at Scale



Scan the Fleet

Discover Configuration Pollution

- Run Advisor to analyze the database estate
- Identify required standard configurations
- Prepare Reference environments for each standard configuration



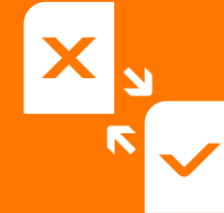
Create New Image and Subscribe

Create Gold Image

- List available images
- List versions of an image
- Make a version "Current"

Subscribe Databases to a Gold Image

- List subscriptions of an image
- Validate subscriptions



Push Image and Switch

Deploy Image

- Shadow Home is created

Switch Database

- Migrate Listener
- Update Database: SI, GI, RAC, Standby

Database Fleet Maintenance

1. Detect “Configuration Pollution”

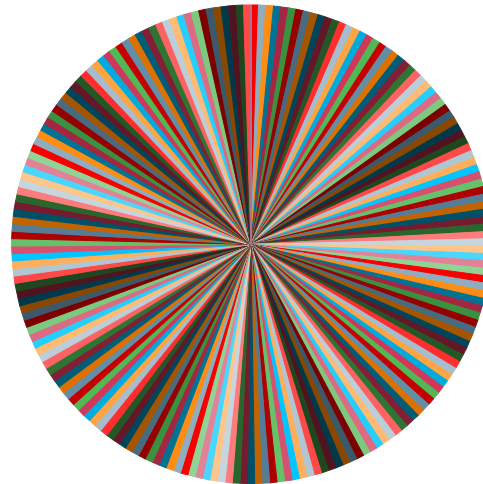
Advisor scans the fleet for configuration variations provides recommendations to standardize.

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

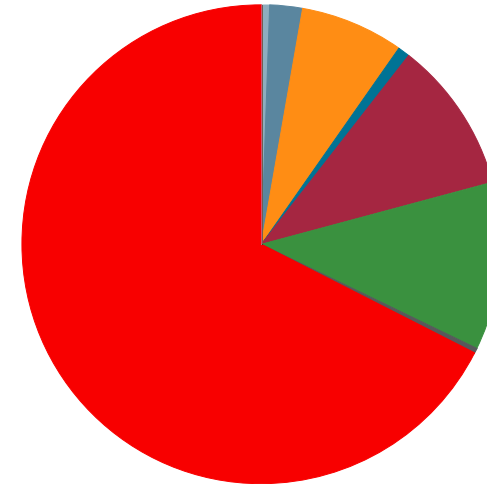
Analysis of Your Enterprise (2693 database installations)

Current Software Configurations (295)



Analysis: 1 in every 6 Oracle Home are different

Recommended Software Configurations (8)



Criteria Used: Platform, Release, Product

Series: Oracle Database
 Release: 11.2.0.4.0
 Platform:226
 Group: Oracle Homes
 Value: 201

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.



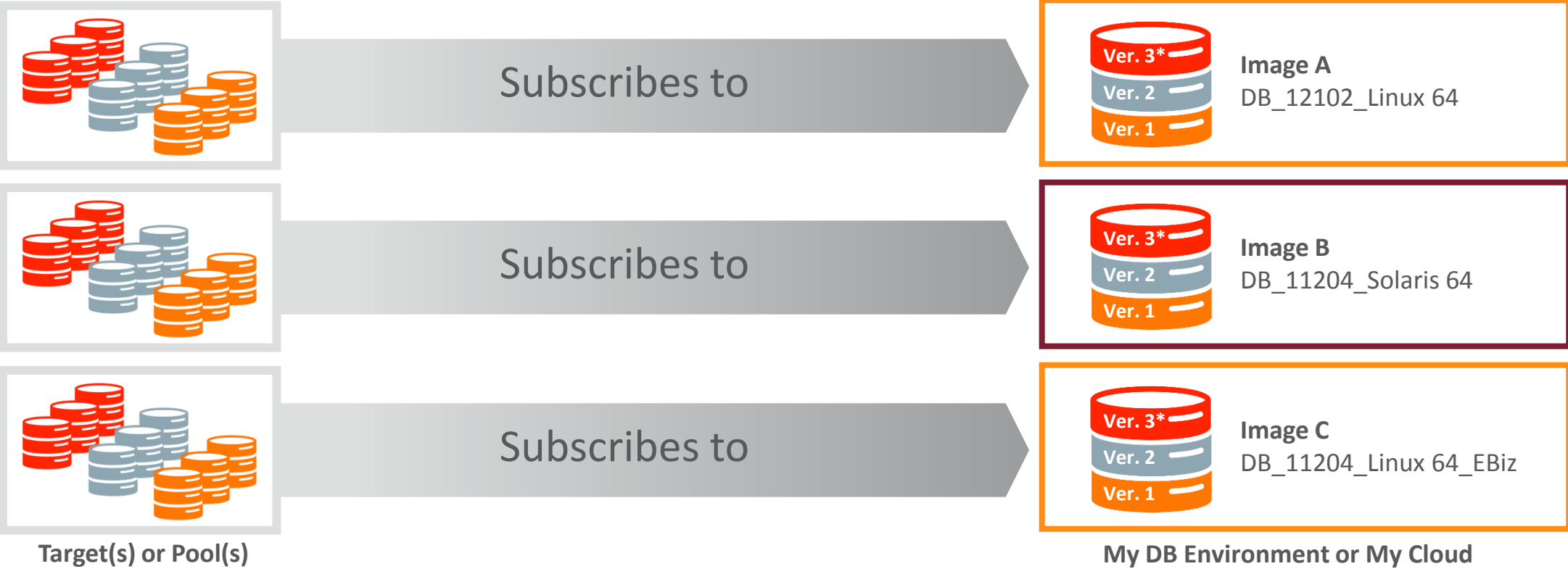
Software “End State”
Image – Versioning

* Current / Latest version

Database **Fleet** Maintenance

2. Create Images and Subscribe

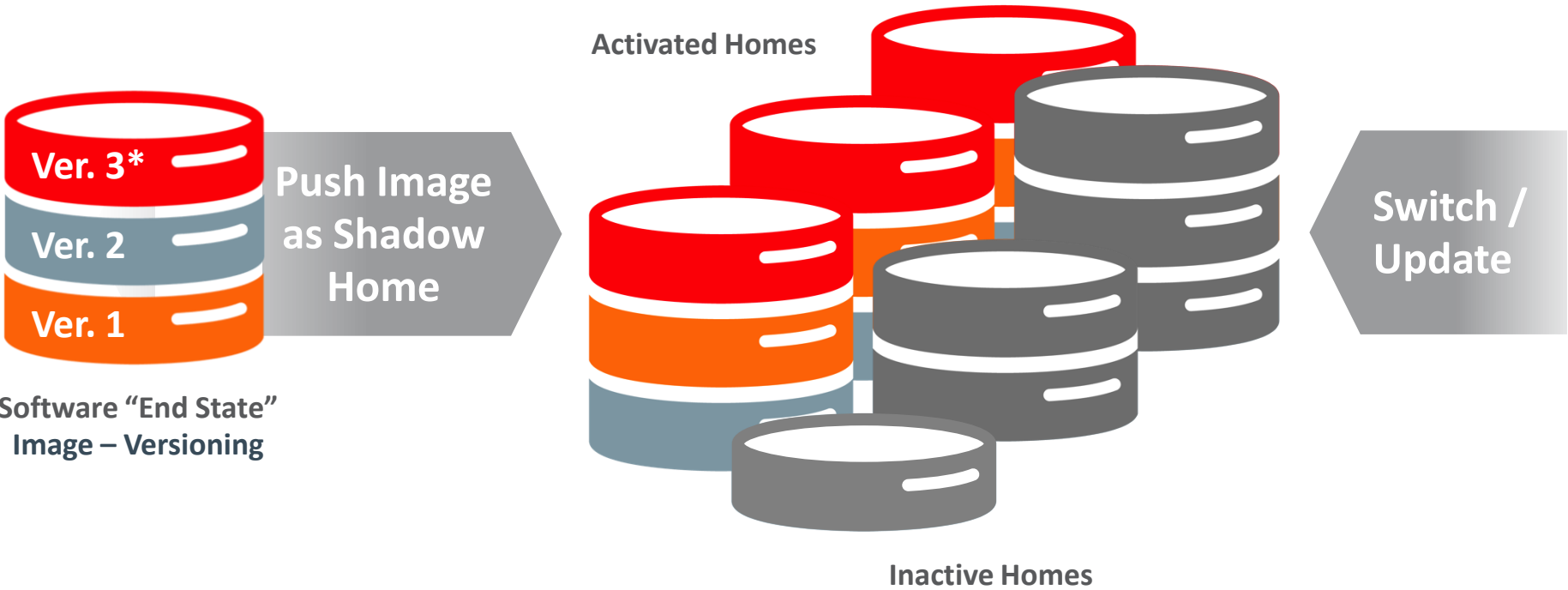
B. Subscribe targets/pools to the images



* Current / Latest version

Database Fleet Maintenance

3. Propagate Changes and Switch with Ease



DBAs



Application Owners

Database **Fleet** Maintenance

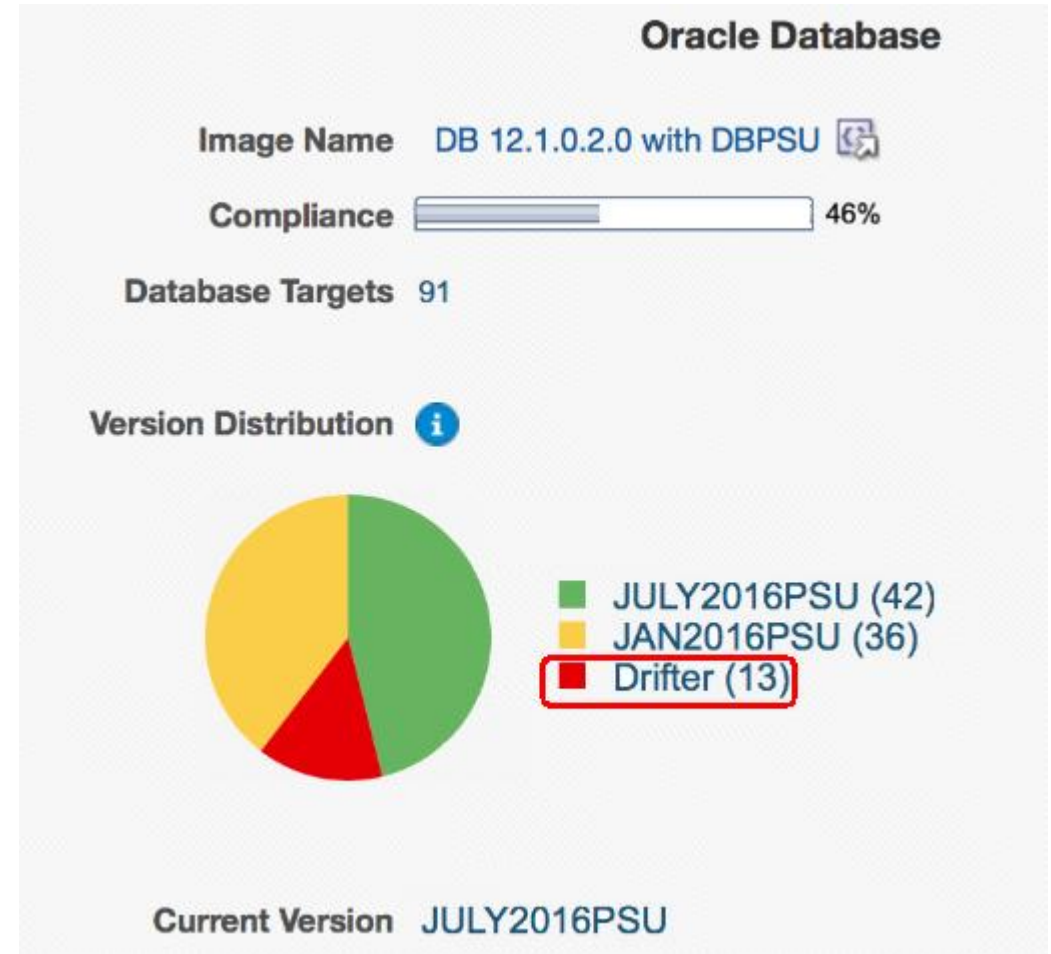
Manage Exceptions and Emergencies

- Allows emergency, ad-hoc patching.
- Ad-hoc is more an exception than a norm, its 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



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

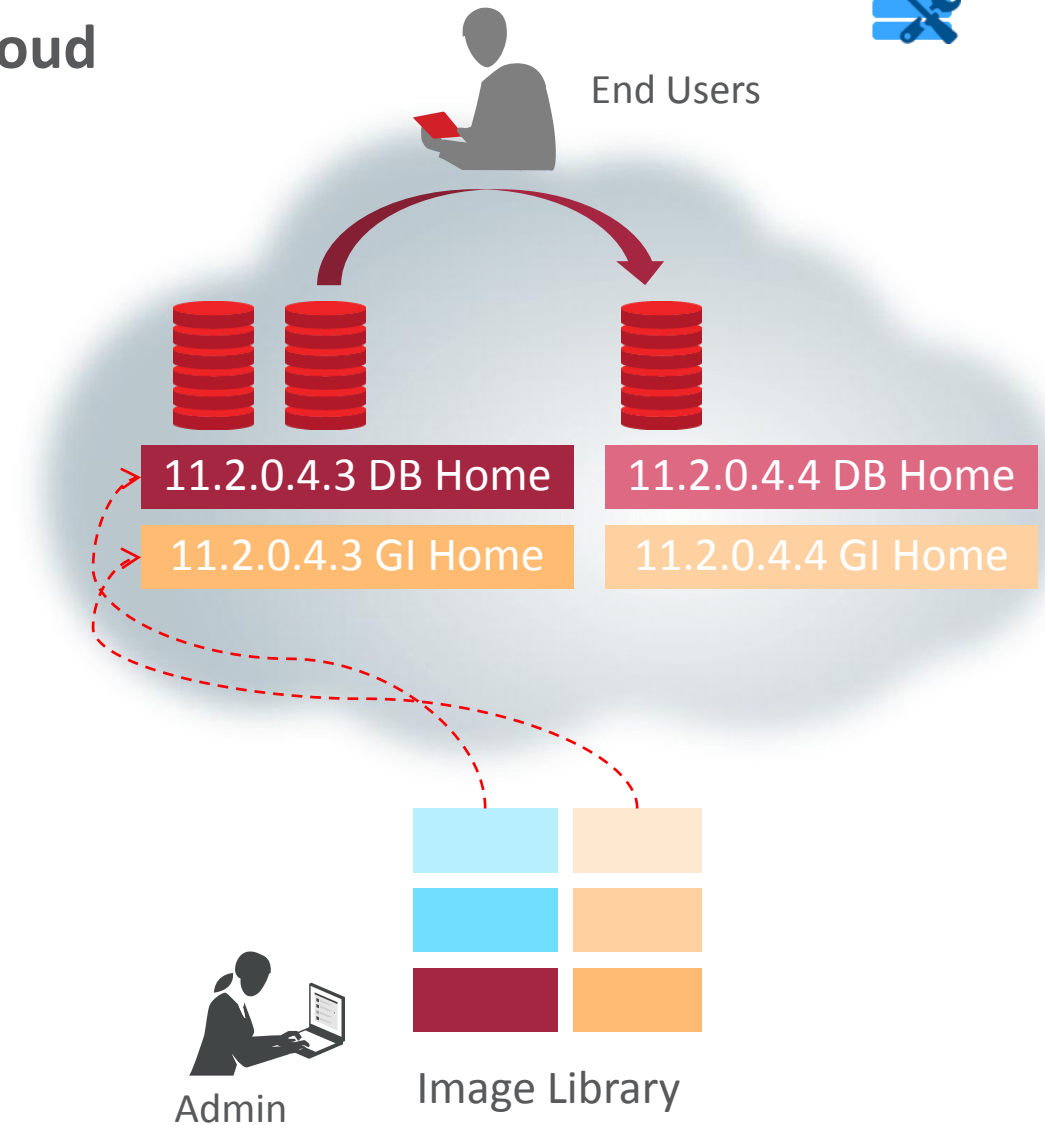


Process

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



Database **Fleet** Maintenance

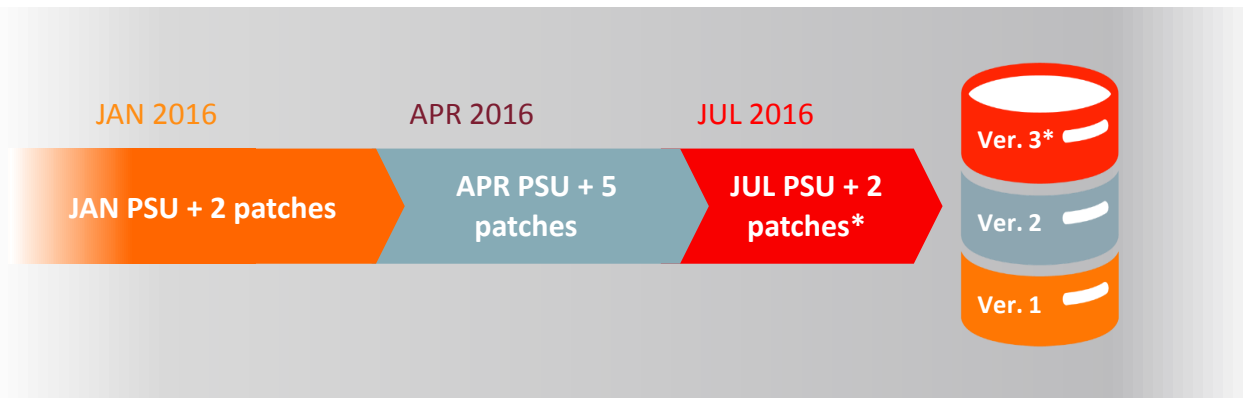
New! Simplified software configuration standardization at scale



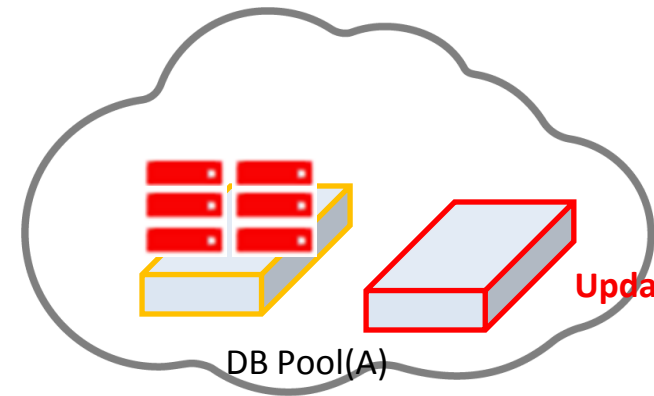
3

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.

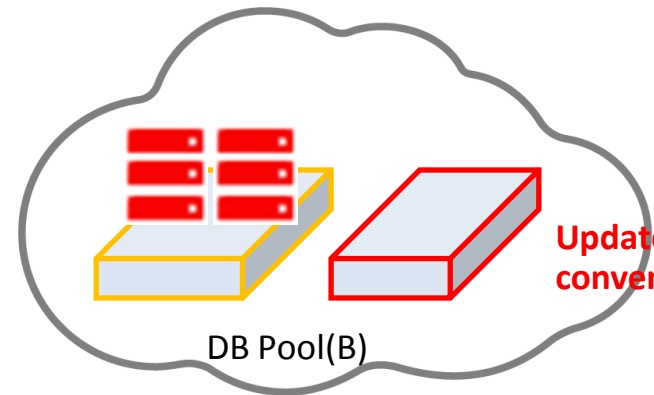


Software "End State"
Image – Versioning



Update all together to new version

Deploy across subscribed environments






Update to new version at convenience



Database **Fleet** Maintenance

Customer Experience

	Requirements	Benefits	
	Patch 1600 DBs every 90 days Each cycle takes 66 days 50 DBAs	2 Months to 2 weeks 1280 Hours saved per quarter 26 FTEs assigned to important work	5x
	60+ Minutes + Patching Time 1 Home at a time	7-15 Minutes Scalable Concurrent patching	4x
	Multiple Platforms, DB Versions >> 50+ distinct configurations 4-8 hours per cluster of DBA time	10 Minutes per Node <15 standard configurations Concurrent patching	6x

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



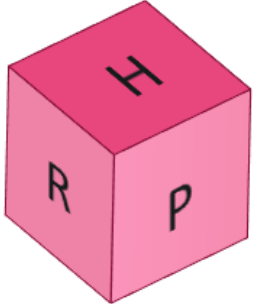
Firmware Patching

- ✓ Compute Nodes
- ✓ Storage Server Cells
- ✓ InfiniBand Network Switches

Database **Fleet** Maintenance Roadmap



Enhanced PDB
Support



Fleet Operations

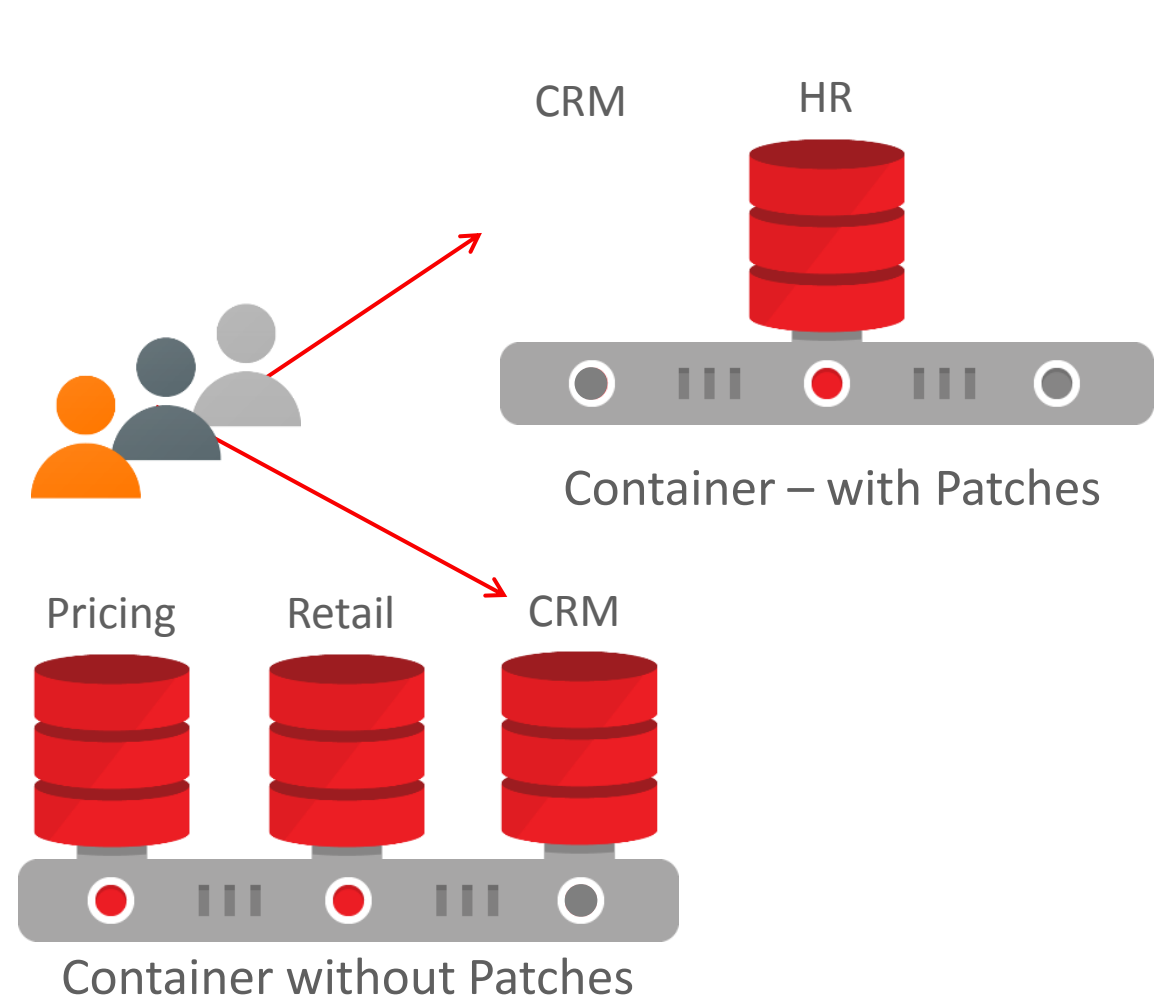
Database **Fleet** Maintenance for PDBs

- Current Solution

- Switches existing CDB to the new OH
- All PDBs moved with Switch
- Single maintenance window for all Applications

- Upcoming Solution

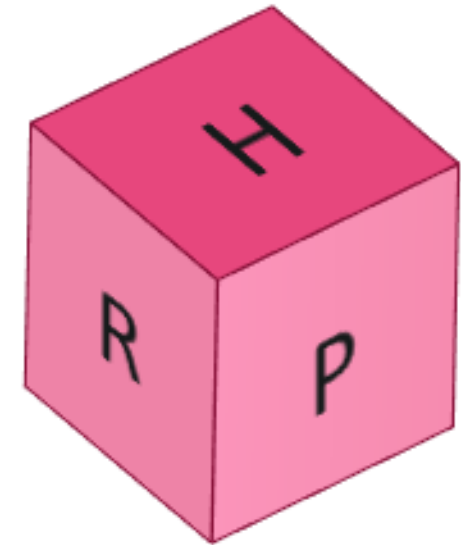
- A new CDB is created and PDBs switched over on-demand
- CDBs on same/different hosts
- Maximum Availability Option



Database **Fleet** Maintenance

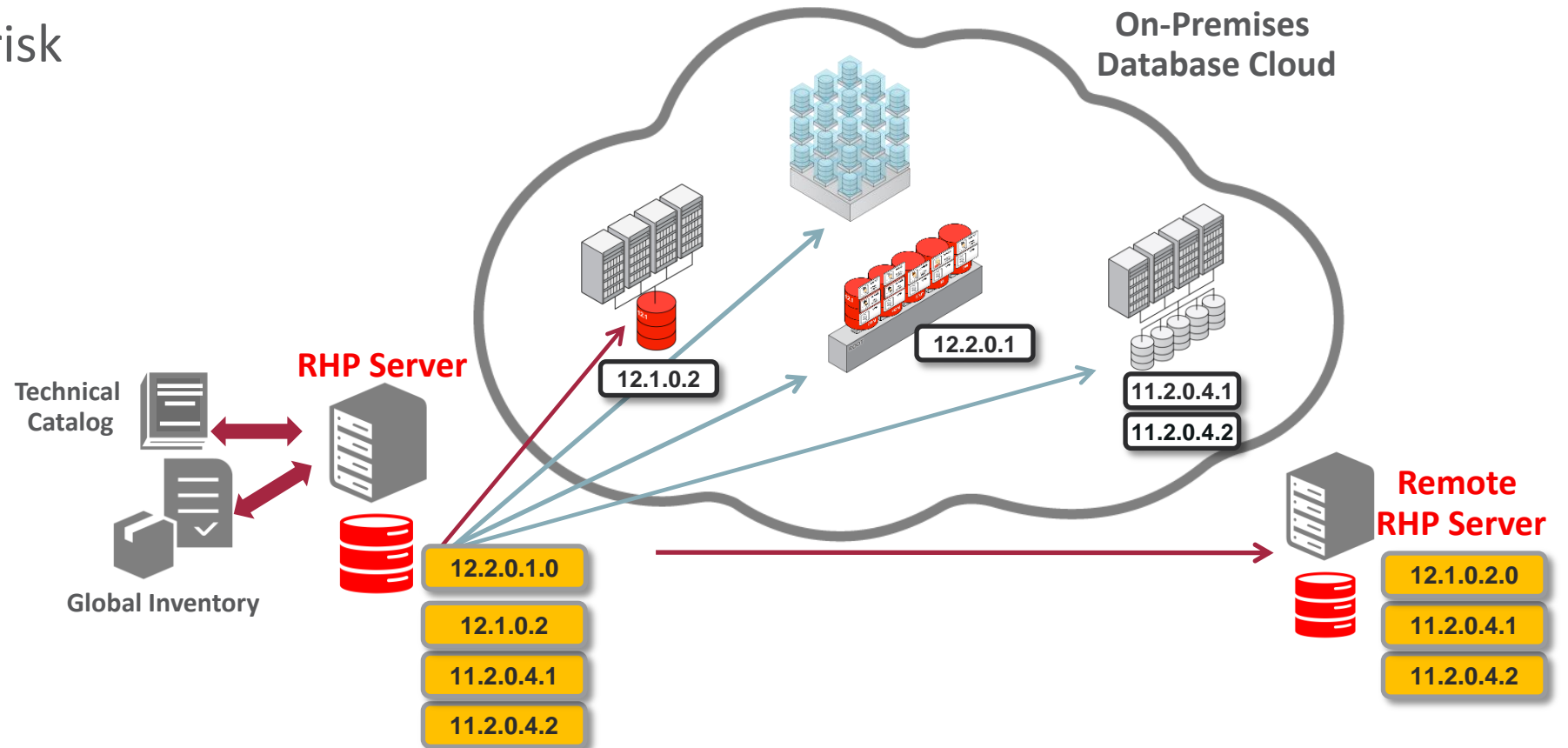
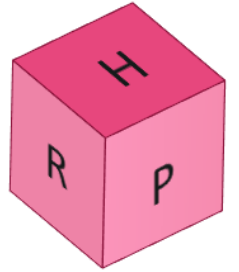
Enabling Rapid Home Provisioning (RHP)

- Fleet Maintenance
 - Will provide a consistent UI/emcli for managing fleet
 - Will provide image management of RHP based images
 - Will deploy and update databases using RHP apis
- Prerequisite
 - Will integrate with RHP Servers v12.2 and above



RHP - Overview

- Simplify & standardize SW deployment & maintenance across deployment models
- Massive scalability; one command – update many
- Low impact and low risk
 - Out-of-place
 - Online rolling
 - Built-in fallback
- Out of the box
 - DB/GI 11.2, 12.x



Database **Fleet** Maintenance – Fleet Operations

Maintenance Window - **Define**

- Thresholds
- Capacity
- Success Criteria
- Schedule

Threshold Settings

The threshold settings lets you specify the maximum number of databases that can be processed in parallel and the average processing time in performing the operation on the given number of databases.

* Maximum number of databases for parallel processing ^ v

* Average processing time for these databases ^ v hours ^ v minutes

Capacity Planning

Capacity planning lets you specify the maximum number of databases for a fleet operation. Required number of slots and the processing time will be automatically deduced based on the threshold settings and maximum number of databases for a fleet operation.

* Maximum number of databases for the fleet operation ^ v

Required number of slots 10

Projected processing time 7 hours and 30 minutes

Slot Success Criteria

You can define your success criteria for slots in fleet operation. If the slot success criteria is violated due to failures, the fleet operation instance will automatically stop.

Slot Success Criteria(%) ^ v

Cut-off Timings

The cut-off timings lets you control the inclusion and exclusion of database in and out of a fleet operation.

Inclusion Cut-off Time ^ v days ^ v hours ^ v minutes

Exclusion Cut-off Time ^ v days ^ v hours ^ v minutes

Database Fleet Maintenance – Fleet Operations

Maintenance Window - **Subscribe**

- Scheduled Patching
- Ad-hoc Patching request

Schedule Patches

Schedule Patching Windows

On the every

Acceptable starting time frames

On this date

Starting time frame

August 2015

S	M	T	W	T	F	S
		4	5	6	7	1
2	3	11	12	13	14	8
9	10	18	19	20	21	15
16	17	25	26	27	28	22
23	24	31				29
30						

<input type="checkbox"/>	Date	Starting Time Frame
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		

🔧 Ad Hoc Patch

Performs a patch outside of your existing patching schedule.

Patch July 2015 Critical Patch Update

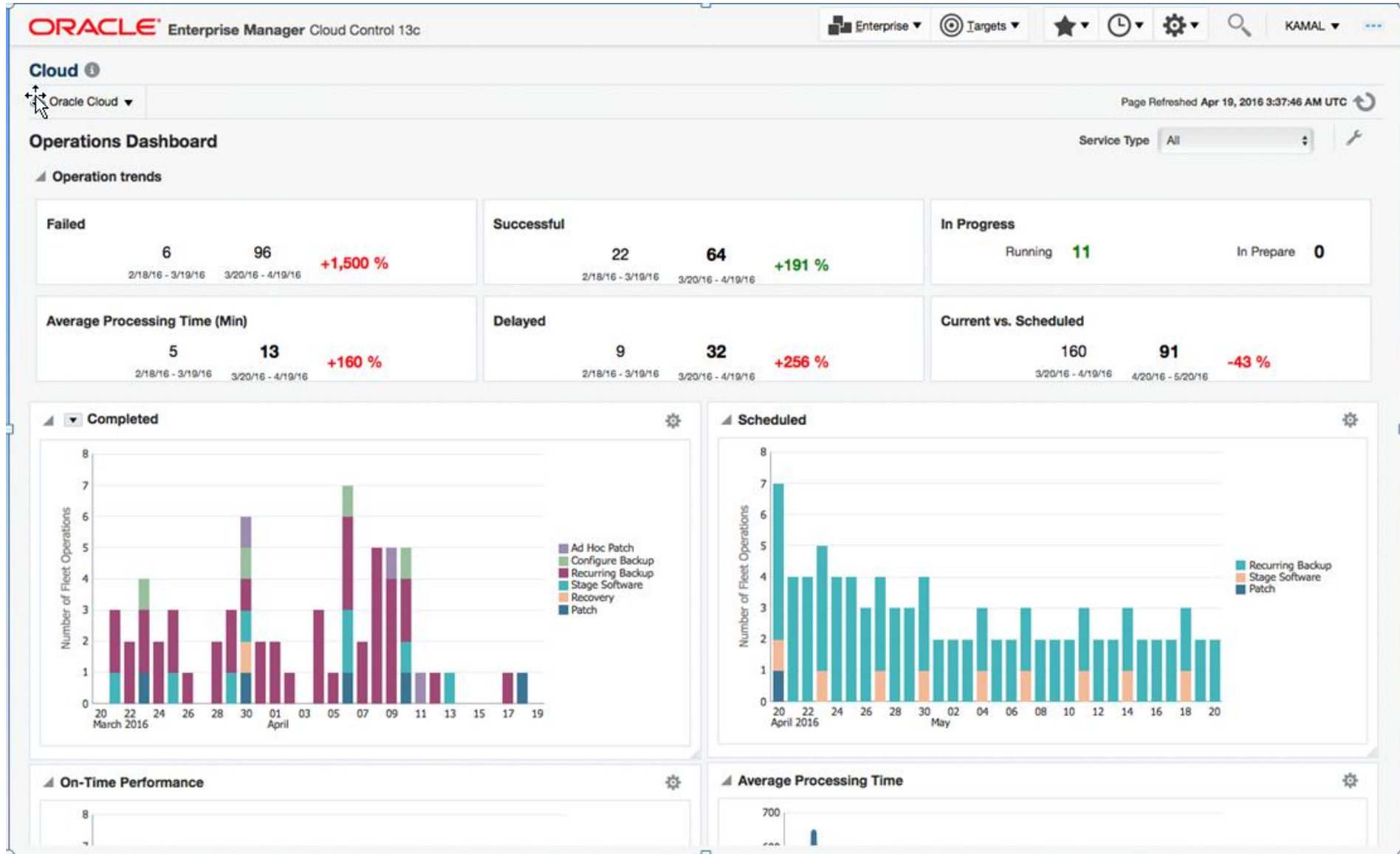
Justification Yada yada yada client app not working blah blah blah says its our our fault due to patch level trying everything because customer in flames...

Start Patching

- As soon as possible using existing service windows:
Thursday Sep 3, 2015 12:00 AM - 2:00 AM
- Immediately (requires custom service window)
This option available # more times this <quarter/year>.

Database Fleet Maintenance – Fleet Operations

Operations Dashboard



Cerner's Fleet Voyage

Timothy Schubert

Technology Architect

September 19th, 2016



Cerner today

over **22,000**
ASSOCIATES

hospitals
5,431

OVER
450,000
PHYSICIAN USERS

physician practices **5,594**
3,888 EXTENDED CARE FACILITIES

98 clients named
Health Care's
2015 Most Wired

52 client hospitals named
US News and World Report
Most Connected

345+ PATENTS
WORLDWIDE

over **20,000**
CLIENT FACILITIES
30+ COUNTRIES

OVER
\$4.9B
CUMULATIVE R&D INVESTMENT

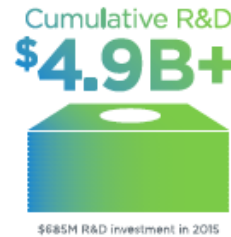
\$4.4 ✓
BILLION
2015 REVENUE

HIMSS **6** **414** ACUTE CLIENTS **43** HIMSS
184 AMBULATORY CLIENTS **303**

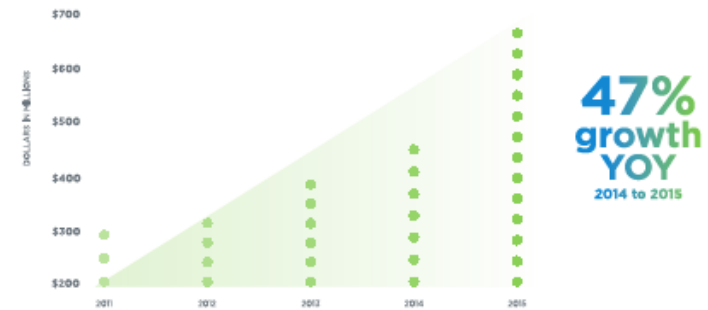
Updated 4/2016

Investing in our Future

- \$4.9 billion of cumulative R&D investments since 1979
- R&D continues to be focused on population health, physician experience, open platforms, revenue cycle and mobility
- With scale from additional Health Services R&D, we expect to maintain industry-leading R&D investment while also getting financial leverage



Cerner R&D investment



Outspending our competitors

"... we estimate that Cerner's top four publicly traded EHR competitors will spend in aggregate \$500M in R&D for FY15."

CANACCORD|Genuity

"Multiple Growth Avenues for Market Leader"
Sept. 16, 2015

10X more U.S. patents
than our major competitor



Secure from the start

Security built in, not bolted on



Health Care Information Technology

Intersection of two fast-paced, quickly changing industries

Health Care

Increasing regulatory requirements
Changing reimbursement models
Focus on population management
Evolving care practices

Information Technology

Mobility
Big Data
Security
Device Integration
Cloud

“New Normal” requires our clients to remain current on the latest IT

How do you patch almost 1600
DB hosts every 90 days?

The Cerner Conundrum – Scale

- 1600 Database Hosts
- 2500 Database Instances
- 50 Database Administrators
- Oracle Patching every other business day
- 1 Hour per host = **66 Days** of patching time per quarter

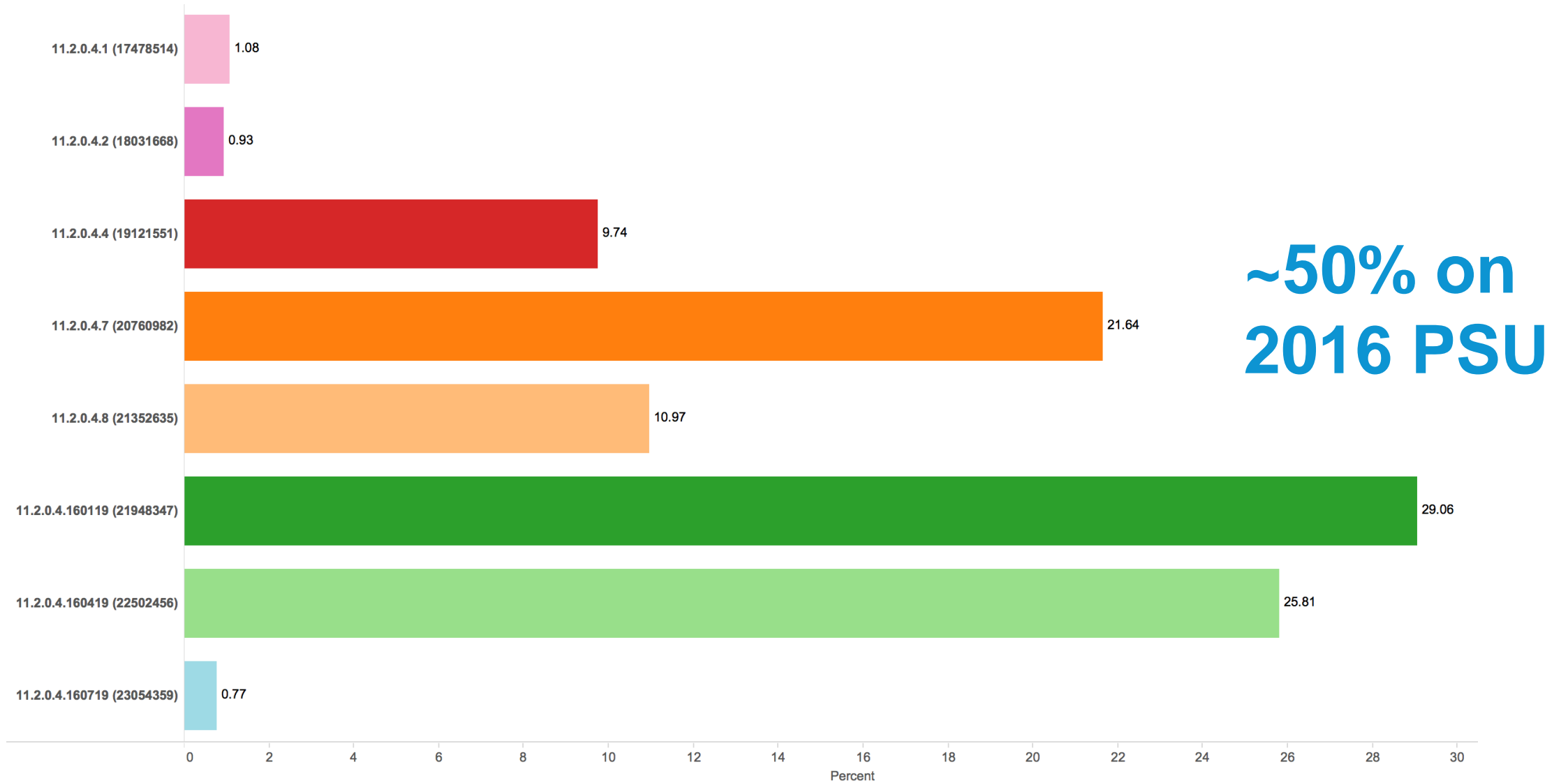


The Cerner Conundrum – Patch Conflicts

- Several Overlay / Merge / Interim Patches
- Only validate from two PSU's prior
- 30 Days to validate a new PSU
- Multiple PSU hops required if a host falls behind
- We want to replace statements like this:
 - Patch 22571752 replaces patch 21033886. Patch 21033886 will be rolled back during the installation of patch 22571752.
 - Patch 22807421 replaces patches 17079301 and 18385424. These patches will be rolled back during the installation of patch 22807421.

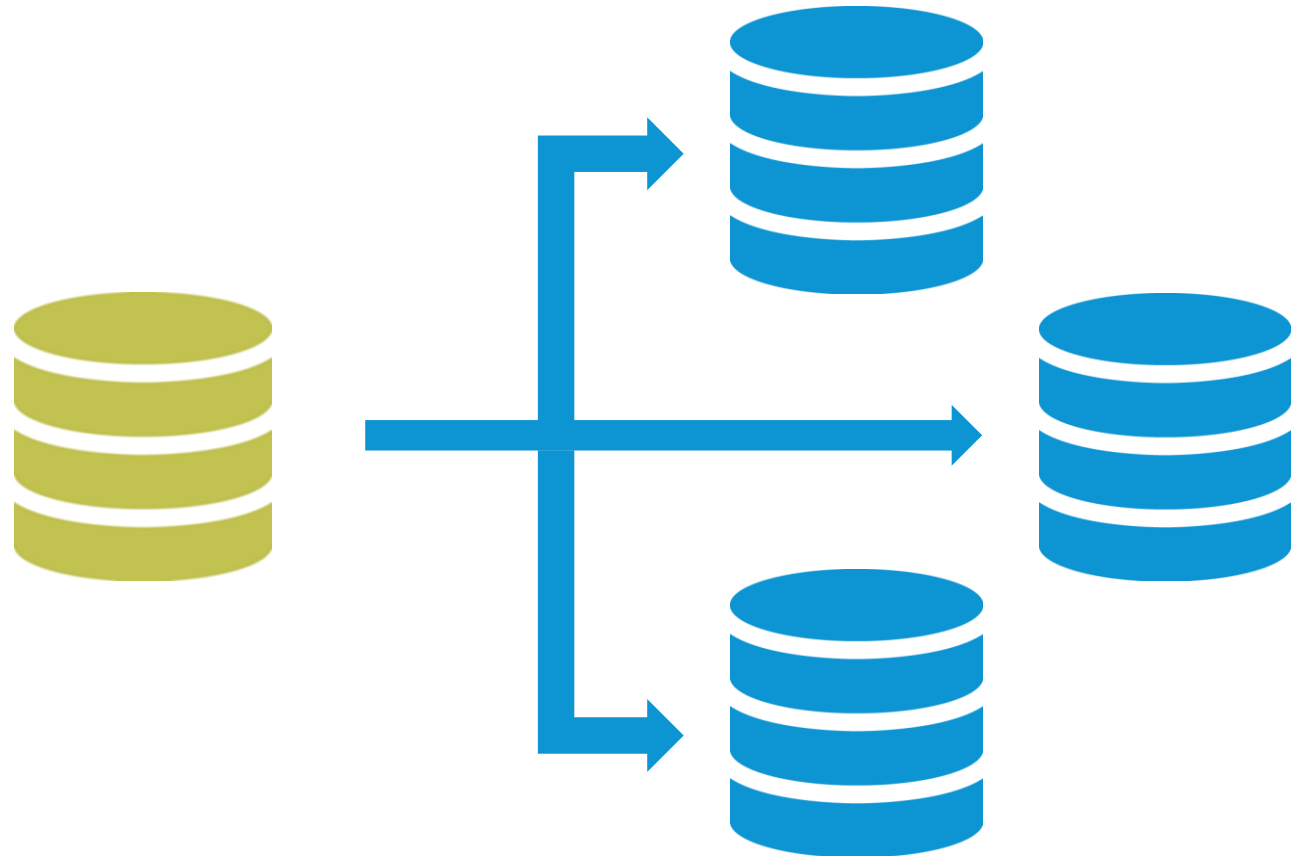


The Cerner Conundrum – Current State



Fleet to the Rescue

- Homogenous environment
 - All DBs on 11.2.0.4 by 2017
- Known end-state
 - 11.2.0.4
 - Most Recent PSU
- Gold Copy

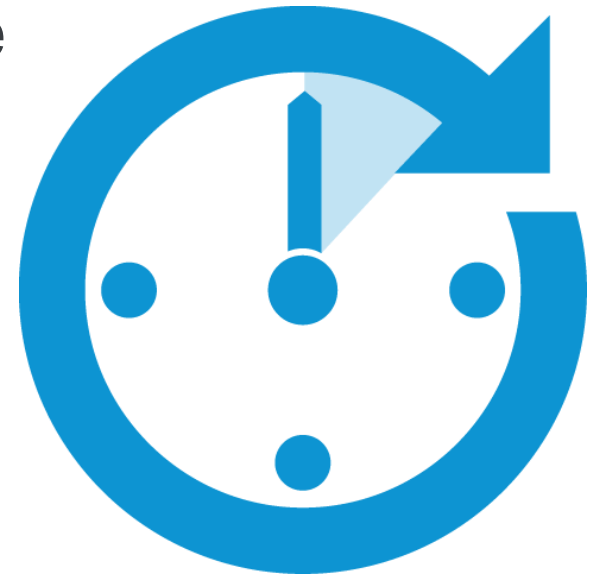


Cerner Requirements and Use Cases

- Minimal loss of redundancy
 - Only one bounce of each Oracle Instance
 - No PSU Downtime (OJVM not installed or Patched)
- Two – Five Node RAC
 - Grid Clusterware
- Single Node
 - Grid Restart

What It's Doing

- Out of Place Grid Infrastructure and RDBMS Patching
 - Deploy up to date Grid and RDBMS kernels without interference
- Rolling Patch Application – One node at a time
 - Stop DB Instances
 - Stop Grid Infrastructure
 - Start Grid in new home
 - Start Instances in new home
 - Repeat on next node
 - Apply post steps (catbundle.sql)
- Also can be used for individual Grid / RDBMS Patches



How Cerner will Deploy

- OEM 13.2
- Dedicated Patch Designer
- RHEL 6.x and Oracle 11.2.0.4 +
- EMCLI Deployed locally
- Scripted Interface for Fleet operations



How Cerner will Deploy

- Scripted Interface for Fleet operations
 - Creates Monitoring Credentials
 - Verifies Agent and Target Configuration
 - Checks and Maintains Target Subscriptions
 - Executes Pre and Post steps
 - Creates and Submits the Fleet Operations
 - Tracks Fleet execution from the Host
 - Manages ORACLE_HOME's

```
[oracle@cerngcsdb6]$ ./fleet.ksh  
Verifying Configuration ...
```

```
Named Credentials Located  
Using the following credentials:  
Oracle: oracle_cerngcs  
Privileged: root_cerngcs
```

```
The following instances discovered:  
stig1 - cerngcsdb6 - /u01/oracle/product/11.2.0.4/db_1  
stig2 - cerngcsdb7 - /u01/oracle/product/11.2.0.4/db_1
```

```
OEM Targets to be patched:  
rac_database - stig.world  
cluster - STIG_Cluster
```

```
Verifying Target Subscription ...  
rac_database subscribed to: 11204_RAC_Image  
cluster subscribed to: 11204_Cluster_Image
```

```
Current Target Version ...  
rac_database: 11204_PSU_20160419  
cluster: 11204_PSU_20160419
```

```
Gold Image Current Version ...  
rac_database: 11204_PSU_20160719  
cluster: 11204_PSU_20160719
```

```
Deploy New Version? (Y/N) :
```

```
Verifying new ORACLE_HOME ...
```

```
Deploying new rac_database for: stig.world  
cerngcsdb6: /u01/oracle/product/11.2.0.4/db_2  
cerngcsdb7: /u01/oracle/product/11.2.0.4/db_2
```

```
Following job execution at the following link:  
https://...:7799/em/faces/core-jobs-procedureExecutionTracking?
```

How It Works at Cerner

- Patch Designer Installs Quarterly PSUs and Additional Patches
- New Image Version is created and marked Current
- DBA's then operate in a Self-Service model
 - Initial Target Subscription
 - Gold Image Deploy
 - Switch over to new home



How It Helps

- Pre-Stage of new Homes saves time
- Any Version to any Version despite additional patches
- Multiple hops eliminated
- Reduce human error
- Ability to quickly “Rollback” – Switchback
- Amount of instance downtime reduced
- Set it and Forget it – Push button automation



How It Helps

- Two-Node Cluster Patched in **25 Minutes**
 - Over **2 months** of patching reduced to **2 weeks**
- **1280 Hours saved** per quarter
 - 25 Hours given back to the DBAs for more important work



Lessons Learned

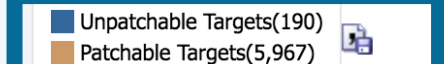
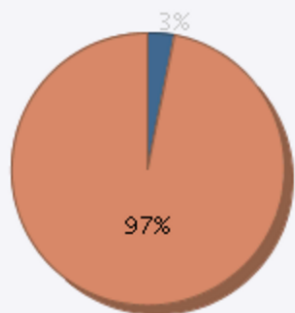
- Target Configuration Matters
 - Wrong Homes / Incorrect Relationships
- Repvfy is awesome
 - List and fix common OEM issues
- Configuration Search is your friend
 - Query Repository for Misconfiguration
- Custom things depend on a static ORACLE_HOME
 - Scripts / Toolkits / Aliases
- OEM Patchability Report

Information Publisher Reports

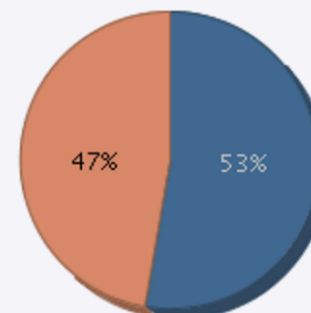
EM Target Patchability Report (Preview)

This report depicts the breakup of the patch-ability of the targets, the issues and problems found with the targets are detailed in the table.

Break up of all Targets



Break up of unpatchable targets

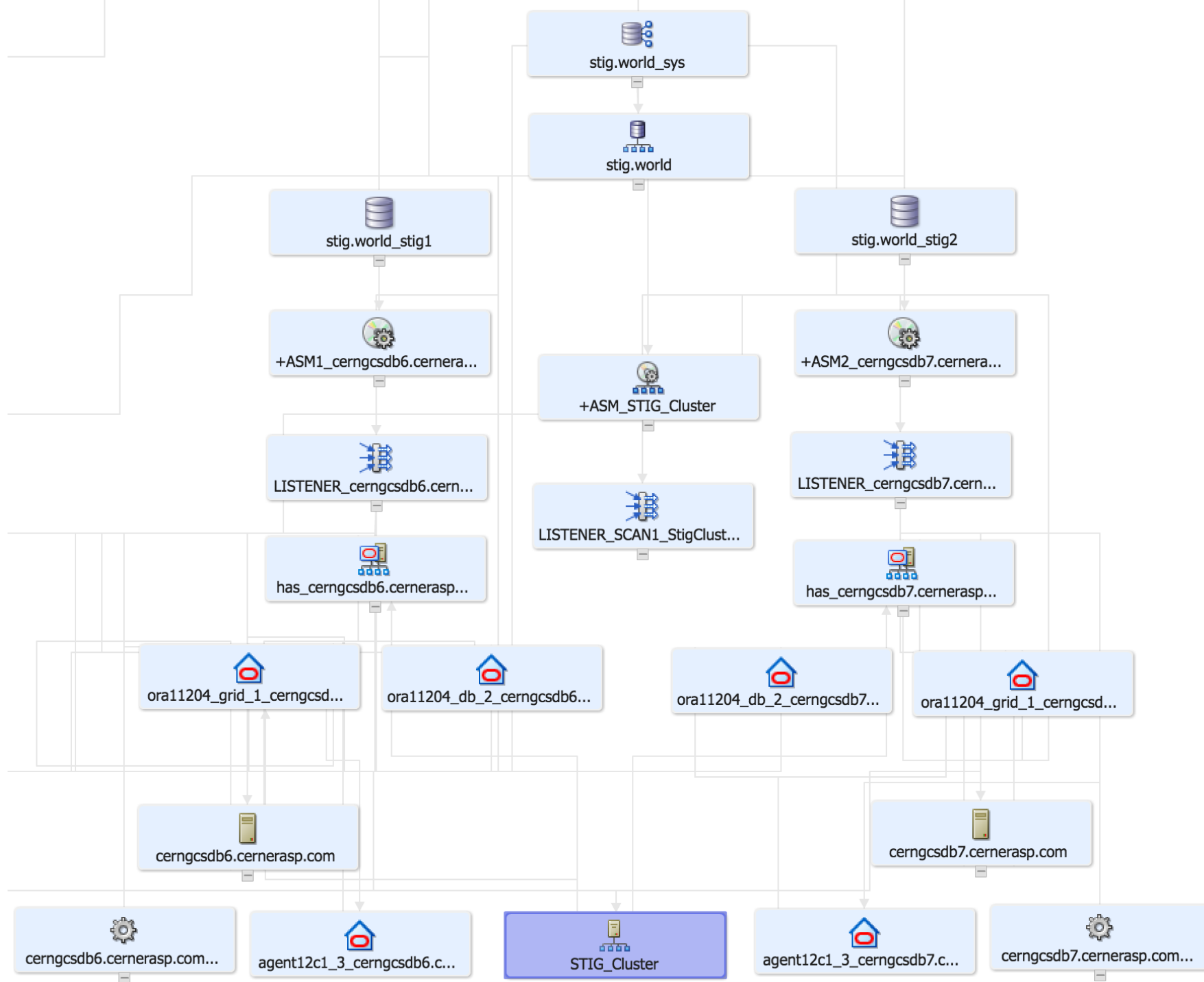


Analysis report of unpatchable targets

Previous 1-10 of 190 Next 10

Target Name	Target Type	Version	Problem	Details	Recommendation
wfbopr-cluster	Cluster		Missing Properties	Version is empty	The target is not properly configured or unavailable. Reconfigure or check for metric collection errors
t1639.world_t16391	Database Instance		Missing Properties	Version is empty	The target is not properly configured or unavailable. Reconfigure or check for metric collection errors
t1043.world_t10431	Database Instance		Missing Properties	Version is empty	The target is not properly configured or unavailable. Reconfigure or check for metric collection errors
p05791_tdadb1.cernerasp.com	Database Instance	11.2.0.4.0	Unsupported Configuration	RAC Instance does not have an associated RAC Database	Rediscover the RAC Target and Add the RAC Instance to the RAC Database
p0111.world	Database Instance	11.2.0.4.0	Unsupported Configuration	RAC Instance does not have an associated RAC Database	Rediscover the RAC Target and Add the RAC Instance to the RAC Database
mock1_VANDTNDB1.CERNERASP.COM	Database Instance	11.2.0.3.0	Unsupported Configuration	RAC Instance does not have an associated RAC Database	Rediscover the RAC Target and Add the RAC Instance to the RAC Database
c1639.world_c16391	Database Instance		Missing Properties	Version is empty	The target is not properly configured or unavailable. Reconfigure or check for metric collection errors
WINMN_ADMIN.WORLD_admin1	Database Instance	11.1.0.7.0	Unsupported Configuration	RAC Instance does not have an associated RAC Database	Rediscover the RAC Target and Add the RAC Instance to the RAC Database
VIRTNJ_ADMIN.WORLD_admin1	Database Instance	11.2.0.3.0	Unsupported Configuration	RAC Instance does not have an associated RAC Database	Rediscover the RAC Target and Add the RAC Instance to the RAC Database
VAILCO_ADMIN.WORLD_admin1	Database Instance	11.1.0.7.0	Unsupported Configuration	RAC Instance does not have an associated RAC Database	Rediscover the RAC Target and Add the RAC Instance to the RAC Database

Previous 1-10 of 190 Next 10





Configuration Search Library Target With No Home

Save Save As



```
Query SELECT
      s5.target_name,
      s5.target_type,
      s5.host_name
FROM
  MGMT$TARGET s5
WHERE
  (
    NOT EXISTS
    (
      SELECT
        s6.target_name
      FROM
        MGMT$TARGET s6,
        GC$ASSOC_INST_WITH_INVERSE s6a1
      WHERE
        (
          s6a1.SOURCE_ME_GUID = s5.TARGET_GUID
          AND s6a1.DEST_ME_GUID = s6.TARGET_GUID
          AND s6.TARGET_TYPE = 'oracle_home'
          AND s6a1.ASSOC_TYPE = 'installed_at'
        )
    )
  )
AND s5.TARGET_TYPE IN ('cluster','has','oracle_database','oracle_listener','osm_cluster','osm_instance','rac_database')
```

View ▾ Export... Print...

TARGET_NAME	TARGET_TYPE	HOST_NAME
Total Number of Rows 339		



Configuration Search Library
Instances without ASM target

Save Save As Search Using SQL

Target Type Database Instance

Commonly Used Search Criteria

Target Name Configuration Item Member Of On Host

Database Instance

+ Relationships + Properties ✕ Remove
 ⚙️ Advanced Options + Properties ✕ Remove

Initialization Parameters

Name ✕
 Value ✕

Automatic Storage Management (Database Instance->Stores On->Automatic Storage Management)(Advanced Options - Condition : Does not exist) + Relationships ⚙️ Advanced Options + Properties ✕ Remove

Search Reset

View Export... Print... Detach

Search results for the criteria defined above.

Database Instance Name

Total Number of Rows 227

What's Next for Cerner?

- OEM GUI
- Mass Deployment?
 - Patch all Non-Production in a single event
 - Deploy new software everywhere once it's been validated
- Oracle 12c
 - OEM Automation for Upgrades

Important Sessions, HOL & Demo Booths

Sessions

PayPal: Pivot from Manual to Scalable with Oracle Database Lifecycle Management Pack	CON2494
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Database Patch at 1,000 Scale: Nationwide's Oracle Enterprise Manager Fleet Maintenance Odyssey	CON2260
---	---------

Simplify Patching and Upgrades for Your Existing Software Install Base	CON6760
--	---------

Hands-On-Lab – Hotel Nikko, Peninsula (25th Floor)

Hands-On-Lab: Relief from Chronic Patching Pain—Oracle Enterprise Manager Fleet Maintenance	HOL7632
---	---------

Demo Booths - Moscone South, Lower Left

Database Lifecycle Management, DBaaS, Snap Cloning with Oracle Enterprise Manager 13c	SDB-044
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Hybrid Clouds with Oracle Enterprise Manager 13c: IT Automation for DevOps	SDB-045
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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!



Admin



End Users

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

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

ORACLE®