Achieving Database Patching Success/ Enterprise Manager Fleet Maintenance
Best Practices

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AGENDA

- Intro -- Nationwide
- Why Patch?
- Patching Alternatives
- Our Configuration
- Our Scheduling
- Our Results
- How We Do It
- Best Practices
- Summary
- Questions

Nationwide

Insurance and Financial Services Company

Fortune 100 Company

Founded in 1925

43 Billion in Revenues*

214 Billion in Assets*

30,472 Employees*

#57 on Fortune's "Best Companies to Work For"

#44 in Computer World's "Best Places to Work in IT."

*Fortune 500

Why Patch? Security..Security..Security

Center for Internet Security (CIS)

1 Oracle Database Installation and Patching Requirements One of the best ways to ensure secure Oracle security is to implement Critical Patch Updates (CPUs) as they come out, along with any applicable OS patches that will not interfere with system operations.

1.1 Ensure the Appropriate Version/Patches for Oracle Software Is Installed Profile Applicability:

- Level 1 - ...The Oracle installation version and patches should be the most recent that are compatible with the organization's operational needs.

Rationale: Using the most recent Oracle database software, along with all applicable patches can help limit the possibilities for vulnerabilities in the software, the installation version and/or patches applied during setup should be established according to the needs of the organization. **Ensure you are using a release that is covered by a level of support that includes the generation of Critical Patch Updates.**

- https://workbench.cisecurity.org/files2121/download/2346/

General Data Protection Regulation

Oracle's Annual Release Roadmap Doc ID 742060.1
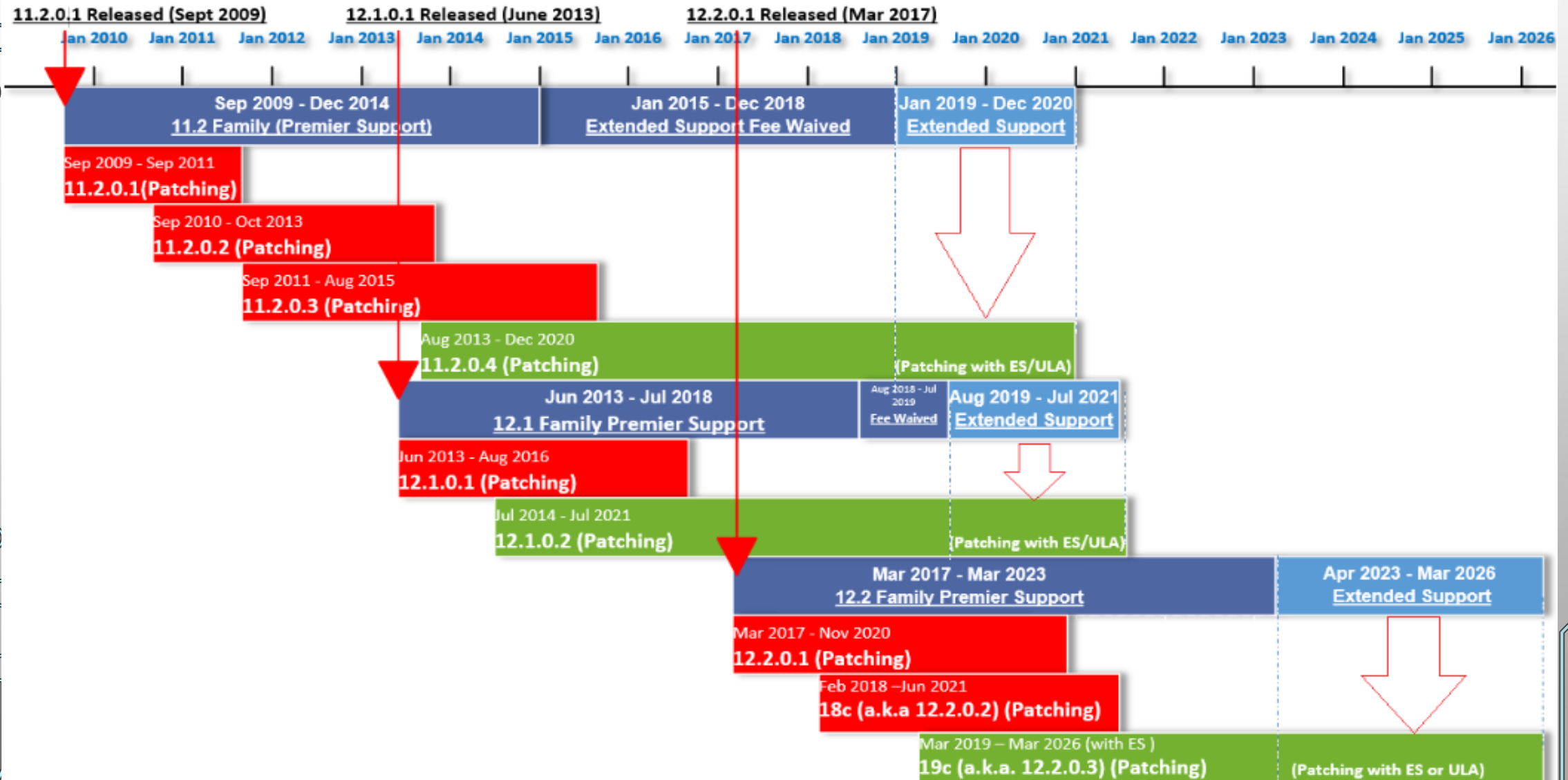
Patching Alternatives

Opatch
- In place
- Challenging error recovery
- Longer Outage window
- All databases in the Home have to be patched together
- Rollback challenging
- Requires less storage than out of place options
- *no extra licensing

Multi-tenancy
- Out of Place
- Unplug from old and plug into updated/ patched
- May require double the memory resources
- *Multi-Tenant license required

Fleet Patching and Provisioning..RHP
- Out of Place
- Gold Image Homes/ Standardization
- Minimal Outage window
- *LifeCycle License Required?

EM Fleet Maintenance
- Out of Place
- Version 1: Switch
- Version 2: Db software maintenance
- Gold Image Homes / Standardization
- Minimal Outage window
- Utilizes EM's deployment job system
- Scalable
- *LifeCycle License Required
- ** Deployment Procedures

Cloud DBaaS
- Cloud Provider applies Patches
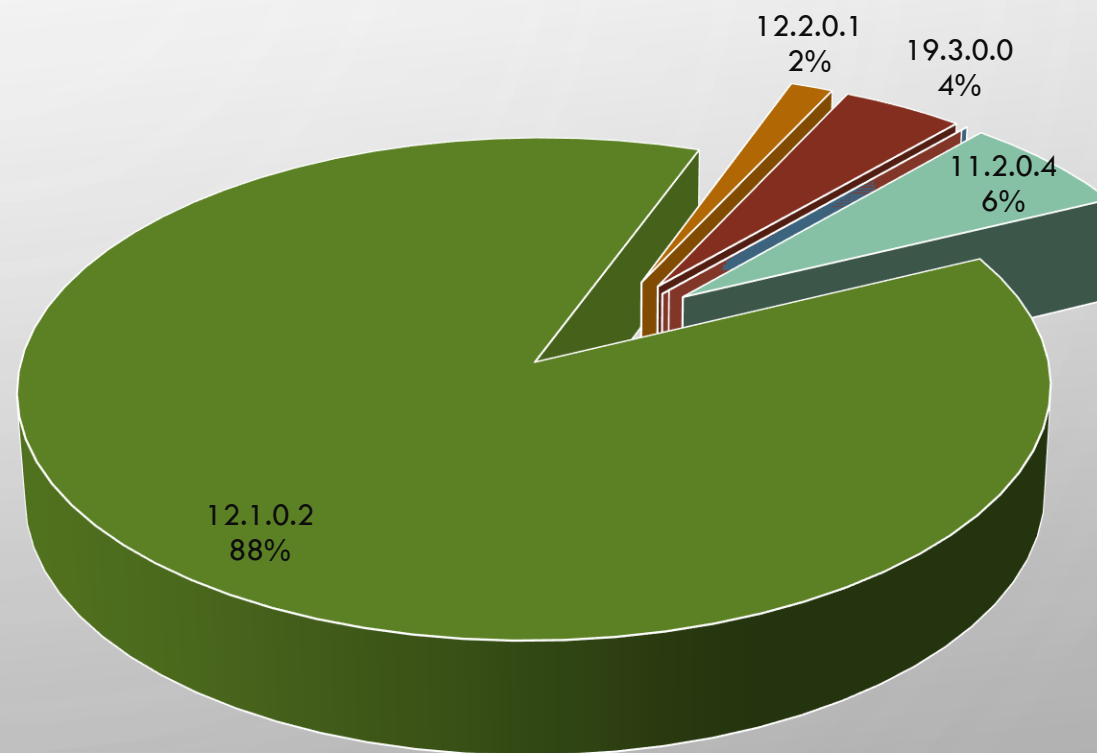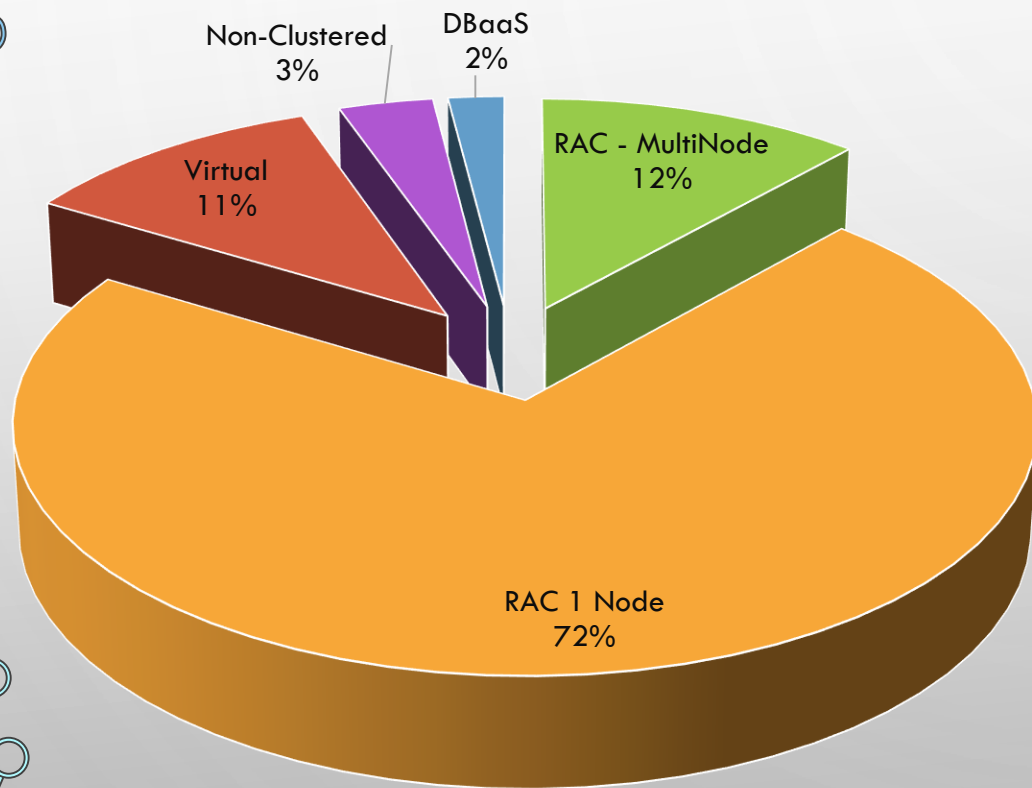
2014 Clustering Technologies vs DB Versions
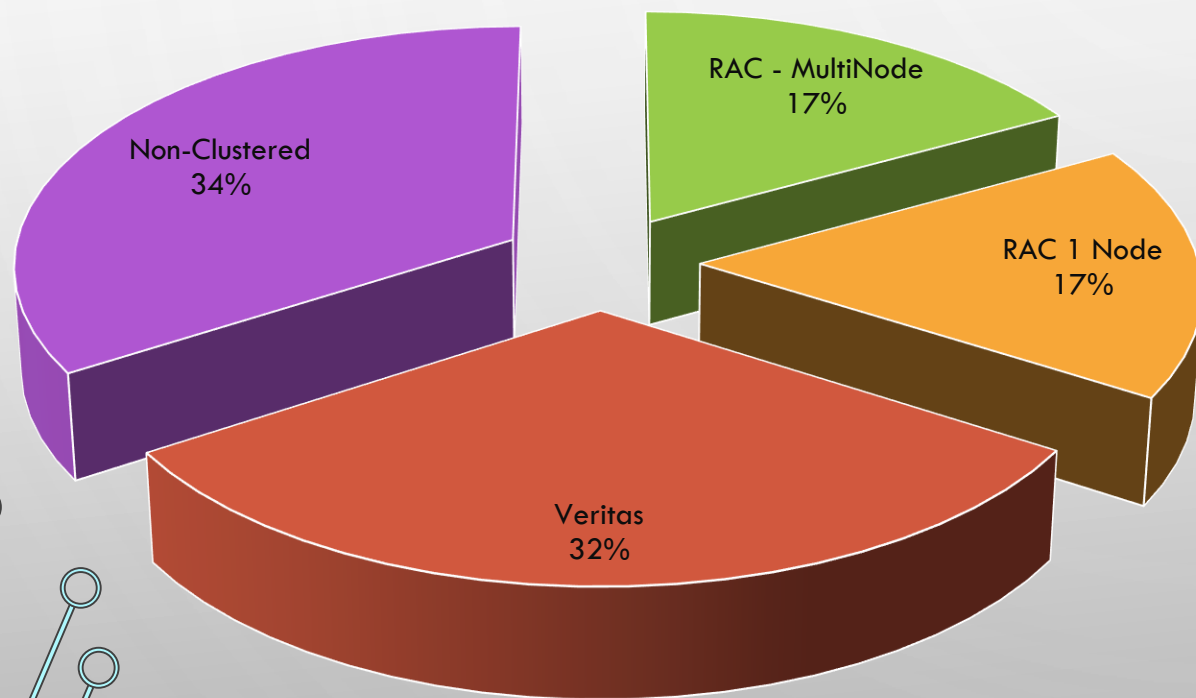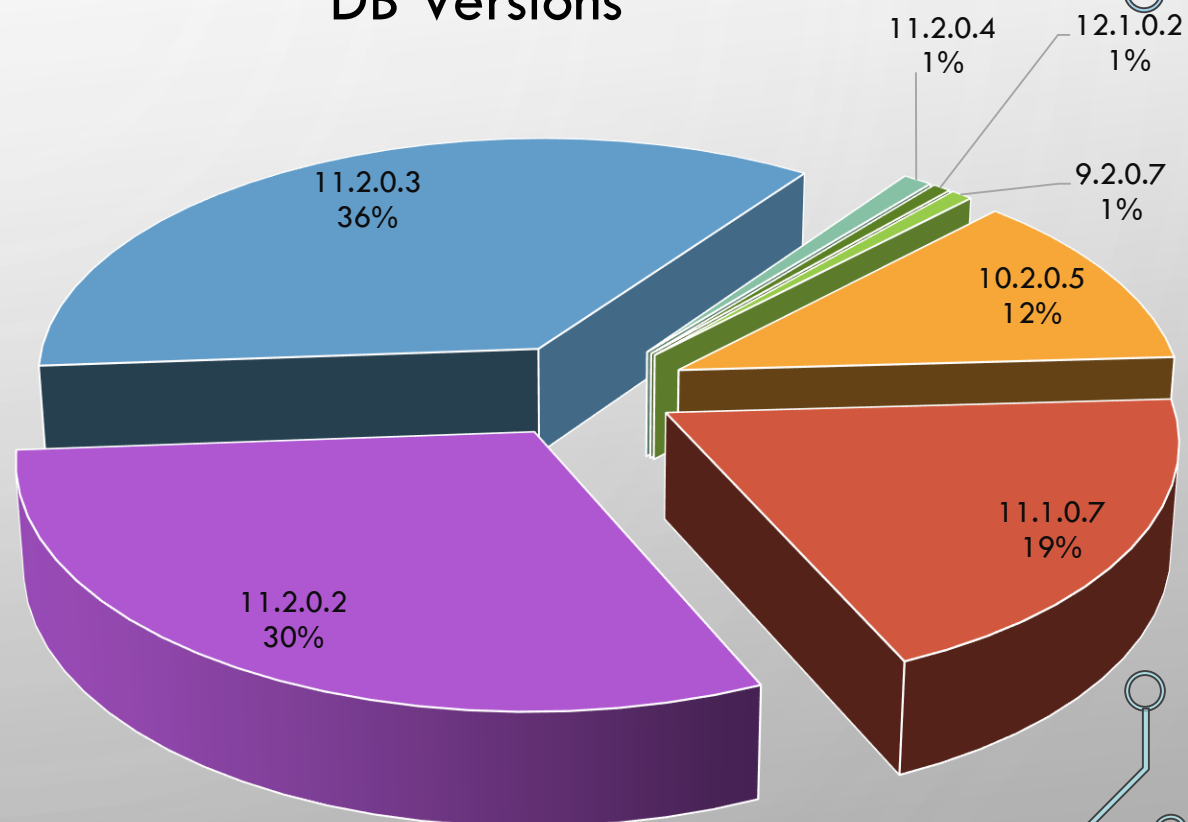
2019 Clustering Technologies vs DB Versions

Progress – Crawl, Walk, Run … Fly

2014   Gold Image Provision of Database Homes

2015   RAC Clusterware Upgrade from 11.2 to 12.1 (60)
            Some Database upgrades 11.2.0.2/3 to 11.2.0.4

2016   Q1 & Q2 Mandate ALL DB homes EM provisioned
            Mandate ALL RAC Clusters built with EM
            Continue upgrades 11.2.0.4 to 12.1.0.2
            Q3 & Q4 Patch 1033 databases using Switch Database

2017   2365 databases patched

2018   3376 databases patched
            All databases patched in 2nd quarter
            3rd Quarter moved from Switch to DB_Software_Maintenance

2019   1744 databases patched (so far)
            More Automation for clusterware (subscribe & deploy)
            Planned upgrade of 12.1 clusterware to 19.3 clusterware

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Quarterly Patching Windows

- Download Patches
- Create new Oracle Homes on our "Gold Image" servers
- Create Software Images of the new Oracle Homes
- Make the new "version" Current within the Gold Image
- Test & Validate Fleet processes in Sandbox Environment

3 Person Team:

- DBA – Scheduler / Database Patching
- DBA – EM Tester / Clusterware Patching
- EM – Administrator / Developer

PATCHING RESULTS

Databases Patched per Month
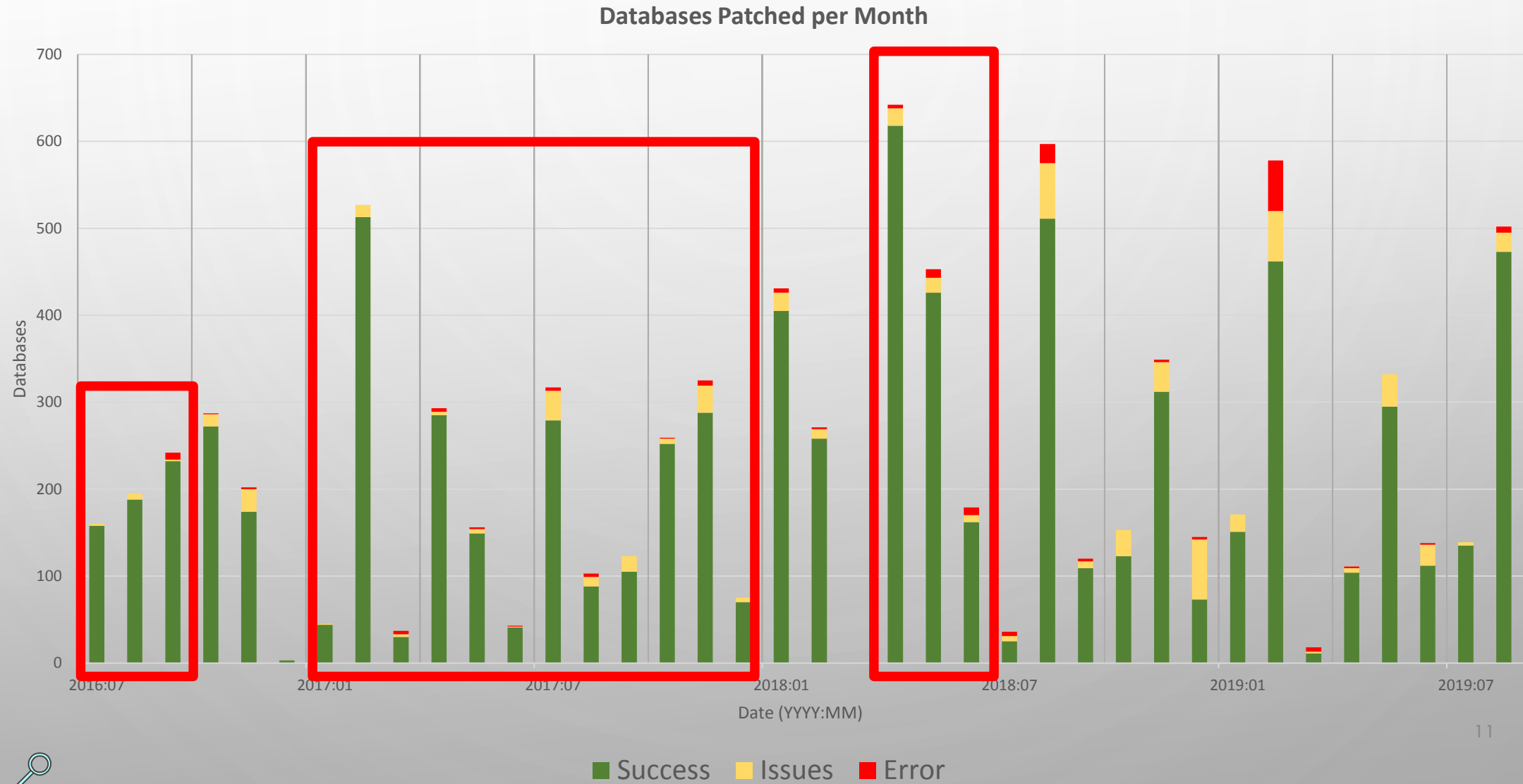
Stuff Happens

```
Running command /u01/app/oracle/12.1.0.2.171017/bin/sqlplus / as sysdba @/u01/home/oracle/agent/stage/1516806715732/prepatch.sql

SQL*Plus: Release 12.1.0.2.0 Production on Wed Jan 24 10:13:18 2018

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Connected to:
Oracle Database 12c Enterprise Edition Release 12.1.0.2.0 - 64bit Production
With the Partitioning, Automatic Storage Management, OLAP, Advanced Analytics
and Real Application Testing options

ORACLE instance shut down.
ORA-32004: obsolete or deprecated parameter(s) specified for RDBMS instance
ORACLE instance started.

Total System Global Area 2835349504 bytes
Fixed Size                  2928440 bytes
Variable Size            2197815496 bytes
Database Buffers          620756992 bytes
Redo Buffers               13848576 bytes
Database mounted.
Database opened.
Disconnected from Oracle Database 12c Enterprise Edition Release 12.1.0.2.0 - 64bit Production
With the Partitioning, Automatic Storage Management, OLAP, Advanced Analytics
and Real Application Testing options

Error code is -1 [ERROR] - Error occured while executing /u01/home/oracle/agent/stage/1516806715732/prepatch.sql

Deleted temporary destination directory /u01/home/oracle/agent/stage/JOB_638810C2BD91358CE053AEB718AC13A7
Process returned : 1.
```

Software Standardization Advisor

Targets →Databases→Administration→Software Standardization Advisor
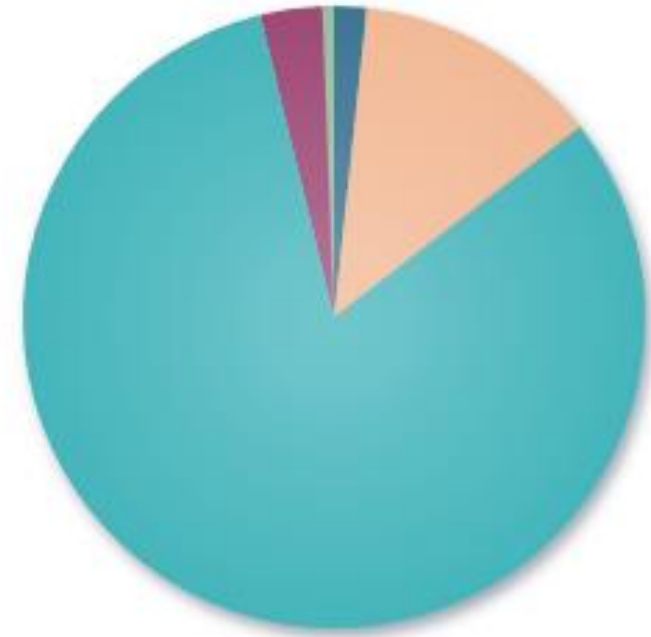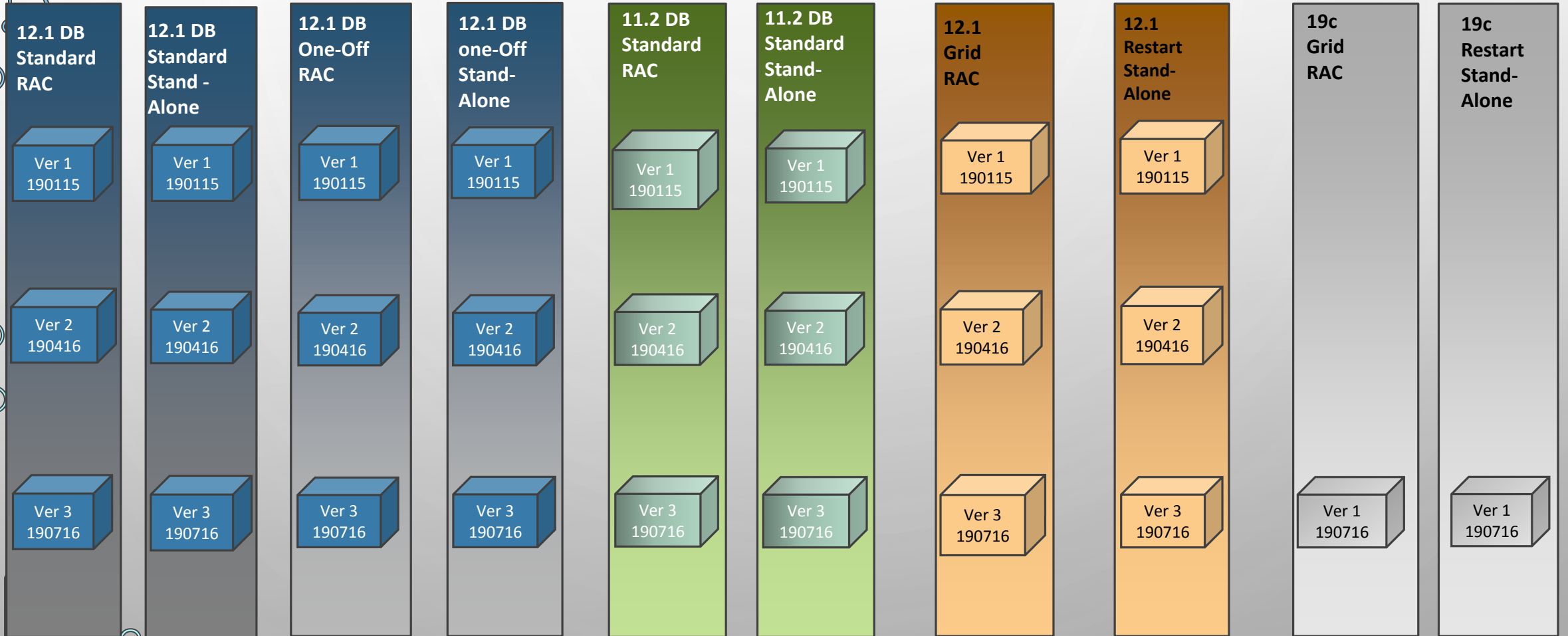
DB Software Maintenance
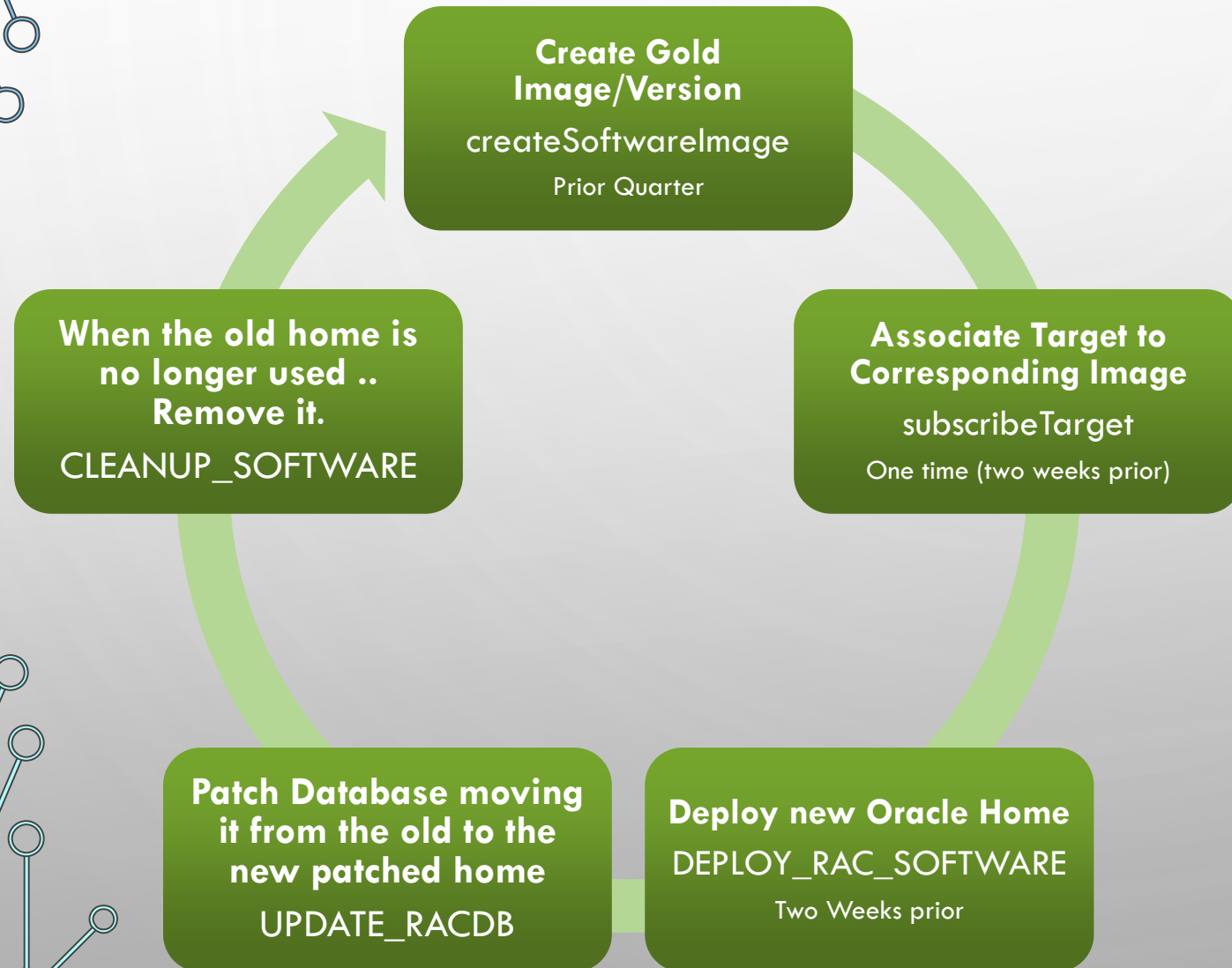
Db_Software_Maintenance

- createSoftwareImage
- subscribeTarget
- checkApplicability
- performOperation
  - DEPLOY_GI_SOFTWARE
  - UPDATE_GI
  - DEPLOY_DB_SOFTWARE
  - UPDATE_DB
  - DEPLOY_RAC_SOFTWARE
  - UPDATE_RACDB
  - DEPLOY_CDB
  - ATTACH_CDB
  - ROLLBACK_DB …RACDB ..GI
  - CLEANUP_SOFTWARE

Create Gold Image/Version
createSoftwareImage
Prior Quarter

Associate Target to Corresponding Image
subscribeTarget
One time (two weeks prior)

Deploy new Oracle Home
DEPLOY_RAC_SOFTWARE
Two Weeks prior

Patch Database moving it from the old to the new patched home
UPDATE_RACDB

When the old home is no longer used .. Remove it.
CLEANUP_SOFTWARE

Gold Image Version – LINEAGE/Swim Lanes

Procedure Activity Monitoring

Our Automation Leveraging Db Software Maintenance

~~Best~~ Helpful Practices – Part 1

- "Oracle Database Fleet Maintenance" Reference Manual: https://bit.ly/2S4FZsz

- Create Global Credentials (Sys, Oracle, Privileged Account)
  - A Private role can be given access to these credentials … Then the role granted to DBA's

- Set the preferred credentials on accounts doing provisioning and patching

- Change your staging location (emStageDir) from /tmp (Doc ID 1610321.1)

- Ensure your oraInst.loc are correct .. Especially in the Home and /etc

- Ensure your cluster/has/database EM target properties are correct

- Clean up your EM Oracle Home Targets…. Add missing, delete decommed

- Grant access to all DBA's to look at the procedure activity of others.
  - EM Resource Privileges --> Job System -->Edit any procedure configuration

- Ensure your Oracle base can hold at least 3 homes (current, future, unzip)

~~Best~~ Helpful Practices – Part 2

- Study/Use the gold agent provisioning …

- EMCLI commands: Switch_database, Switch_GI, → Db_Software_Maintenance

- Establish a clearly defined cycle
  - A cycle ends/begins when the next version is made current

- Pick a model for subscribes and deploys
  - Mass operation at beginning of cycle or Just-in-Time.   Each has pros and cons.

- Have a directory naming convention to make versions obvious
  - …../12.1.0.2.190416
  - …../12.1.0.2.190416-oneoff
  - …../19.3.0.0.190416

- EM Book Keeping … Associations … Oracle Home to Target .. "Installed At"

- Keep track of errors as you encounter them … You may be hitting them each cycle.

~~Best~~ Helpful Practices – Part 3

- Clean up Software … (default 3 homes) Set to 1.

  - emctl set property -name oracle.sysman.emInternalSDK.db.gis.lineageLength

  - NEW .. Ability to delete home by home name.

- Have a development EM install …. Test out new Patches… Stay current.

  - Base Product patch (quarterly)

  - Plugin Bundle patch (monthly)

  - Agent Patch

  - Weblogic (quarterly)

- New Ability to move Gold Images between EM systems.

- Lineage: Rare but occasional problems (Doc ID 2346150.1)

EMCLI

db_software_maintenance -subscribeTarget

Creates new target or modifies the target subscription.

Format

emcli db_soft
    -targe
    -targe
    -imag

```
[Configuration]

[Report01]
instance=dbxyz
user=useridxyz
password=@{oracle/useridxyz}@
sql= select target_name, target_type, oem_patching.get_instance_image_id(seq_id) ......
where window_start_date > sysdate and window_start_date < sysdate +14
 minus
select target_name, target_type, image_id from GP_DB_GI_SUBSCRIPTIONS
..... order by 1
format=./emcli db_software_maintenance -subscribeTarget -target_name="%s" -target_type=%s -image_id=%s
```

Questions ???