ORACLE

Upgrade and migrations

21c New Features

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Photo by Samuel Ferrara on Unsplash

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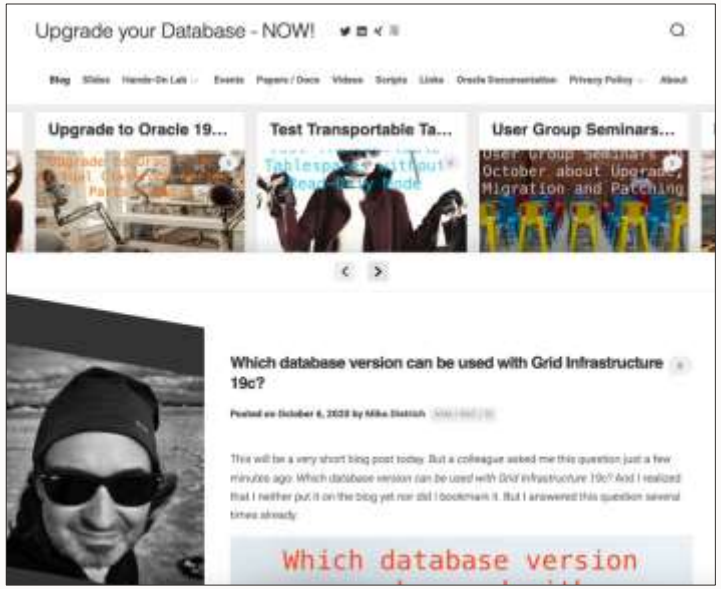
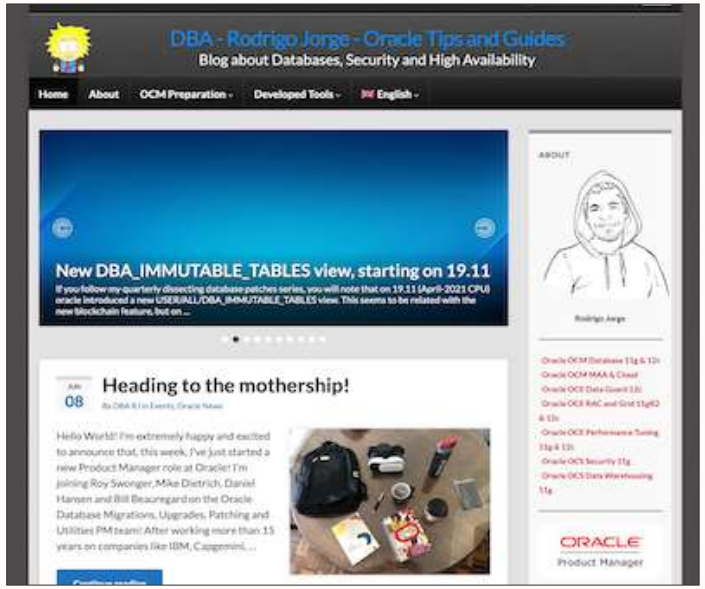


https://www.dbarj.com.br/en



https://DOHdatabase.com

NEW Episode 1

Release and Patching Strategy

105 minutes – Feb 4, 2021

NEW Episode 2

AutoUpgrade to Oracle Database 19c

115 minutes – Feb 20, 2021

NEW Episode 3

Performance Stability, Tips and Tricks and Underscores

120 minutes – Mar 4, 2021

NEW Episode 4

Migration to Oracle Multitenant

120 minutes – Mar 16, 2021

NEW Seminar 5

Migration Strategies – Insights, Tips and Secrets

120 minutes – Mar 25, 2021

NEW Seminar 6

Move to the Cloud – Not only for techies

115 minutes – Apr 8, 2021

NEW Episode 7

Cool Features – Not only for DBAs

110 minutes – Jan 14, 2021

NEW Episode 8

Database Upgrade Internals – and so much more

Recorded Web Seminars

https://MikeDietrichDE.com/videos/

https://dohdatabase.com/webinars/

Upgrade

Checksum

Resume Parallel

Fast Deploy

Unplug Plug

Data Guard

Restore

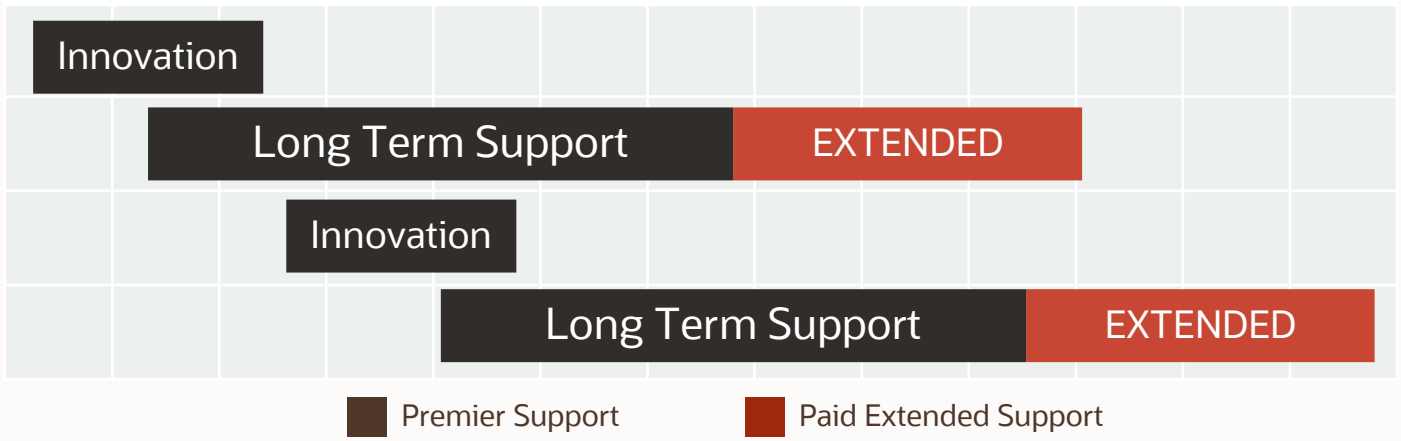
Upgrade | Release Types

Long Term Support Release

- 5 years of Premier Support followed by 3 years of Extended Support

Innovation Release

- 2 years of Premier Support, but there is no Extended Support

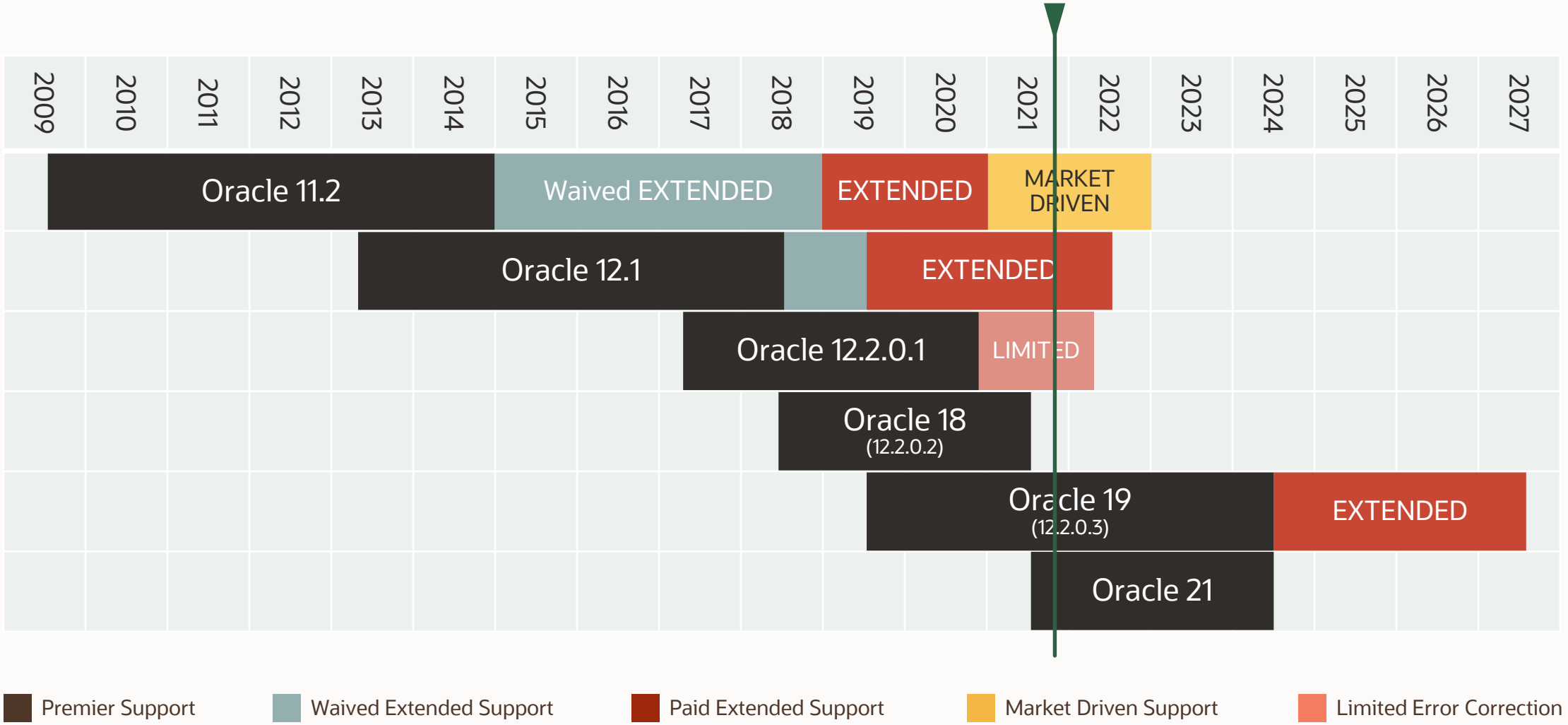


Recommendation: Production environments should go from LTS to LTS

Upgrade | Pro Tip

Move production databases
from one Long Term Support release to the next

Upgrade | Lifetime Support Policy

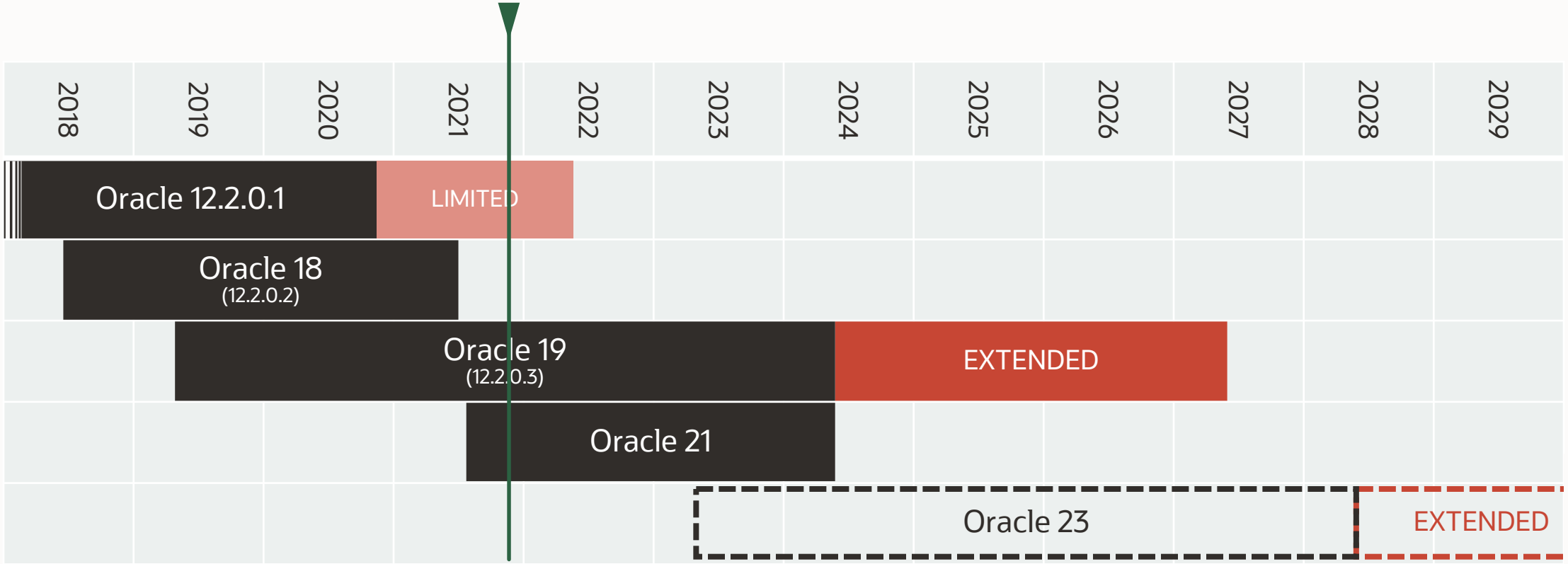


Upgrade | Lifetime Support Policy

Different Support Periods

Premier Support	Bug fixing support regardless of severity
Paid Extended Support	Extra cost extension, 10% / 20% extra cost Included in ULA/PULA contracts
Waived Extended Support	Extended support gets waived to everybody having a valid Support contract for the product
Market Driven Support	Extra cost extension after Extended Support Fixes done only for critical and security issues
Limited Error Correction	Extension for Oracle 12.2.0.1 at no extra cost Only applicable for Sev.1 and security issues
Sustaining Support	Oracle Support assists as long as the customer is using the product – but no new fixes will be delivered

Upgrade | Oracle Database 12.2 and beyond



- MOS Note:742060.1 - The Single Source of Truth
- MOS Note:161818.1 - Releases Support Status Summary

Upgrade | AutoUpgrade

AutoUpgrade is fully backwards compatible.
AutoUpgrade v. 21 can also upgrade databases to previous releases

Pro tip: Use `autoupgrade.jar -version` to get a list of supported releases

Upgrade

Checksum

Resume Parallel

Fast Deploy

Unplug Plug

Data Guard

Restore

Data Pump | Checksum

Calculate the checksum of dump files on export, and verify the integrity of dump files on import

Data Pump | Checksum

What can happen to a dump file when it is transferred?

- Tampering
- Corruption

Pro tip: Corruptions usually manifests as `ORA-31693`, `ORA-29913` or `ORA-29104`

Data Pump | Checksum

How to detect corruption or alteration?

```
[oracle@hol]$ md5sum metal*.dmp



5edf66ed92086b4f69580fc27b75f662  metal_01.dmp
59eb25ff2a0f648c051a9212e0861979  metal_02.dmp
29951a56abe074d9151c27728d88e9eb  metal_03.dmp
c8860e7a71e74f8013068240b598c116  metal_04.dmp
0d05d258e4b501c657cd9490b7e48715  metal_05.dmp
1e367394a31e2ce45d2aeb6a3d4f9507  metal_06.dmp
9c276aa580c0e57c0829f274d04d15de  metal_07.dmp
0d560d0ce57c47425424e17604d8ec49  metal_08.dmp
```

```
SQL> select object_name, checksum
     from dbms_cloud.list_objects(
          '<credential_name>',
          '<location_uri>');

metal_01.dmp 5edf66ed92086b4f69580fc27b75f662
metal_02.dmp 59eb25ff2a0f648c051a9212e0861979
metal_03.dmp 29951a56abe074d9151c27728d88e9eb
metal_04.dmp c8860e7a71e74f8013068240b598c116
metal_05.dmp 0d05d258e4b501c657cd9490b7e48715
metal_06.dmp 1e367394a31e2ce45d2aeb6a3d4f9507
metal_07.dmp 9c276aa580c0e57c0829f274d04d15de
metal_08.dmp 0d560d0ce57c47425424e17604d8ec49
```

- Windows: `Get-FileHash *.dmp -Algorithm MD5`

Data Pump | Checksum

Data Pump can calculate checksum on export

```
$ expdp system directory=dmpdir ... checksum_algorithm=sha384
```

Verify dump file integrity on import

```
$ impdp system directory=dmpdir ... verify_only=yes


$ impdp system directory=dmpdir ... verify_checksum=yes
```

Pro tip: Multiple checksum algorithms are available

Upgrade

Checksum

Resume Parallel

Fast Deploy

Unplug Plug

Data Guard

Restore

Transportable Tablespace | Resume

Transportable tablespace jobs are resumable

Transportable Tablespace | Parallel

Transportable tablespace jobs are faster

Transportable Tablespace | Parallel

```
$ expdp ... dumpfile=exp%L.dmp parallel=8 transport_tablespaces=...

$ impdp ... dumpfile=exp%L.dmp parallel=8 transport_tablespaces=...
```

Pro tip: For optimal performance use multiple dump files

Transportable Tablespace | Parallel

If the export was made on a lower version,
it is still possible to import
in parallel in Oracle Database 21c

Pro tip: Imports over a database link does not go parallel

Upgrade

Checksum

Resume
Parallel

**Fast
Deploy**

Unplug
Plug

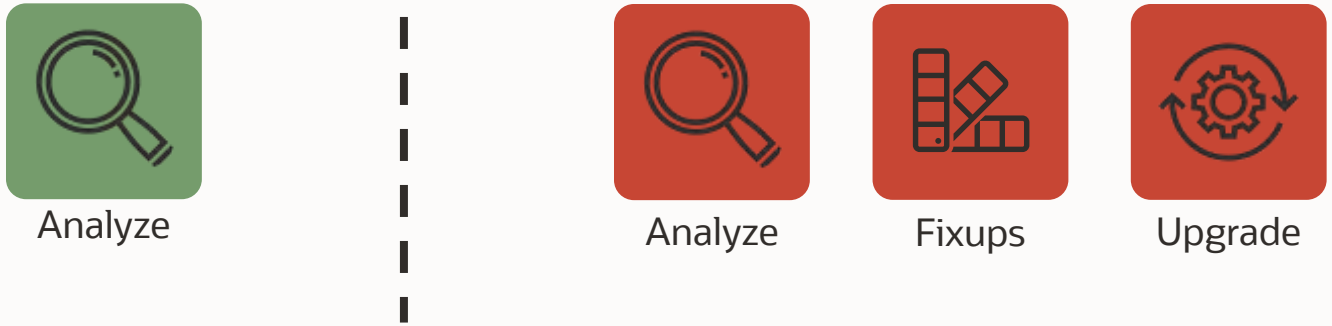
Data
Guard

Restore

Fast Deploy | Overview

Upgrade with less downtime by running preupgrade fixups in advance

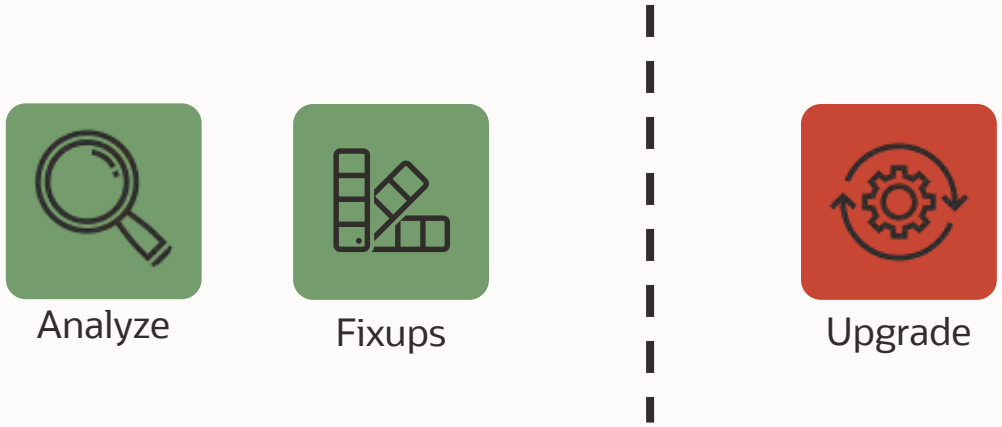
Fast Deploy | Traditional




```
$ java -jar autoupgrade.jar -mode analyze

$ java -jar autoupgrade.jar -mode deploy
```

Fast Deploy | Faster




```
$ java -jar autoupgrade.jar -mode analyze
$ java -jar autoupgrade.jar -mode fixups

$ java -jar autoupgrade.jar -mode upgrade
```

Fast Deploy | Caution

Between fixups and downtime there is a risk that new, undetected issues are introduced

Pro tip: Blog post with more details

Upgrade

Checksum

Resume Parallel

Fast Deploy

Unplug Plug

Data Guard

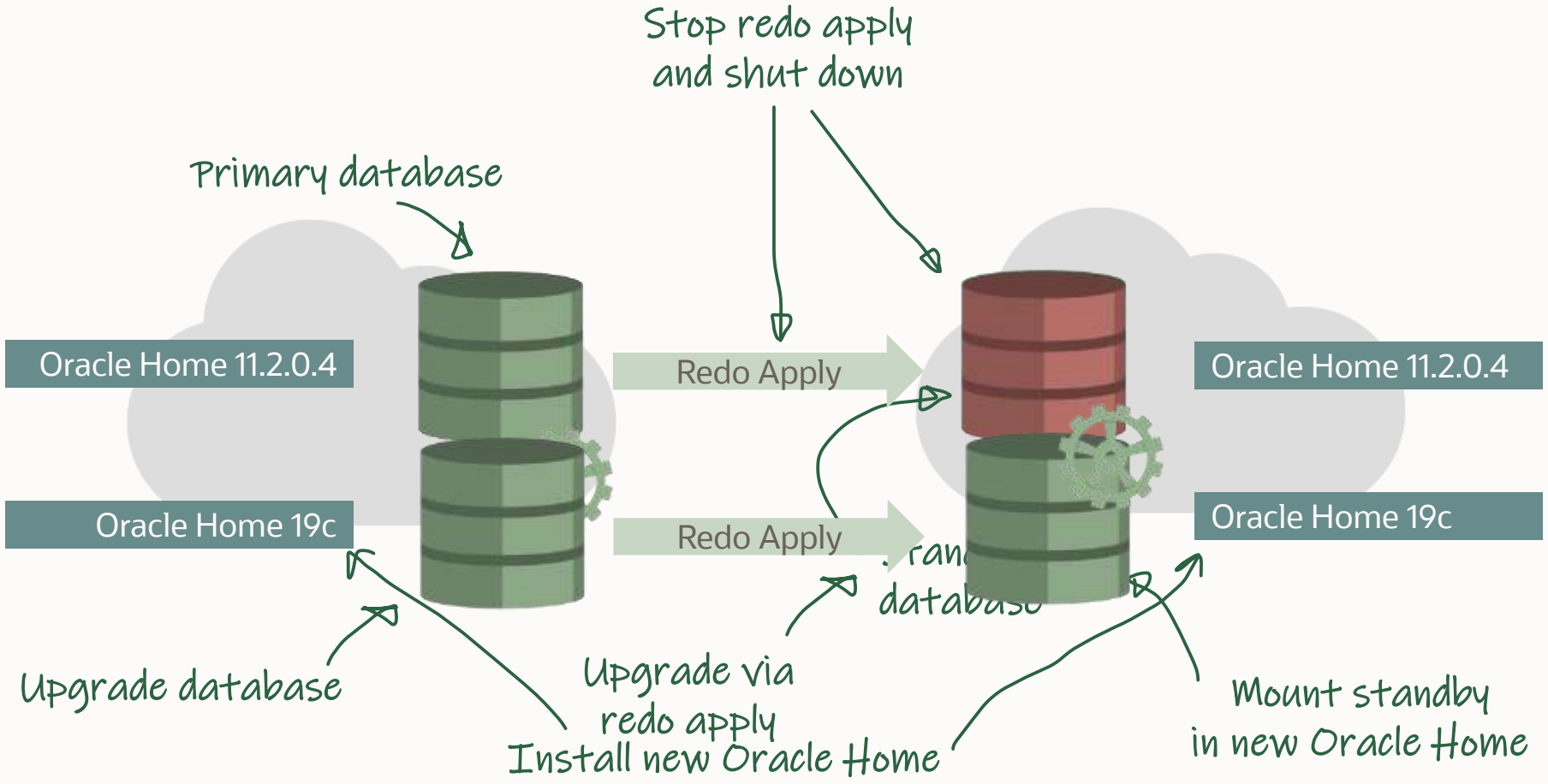
Restore

Data Guard | Overview

AutoUpgrade detects presence of Data Guard, and takes care of the primary database

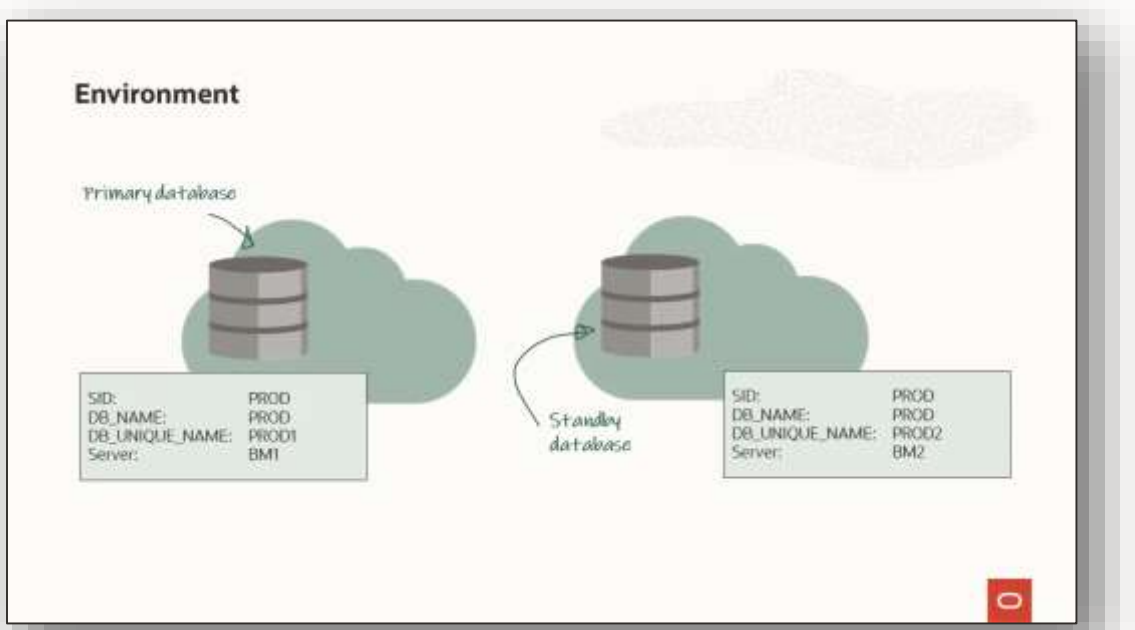
Pro tip: Works for broker managed and manual Data Guard environments

Data Guard | Concept



Remember use latest
Release Update

Data Guard | AutoUpgrade



Watch on YouTube

AutoUpgrade | Data Guard

MAA Approach

- Keep standby online during upgrade
- Allows for faster go-live after upgrade
- Move standby database to new Oracle Home before upgrade
- Keep redo transport and redo apply on during upgrade

Pro tip: More details in blog post and YouTube video

Upgrade

Checksum

Resume
Parallel

Fast
Deploy

Unplug
Plug

Data
Guard

Restore

Restore | Overview

AutoUpgrade can now revert a database upgrade

Restore | AutoUpgrade

Use AutoUpgrade to:

- Flashback the database
- Revert a plug-in operation (only when data files are copied)
- Revert a non-CDB to PDB conversion (only when data files are copied)

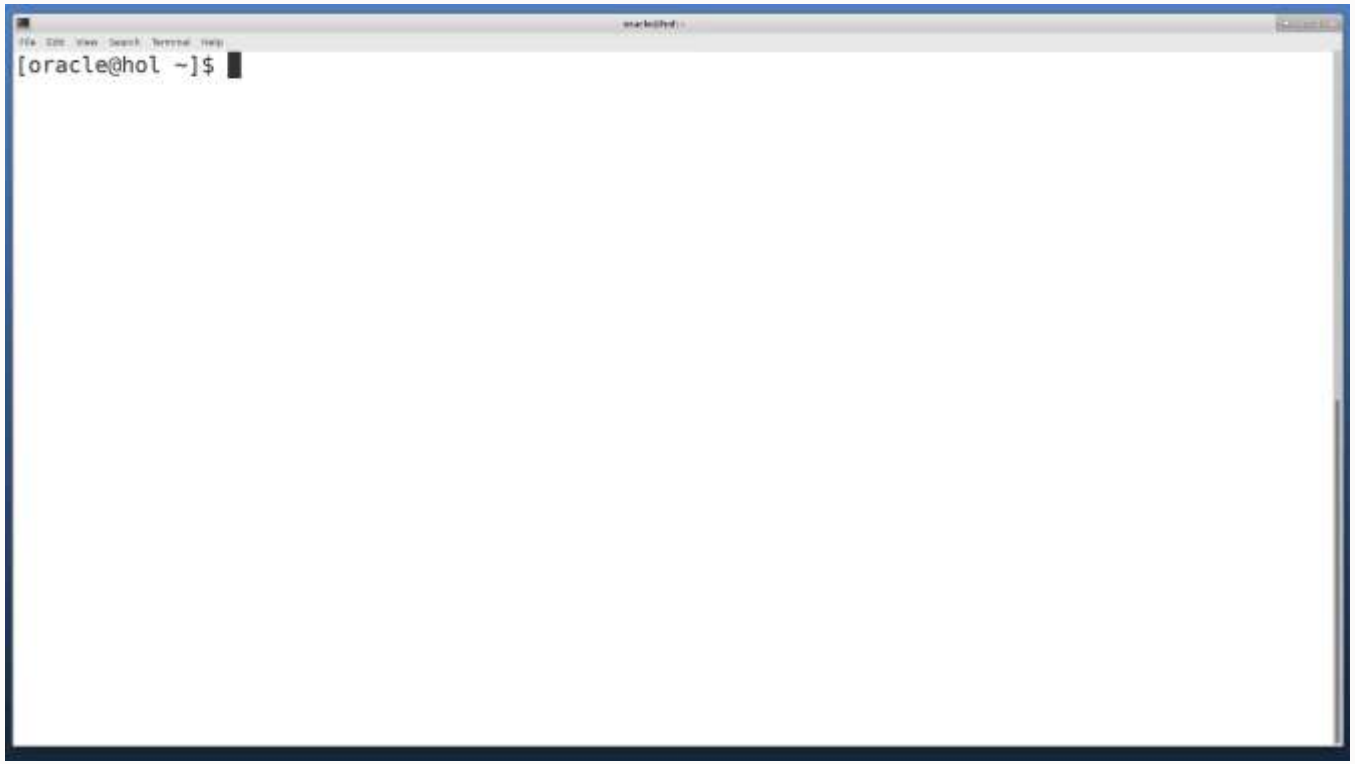
Restore | Command

```
$ java -jar autoupgrade.jar -restore -jobs n
```

Restore | Flashback Database

Pre Upgrade Environment	Post Upgrade Environment
`CREATE RESTORE POINT grpt GUARANTEE FLASHBACK DATABASE;`	
UPGRADE	
	`SHUTDOWN IMMEDIATE`
	`STARTUP MOUNT;`
	`FLASHBACK DATABASE TO RESTORE POINT grpt;`
	`SHUTDOWN IMMEDIATE`
`STARTUP MOUNT;`	
`ALTER DATABASE OPEN RESETLOGS;`	
`DROP RESTORE POINT grpt;`	

Restore | Demo



Watch on YouTube

AutoUpgrade | Restore

AutoUpgrades handles everything, including

- `/etc/oratab`
- Clusterware registration
- Moving files
  - PFile
  - SPFile
  - Password file
  - Etc.

Pro tip: If restoring a primary database, you must manually handle the standby database

Upgrade

Checksum

Resume
Parallel

Fast
Deploy

**Unplug
Plug**

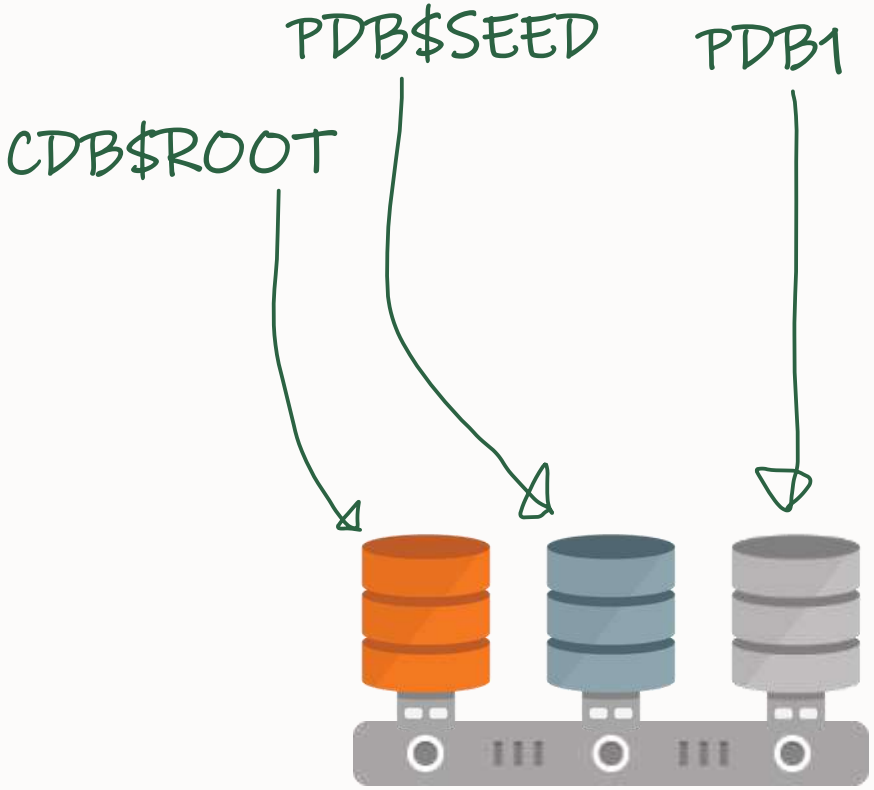
Data
Guard

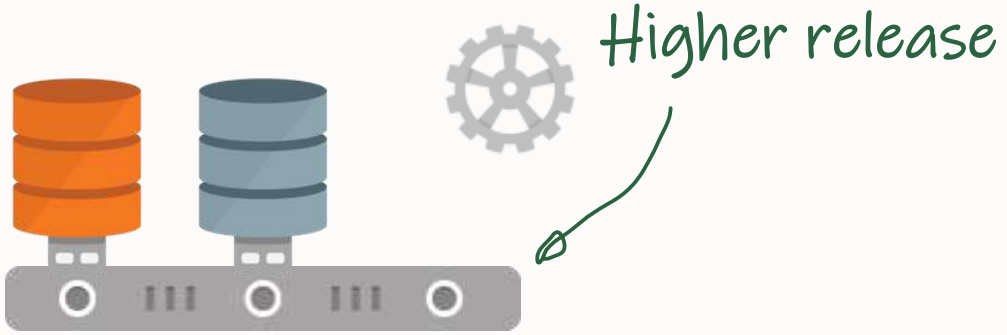
Restore

Unplug-Plug | Overview

AutoUpgrade can now perform unplug-plug upgrades

Unplug-Plug | Concept





Unplug-Plug | AutoUpgrade

Fully automated unplug-plug upgrade

```
upg1.source_home=/u01/app/oracle/product/12.2
upg1.target_home=/u01/app/oracle/product/19
upg1.sid=CDB1
upg1.pdbs=PDB1
upg1.target_cdb=CDB2
```

Command

```
java -jar autoupgrade.jar -config DB19.cfg -mode deploy
```

Pro tip: The CDB must be created in advance

Unplug-Plug | AutoUpgrade

Flashback Database doesn't work for unplug-plug upgrade, and the existing data files are re-used

Unplug-Plug | AutoUpgrade

Fully automated unplug-plug upgrade - data files are copied

```
upg1.source_home=/u01/app/oracle/product/12.2
upg1.target_home=/u01/app/oracle/product/19
upg1.sid=CDB1
upg1.pdbs=PDB1
upg1.target_cdb=CDB2
upg1.target_pdb_copy_option.PDB1=file_name_convert=NONE
```

Command

```
java -jar autoupgrade.jar -config DB19.cfg -mode deploy
```


Unplug-Plug | AutoUpgrade

Fully automated unplug-plug upgrade - data files are copied

```
upg1.source_home=/u01/app/oracle/product/12.2
upg1.target_home=/u01/app/oracle/product/19
upg1.sid=CDB1
upg1.pdbs=PDB1
upg1.target_cdb=CDB2
#upg1.target_pdb_copy_option.PDB1=file_name_convert=NONE
upg1.target_pdb_copy_option.PDB1=file_name_convert=('CDB1','CDB2')
```

Command

```
java -jar autoupgrade.jar -config DB19.cfg -mode deploy
```


Unplug-Plug | AutoUpgrade

But it takes time to copy the data files

Unplug-Plug | AutoUpgrade

And the target CDB is located on a different host

Unplug-Plug | Refreshable Clone PDB

COMING SOON!
Upgrade via refreshable clone PDB

Unplug-Plug | Refreshable Clone PDB

Clone User

```
CREATE USER c##borg
IDENTIFIED BY oracle
DEFAULT TABLESPACE users
TEMPORARY TABLESPACE temp
CONTAINER=ALL;
```

```
GRANT
CREATE SESSION,
CREATE PLUGGABLE DATABASE,
SELECT_ANY_CATALOG
TO c##borg
CONTAINER = ALL;
```

Unplug-Plug | Refreshable Clone PDB

Database link into source PDB

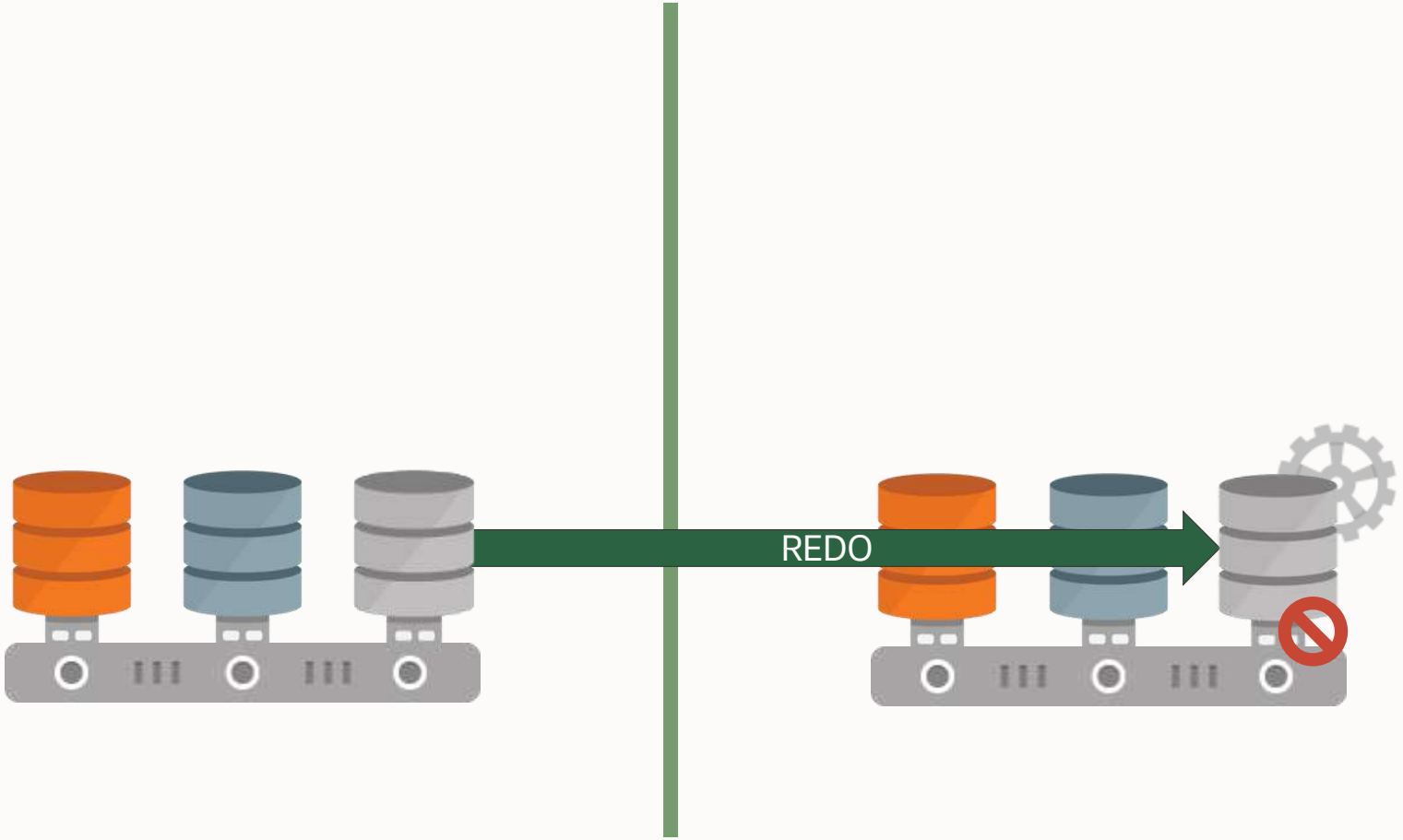
```
CREATE DATABASE LINK clonePDB1
CONNECT TO c##borg
IDENTIFIED BY oracle
USING 'tns-or-ezconnect';
```

Unplug-Plug | Refreshable Clone PDB

Fully automated relocation with upgrade

```
upg1.source_home=/u01/app/oracle/product/12.2
upg1.target_home=/u01/app/oracle/product/19
upg1.sid=CDB1
upg1.pdbs=PDB1
upg1.target_cdb=CDB2
upg1.source_dblink.PDB1=clonePDB1 600
```

Unplug-Plug | Refreshable Clone PDB



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AUTOUPGRADE DEEP DIVE

KSAOUG (Saturday 23 October)

LVOUG (Thursday 28 October)

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