

ORACLE

Upgrade to Oracle Database 19c

From Zero To Hero

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<https://dohdatabase.com/slides>

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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>





Release and Patching Strategy

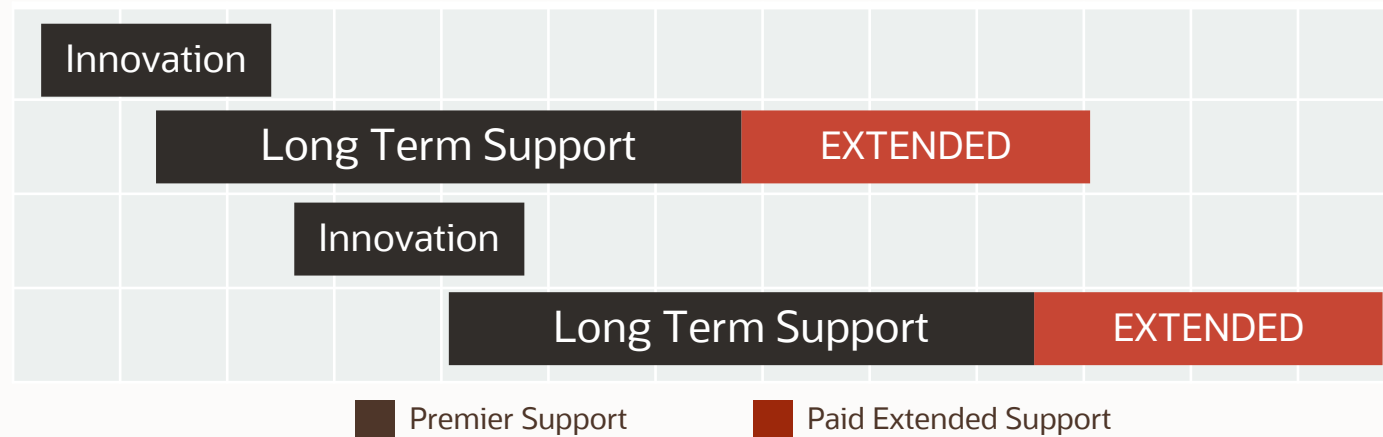
Release Types | Long Term Support vs Innovation Releases

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

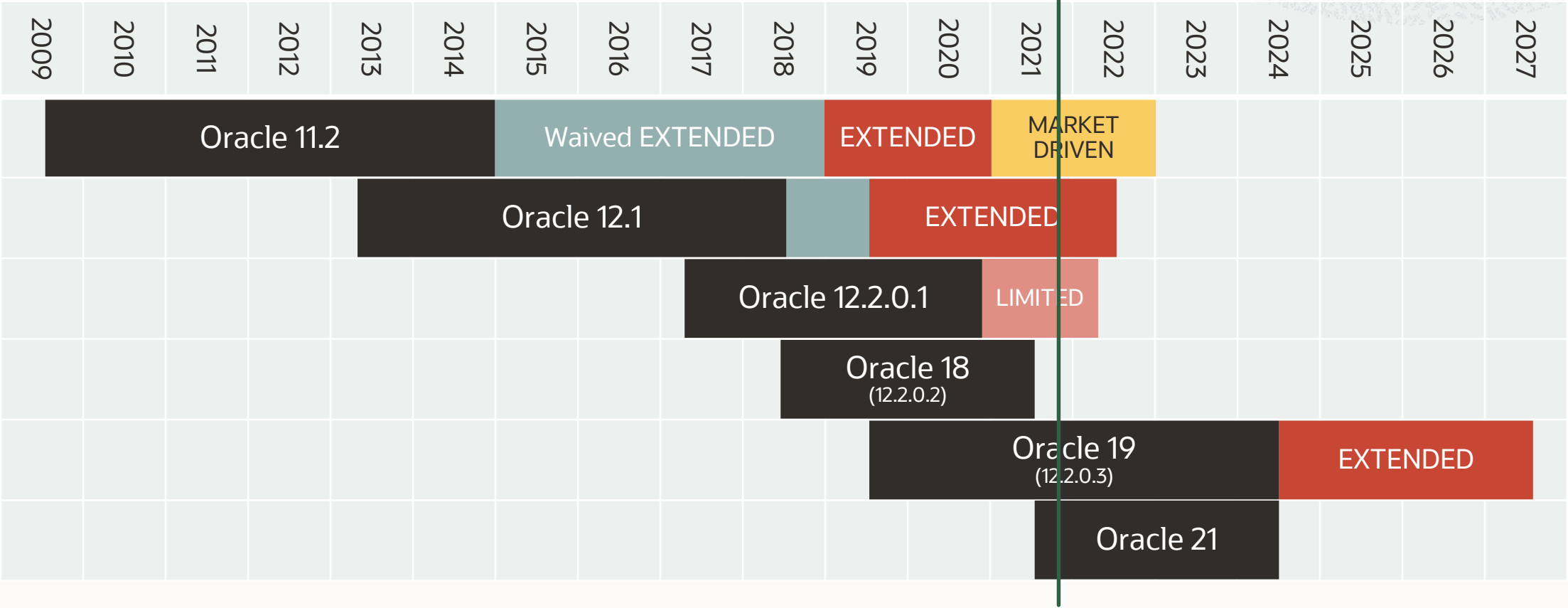


Recommendation: Production environments should go from LTS to LTS



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

Lifetime Support Policy



Premier Support

Waived Extended Support

Paid Extended Support

Market Driven Support

Limited Error Correction



Lifetime Support Policy

Different Support Periods

- Premier Support
- Paid Extended Support
- Waived Extended Support
- Market Driven Support
- Limited Error Correction
- Sustaining Support

Bug fixing support regardless of severity

Extra cost extension, **10% / 20% extra cost**
Included in ULA/PULA contracts

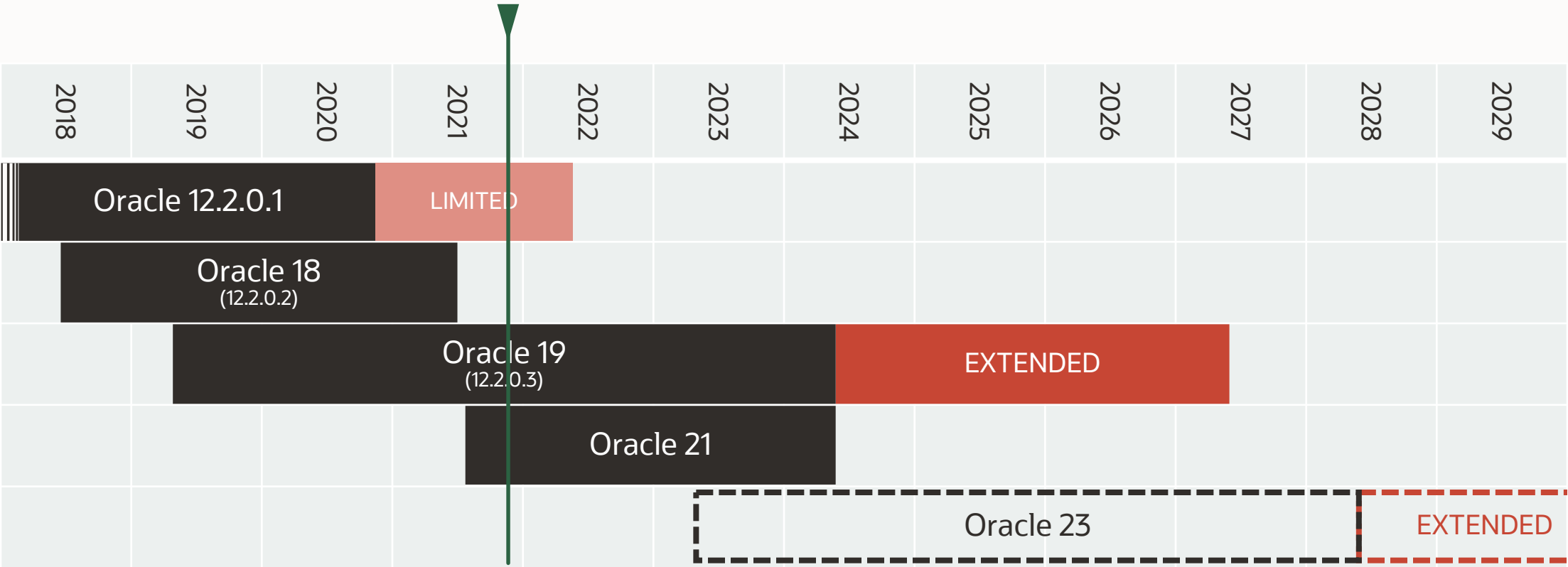
Extended support gets waived to everybody
having a valid Support contract for the product

Extra cost extension after Extended Support
Fixes done only for critical and security issues

Extension for Oracle 12.2.0.1 at **no extra cost**
Only applicable for Sev.1 and security issues

Oracle Support assists as long as the customer
is using the product – but no new fixes will be delivered

Oracle Database 12.2 and beyond



- [MOS Note:742060.1](#) - The Single Source of Truth
- [MOS Note:161818.1](#) - Releases Support Status Summary





Photo by Jose Fontano on Unsplash

Security

The most important reason
to upgrade and patch

Security | Do We Really Need To Say This?

Source: <https://www.nytimes.com/2019/07/22/business/equifax-settlement.html?module=inline>

[nytimes.com](https://www.nytimes.com)

Equifax to Pay at Least \$650 Million in Largest-Ever Data Breach Settlement

By Stacy Cowley

"My database is not facing the internet"



92%

of malware gets
delivered via email



Upgrade to Oracle Database 19c



your key to

Successful Database Upgrades

Step 1

Download and
install **Oracle 19c**

[eDelivery.oracle.com](https://edelivery.oracle.com)

Step 2

Download and
install **newest RU**

MOS Note: 2118136.2

Step 3

Download and use
AutoUpgrade

MOS Note: 2485457.1

Step 4

Performance Stability
with SPM, STA and RAT

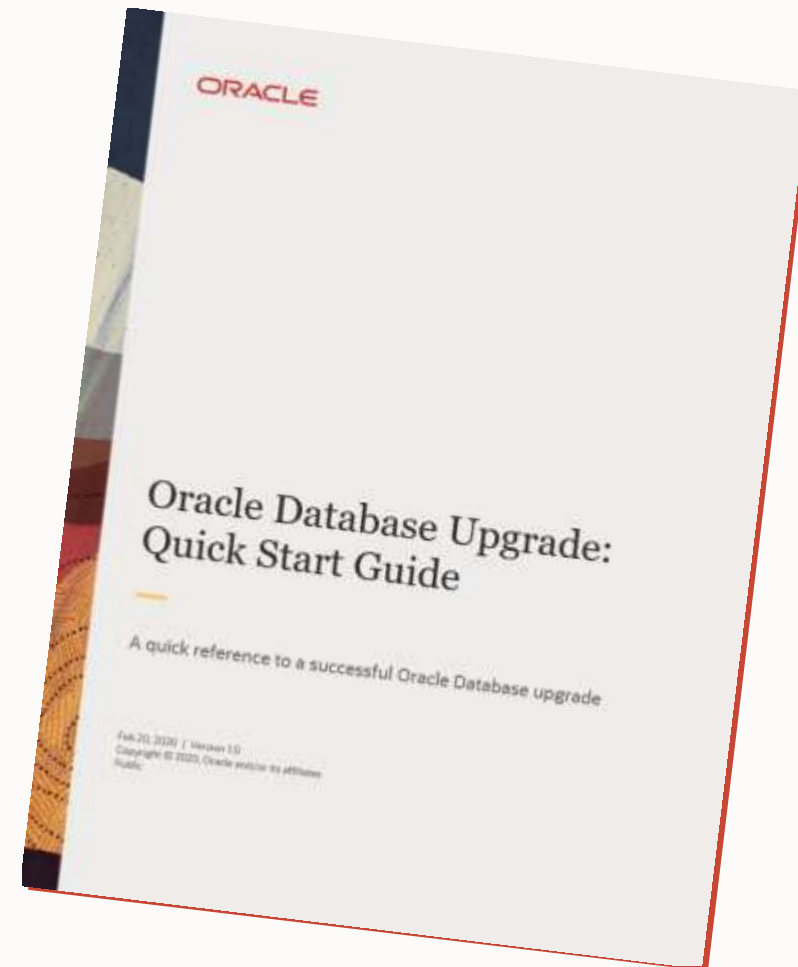


Get started | Quick Start Guide

Simple overview


Read it, try it





Download from [oracle.com](https://www.oracle.com)



Patch Download Assistant | Find the newest RU

Always use the Patch Download Assistant note [MOS Note: 2118136.2](#)

 **Assistant: Download Reference for Oracle Database/GI Update, Revision, PSU, SPU(CPU), Bundle Patches, Patchsets and Base Releases (Doc ID 2118136.2)** [To Bottom](#)

Selection(s)	Solution(s)
<p>What would you like to download?</p> <ul style="list-style-type: none"><input type="radio"/> Oracle Database Base Releases<input type="radio"/> Oracle Database Patchsets<input type="radio"/> Oracle Database Updates (Versions 12.2 & higher)<input type="radio"/> Oracle Database Update Revisions (Versions 12.2 & higher)<input type="radio"/> Oracle Database PSU, SPU(CPU), Bundle Patches (Versions 12.1 & lower)<input type="radio"/> OJVM Update/PSU/Bundle Patches<input type="radio"/> Latest Available Microsoft Windows Patches	<p>Possible Solutions will appear once you make your selection.</p>

Most Important Fixes | Apply on top of the RU

Important recommended one-off patches: [MOS Note: 555.1](#)

Recommended Patches for 19.12 DB Home

Below is the list of important patches to consider applying on top of 19.12

Bug	Fixed in RU	Description	Patches	Added
33121934		Library cache lock / load lock / mutex x during connection storm	[list-patches]	24/Sep/21
32651063		Rebalance / Resync Takes a Long Time Due to Working on One Disk At a Time	[list-patches]	02/Sep/21
29213893		DBMS_STATS Failing With Error Ora-1422 When Gathering Stats for User\$ Table	[list-patches]	01/Sep/21
33027539		ogg integrated extract abends with ORA-600 [krvxfixupcolinfo20]	[list-patches]	01/Sep/21
32544464		ExaData Flash Failure Test Causes Control File Extent Set Corruption - ORA-700 [kffscrubdumpextentset_onsuspiciousblks]	[list-patches]	20/Aug/21
33009224		FBDA Process Consuming CPU, After Patching DB With 19.11RU	[list-patches]	18/Aug/21
31002346		ASM Stuck At resync For More Than 7 Hours	[list-patches]	18/Aug/21
33144001		RMAN: Restore operations of any kind fail with an ORA-7445 [_intel_avx_rep_memcpy] / [SIGSEGV] [Address not mapped to object] with "krbipIntLocalize" in call stack.	[list-patches]	06/Aug/21
30978304		ORA-20000 During Data Pump Import While Importing Statistics	[list-patches]	03/Aug/21
32530202		Wrong Results from Subquery Execution due to regression of 27864047	[list-patches]	29/Jul/21
32662165		ORA-12801 & ORA-22922: nonexistent lob value on Exadata RAC When Creating Index in Parallel	[list-patches]	29/May/21
31602782		Contention on "CURSOR: PIN S WAIT ON X" when PQ slave's execution plan does not match with QC	[list-patches]	02/Dec/20

Recommended Patches for 19.12 GI Home

Below is the list of important patches to consider applying on top of 19.12

Only one OCW (Oracle Clusterware) patch should be applied to GI homes. Ensure you apply the patch starting with X8M if you are on an X8M system

Bug	Fixed in RU	Description	Patches	Added
32651063		Rebalance / Resync Takes a Long Time Due to Working on One Disk At a Time	[list-patches]	02/Sep/21
31002346		ASM Stuck At resync For More Than 7 Hours	[list-patches]	18/Aug/21

Basic Facts | Upgrade happens mostly parallel



A number of parallel processes

- Minimum 1
- Maximum 8
- Default 4

Basic Facts | How long does an upgrade take?

Things that **matter a lot**

- Number of installed components
- Size & complexity of data dictionary

Things that **matter a little**

- CPU and disk speed
- SGA/PGA

Things that **don't matter**

- Amount of user data

Component	HH:MM:SS
Oracle Server	00:16:17
JServer JAVA Virtual Machine	00:05:19
Oracle Workspace Manager	00:01:01
Oracle Enterprise Manager	00:10:13
Oracle XDK	00:00:48
Oracle Text	00:00:58
Oracle XML Database	00:04:09
Oracle Database Java Packages	00:00:33
Oracle Multimedia	00:07:43
Gathering Statistics	00:04:53
Total Upgrade Time: 00:52:01	

Component	HH:MM:SS
Oracle Server	00:16:17
JServer JAVA Virtual Machine	00:05:19
Oracle XDK	00:00:48
Oracle Text	00:00:58
Oracle XML Database	00:04:09
Oracle Database Java Packages	00:00:33
Gathering Statistics	00:02:43
Total Upgrade Time: 00:30:47	

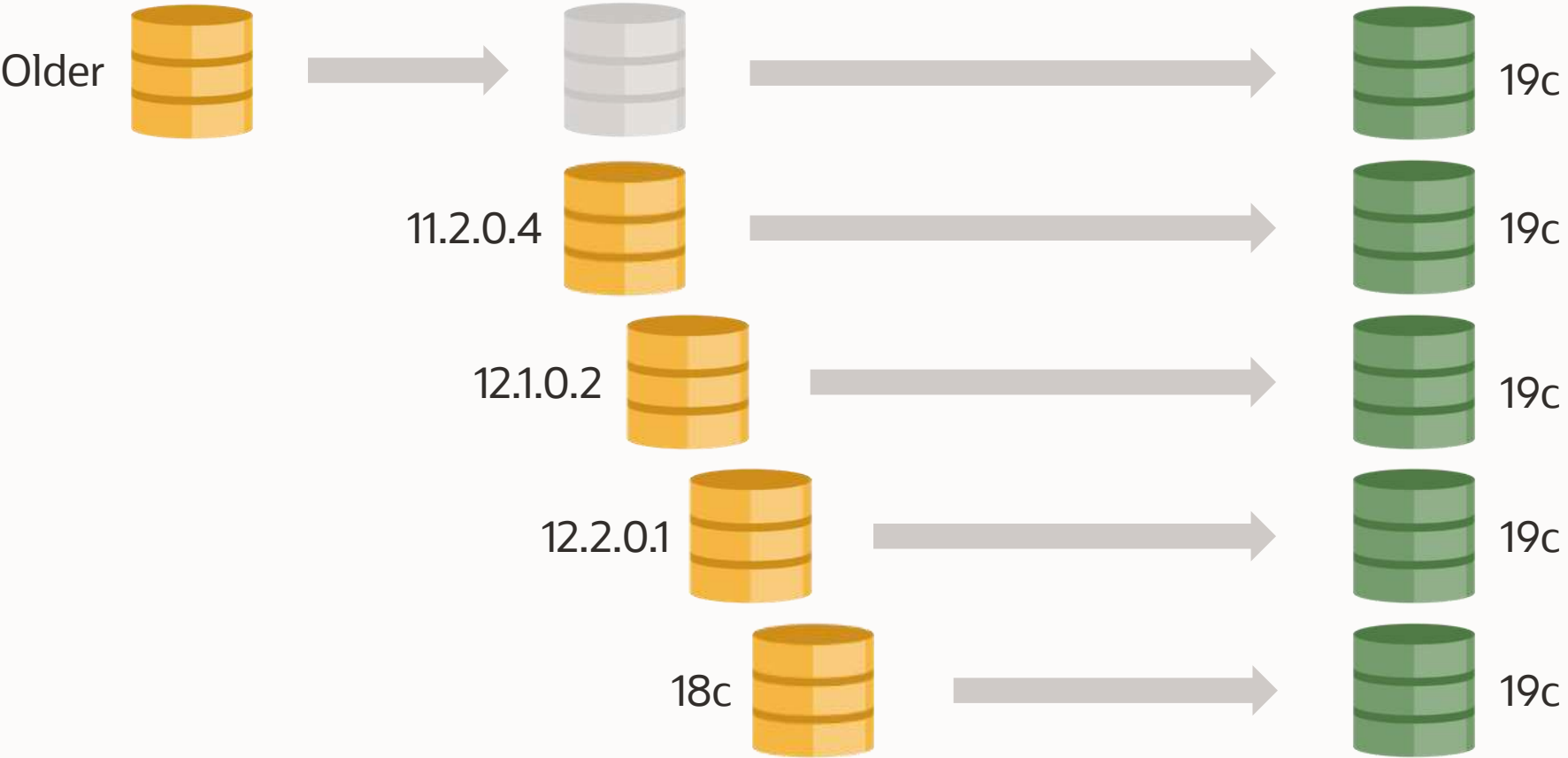


Photo by [Divana Qua](#) on [Unsplash](#)

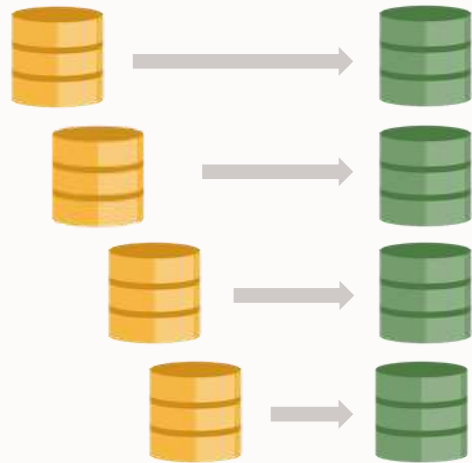
Check

Before Upgrade

Database Upgrade | Supported Releases



Database Upgrade | Supported Releases



Database / Oracle / Oracle Database / Release 19

Database Upgrade Guide

Oracle Database Releases That Support Direct Upgrade

Review the supported options for direct upgrades to the latest Oracle Database release.

You can perform a direct upgrade to the new release from the following releases:

- 11.2.0.4
- 12.1.0.2
- 12.2.0.1
- 18

[Database Upgrade Guide](#)

Database Upgrade | Intermediate Upgrades



- Ideally - upgrade **as far as possible** in the intermediate upgrade
- But often there is a platform upgrades as well
- So - **it depends**

Health Check | **hcheck.sql**

If your database is highly important, do a health check

- Lightweight, non-intrusive script
- Checks consistency of selected dictionary relationships
- [hcheck.sql - Script to Check for Known Problems \(MOS Note: 136697.1\)](#)

```
SQL> @/tmp/hcheck
H.Check Version 4.4 on 01-MAR-2018 23:46:27
-----
Catalog Version 11.2.0.4.0 (1102000400)
db_name: UPGR

Procedure Name          Catalog    Fixed
Result                 Version    Vs Release    Timestamp
-----
-----
.- LobNotInObj          ... 1102000400 <= *All Rel* 03/01 23:46:27 PASS
.- MissingOIDOnObjCol   ... 1102000400 <= *All Rel* 03/01 23:46:27 PASS
.- SourceNotInObj       ... 1102000400 <= *All Rel* 03/01 23:46:27 FAIL
HCKE-0003: SOURCE$ for OBJ# not in OBJ$ (Doc ID 1360233.1)
SOURCE$ has 4 rows for 1 OBJ# values not in OBJ$
.- OversizedFiles       ... 1102000400 <= *All Rel* 03/01 23:46:27 PASS
```



Photo by [Joshua Fernandez](#) on [Unsplash](#)

AutoUpgrade

The **ONLY** recommended way to upgrade databases

Upgrade | **AutoUpgrade** - As Easy As 1-2-3



START

1. DOWNLOAD

2. CONFIG

3. DEPLOY

SUCCESS

Supported **source** releases

- 11.2.0.4
- 12.1.0.2
- 12.2.0.1
- 18
- 19

All architectures (CDB and non-CDB)

All supported operating systems

All editions (SE2, EE)

All types (single instance and RAC)

Upgrade | **AutoUpgrade - As Easy As 1-2-3**



START

1. DOWNLOAD

2. CONFIG

3. DEPLOY

SUCCESS

Download from My Oracle Support ID [2485457.1](#)

Upgrade | **AutoUpgrade** - As Easy As 1-2-3



START

1. DOWNLOAD

2. CONFIG

3. DEPLOY

SUCCESS

Simple text file

```
upg1.source_home=/u01/app/oracle/product/12.2.0.1  
upg1.target_home=/u01/app/oracle/product/19  
upg1.sid=CDB1
```

Upgrade | **AutoUpgrade - As Easy As 1-2-3**



START

1. DOWNLOAD

2. CONFIG

3. DEPLOY

SUCCESS

One command

```
$ java -jar autoupgrade.jar -config cdb1.cfg -mode deploy
```

Advanced monitoring and logging

Upgrade | **AutoUpgrade** - As Easy As 1-2-3



START

1. DOWNLOAD

2. CONFIG

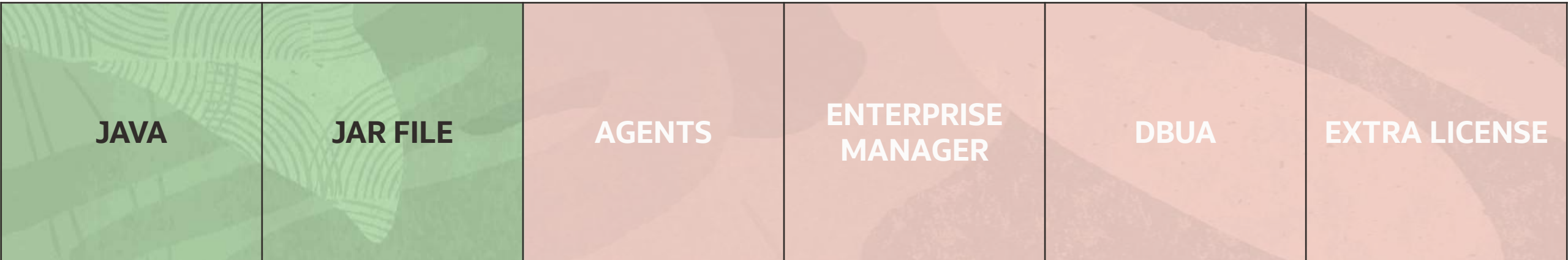
3. DEPLOY

SUCCESS

Supported **target** releases

- 12.2.0.1
- 18
- 19
- 21
- Any future release

AutoUpgrade | Need And Don't Need



- Java 8 required
 - Part of Oracle Home since 12.1.0.2
- 3 MB jar file

AutoUpgrade | **Need And Don't Need**



JAVA	JAR FILE	AGENTS	ENTERPRISE MANAGER	DBUA	EXTRA LICENSE
------	----------	--------	-----------------------	------	---------------

- No agents to install
- Enterprise Manager not needed
- AutoUpgrade offers superior functionality
- No extra license

AutoUpgrade Essentials



AutoUpgrade | Essentials

Download

Configure

Analyze

Check

Upgrade

Always download latest version from MOS

★ AutoUpgrade Tool (Doc ID 2485457.1)

In this Document

[Main Content](#)

[Benefits](#)

[Target Versions Supported](#)

[AutoUpgrade documentation](#)

[References](#)

APPLIES TO:

Oracle Database - Enterprise Edition - Version 12.2.0.1 and later

Oracle Database - Standard Edition - Version 12.2.0.1 and later

Information in this document applies to any platform.

MAIN CONTENT

Description

Oracle Database AutoUpgrade allows DBAs to upgrade one or many databases without human intervention, all with one

AutoUpgrade | Essentials

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Configure

Analyze

Check

Upgrade

Check your version

```
$ java -jar autoupgrade.jar -version

build.version 21.3.211115
build.hash 081e3f7
build.date 2021/11/15 11:57:54
build.max_target_version 21
build.supported_target_versions 12.2,18,19,21
build.type production
```

Compare to latest version on MOS

Download

The most recent version of AutoUpgrade can be downloaded via this link: version [20211115](#).

AutoUpgrade | Essentials

Download

Configure

Analyze

Check

Upgrade

AutoUpgrade handles older releases as well

```
$ java -jar autoupgrade.jar -version
```

```
build.version 21.3.211115
```

```
build.hash 081e3f7
```

```
build.date 2021/11/15 11:57:54
```

```
build.max_target_version 21
```

```
build.supported_target_versions 12.2,18,19,21
```

AutoUpgrade | Essentials

Download

Configure

Analyze

Check

Upgrade

Shortest possible config file version

```
upg1.source_home=/u01/app/oracle/product/12.2.0.1  
upg1.target_home=/u01/app/oracle/product/19  
upg1.sid=CDB1
```

Or, generate a sample config file

```
$ java -jar autoupgrade.jar -create_sample_file config  
  
Created sample configuration file /home/oracle/sample_config.cfg
```

Pro tip: *upg1* is a prefix that you decide.
Use it to define multiple databases

AutoUpgrade | Essentials

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Configure

Analyze

Check

Upgrade

Analyze your database

```
$ java -jar autoupgrade.jar -config CDB1.cfg -mode analyze

...

upg> Job 100 completed

Please check the summary report at:
/u01/app/oracle/cfgtoollogs/autoupgrade/cfgtoollogs/upgrade/auto/status/status.html
/u01/app/oracle/cfgtoollogs/autoupgrade/cfgtoollogs/upgrade/auto/status/status.log
```

Pro tip: Analyze is similar to running `preupgrade.jar`



AutoUpgrade | Essentials

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Configure

Analyze

Check

Upgrade

Summary report - text

```
=====
                        Autoupgrade Summary Report
=====
[Date]                  Tue Jan 12 10:26:19 CET 2021
[Number of Jobs] 1
=====
[Job ID] 100
=====
[DB Name]                CDB1
[Version Before Upgrade] 12.2.0.1.0
[Version After Upgrade]  19.9.0.0.0
-----
[Stage Name]    PRECHECKS
[Status]        SUCCESS
[Start Time]    2021-01-12 10:25:58
[Duration]      0:00:20
[Log Directory] /u01/app/oracle/upg/CDB1/100/prechecks
[Detail]        /u01/app/oracle/upg/CDB1/100/prechecks/cdb1_preupgrade.log
                  Precheck passed and no manual intervention needed
-----
```

AutoUpgrade | Essentials

Download

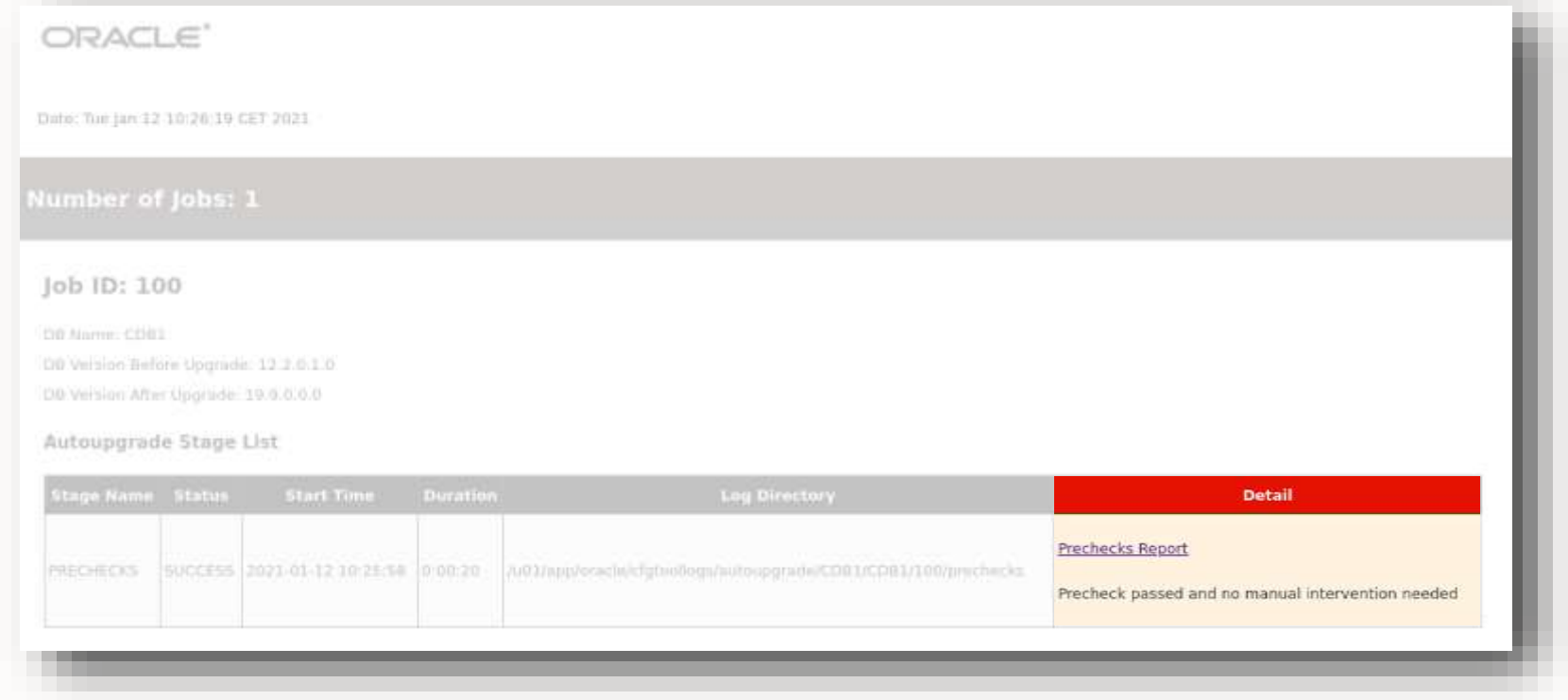
Configure

Analyze

Check

Upgrade

Summary report - HTML



ORACLE®

Date: Tue Jan 12 10:26:19 CET 2021

Number of Jobs: 1

Job ID: 100

DB Name: CDB1

DB Version Before Upgrade: 12.2.0.1.0

DB Version After Upgrade: 19.9.0.0.0

Autoupgrade Stage List

Stage Name	Status	Start Time	Duration	Log Directory	Detail
PRECHECKS	SUCCESS	2021-01-12 10:25:58	0:00:20	/u01/app/oracle/cfgtoollogs/autoupgrade/CDB1/CDB1/100/prechecks	Prechecks Report Precheck passed and no manual intervention needed

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CDB1

DATABASE

DB Compatible	12.2.0
DB Version	12.2.0.1.0
Operating System	Linux
Blocksize	8192
Timezone	26
LogMode	ARCHIVELOG
Readonly	false
Edition	EE

COMPONENTS

Oracle Component	Version	Upgrade Action	Current Status
Oracle Workspace Manager	12.2.0.1.0	to be upgraded	VALID
Oracle Catalog Views	12.2.0.1.0	to be upgraded	VALID
Real Application Clusters	12.2.0.1.0	to be upgraded	OPTION OFF
Oracle XML Database	12.2.0.1.0	to be upgraded	VALID
Oracle Label Security	12.2.0.1.0	to be upgraded	VALID
Oracle Packages and Types	12.2.0.1.0	to be upgraded	VALID

Containers

CDB\$ROOT

PreChecks Recommend(3)
PreChecks Info(4)
PostChecks Warning(3)
PostChecks Recommend(3)

PDB\$SEED

PreChecks Recommend(3)
PreChecks Info(1)
PostChecks Warning(3)
PostChecks Recommend(3)

PDB3

PreChecks Warning(2)
PreChecks Recommend(3)
PreChecks Info(1)
PostChecks Warning(4)
PostChecks Recommend(3)

PDB1

PreChecks Recommend(3)
PreChecks Info(1)
PostChecks Warning(3)

CDB\$ROOT

CheckName: DICTIONARY_STATS FixUp Available: YES Severity: RECOMMEND Stage: PRECHECKS

Gather stale data dictionary statistics prior to database upgrade in off-peak time using:

EXECUTE DBMS_STATS.GATHER_DICTIONARY_STATS;

Dictionary statistics help the Oracle optimizer find efficient SQL execution plans and are essential for proper upgrade timing. Oracle recommends gathering dictionary statistics in the last 24 hours before database upgrade.

For information on managing optimizer statistics, refer to the 12.2.0.1 Oracle Database SQL Tuning Guide.

Dictionary statistics do not exist or are stale (not up-to-date).

CheckName: HIDDEN_PARAMS FixUp Available: NO Severity: RECOMMEND Stage: PRECHECKS

Review and remove any unnecessary HIDDEN/UNDERSCORE parameters.

Remove hidden parameters before database upgrade unless your application vendors and/or Oracle Support state differently. Changes will need to be made in the pfile/spfile.

The database contains the following initialization parameters whose name begins with an underscore:



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Configure

Analyze

Check

Upgrade

Preupgrade report comes in:

- HTML
- Text
- JSON

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Upgrade

```
$ java -jar autoupgrade.jar -config CDB1.cfg -mode deploy
```



Have a cup of coffee and wait, or ...

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- Configure
- Analyze
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Monitor

```
upg> lsj
```

Job#	DB_NAME	STAGE	OPERATION	STATUS	START_TIME	UPDATED	MESSAGE
101	CDB1	PREFIXUPS	EXECUTING	RUNNING	20/11/24 13:38	13:39:26	Remaining 12/13



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Upgrade

All the details

```
upg> status -job 101

Progress
-----
Start time:      20/11/24 13:38
Elapsed (min):   13
Last update:     2020-11-24T13:48:52.139
Stage:           DBUPGRADE
Operation:       EXECUTING
Status:          RUNNING
Stage summary:
  SETUP          <1 min
  GRP             <1 min
  PREUPGRADE     <1 min
  PRECHECKS      <1 min
  PREFIXUPS      8 min
  DRAIN          <1 min
  DBUPGRADE      3 min (IN PROGRESS)

Job Logs Locations
-----
Logs Base:       /home/oracle/autoupg_default/CDB1/CDB1
Job logs:        /home/oracle/autoupg_default/CDB1/CDB1/101
Stage logs:      /home/oracle/autoupg_default/CDB1/CDB1/101/dbupgrade
TimeZone:        /home/oracle/autoupg_default/CDB1/CDB1/temp
```

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Configure

Analyze

Check

Upgrade

All the details - continued

...

Additional information

Details:

[Upgrading] is [0%] completed for [cdb1-cdb\$root]

CONTAINER	PERCENTAGE
CDB\$ROOT	UPGRADE [12%]
PDB\$SEED	UPGRADE PENDING
PDB3	UPGRADE PENDING

Error Details:

None

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Configure

Analyze

Check

Upgrade

Success

```
upg> Job 101 completed
----- Final Summary -----
Number of databases          [ 1 ]

Jobs finished successfully    [1]
Jobs failed                   [0]
Jobs pending                  [0]
----- JOBS FINISHED SUCCESSFULLY -----
Job 101 for CDB1

---- Drop GRP at your convenience once you consider it is no longer needed ----
Drop GRP from CDB1: drop restore point AUTOUPGRADE_9212_CDB1122010
```

And it includes:

- Recompilation (utlrp.sql)
- Time zone file upgrade
- Postupgrade fixups
- ... and so much more



AutoUpgrade | Essentials

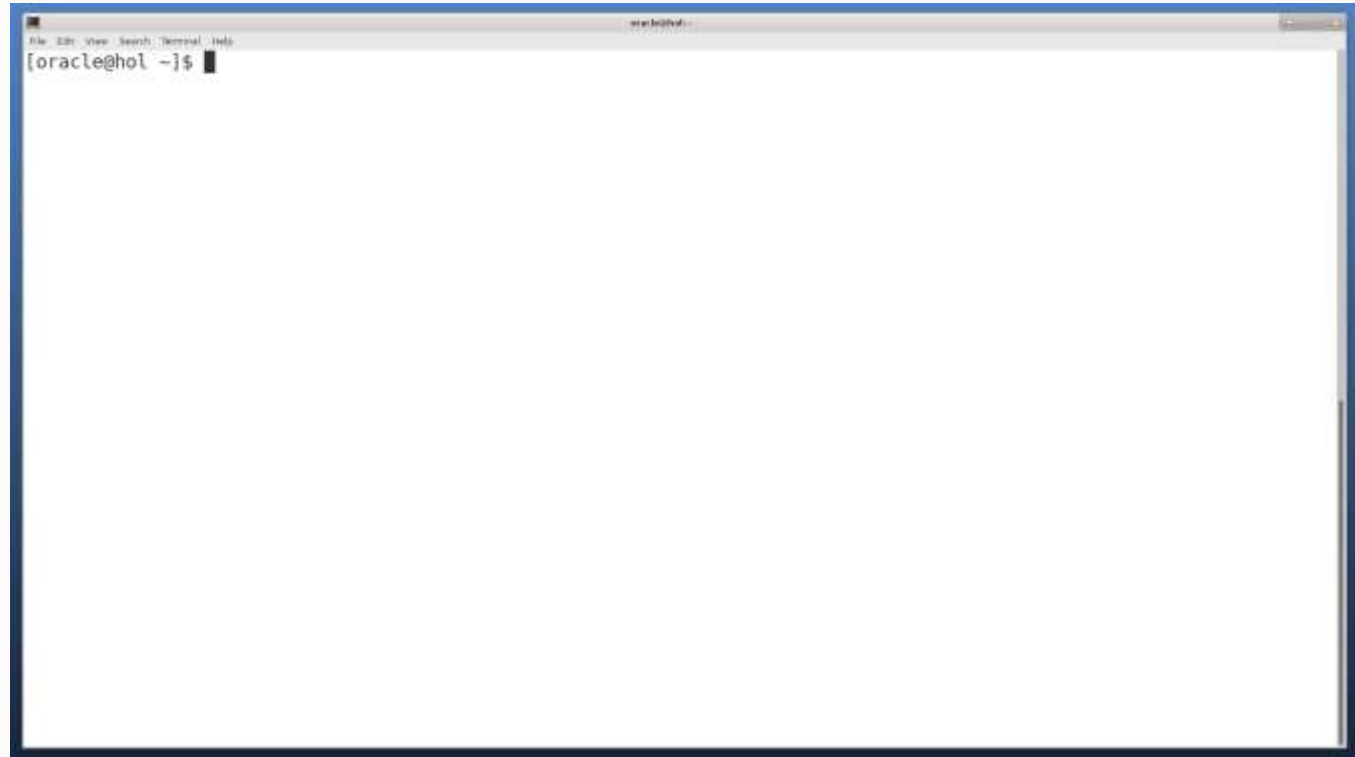
Download

Configure

Analyze

Check

Upgrade



[Watch on YouTube](#)



Photo by Hello I'm Nik  on Unsplash

AutoUpgrade to a New Server

Upgrade to a new server | Overview



Source System

autoupgrade.jar

-analyze

-fixups

Target System

autoupgrade.jar

-upgrade

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

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

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

Upgrade to a new server | Details

Source Server

```
upg1.source_home=/u01/app/oracle/product/12
upg1.target_home=/u01/app/oracle/product/19
upg1.sid=DB12
```

- -mode analyze
- -mode fixups
- shutdown immediate

Copy database including redo logs, control files, SPFILE, password file

Target Server

- Update /etc/oratab
- Prepare ?/network/admin files

- STARTUP UPGRADE

```
upg1.source_home=/tmp
upg1.target_home=/u01/app/oracle/product/19
upg1.sid=DB12
```

- -mode upgrade

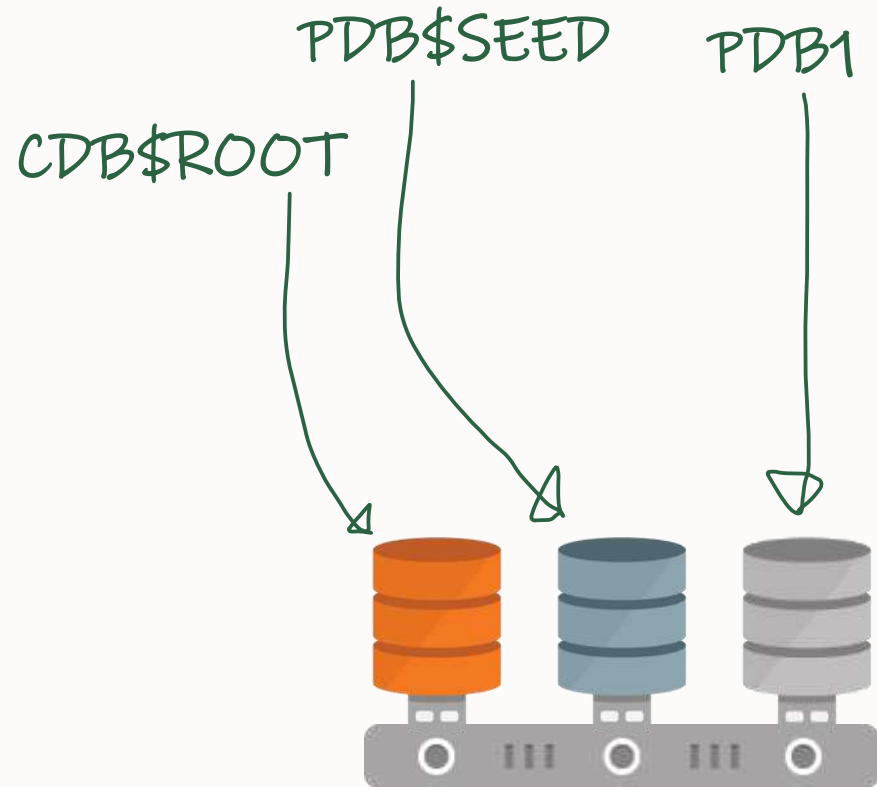
Pro tip: Find more details in blog post
[Oracle AutoUpgrade between two servers](#)



Photo by [Danilo Alves](#) on [Unsplash](#)

Unplug – Plug – Upgrade ... and even more

Upgrade | **Unplug – Plug – Upgrade**

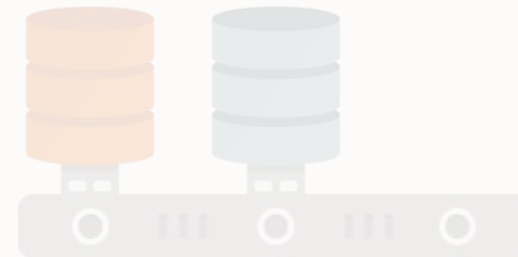


Unplug - Plug - Upgrade | Preparation

Clone User

```
CREATE USER c##borg  
IDENTIFIED BY s3cr3t  
DEFAULT TABLESPACE users  
TEMPORARY TABLESPACE temp  
CONTAINER=ALL;
```

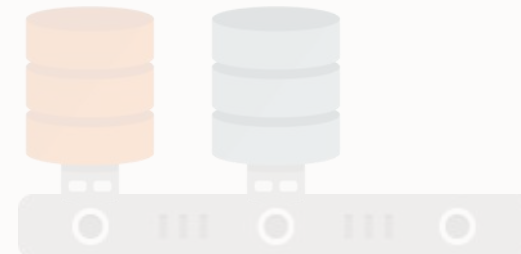
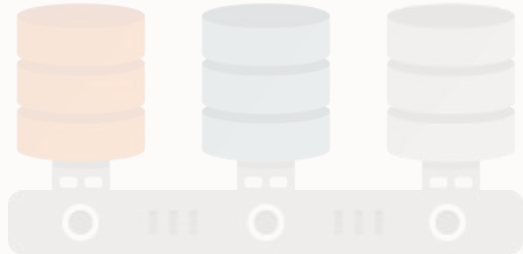
```
GRANT  
  CREATE SESSION,  
  CREATE PLUGGABLE DATABASE,  
  SELECT_ANY_CATALOG  
TO c##borg  
CONTAINER = ALL;
```



Unplug / Plug / Upgrade | Preparation

Database link into source PDB

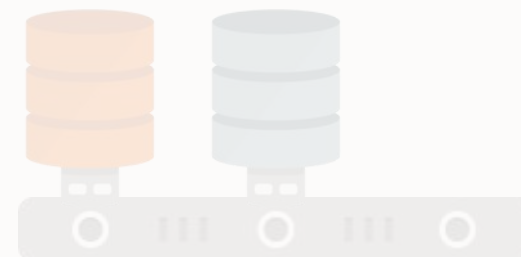
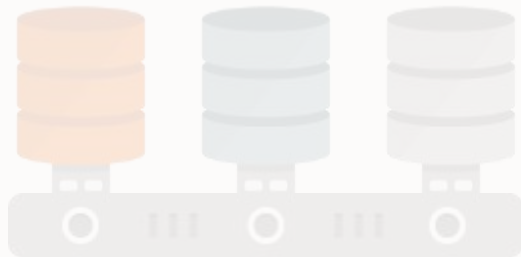
```
CREATE DATABASE LINK clonePDB1  
CONNECT TO c##borg  
IDENTIFIED BY s3cr3t  
USING 'tns-or-ezconnect';
```



Unplug / Plug / Upgrade | AutoUpgrade

Fully automated relocation with upgrade

```
upg1.source_home=/u01/app/oracle/prod/19  
upg1.target_home=/u01/app/oracle/prod/21  
upg1.sid=CDB19  
upg1.pdbs=pdb1  
upg1.target_cdb=CDB21  
upg1.source_dblink.pdb1=clonePDB1
```



AutoUpgrade | Unplug-plug via Refreshable Clone PDB

Refreshable clone

```
upg1.source_home=/u01/app/oracle/prod/19  
upg1.target_home=/u01/app/oracle/prod/21  
upg1.sid=CDB19  
upg1.pdbs=pdb1  
upg1.target_cdb=CDB21  
upg1.source_dblink.pdb1=clonePDB1 600
```

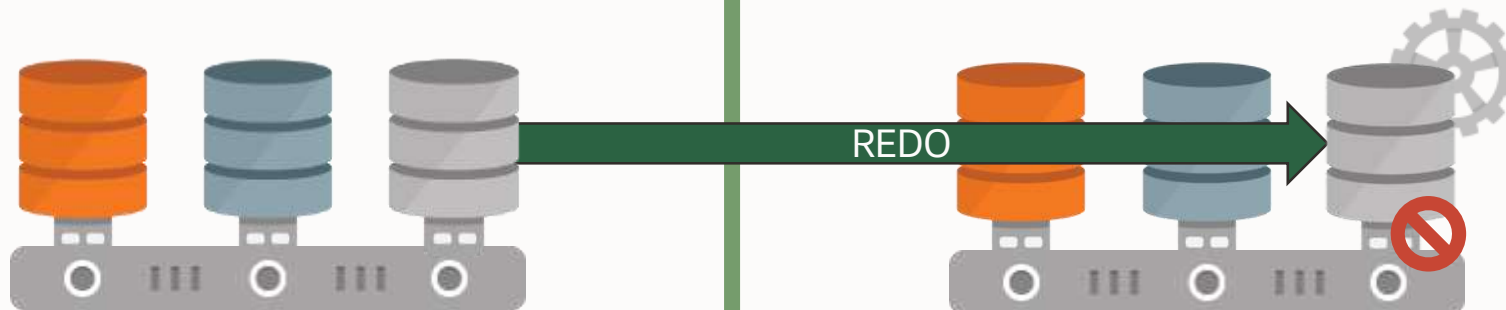




Photo by Philipp Katzenberger on Unsplash

Grid Infrastructure, Upgrade and Patching

AutoUpgrade | RAC

How to upgrade a RAC database

1. Upgrade Grid Infrastructure
 - Not covered by AutoUpgrade
 - Recommended to upgrade in advance
2. Upgrade Database
 - Upgrade with AutoUpgrade
 - Everything handled by AutoUpgrade

Recommendation: Keep GI and database patch level in sync

WHAT IF ...



AutoUpgrade | What if ... AutoUpgrade fails

1. Create zip file

```
$ java -jar autoupgrade.jar -config config.cfg -zip
```

2. Optionally, add opatch lsinventory

```
$ $ORACLE_HOME/OPatch/opatch lsinventory > opatch.txt  
$ zip -r AUPG_210419_0735_461.zip opatch.txt
```

3. Upload it to My Oracle Support





"We upgraded 735 databases to 19c, and the task was mostly relatively relaxed.

Start the AutoUpgrade tool and monitor the progress from time to time.

Sitting in front of the screen the whole time is not necessary."

Alain Fuhrer

(Former) Head IT Database Services

La Mobilière

Bern, Switzerland

THANK YOU



Visit our blogs:

<https://MikeDietrichDE.com>

<https://DOHdatabase.com>

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

THANK YOU



Webinars:

<https://MikeDietrichDE.com/videos>

YouTube channel:

[OracleDatabaseUpgradesandMigrations](#)

THANK YOU



HUH? IS IT FIXED IN 23C?
Saturday 11 December

THANK
YOU

