ORACLE
DevLive

Boas práticas de atualização e migração para o Oracle Database 23c

[LRN1099]

Rodrigo Jorge

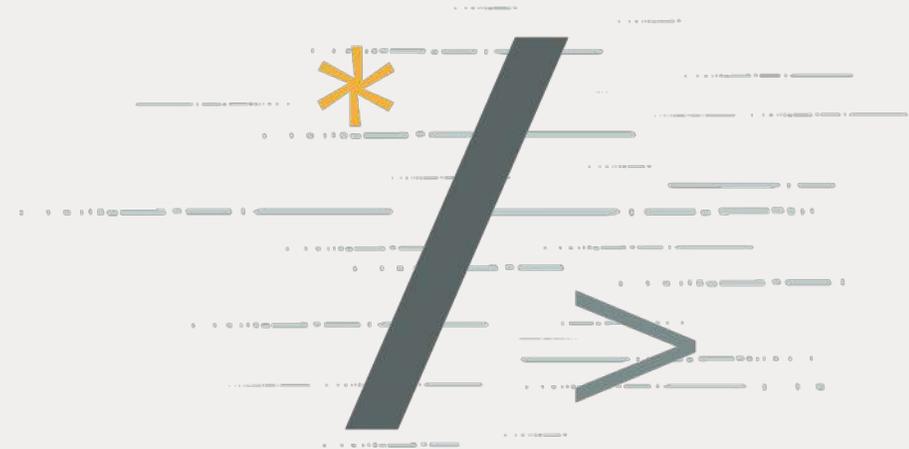Senior Principal Product Manager

Database Upgrade, Migration and Patching

April 03, 2024

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, timing, and pricing of any features or functionality described for Oracle's products may change and remains at the sole discretion of Oracle Corporation.
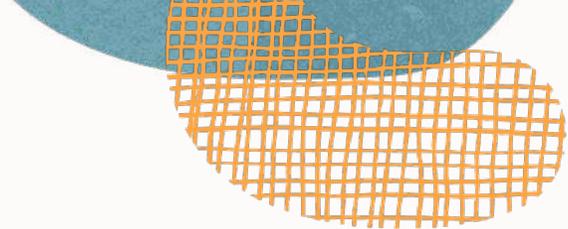
     [Date]

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Senior Principal Product Manager
Database Upgrade, Migrations & Patching

in rodrigoaraujorge

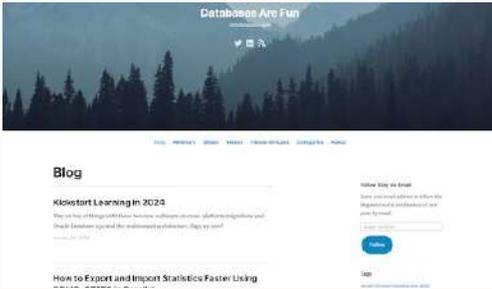🐦 @rodrigojorgedba

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Episode 1

Release and Patching Strategy

105 minutes – Feb 4, 2021

Episode 2

AutoUpgrade to Oracle Database 19c

115 minutes – Feb 20, 2021

Episode 3

Performance Stability, Tips and Tricks and Underscores

120 minutes – Mar 4, 2021

Episode 4

Migration to Oracle Multitenant

120 minutes – Mar 16, 2021

Episode 5

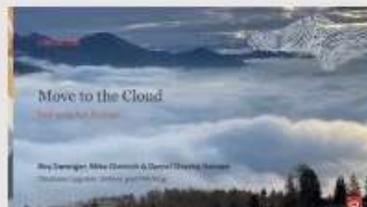Migration Strategies – Insights, Tips and Secrets

120 minutes – Mar 25, 2021

Episode 6

Move to the Cloud – Not only for techies

115 minutes – Apr 8, 2021

Recorded Web Seminars
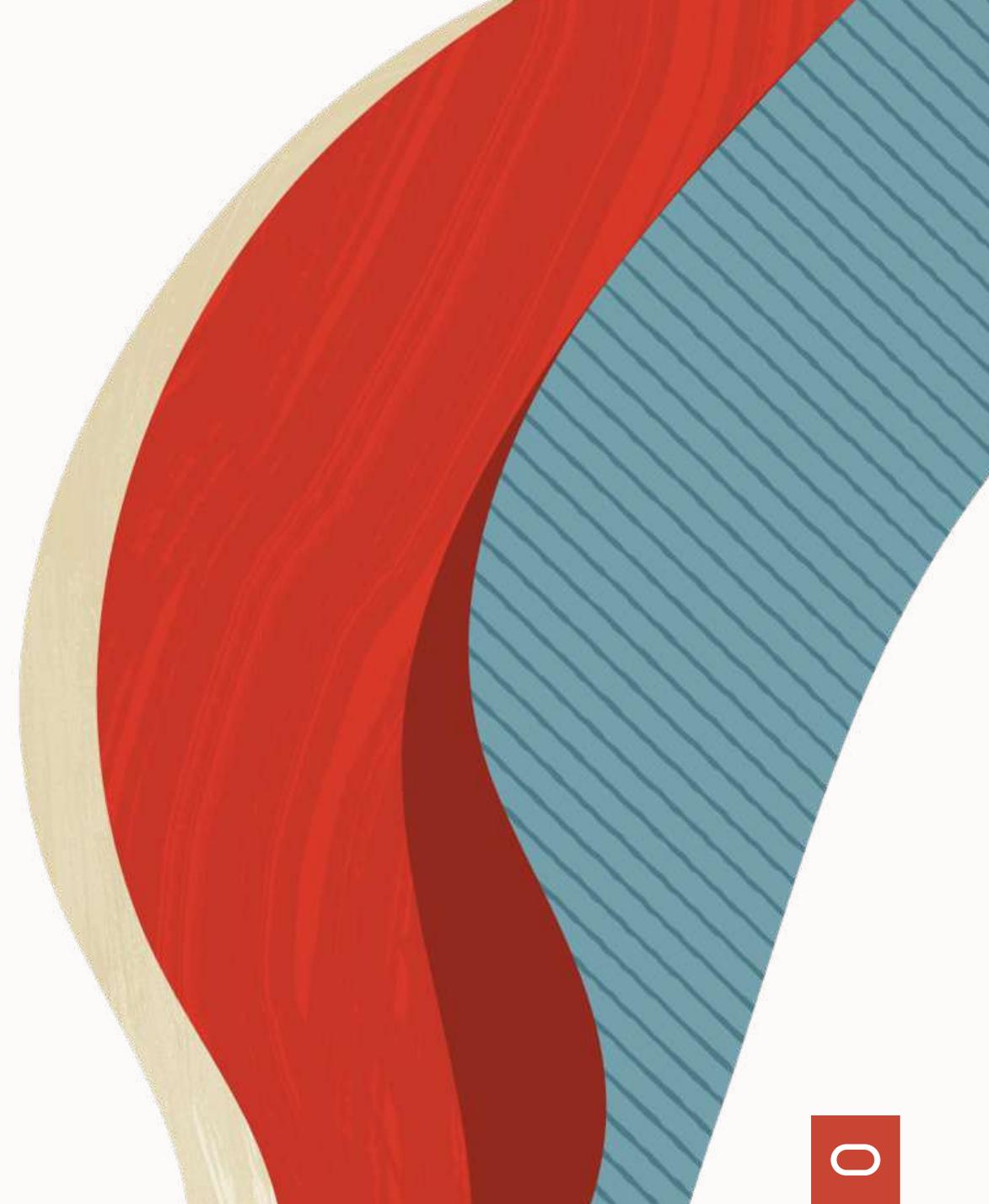
https://MikeDietrichDE.com/videos

More than 30 hours of technical content, on-demand, anytime, anywhere

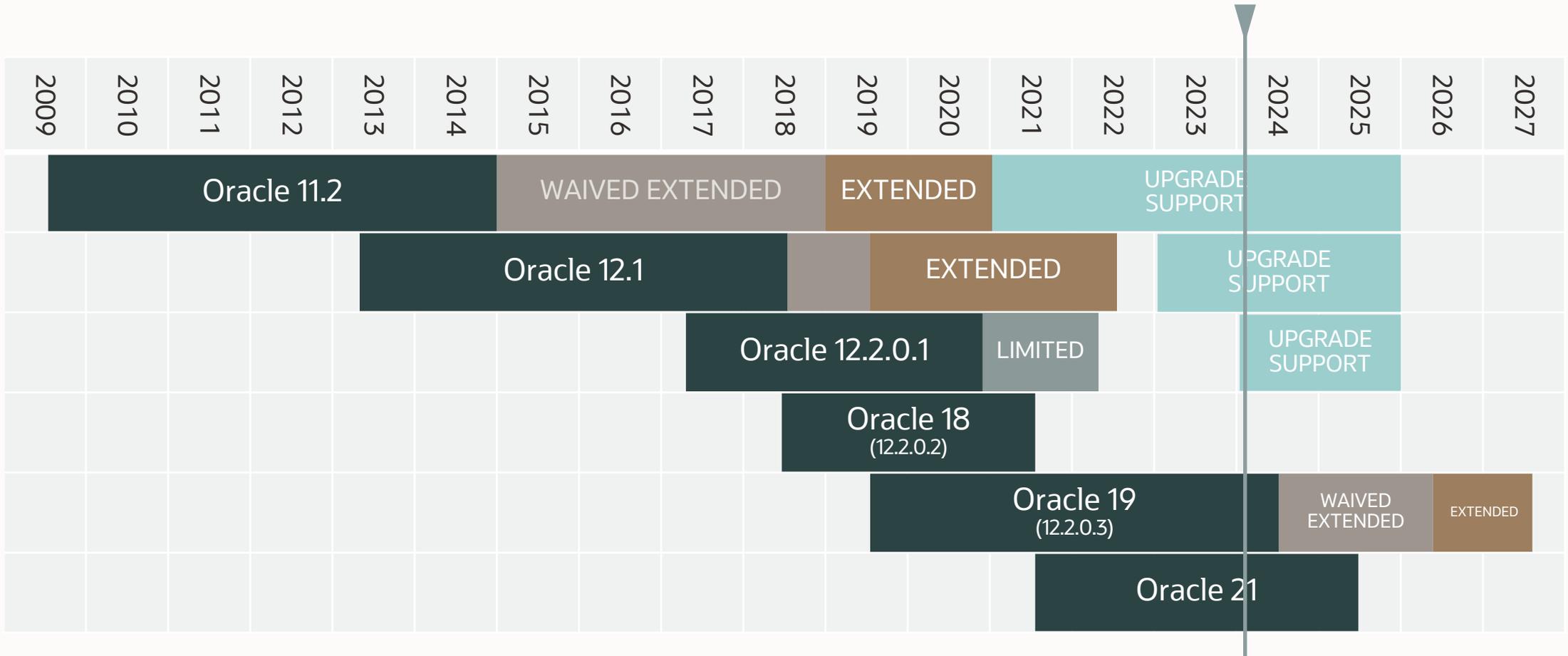# **Before upgrade**

How to upgrade

After upgrade

Which versions of Oracle Database are you using?

- 21c
- 19c
- 18c
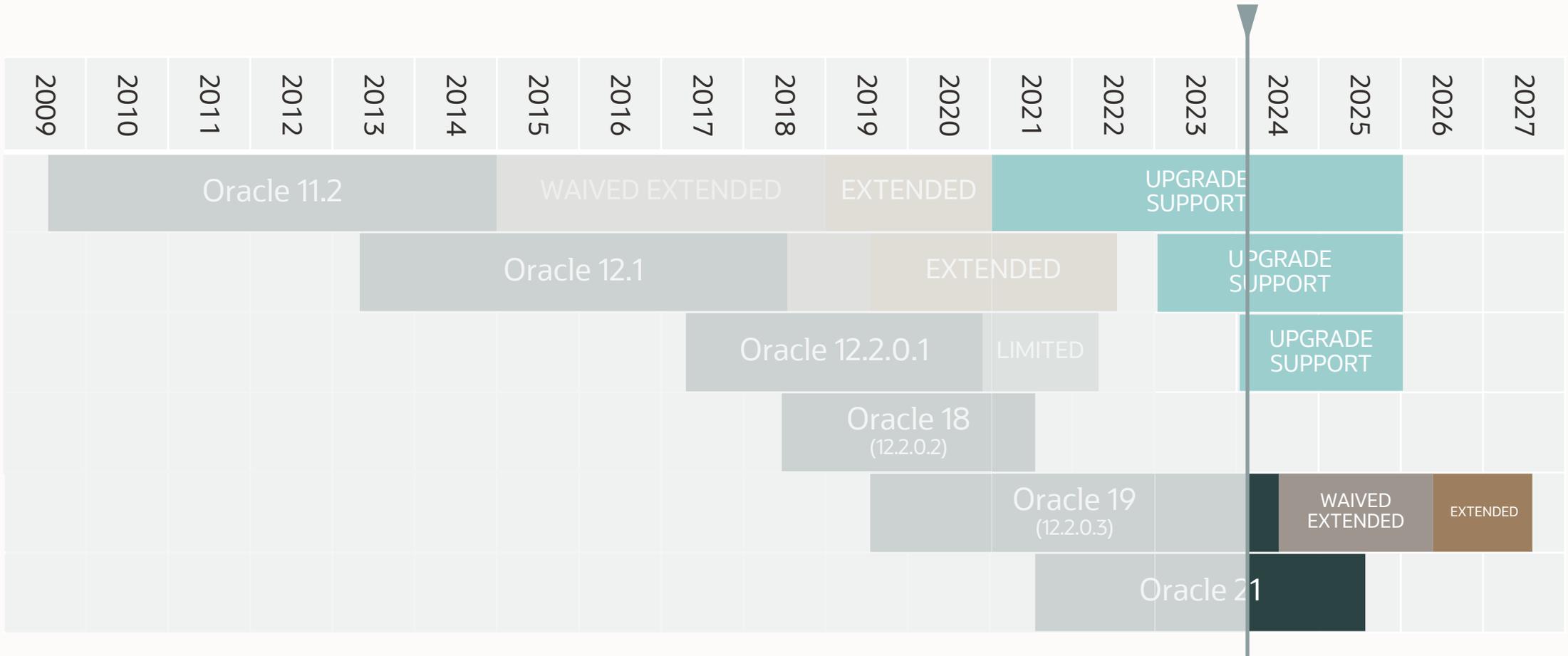- 12.2.0.1
- 12.1.0.2
- 11.2.0.4
- Older?

Lifetime Support Policy

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027

Oracle 11.2 — Premier Support (2009–2015), WAIVED EXTENDED (2015–2018), EXTENDED (2018–2021), UPGRADE SUPPORT (2021–2025)

Oracle 12.1 — Premier Support (2013–2018), Waived Extended (2018–2019), EXTENDED (2019–2022), UPGRADE SUPPORT (2022–2025)

Oracle 12.2.0.1 — Premier Support (2017–2021), LIMITED (2021–2022), UPGRADE SUPPORT (2024–2025)

Oracle 18 (12.2.0.2) — Premier Support (2018–2021)

Oracle 19 (12.2.0.3) — Premier Support (2019–2024), WAIVED EXTENDED (2024–2026), EXTENDED (2026–2027)
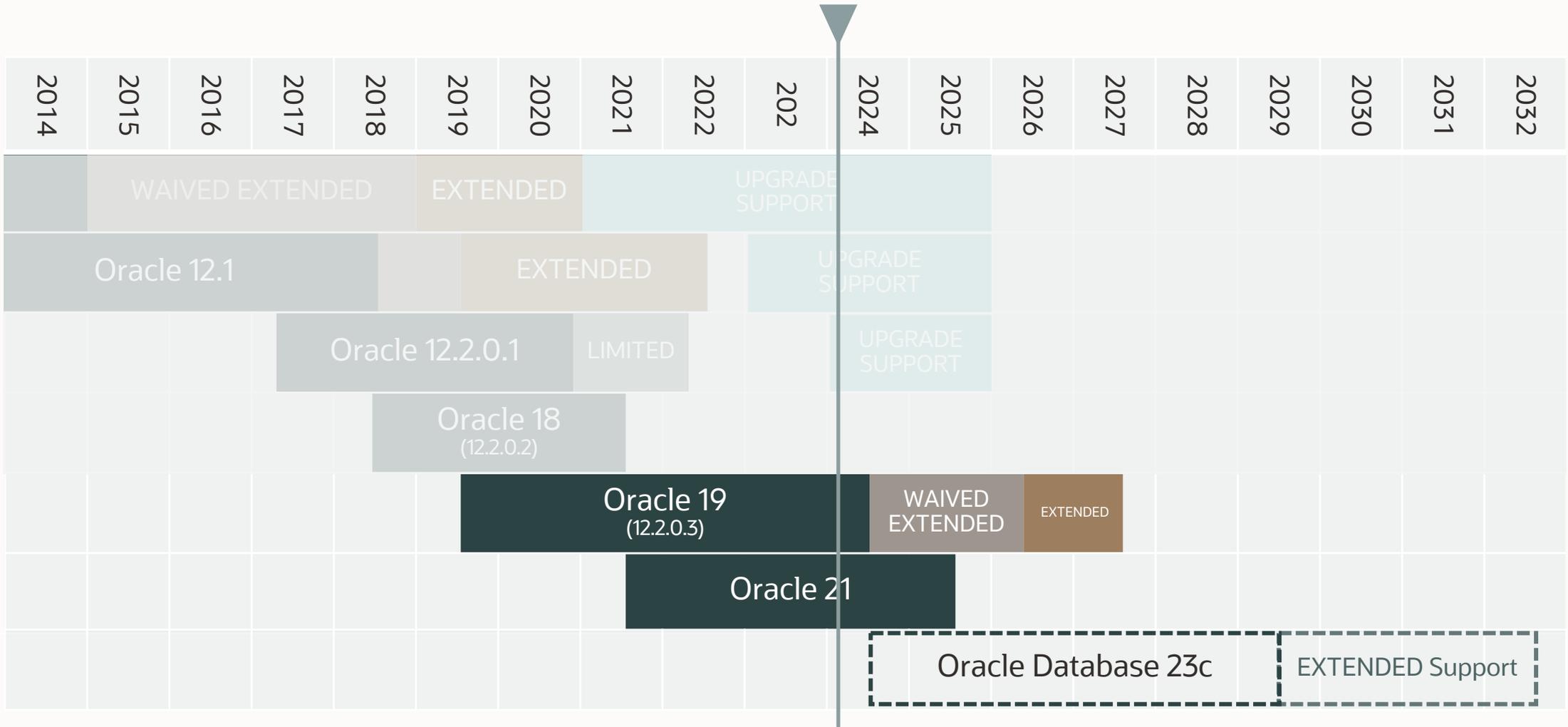
Oracle 21 — Premier Support (2021–2024)

Legend:
- ■ Premier Support
- ■ Waived Extended Support
- ■ Paid Extended Support
- ■ Restricted Upgrade Support
- ■ Limited Error Correction

Lifetime Support Policy

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027

Oracle 11.2 — WAIVED EXTENDED — EXTENDED — UPGRADE SUPPORT

Oracle 12.1 — EXTENDED — UPGRADE SUPPORT

Oracle 12.2.0.1 — LIMITED — UPGRADE SUPPORT

Oracle 18 (12.2.0.2)

Oracle 19 (12.2.0.3) — WAIVED EXTENDED — EXTENDED

Oracle 21

Legend:
- ■ Premier Support
- ■ Waived Extended Support
- ■ Paid Extended Support
- ■ Restricted Upgrade Support
- ■ Limited Error Correction

Lifetime Support Policy

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

Why 23c in 20<u>24</u> ?

          [Date]

Press Release

Oracle Introduces Integrated Vector Database to Augment Generative AI and Dramatically Increase Developer Productivity
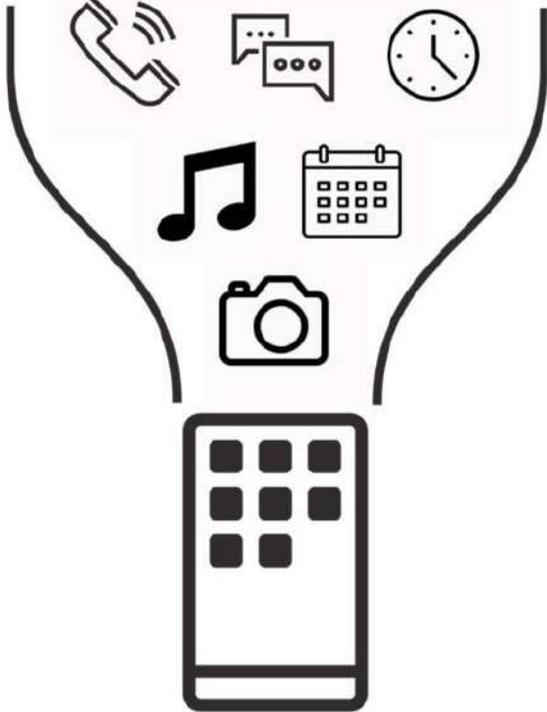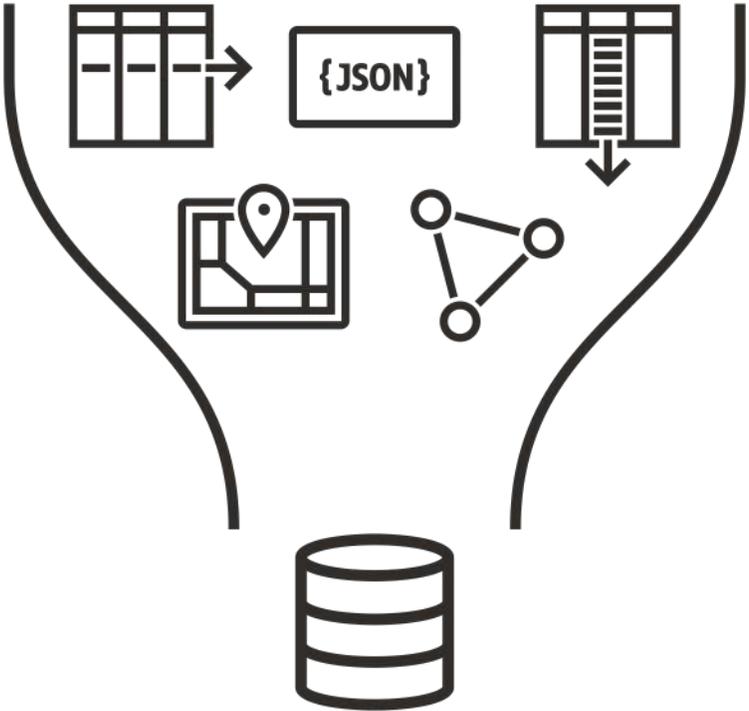
New AI vector similarity search in Oracle Database 23c allows the combination of search on semantic and business data resulting in highly accurate answers quickly and securely

Oracle CloudWorld, Las Vegas—September 19, 2023

Oracle today announced its plans to add semantic search capabilities using AI vectors to Oracle Database 23c. The collection of features, called AI Vector Search, includes a new vector data type, vector indexes, and vector search SQL operators that enable the Oracle Database to store the semantic content of documents, images, and other unstructured data as vectors, and use these to run fast similarity queries. These new capabilities also support Retrieval Augmented Generation (RAG), a breakthrough generative AI technique that combines large

ANNOUNCEMENT

Oracle Introduces Integrated Vector Database

Converged Database

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Examine Oracle Database changes using ORAdiff

- Oracle Release Analyzer Diff Utility
- https://oradiff.oracle.com

ORAdiff

- Home
- Parameters
- Users, Roles, etc
- Privileges
- Included Fixes
- Oracle Database Home
- Objects
- Fixed Objects
- Audit
- System
- Scheduler
- Report

ORAdiff

ORAdiff - Find the differences between two Oracle Database releases

ORAdiff allows you to compare two database releases to each other - with or without patch bundles on top.

Get Started

1. Click the menu icon on the upper left corner of the page
2. Select an object type from the left-hand navigation menu
3. Choose the Source and Target versions and patch levels
4. View the report. You may optionally choose a filter

Version Selector

Source Version	Source Patch level
18c	18.17.0

Target Version	Target Patch level
- Select Version -	- Select Patch Level -

V_$PARAMETER

Added Removed Changed

Q⌄ Go Actions ⌄
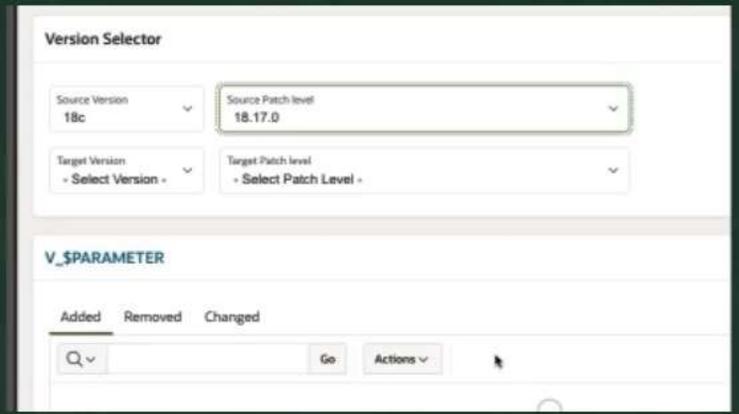
ORAdiff will display the differences such as "new tables", "added parameters", "changed columns", "removed privileges" and much more. ORAdiff search can tell you when a parameter was added and which files changed in your Oracle Home.

ORAdiff data is refreshed when new patch bundles are released to the public.

Questions? Ideas? Enhancement requests? Contact us on: #oradiff-int

Next Long Term Support release

Oracle Database 23c

Upgrade possible <u>only</u> from:

- Oracle Database 19c

- Oracle Database 21c

Do you want to upgrade?

Oracle Database 11.2.0.4
Oracle Database 12.1.0.2
Oracle Database 12.2.0.1
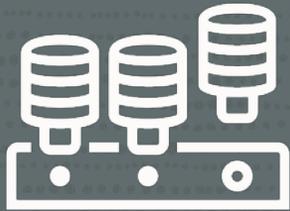**Oracle Database 18c**

Oracle Database 11.2.0.4
Oracle Database 12.1.0.2
Oracle Database 12.2.0.1 ⟹ Oracle Database 19c ⟹ **Oracle Database 23c**
Oracle Database 18c

Oracle Database 23c supports the multitenant architecture only

- You must convert your database to a PDB

```
--Use up to 3 user-created PDBs
--without a license for Multitenant option.
--Applies to Oracle Database 19c and newer, including SE2


alter system set max_pdbs=3;
```

Ensure your clients can connect to Oracle Database 23c

- Upgrade your clients well in advance of the upgrade

Client / Server Interoperability

Client Version	Server Version						
	23c	21c	19c	18c	12.2.0	12.1.0	11.2.0
23c[11]	Yes	Yes	Yes	No	No	No	No
21c	Yes	Yes	Yes	Was	Was	Yes[12]	No
19c	Yes	Yes	Yes	Was	Was	Yes[12]	Yes[9]
18c	No	Was	Was	Was	Was	Was	Was
12.2.0	No	Was	Was	Was	Was	Was	Was
12.1.0	No	Yes[12]	Yes[12]	Was	Was	Yes[12]	Yes[12]
11.2.0	No	No	Yes[9]	Was	Was	Yes[12]	Yes[9]

MOS Note: 207303.1 - Client / Server Interoperability Support Matrix

On important databases,
execute a dictionary check before upgrade

- Formerly known as *Health Check*
- MOS Doc ID 1366971

Ensure dictionary and fixed objects statistics are accurate

- Save downtime by gathering in advance

Before upgrade

How to upgrade

After upgrade
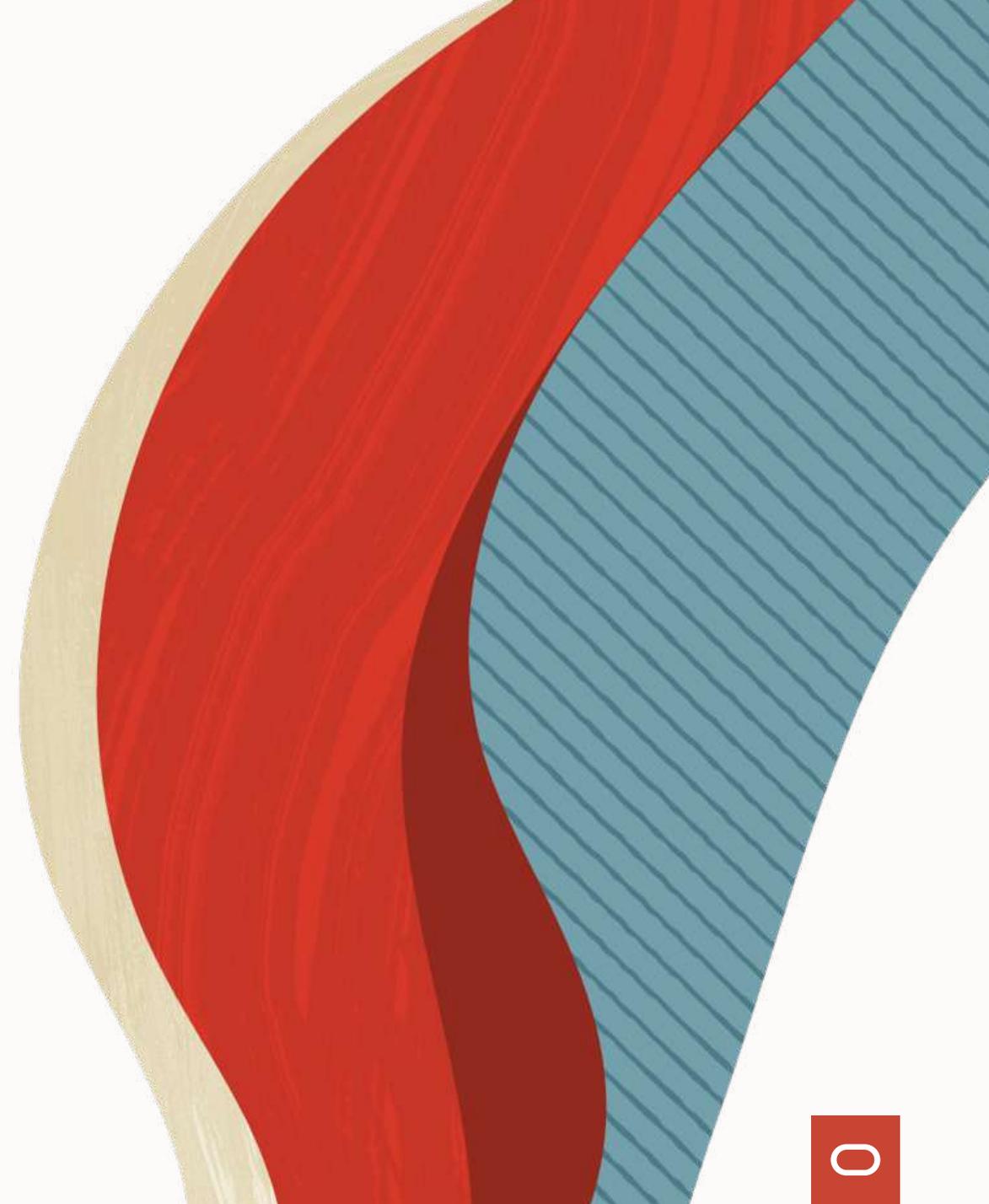
How do you start?

Installation

Download and install
Oracle Database 23c

Container Database

AutoUpgrade

Installation of Oracle Home is simpler

- Gold images with recent Release Update
- Available for Oracle Database 23c

Simplified Installation

1   Download software

2   Download patches

3   Unzip

4   Update OPatch

5   Install

6   Apply patches

Simplified Installation

1   Download software

2   ~~Download patches~~

3   Unzip

4   ~~Update OPatch~~

5   Install

6   ~~Apply patches~~

Simplified Installation

1   Download software

2   Unzip   ⟹

3   Install

Fully updated
Oracle Home

How do you start?

Installation
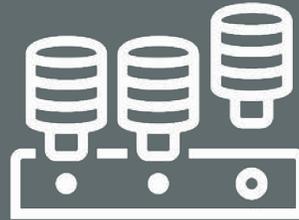
Container Database

Create a new CDB in
Oracle Database 23c

AutoUpgrade

Create Container Database
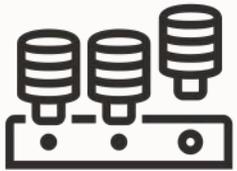
1   Character set

2   Components

3   `COMPATIBLE`

Create Container Database

1 Character set

- Always choose AL32UTF8
- Allows PDBs with any character set

2 Components

3 COMPATIBLE

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Create Container Database

1 Character set

2 Components

- Install as many as you need
- No more than that

3 COMPATIBLE

Create Container Database

1 Character set

2 Components

All initialization parameters   ✕

⚠ Update the initialization parameters only when it is required. Refer to the Oracle documentation to learn more about each initialization parameter and its valid set of values.

(Storage related parameter(s) value is shown in MB)   ☐ *Show advanced parameters*

Name ▲	Value	Include in spfile	Category
cluster_database	FALSE	☐	Cluster Database
compatible	**19.0.0**	☑	**Miscellaneous**
control_files	("/u02/oradata/{DB_UNI...	☑	File Configuration
db_block_size (bytes)	**8192**	☑	**Cache and I/O**
db_create_file_dest	/u02/oradata/{DB_UNIQUE ...	☐	File Configuration

3 `COMPATIBLE`

- Keep at the default setting, *23.0.0*
- Unless you want the option of downgrade

```
--Allows CDB views to include information on PDB$SEED objects.
--By default, such information is hidden.
--https://mikedietrichde.com/2017/07/21/why-exclude_seed_cdb_view-is-now-an-underscore-in-oracle-12-2/


alter system set "_exclude_seed_cdb_view"=false;
```

How do you start?

Installation

Container Database

AutoUpgrade

Download latest version, create your config file and start the process

Always download
the latest version of AutoUpgrade

- My Oracle Support Doc ID 2485457.1

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

build.version 23.3.230829
build.date 2024/08/29 19:47:13 -0700
build.hash 8ab1875
build.hash_date 2024/08/29 03:54:58 -0700
build.supported_target_versions 12.2,18,19,21,23
build.type test
build.label (HEAD, origin/devel)
```

Flow

1

Plug in

2

Upgrade

3

Convert

$\Rightarrow$

23c

Demo

Upgrade to Oracle Database 23c

- Using AutoUpgrade
- Including PDB conversion

Watch on YouTube

```
SQL> select version_full from v$instance;

VERSION_FULL
------------
23.3.0.23.9
```
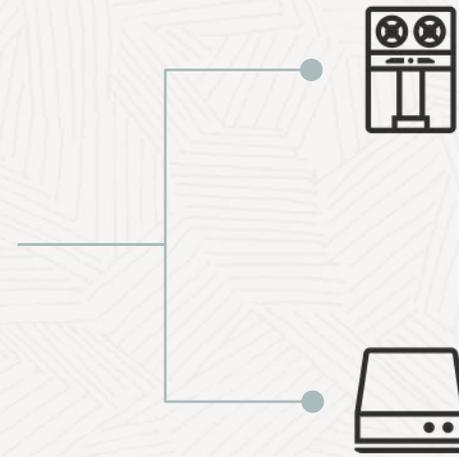
Non-CDB to PDB conversion is irreversible

What are your rollback options?

Before Go-Live

ROLLBACK

Backup / restore
Ensure you have a recent backup and requires time to restore and recover

Copy data files
Requires time and disk space to hold a copy of the data files

Before Go-Live

ROLLBACK

Backup / restore
Ensure you have a recent backup and requires time to restore and recover

Copy data files
Requires time and disk space to hold a copy of the data files

Refreshable clone
Requires ~~time and~~ disk space to hold a copy of the data files

Requires Oracle Database 12.2 or newer

After Go-Live

FALLBACK

Back to 19c non-CDB

Data Pump

Golden Gate

Back to 19c, stay on PDB

Downgrade

COMPATIBLE must be 19.0.0 in 23c CDB

Refreshable Clone

CREATE

Create PDB from non-CDB over a database link

REFRESH

Apply redo from non-CDB to keep PDB up-to-date

OUTAGE

Disconnect users and refresh PDB for the last time

CONVERT

To become a proper PDB, it must be converted

Refreshable Clone

Source non-CDB	Target CDB

```
CREATE USER dblinkuser
      IDENTIFIED BY ... ;

GRANT CREATE SESSION,
      CREATE PLUGGABLE DATABASE,
      SELECT_CATALOG_ROLE TO dblinkuser;

GRANT READ ON sys.enc$ TO dblinkuser;
```

```
CREATE DATABASE LINK CLONEPDB
      CONNECT TO dblinkuser
      IDENTIFIED BY ...
      USING 'noncdb-alias';
```

Refreshable Clone

Source non-CDB	Target CDB

```
upg1.source_home=/u01/app/oracle/product/12.2.0.1
upg1.target_home=/u01/app/oracle/product/19
upg1.sid=NONCDB1
upg1.target_cdb=CDB1
upg1.source_dblink.NONCDB1=CLONEPDB
upg1.target_pdb_name.NONCDB1=PDB1

--Specify relative start time
--upg1.start_time=+1h30m
```

Refreshable Clone

Source non-CDB	Target CDB

```
upg1.source_home=/u01/app/oracle/product/12.2.0.1
upg1.target_home=/u01/app/oracle/product/19
upg1.sid=NONCDB1
upg1.target_cdb=CDB1
upg1.source_dblink.NONCDB1=CLONEPDB 300
upg1.target_pdb_name.NONCDB1=PDB1

--Specify relative start time
--upg1.start_time=+1h30m
```

Refreshable Clone

Source non-CDB	Target CDB

```
upg1.source_home=/u01/app/oracle/product/12.2.0.1
upg1.target_home=/u01/app/oracle/product/19
upg1.sid=NONCDB1
upg1.target_cdb=CDB1
upg1.source_dblink.NONCDB1=CLONEPDB 300
upg1.target_pdb_name.NONCDB1=PDB1
upg1.start_time=22/10/2024 02:00:00
--Specify relative start time
--upg1.start_time=+1h30m
```

Refreshable Clone

Source non-CDB	Target CDB


```
upg1.source_home=/u01/app/oracle/product/12.2.0.1
upg1.target_home=/u01/app/oracle/product/19
upg1.sid=NONCDB1
upg1.target_cdb=CDB1
upg1.source_dblink.NONCDB1=CLONEPDB 300
upg1.target_pdb_name.NONCDB1=PDB1
upg1.start_time=22/10/2024 02:00:00
--Coming in the next version of AutoUpgrade
upg1.parallel_pdb_creation_clause=4
```

Refreshable Clone

1

Run on source

```
autoupgrade.jar ... -mode analyze

autoupgrade.jar ... -mode fixups
```

2

Run on target

```
autoupgrade.jar ... -mode deploy
```

Refreshable Clone

| 1. PDB is created | 2. Data files are copied | 3. Redo is applied | 4. Final refresh | 5. Disconnect and convert |

```
autoupgrade.jar ... –mode deploy
```

```
upg1.start_time=22/10/2024 02:00:00
```

The source non-CDB stays intact
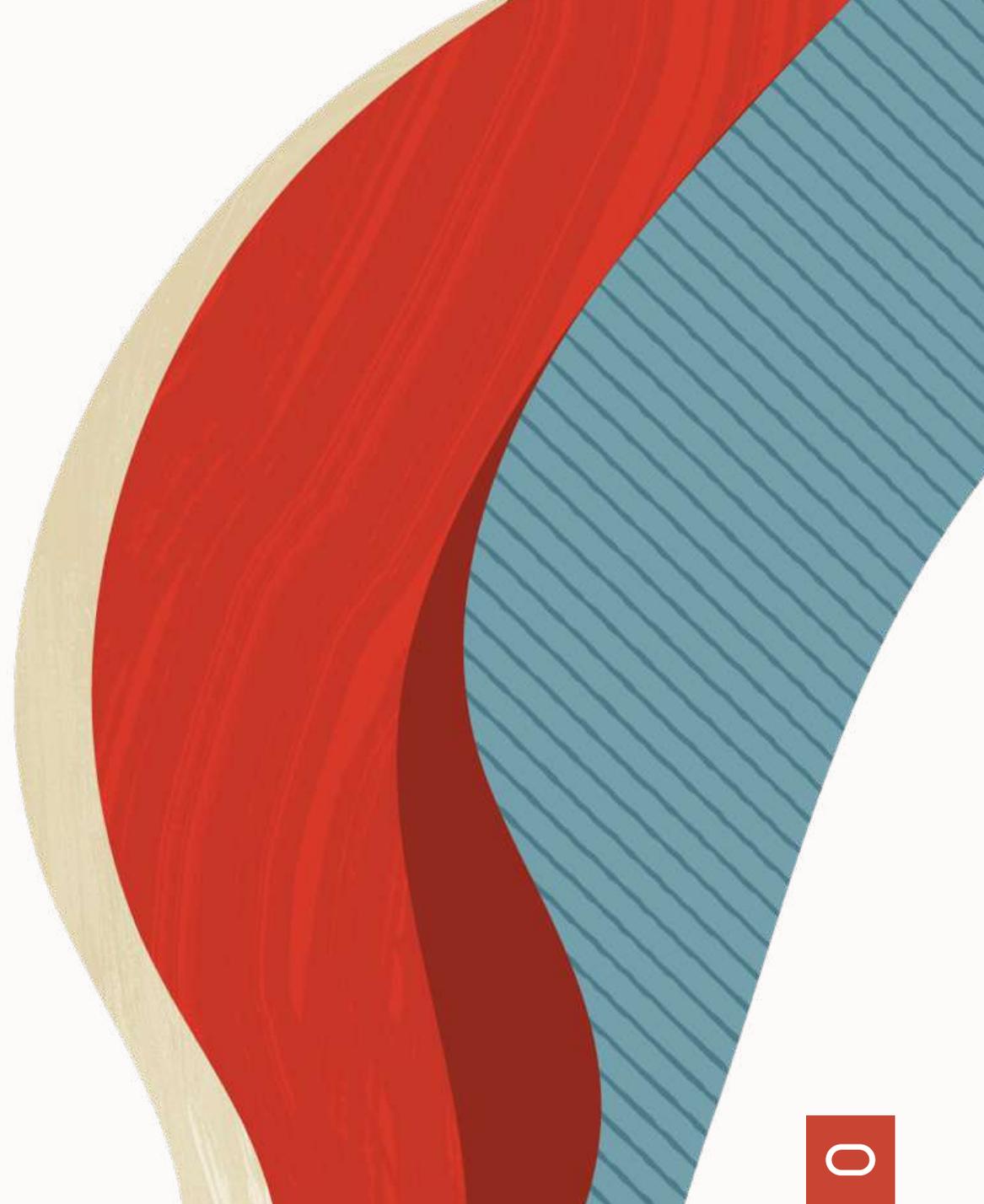to allow rollback

Works for unplug-plug upgrades as well

You can also migrate with
Data Pump or Transportable Tablespaces

- Suitable when direct upgrade is not possible
- Smaller databases
- Reorganizing data

Before upgrade

How to upgrade

After upgrade

Backup your database after migration

- Level 0
- Practice restore with pre-plugin backups

Check your standby databases

- Special attention is needed for standby databases

Don't jeopardize your Data Guard

- Test the procedure and verify your environment

```
--Default value is for CDBs with many PDBs
--Other places, it leads to concurrency issues
--Reset back to 12.1 default as described in MOS 2431353.1


alter system set "_cursor_obsolete_threshold"=1024;
```

```
--Database collects SQL Plan Directives even when adaptive
--statistics are off.
--If you do not use Adaptive Statistics (optimizer_adaptive_statistics)
--then turn it completely off as described in MOS 2209560.1


alter system set "_sql_plan_directive_mgmt_control"=0;
```

Enjoy lots of awesome great new features

Oracle Database 23c

YouTube | Oracle Database Upgrades and Migrations
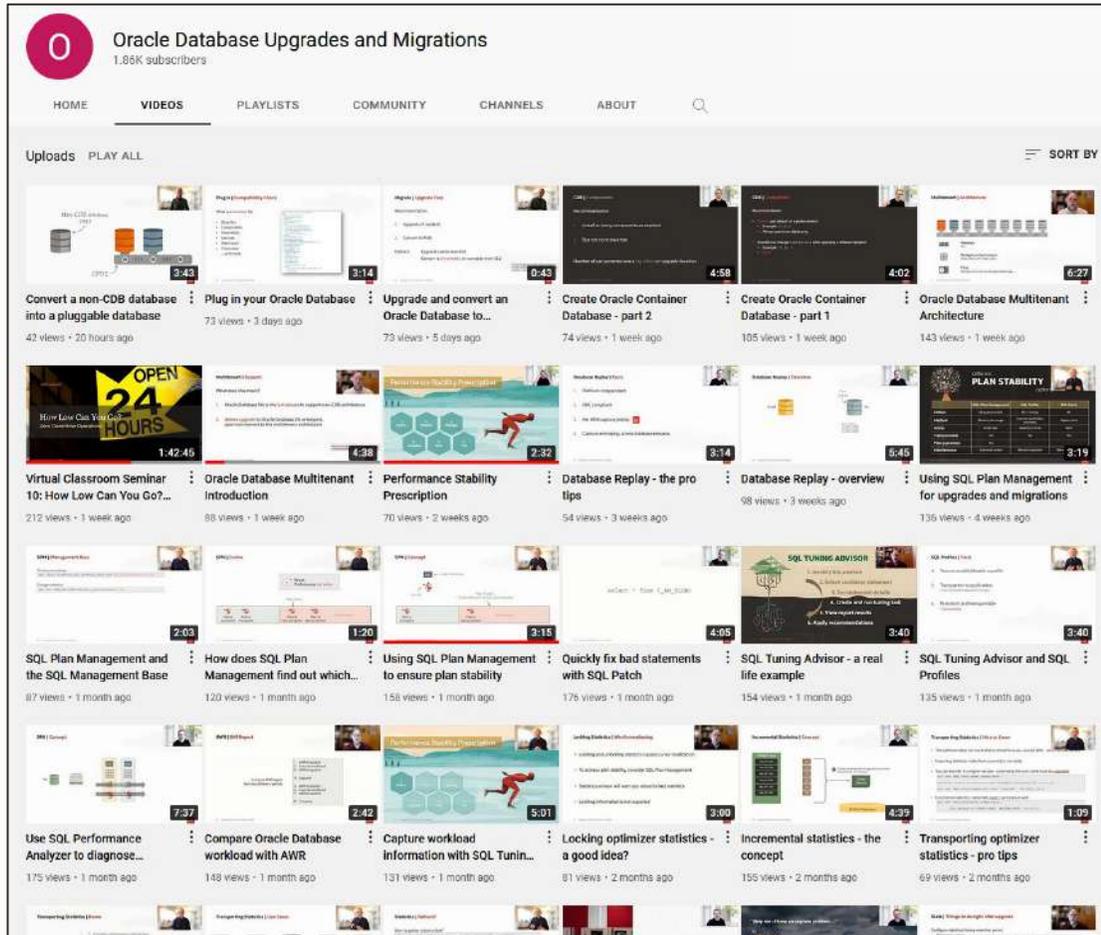
- 300+ videos

- New videos every week

- No marketing

- No buzzword

- All tech

ORACLE
CloudWorld Tour

Thank you

Rodrigo Jorge, Senior Principal Product Manager

dbaRJ.com.br