



ORACLE

# Upgrade to Oracle AI Database 26ai

Best Practices and Customer Experience



# Alex Zaballa

CHRISTIAN, HUSBAND, FATHER, PM, DBA, WRITER, SPEAKER AND BLOGGER.

Born

Double  
Citizenship

Living












25 years – Oracle Technologies  
Oracle Developer: 2000 – 2007  
Oracle DBA: 2007 – 2023  
Oracle Cloud Architect: 2016 – 2023  
Oracle Database PM - 2024



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 @alexzaballa.bsky.social































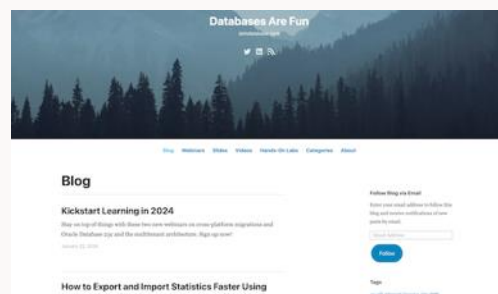


# Find Slides and Much More on Our Blogs



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Oracle

**DBAs**

run the world



# Connect with us



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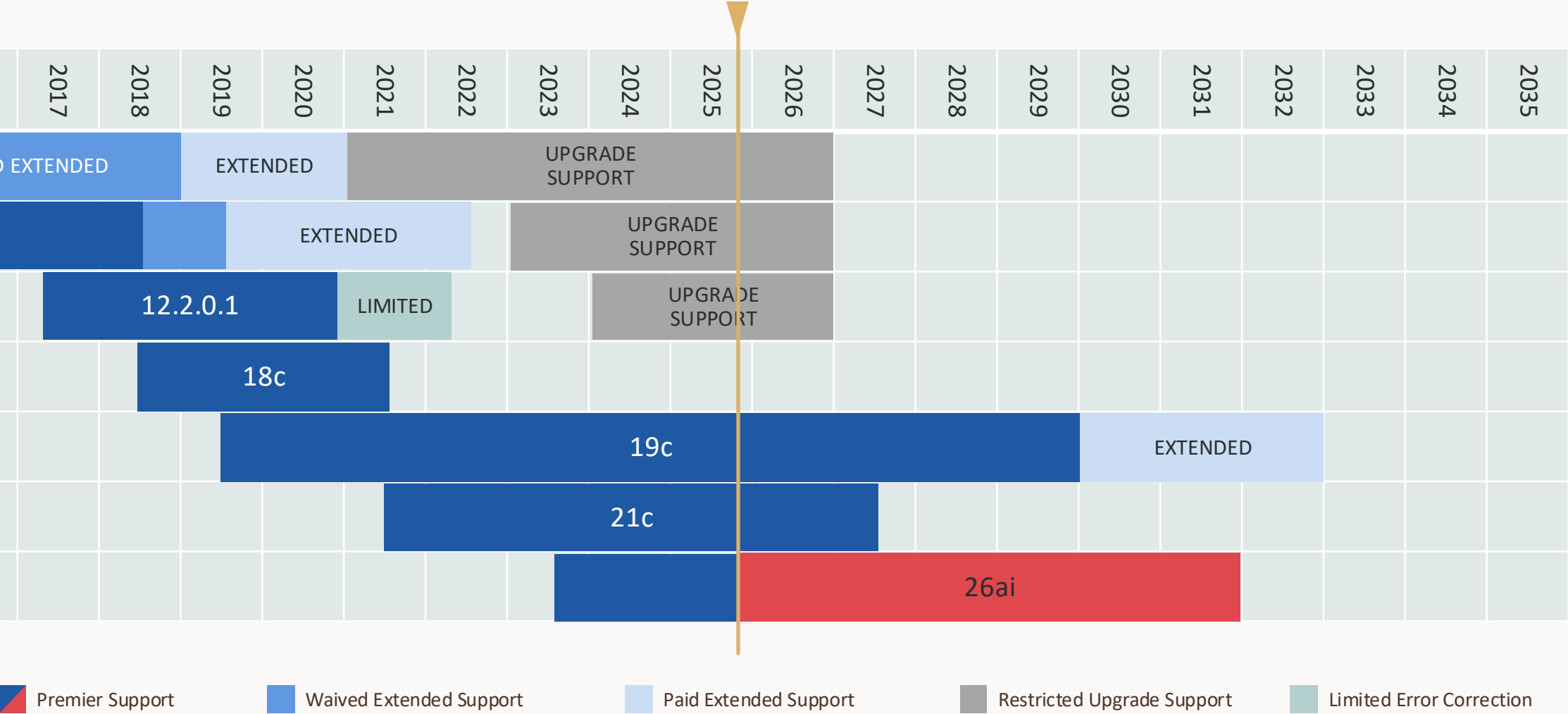


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<https://mikeditrichde.com>  
<https://dohdatabase.com>  
<https://dbarj.com.br/en>  
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# Lifetime Support Policy



- **Virtual Classroom Seminar #19: Move to Oracle 26ai - Everything about Multitenant - PART 1**

<https://www.youtube.com/watch?v=k0wCWbp-htU>

- **Virtual Classroom Seminar #20: Move to Oracle 26ai - Everything about Multitenant - PART 2**

<https://www.youtube.com/watch?v=Sm75OIWagkE>

<https://www.youtube.com/@upgradenow>





# Upgrade from 19c to 26ai using AutoUpgrade

## Exadata Database Service on Dedicated Infrastructure (ExaCS/ExaCC)

- [Part 1](#) – Refreshable Clone PDBs
- [Part 2](#) – Non-CDB 19c to 26ai PDB
- [Part 3](#) – 19c PDB to 26ai
- [Part 4](#) – Fallback options
- [Part 5](#) – Target\_pdb\_copy\_option
- [Part 6](#) – Create a 26ai Database with Compatible set to 19c

**<https://alexzaballa.com>**

# Virtual Classroom Seminar Series #22 – #25



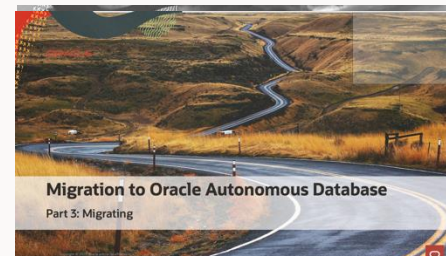
## 1 PLANNING

Watch [recording](#)  
Get [slides](#)



## 2 PREPARING

Watch [recording](#)  
Get [slides](#)



## 3 MIGRATING

Watch [recording](#)  
Get [slides](#)



## 4 OPERATING

Wach [recording](#)  
Get [slides](#)



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

- Release Schedule of Current Database Releases  
(Doc ID [742060.1](#))

Next Long Term Support release

# Oracle AI Database 26ai

Upgrade possible only 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 18c



Oracle Database 19c



**Oracle Database 23ai**

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



Oracle Database 19c



Oracle Database 23ai

**Oracle AI Database 26ai**

# 26<sup>ai</sup>

When is a database upgrade required?

Oracle Database 19c ⇒ Oracle Database 23ai ⇒ Oracle AI Database 26ai

**UPGRADE**

Oracle Database 19c



Oracle AI Database 26ai

**UPGRADE**



Oracle Database 19c



Oracle Database 23ai



Oracle AI Database 26ai

**UPDATE**

July 2025

Oracle Database 23ai

23.9.0.25.07

October 2025

Oracle AI Database 26ai

23.26.0.0.0

January 2026

Oracle AI Database 26ai

23.26.1.0.0

April 2026

Oracle AI Database 26ai

23.26.2.0.0

July 2025

Oracle Database 23ai

23.9.0.25.07

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Oracle Database 23ai

23.9.0.25.07

October 2025

Oracle AI Database 26ai

23.26.0.0.0

January 2026

Oracle AI Database 26ai

23.26.1.0.0

April 2026

Oracle AI Database 26ai

23.26.2.0.0


```
SQL> select version, version_full from v$instance
```

VERSION

VERSION\_FULL

-----  
23.0.0.0.0

-----  
23.26.0.0.0

  
No changes


```
SQL> select version, version_full from v$instance
```

VERSION

23.0.0.0.0

VERSION\_FULL

23.26.0.0.0

 This changes

*Your Road to Oracle AI Database 26ai*

**ANALYZE**    ➡    **UPGRADE**    ➡    **GO-LIVE**





## Oracle AI Database 26ai 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\_pdb=3;**





## Update Exadata System Software to the latest version

# Further Information

## Exadata System Software



- Recommended to use latest version. However, minimum version is 25.1

- [MOS Note: 888828.1](#)

Exadata Database Machine and Exadata Storage Server Supported Versions





## Upgrade to Oracle Grid Infrastructure 26ai

- Manages Oracle Database 19c and newer
- Upgrade older databases in advance

--Grid Infrastructure 26ai requires a minimum compatible setting

--Databases older than 19c may not use this disk group anymore

```
alter diskgroup DATA set attribute 'compatible.rdbms' = '19.0.0.0.0';
```





## Confirm your clients can connect to Oracle AI Database 26ai

- Upgrade your clients well in advance of the upgrade

# Client / Server Interoperability

| Client Version |      | Server Version     |                    |                   |        |                    |                    |
|----------------|------|--------------------|--------------------|-------------------|--------|--------------------|--------------------|
|                | 26ai | 21c                | 19c                | 18c               | 12.2.0 | 12.1.0             | 11.2.0             |
| 26ai           | Yes  | Yes                | Yes                | No                | No     | No                 | No                 |
| 21c            | Yes  | Yes                | Yes                | Was               | Was    | Yes <sup>#12</sup> | No                 |
| 19c            | Yes  | Yes                | Yes                | Was               | Was    | Yes <sup>#12</sup> | Yes <sup>#9</sup>  |
| 18c            | No   | Was                | Was                | Was               | Was    | Was                | Was <sup>#9</sup>  |
| 12.2.0         | No   | Was                | Was                | Was               | Was    | Was                | Was                |
| 12.1.0         | No   | Yes <sup>#12</sup> | Yes <sup>#12</sup> | Was               | Was    | Yes <sup>#12</sup> | Yes <sup>#12</sup> |
| 11.2.0         | No   | No                 | Yes <sup>#9</sup>  | Was <sup>#9</sup> | Was    | Yes <sup>#12</sup> | Yes <sup>#9</sup>  |

MOS Note: 207303.1 - Client / Server Interoperability Support Matrix





# Client / Server Interoperability

| Client Version |      |                    |                    | Server Version    |        |                    |                    |
|----------------|------|--------------------|--------------------|-------------------|--------|--------------------|--------------------|
|                | 26ai | 21c                | 19c                | 18c               | 12.2.0 | 12.1.0             | 11.2.0             |
| 26ai           | Yes  | Yes                | Yes                | No                | No     | No                 | No                 |
| 21c            | Yes  | Yes                | Yes                | Was               | Was    | Yes <sup>#12</sup> | No                 |
| 19c            | Yes  | Yes                | Yes                | Was               | Was    | Yes <sup>#12</sup> | Yes <sup>#9</sup>  |
| 18c            | No   | Was                | Was                | Was               | Was    | Was                | Was <sup>#9</sup>  |
| 12.2.0         | No   | Was                | Was                | Was               | Was    | Was                | Was                |
| 12.1.0         | No   | Yes <sup>#12</sup> | Yes <sup>#12</sup> | Was               | Was    | Yes <sup>#12</sup> | Yes <sup>#12</sup> |
| 11.2.0         | No   | No                 | Yes <sup>#9</sup>  | Was <sup>#9</sup> | Was    | Yes <sup>#12</sup> | Yes <sup>#9</sup>  |

MOS Note: 207303.1 - Client / Server Interoperability Support Matrix



--List current connections and their driver details  
--Join to gv\$session for more details.

**select \* from gv\$session\_connect\_info;**



The same certification matrix applies to [database links](#) as well

# Further Information

## Client / Server Interoperability



- Client / Server Interoperability Support Matrix (Doc ID [207303.1](#))
- Blog post: [Are Your Oracle Database Clients Ready for the next Database Upgrade?](#)

# Upgrade

---

your key to

Successful Database Upgrades

# AutoUpgrade

Only supported method for upgrading to Oracle AI Database 26ai



# AutoUpgrade



- 1 Upgrading
- 2 Non-CDB to PDB
- 3 Patching

# AutoUpgrade

## Upgrading

Non-CDB to PDB

Patching

Oracle  
Database 19c



Oracle  
AI Database 26ai





# AutoUpgrade

Upgrading

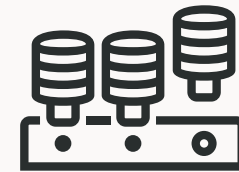
**Non-CDB to PDB**

Patching

Non-CDB



Multitenant



# AutoUpgrade

Upgrading

Non-CDB to PDB

Patching

23.9.0

23.26.0





One single tool for everything  
- on all platforms

-- Always use the latest version of AutoUpgrade

-- Available as a direct download from oracle.com or MOS (Doc ID 2485457.1)

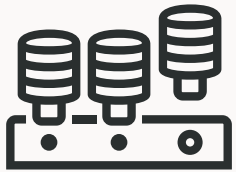
wget [https://download.oracle.com/otn-pub/otn\\_software/autoupgrade.jar](https://download.oracle.com/otn-pub/otn_software/autoupgrade.jar)





Create Container Database in advance

# 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

Database Configuration Assistant - Create 'orcl' database - Step 9 of 15

Specify Configuration Options

ORACLE 26<sup>ai</sup>  
AI Database

Memory Sizing **Character sets** Connection mode

The database character set determines how character data is stored in the database.

☒ Use Unicode (AL32UTF8)  
Setting character set to Unicode (AL32UTF8) enables you to store multiple language groups.

☐ Use OS character set (WE8MSWIN1252)  
Character set is based on the language setting of this operating system.

☐ Choose from the list of character sets

Database character set: AL32UTF8 - Unicode UTF-8 Universal character set

☒ Show recommended character sets only

National character set: AL16UTF16 - Unicode UTF-16 Universal character set

Default language: American

Default territory: United States

# Create Container Database

## 1 Character set

## 2 Components

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

## 3 COMPATIBLE

Database Configuration Assistant - Create 'orcl' database - Step 8 of 15

Select Database Options

ORACLE 26<sup>ai</sup>  
AI Database

Database \_components

Select the standard database components you want to configure for use in your database. Oracle recommends that you always install these components in your database. Deselecting these components may cause you to no longer be able to choose some components on the subsequent page.

| Select Component                               | Tablespace | Include in PDBs          |
|--|------------|--------------------------|
| <input type="checkbox"/> Oracle JVM            | SYSTEM     | <input type="checkbox"/> |
| <input type="checkbox"/> Oracle Text           | SYS_AUX    | <input type="checkbox"/> |
| <input type="checkbox"/> Oracle OLAP           | SYS_AUX    | <input type="checkbox"/> |
| <input type="checkbox"/> Oracle Spatial        | SYS_AUX    | <input type="checkbox"/> |
| <input type="checkbox"/> Oracle Label Security | SYSTEM     | <input type="checkbox"/> |
| <input type="checkbox"/> Oracle Database Vault | SYS_AUX    | <input type="checkbox"/> |



# Create Container Database

## 1 Character set

## 2 Components

## 3 COMPATIBLE

- Keep at **23.6.0** to benefit from AI Vector Search features
- Unless you want the option of downgrade

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.

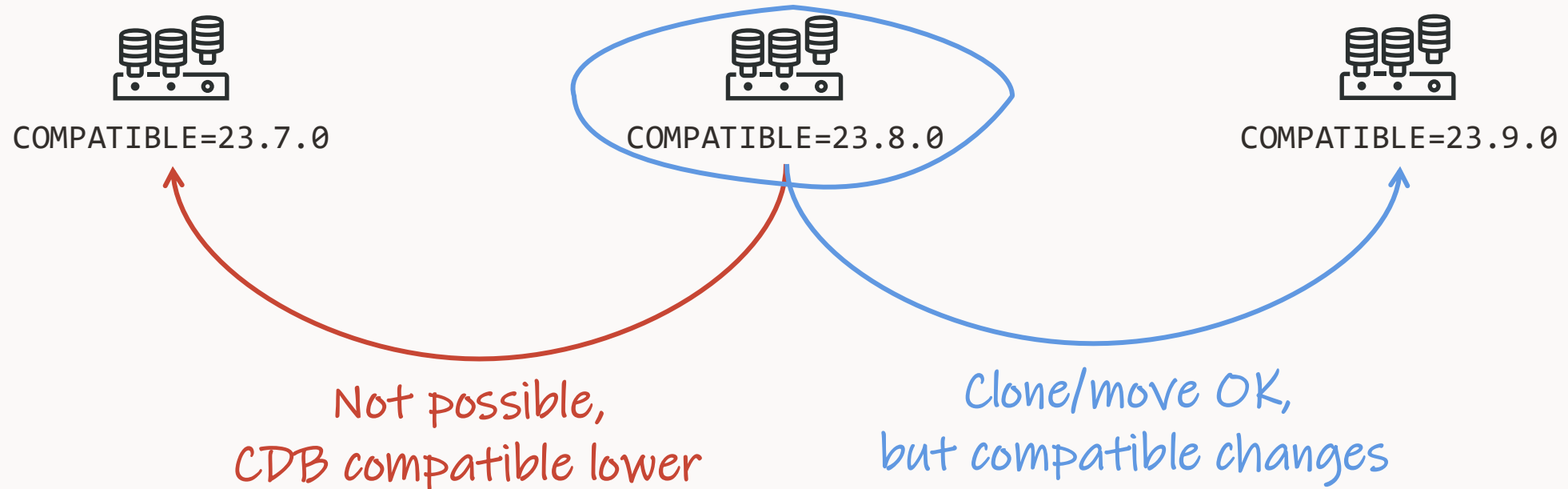
(Storage related parameter(s) value is shown in MB) ☐ Show advanced parameters

| Name                      | Value                       | Include in spfile                   | Category                         |
|---------------------------|-----------------------------|-------------------------------------|----------------------------------|
| undo_tablespace           | UNDOTBS1                    | <input checked="" type="checkbox"/> | Cluster Database                 |
| sga_target                | 19202                       | <input checked="" type="checkbox"/> | SGA Memory                       |
| db_block_size (bytes)     | 8192                        | <input checked="" type="checkbox"/> | Cache and I/O                    |
| nls_language              | AMERICAN                    | <input checked="" type="checkbox"/> | NLS                              |
| control_files             | ("{ORACLE_BASE}/oradata/... | <input checked="" type="checkbox"/> | File Configuration               |
| remote_login_passwordfile | EXCLUSIVE                   | <input checked="" type="checkbox"/> | Security and Auditing            |
| processes                 | 640                         | <input checked="" type="checkbox"/> | Processes and Sessions           |
| pga_aggregate_target      | 6401                        | <input checked="" type="checkbox"/> | Sort, Hash Joins, Bitmap Indexes |
| nls_territory             | AMERICA                     | <input checked="" type="checkbox"/> | NLS                              |
| open_cursors              | 300                         | <input checked="" type="checkbox"/> | Cursors and Library Cache        |
| db_domain                 | livelabs.oraclevcn.com      | <input checked="" type="checkbox"/> | Database Identification          |
| compatible                | 23.6.0                      | <input checked="" type="checkbox"/> | Miscellaneous                    |
| db_name                   | orcl                        | <input checked="" type="checkbox"/> | Database Identification          |
| cluster_database          | FALSE                       | <input type="checkbox"/>            | Cluster Database                 |

Description:

compatible: Allows you to use a new release, while at the same time guaranteeing backward compatibility with an earlier release. Range of Values: Default to current release. Default Value: Release dependent

# Compatible





- You can now update the COMPATIBLE parameter without a restart
- Works within a release, e.g., from 23.6.0 to 23.26.0
- Cross-release changes, e.g., 19.0.0 to 23.6.0, still requires a restart

**alter database set downgrade compatibility to '23.6.0';**

# Further Information

## COMPATIBLE and Compatibility



- [Documentation](#)
- Blog post: [Online COMPATIBLE raise starting with 23.9](#)



```
SQL> select con$name, comp_id, status from cdb_registry;
```

| CON\$NAME | COMP_ID | STATUS |
|-----------|---------|--------|
| -----     | -----   | -----  |
| CDB\$ROOT | CATALOG | VALID  |
| CDB\$ROOT | CATPROC | VALID  |
| CDB\$ROOT | XDB     | VALID  |
| RED       | CATALOG | VALID  |
| RED       | CATPROC | VALID  |
| RED       | XDB     | VALID  |

No information on  
PDB\$SEED





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



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

```
SQL> select con$name, comp_id, status from cdb_registry;
```

| CON\$NAME | COMP_ID | STATUS |
|-----------|---------|--------|
| -----     | -----   | -----  |
| CDB\$ROOT | CATALOG | VALID  |
| CDB\$ROOT | CATPROC | VALID  |
| CDB\$ROOT | XDB     | VALID  |
| PDB\$SEED | CATALOG | VALID  |
| PDB\$SEED | CATPROC | VALID  |
| PDB\$SEED | XDB     | VALID  |
| RED       | CATALOG | VALID  |
| RED       | CATPROC | VALID  |
| RED       | XDB     | VALID  |

1

Plug in

2

Upgrade

3

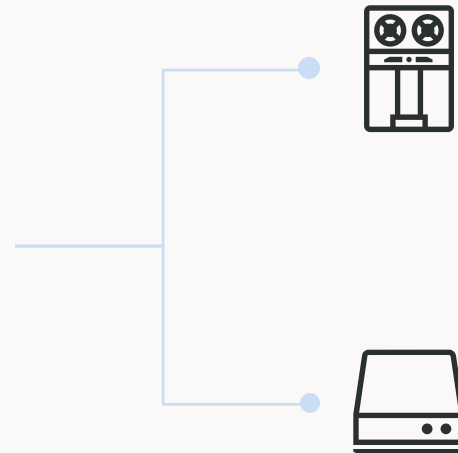
Convert



*Irreversible!  
Flashback no good*



# ROLLBACK



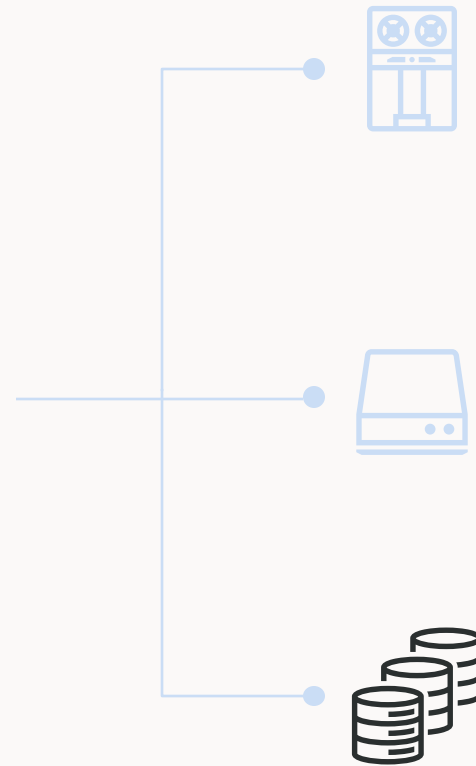
## Backup / restore

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

# 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 PDB

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

Requires Oracle Database 12.2 or newer

# Upgrade via Refreshable Clone PDB



## CREATE

In CDB on Oracle AI Database 26ai, create a copy of PDB over a database link



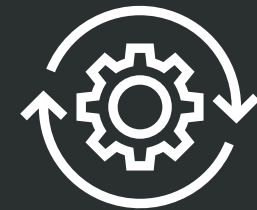
## REFRESH

Apply redo from source to keep PDB up-to-date



## OUTAGE

Disconnect users and refresh PDB for the last time



## UPGRADE

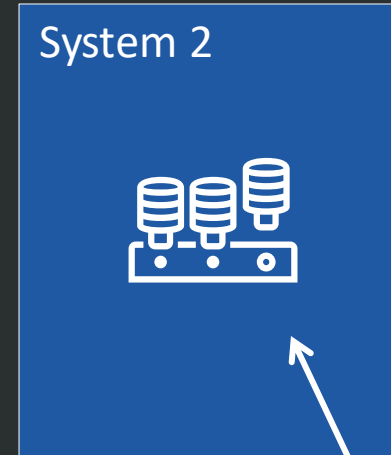
Upgrade PDB to Oracle AI Database 26ai

# Upgrade via Refreshable Clone PDB

system01.dbf  
sysaux01.dbf  
users01.dbf  
undo01.dbf  
...



*19c  
database*



*26ai  
CDB*

# Upgrade via Refreshable Clone PDB

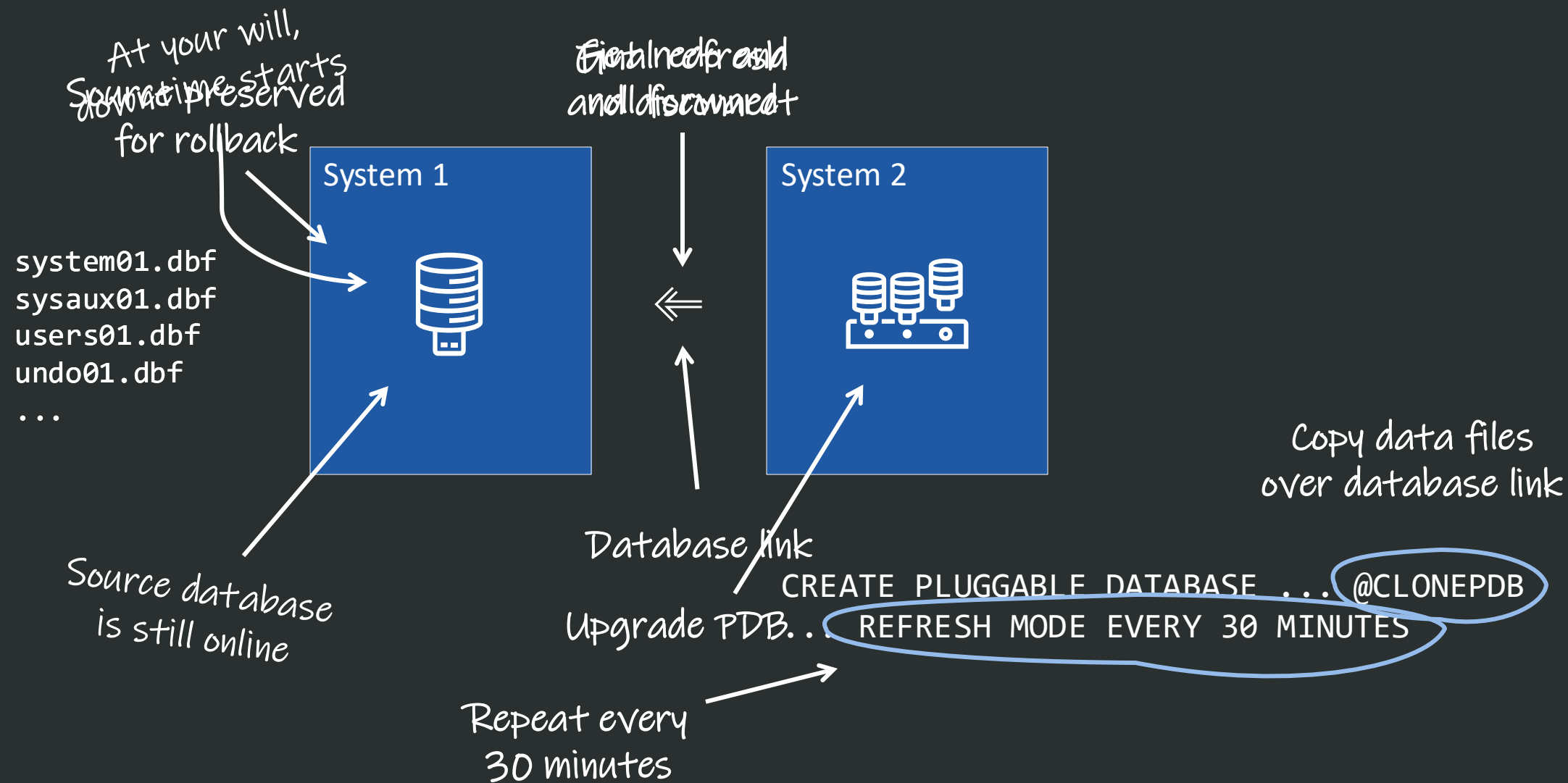
system01.dbf  
sysaux01.dbf  
users01.dbf  
undo01.dbf  
...



*Could be same  
system as well*



# Upgrade via Refreshable Clone PDB



DEMO

# Upgrade to Oracle AI Database 26ai



[Watch on YouTube](#)



# Key Benefits of Upgrade via Refreshable Clone PDB



- 1 Less downtime
- 2 Excellent rollback option
- 3 For PDBs and non-CDBs

*We used AutoUpgrade and refreshable clone  
to move a mission-critical 76 TB database  
to Oracle Database 23ai in **less than 45 minutes**  
- while preserving the source as rollback option*

---

**Portuguese Government Agency**

# Works everywhere



# Works everywhere



- Base Database Service
- Exadata Database Service
- Exadata Cloud@Customer
- On-prem and other clouds
- Exascale migration
- Non-CDB to PDB migration
- PDB upgrade
- On-prem to cloud migration

## Upgrading in the cloud



- Blog post: [Upgrade Pluggable Database to Oracle Database 23ai](#)
- Blog post: [Upgrade Oracle Base Database Service to Oracle Database 23ai](#)
- Blog post: [Upgrade from 19c to 23ai using AutoUpgrade –ExaDB-D or ExaC@C – Part 1](#)
- Blog post: [When A Refreshable Clone Takes Over The Service](#)
- Blog post: [Upgrade Pluggable Database to Oracle Database 23ai](#)
- Documentation: [Proceed command](#)

# Go Live







## Check your standby databases

- Check our [webinar](#) for details

- 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;
```



--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  
comment="Added 2025-10-14 - Advice from MOS Note: 2431353.1";
```

--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;

--Database collects expression statistics for  
--SQL Plan Directives and Auto-Indexing.  
--If you don't use any of these, then turn it to the 11.2 value of "1".  
--Tables being used in dictionary: EXP\_HEAD\$, EXP\_OBJ\$, EXP\_STAT\$  
--Doc ID 2674400.1, Value of "0" fully disables tracking.

alter system set "\_column\_tracking\_level"=1;

# Should You Enable Optimizer Fixes?

Many optimizer fixes are OFF by default

Enable optimizer fixes using DBMS\_OPTIM\_BUNDLE

```
begin
  dbms_optim_bundle.enable_optim_fixes(
    action          => 'ON',
    scope           => 'BOTH',
    current_setting_precedence => 'YES');
end;
/
```

Find available bug fixes in ORAdiff or `dbms_optim_bundle.GetBugsForBundle`

# Should You Enable Optimizer Fixes?

oradiff.oracle.com

Oracle Release Analyzer Diff Utility

AdministratorMOS AccountOracle Accountmike.dietrich@oracle.com

Home

Parameters

Users, Roles, etc

Privileges

Included Fixes

List of Fixes

Total Fixes

Search Fixes

List of CVEs

CPU Explore

Fix Control

Version Selector

Source Release19c

Source Patch Level19.3.0 (Base Release)

Target Release19c

Target Patch Level19.24.0

List Mode

V\_\$SYSTEM\_FIX\_CONTROL

AddedRemovedModified

QvGoActions

| BUGNO    | VALUE | SQL_FEATURE              | DESCRIPTION   | OPTIMIZER_FEATURE_ENABLE | EVENT | IS_DEFAULT |
|----------|-------|--------------------------|---|--------------------------|-------|------------|
| 33636280 | 0     | QKSFM_EXTTAB_33636280    | fix for serializable transaction                                |                          | 0     | 1          |
| 33649782 | 0     | QKSFM_OR_EXPAND_33649782 | Try LORE after ORE rejected due to LOB structure                |                          | 0     | 1          |
| 33667505 | 0     | QKSFM_OR_EXPAND_33667505 | enhance index check in presence of NLSSORT function based index |                          | 0     | 1          |

1 - 50 of 235 >





# Should You Enable Optimizer Fixes?

## Upgrade?

Enable optimizer fixes using DBMS\_OPTIM\_BUNDLE

## New database?

Enable optimizer fixes using DBMS\_OPTIM\_BUNDLE

## Patching?

Do proper testing before enabling optimizer fixes using DBMS\_OPTIM\_BUNDLE

**It's better to fail in our lab,  
than in production**

Oracle LiveLabs:

[Hitchhiker's Guide for Upgrading to Oracle Database 23ai](#)



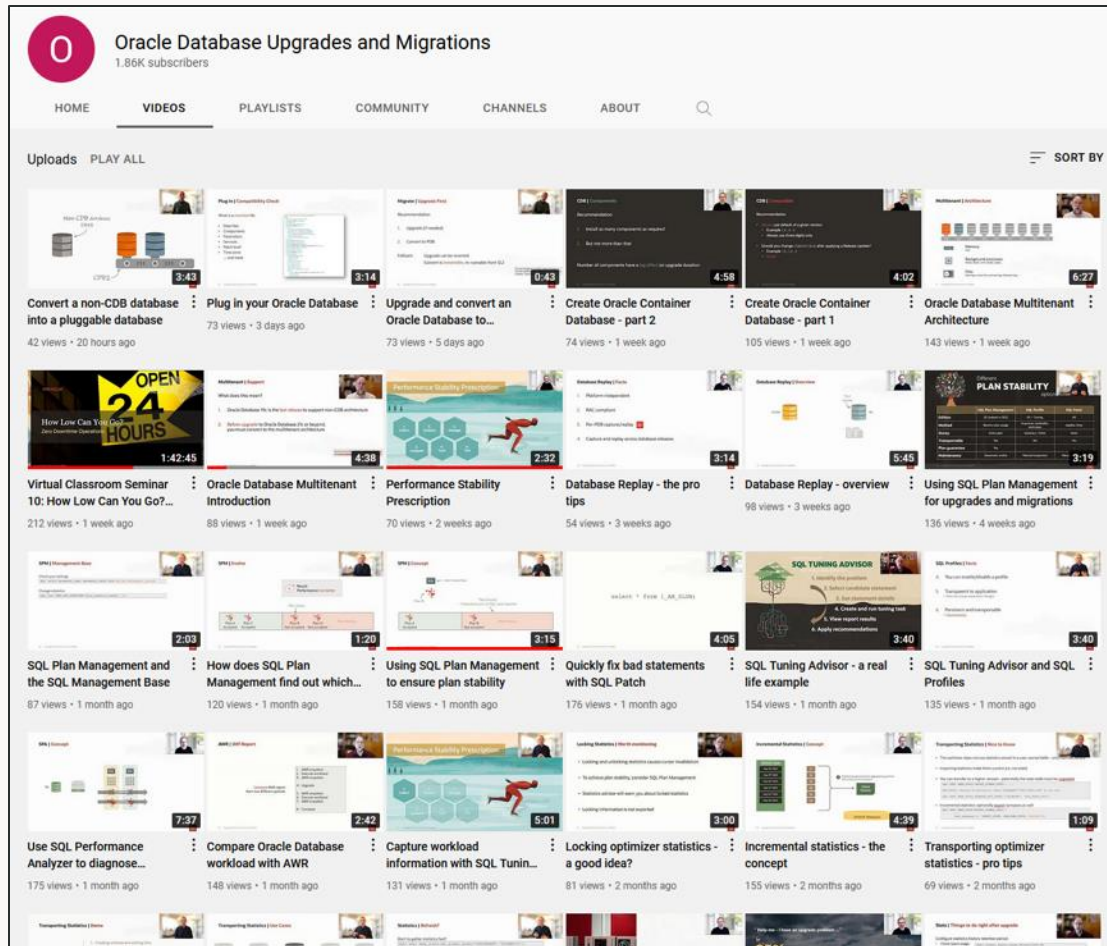
# Key Learnings



- 1 Start preparing today
- 2 Use AutoUpgrade
- 3 Caution with Data Guard and Multitenant conversion



# YouTube | Oracle Database Upgrades and Migrations



<https://www.youtube.com/@upgradenow>

- 300+ videos
- New videos every week
- No marketing
- No buzzword
- All tech

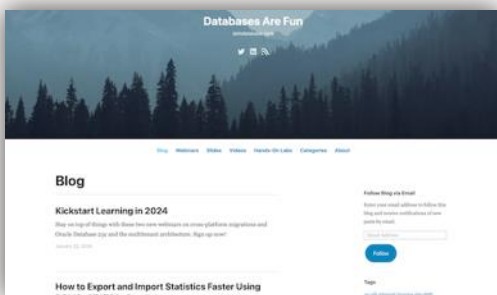


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## Virtual Classroom Seminars

### Episode 16

(replaces Episode 1 from Feb 2021)

[Oracle Database Release and Patching Strategy for 19c and 23c](#)

115 minutes – May 10, 2023



### Episode 17

[From SR to Patch – Insights into the Oracle Database Development process](#)

55 minutes – June 22, 2023



### Episode 18

[Cross Platform Migration – Transportable Tablespaces to the Extreme](#)

145 min – February 22, 2024



### Episode 19

[Move to Oracle Database 23ai – Everything you need to know about Multitenant PART 1](#)

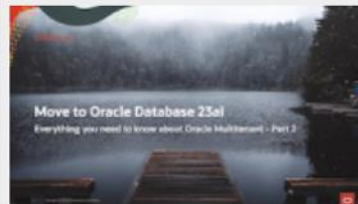
145 min – May 16, 2024



### Episode 20

[Move to Oracle Database 23ai – Everything you need to know about Multitenant PART 2](#)

100 min – June 28, 2024



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