

ORACLE
Data Deep Dive
at AI World

Upgrading to Oracle AI Database 26ai

Best Practices



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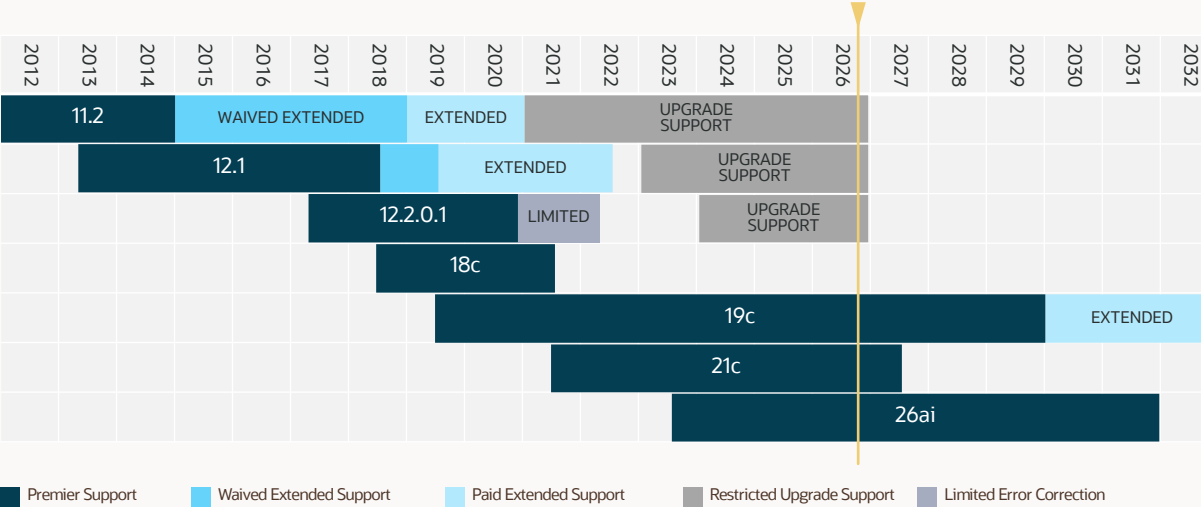


<https://dohdatabase.com>

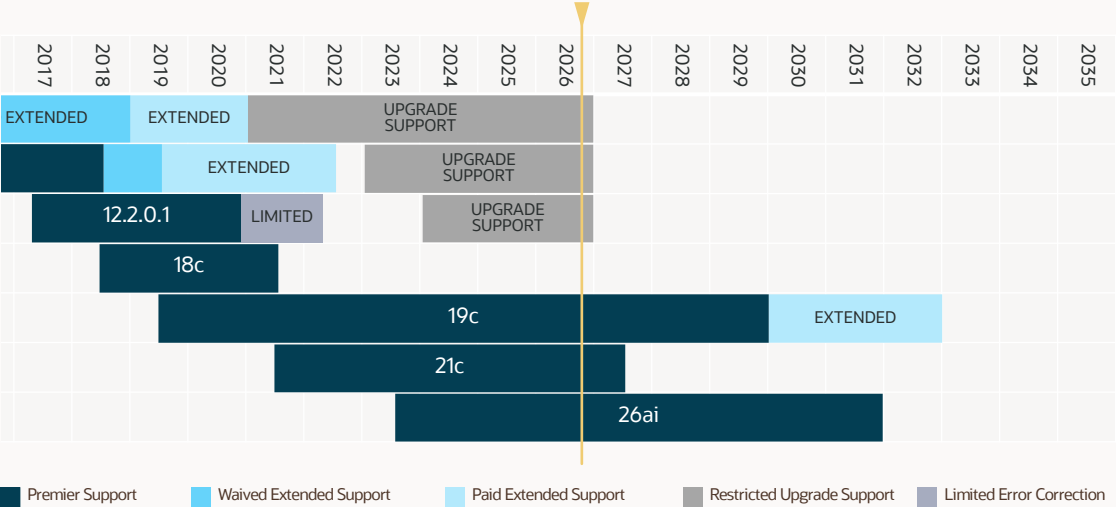
Release Strategy

Lifetime Support Policy and Upgrade Path

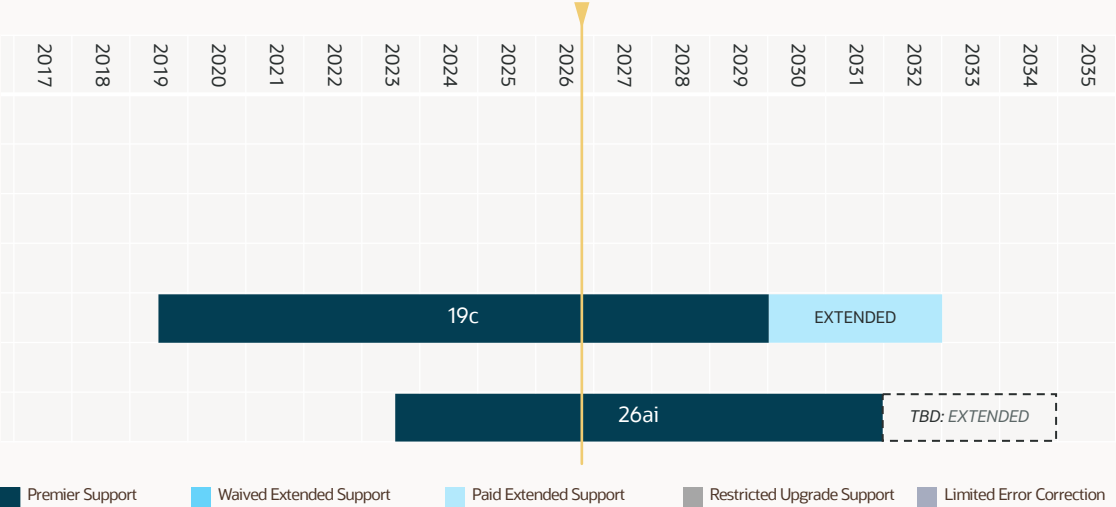
Lifetime Support Policy



Lifetime Support Policy



Lifetime Support Policy



Security Updates

Accelerating Vulnerability Detection and Response at Oracle

April 29, 2026 | 3 minute read



Integrated Cyber Center (ICC)

The latest generation of AI is transforming how software vulnerabilities are identified and fixed, increasing the speed and scale of discovery and remediation.

At Oracle, we have long applied AI across our cloud and software environments to support security testing, vulnerability detection, and code analysis. These capabilities run on Oracle Cloud Infrastructure (OCI), leveraging OCI AI services, infrastructure, and development platforms to operate continuously at scale.

Oracle has access to leading frontier AI models, including Anthropic's Claude Mythos Preview and OpenAI's most capable models through Trusted Access for Cyber, and we are extending our capabilities with these models to improve how quickly and effectively vulnerabilities are identified. Combined with our AI-enabled security operations, these capabilities are applied across Oracle-developed software and services, Oracle Health, and the open-source components we build and use in our products.

The result is stronger code, earlier identification of risk and mitigations, and better protection for Oracle and our



Security Updates

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The result is stronger code, earlier identification of risk and mitigations, and better protection for Oracle and our

Security



- [Accelerating Vulnerability Detection and Response at Oracle](#)
- [Update: Monthly Critical Security Patch Updates \(CSPUs\) Begin May 28, 2026](#)
- [Take Action Today: Protect Your Oracle Database Against AI-Enabled Cybersecurity Threats](#)
- [Recommendations to Help Protect Oracle Databases from Emerging AI-enabled Security Threats \(PNEWS3015\)](#)



You **must upgrade** to
a Long-Term Support Release

- Oracle AI Database 26ai
- Oracle Database 19c

your key to
successful upgrades

AutoUpgrade

Only supported method for upgrading to Oracle AI Database 26ai



AutoUpgrade



1 Upgrading

2 Non-CDB to PDB

3 Patching



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 (KB123450)

```
wget https://download.oracle.com/otn-pub/otn_software/autoupgrade.jar
```

It starts with an Oracle home

DEMO

Download patches
Install Oracle home
Create gold image



[Watch on YouTube](#)

But What About ...

PATCH WITHOUT THE OUTAGE WINDOW

Stay Current When Attackers Move Fast

Today, 14:15 - 15:00

LRN6040

Downloading / Creating Oracle home / Gold image



- Webinar: [Database Patching for DBAs – Patch smarter, not harder](#)
- Webinar: [Patch smarter, not harder – MS Windows Special Edition](#)
- Blog post: [AutoUpgrade Patching – From Zero to Hero – Part 1: Download AutoUpgrade](#)
- Blog post: [AutoUpgrade New Features: Create and Use Your Own Gold Images](#)

Your Options



Non-CDB architecture

(desupported)



Multitenant architecture

`global.global_log_dir=/home/oracle/autoupgrade/logs`

`upg1.sid=SALES`

`upg1.target_cdb=CDB1`

`upg1.source_home=/u01/app/oracle/product/dbhome_19_33`

`upg1.target_home=/u01/app/oracle/product/dbhome_26_4`



That's it!
Unless you want more...

`global.global_log_dir=/home/oracle/autoupgrade/logs`

`upg1.sid=SALES`

`upg1.target_cdb=CDB1`

`upg1.source_home=/u01/app/oracle/product/dbhome_19_33`

`upg1.target_home=/u01/app/oracle/product/dbhome_26_4`

`upg1.run_dictionary_health=critical`

`global.global_log_dir=/home/oracle/autoupgrade/logs`

`upg1.sid=SALES`

`upg1.target_cdb=CDB1`

`upg1.source_home=/u01/app/oracle/product/dbhome_19_33`

`upg1.target_home=/u01/app/oracle/product/dbhome_26_4`

`upg1.run_dictionary_health=critical`

`upg1.timezone_upg=yes`

Time Zone Upgrade

You can skip the time zone upgrade when:

- You would like to shorten downtime
- You have no `TIMESTAMP WITH TIMEZONE` data
- Or, it is not affected by DST convention changes



Oracle recommends performing the Time Zone upgrade

- Either during the upgrade or at a later time

global.global_log_dir=/home/oracle/autoupgrade/logs

upg1.sid=SALES

upg1.target_cdb=CDB1

upg1.source_home=/u01/app/oracle/product/dbhome_19_33

upg1.target_home=/u01/app/oracle/product/dbhome_26_4

upg1.run_dictionary_health=critical

upg1.timezone_upg=yes

upg1.remove_underscore_parameters=yes

`global.global_log_dir=/home/oracle/autoupgrade/logs`

`upg1.sid=SALES`

`upg1.target_cdb=CDB1`

`upg1.source_home=/u01/app/oracle/product/dbhome_19_33`

`upg1.target_home=/u01/app/oracle/product/dbhome_26_4`

`upg1.run_dictionary_health=critical`

`upg1.timezone_upg=yes`

`upg1.remove_underscore_parameters=yes`

`upg1.add_after_upgrade_pfile=/home/oracle/scripts/SALES_add.ora`

`upg1.delete_before_upgrade_pfile=/home/oracle/scripts/SALES_remove.ora`

-- Start the pre-upgrade analysis to determine the upgrade readiness
-- Non-intrusive and lightweight check of the database

java -jar autoupgrade.jar -config sales.cfg -mode analyze

DATABASE

DB Compatible	19.0.0
DB Version	19.33.0.0.0
Operating System	Linux
Blocksize	8192
Timezone	45
LogMode	ARCHIVELOG
Readonly	FALSE
Edition	EE

Containers

CDB\$ROOT

PreChecks Warning(1)
 PreChecks Recommend(2)
 PreChecks Info(10)
 PostChecks Warning(1)
 PostChecks Recommend(3)
 PostChecks Info(1)

POBSSEED

PreChecks Warning(1)
 PreChecks Recommend(2)
 PreChecks Info(5)
 PostChecks Warning(1)
 PostChecks Recommend(3)
 PostChecks Info(1)

MOCHA

PreChecks Warning(1)
 PreChecks Recommend(2)
 PreChecks Info(5)
 PostChecks Warning(1)
 PostChecks Recommend(3)
 PostChecks Info(1)

COMPONENTS

Oracle Component	Version	Upgrade Action	Current Status
Oracle Catalog Views	19.33.0.0.0	to be upgraded	VALID
Oracle Packages and Types	19.33.0.0.0	to be upgraded	VALID
Oracle Workspace Manager	19.33.0.0.0	to be upgraded	VALID
Real Application Clusters	19.33.0.0.0	to be upgraded	OPTION OFF
Oracle XML Database	19.33.0.0.0	to be upgraded	VALID

CDB\$ROOT

CheckName: UNIFIED_AUDIT_ON FixUp Available: NO Severity: WARNING Stage: PRECHECKS

Convert your traditional audit configurations to unified audit policies and enable them. To continue using traditional audit in 23, make sure initialization parameters AUDIT_TRAIL and AUDIT_SYS_OPERATIONS are set in the database after the upgrade process. This is intended as a temporary measure until you have time to convert to unified audit. Refer to MOS note 2909718.1 for more details on converting to unified audit.

Starting in 23, Oracle unified audit is the auditing configuration for use in newly created databases. Support for traditional audit in 23 is limited to upgraded databases. On database upgrades, existent traditional audit settings are operational post upgrade for continued generation of audit records to the traditional audit trails. However, new traditional audit configurations cannot be created. Oracle strongly recommends to start using unified audit at the earliest opportunity.

Traditional audit configuration is found in this database.

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 19.0.0.0 Oracle Database Upgrade Guide.

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

-- AutoUpgrade "deploy" mode starts the upgrade incl. all pre- and post-tasks

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



Check your standby database

- Check [webinar](#) for details

Your Options?



Non-CDB architecture

(desupported)



Multitenant architecture

Your Options?



**Multitenant
architecture**

The **easy** option

The **fast** option



The **easy** option



Upgrade entire CDB, including all PDBs



The **fast** option



Upgrade single PDB

`global.global_log_dir=/home/oracle/autoupgrade/logs`

`upg1.sid=CDB1`

`upg1.source_home=/u01/app/oracle/product/dbhome_19_33`

`upg1.target_home=/u01/app/oracle/product/dbhome_26_4`

`global.global_log_dir=/home/oracle/autoupgrade/logs`

`upg1.sid=CDB1`

`upg1.source_home=/u01/app/oracle/product/dbhome_19_33`

`upg1.target_home=/u01/app/oracle/product/dbhome_26_4`

`upg1.raise_compatible=no`



Wait one or two weeks before raising the `COMPATIBLE` parameter

- If you can afford a short outage
- Preserves the downgrade option

`global.global_log_dir=/home/oracle/autoupgrade/logs`

`upg1.sid=CDB1`

`upg1.source_home=/u01/app/oracle/product/dbhome_19_33`

`upg1.target_home=/u01/app/oracle/product/dbhome_26_4`

`upg1.raise_compatible=no`

`upg1.drop_grp_after_upgrade=yes`

```
global.global_log_dir=/home/oracle/autoupgrade/logs
```

```
upg1.sid=CDB1
```

```
upg1.source_home=/u01/app/oracle/product/dbhome_19_33
```

```
upg1.target_home=/u01/app/oracle/product/dbhome_26_4
```

```
upg1.raise_compatible=no
```

```
upg1.drop_grp_after_upgrade=yes
```

```
upg1.emcli_path=/u01/app/oracle/oem
```

```
upg1.em_target_name=CDB1_myhost.domain.int
```

```
global.global_log_dir=/home/oracle/autoupgrade/logs
```

```
upg1.sid=CDB1
```

```
upg1.source_home=/u01/app/oracle/product/dbhome_19_33
```

```
upg1.target_home=/u01/app/oracle/product/dbhome_26_4
```

```
upg1.raise_compatible=no
```

```
upg1.drop_grp_after_upgrade=yes
```

```
upg1.emcli_path=/u01/app/oracle/oem
```

```
upg1.em_target_name=CDB1_myhost.domain.int
```

```
upg1.rman_catalog_connect_string=catalogdb
```

`global.global_log_dir=/home/oracle/autoupgrade/logs`

`upg1.sid=CDB1`

`upg1.source_home=/u01/app/oracle/product/dbhome_19_33`

`upg1.target_home=/u01/app/oracle/product/dbhome_26_4`

`upg1.raise_compatible=no`

`upg1.drop_grp_after_upgrade=yes`

`upg1.emcli_path=/u01/app/oracle/oem`

`upg1.em_target_name=CDB1_myhost.domain.int`

`upg1.rman_catalog_connect_string=catalogdb`

`upg1.run_dictionary_health=critical`

`upg1.timezone_upg=yes`

`upg1.remove_underscore_parameters=yes`

`upg1.add_after_upgrade_pfile=/home/oracle/scripts/CDB1_add.ora`

`upg1.delete_before_upgrade_pfile=/home/oracle/scripts/CDB1_remove.ora`

-- Use "analyze" and "deploy" to carry out a full CDB upgrade

```
java -jar autoupgrade.jar -config sales.cfg -mode analyze
```

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



Upgrade faster by processing more PDBs concurrently

- Finetune the upgrade

Total number of threads
Defaults to CPU_COUNT

Threads per PDB

upg1.catctl_options=-n 16 -N 2

upg1.catctl_options=-n ¹⁶24 -N ²1

More threads than CPU_COUNT

Just one thread per PDB

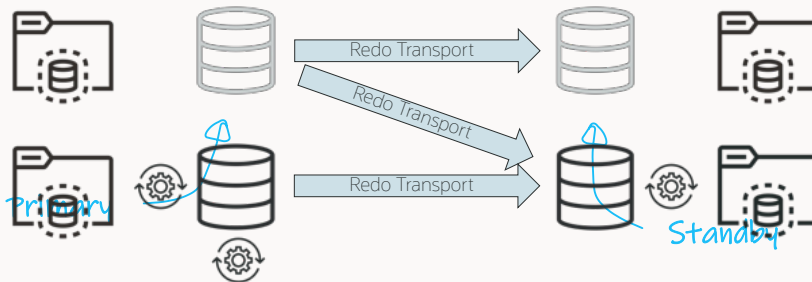


Upgrading Data Guard

Upgrade Data Guard | MAA Method

Oracle Home
19.33.0

Oracle Home
23.26.4



```
java -jar autoupgrade.jar \  
-config ... \  
-mode deploy
```

```
java -jar autoupgrade.jar \  
-config ... \  
-mode deploy
```

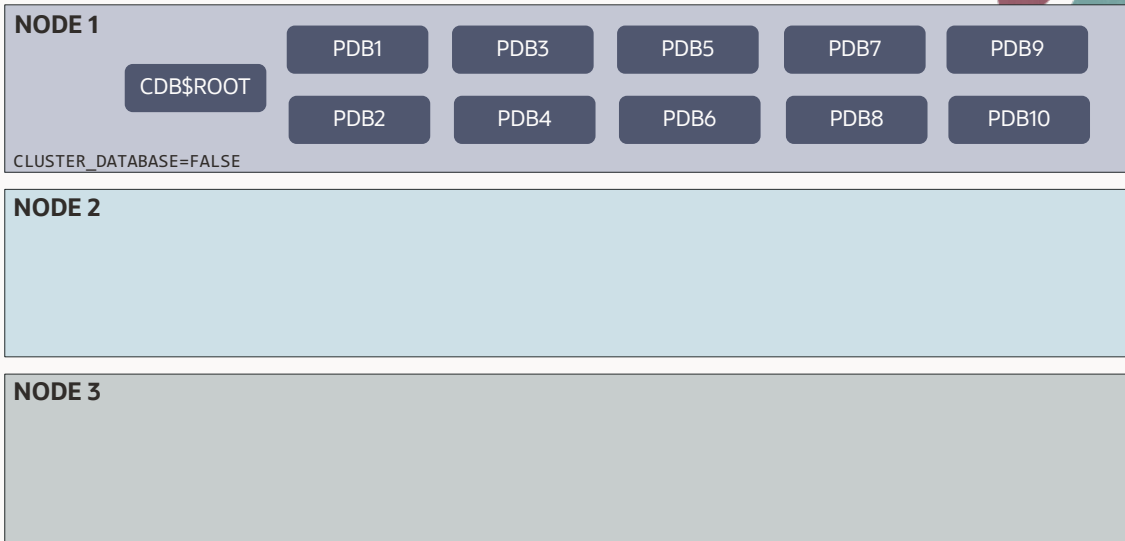
Upgrade Data Guard | MAA Method

- Complies with MAA architecture
- Database is protected during upgrade
- Standby applies logs throughout the process
- Shortest possible downtime

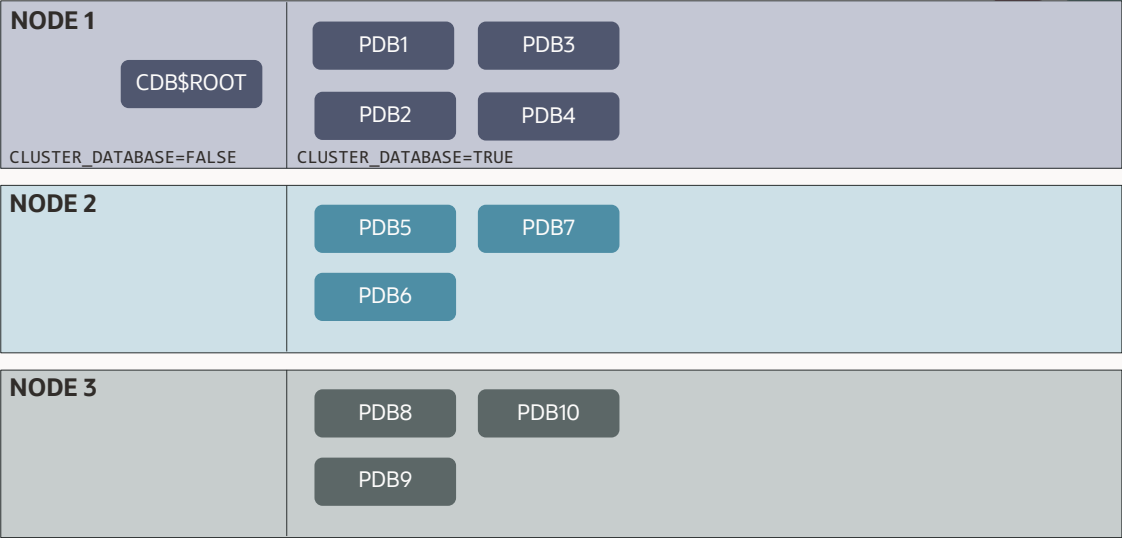


Speed up upgrades of RAC databases

Distributed Upgrade



Distributed Upgrade



```
$ cat RACCDDB1.cfg
```

```
global.autoupg_log_dir /home/oracle/autoupgrade/logs
```

```
upg1.source_home=/u01/app/oracle/product/dbhome_19_33
```

```
upg1.target_home=/u01/app/oracle/product/dbhome_26_4
```

```
upg1.sid=RACCDDB1
```

```
upg1.tune_setting=distributed_upgrade=true
```

```
$ cat RACCDDB1.cfg
```

```
global.autoupg_log_dir /home/oracle/autoupgrade/logs
```

```
upg1.source_home=/u01/app/oracle/product/dbhome_19_33
```

```
upg1.target_home=/u01/app/oracle/product/dbhome_26_4
```

```
upg1.sid=RACCDDB1
```

```
upg1.tune_setting=distributed_upgrade=true,active_nodes_limit=<number>
```



The **easy** option



Upgrade entire CDB, including all PDBs



The **fast** option



Upgrade single PDB

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

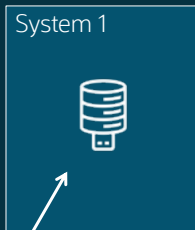


UPGRADE

Upgrade PDB to Oracle AI Database 26ai

Upgrade via Refreshable Clone PDB

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



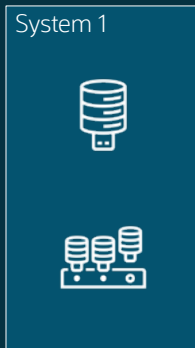
19c
database



26ai
CDB

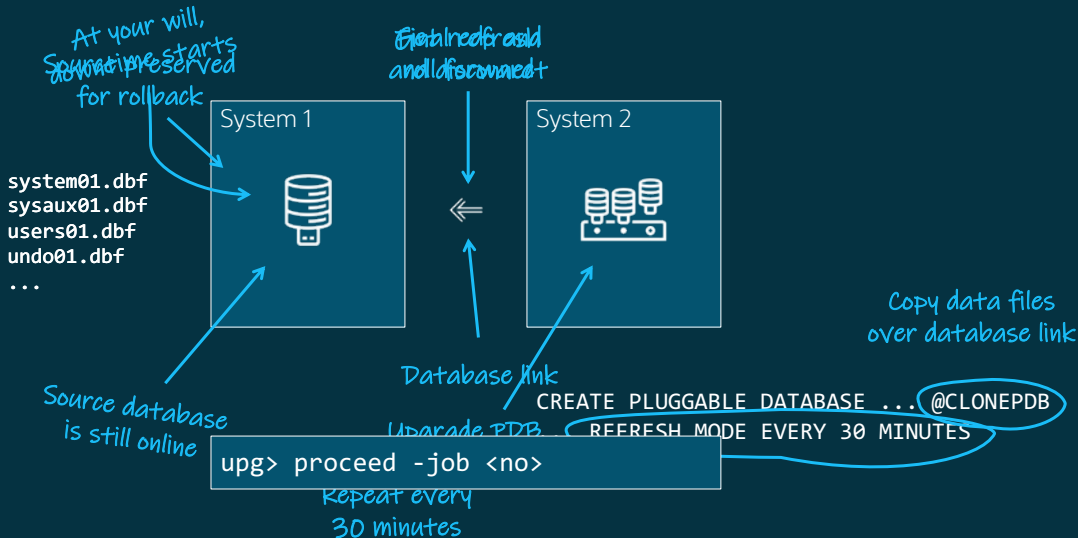
Upgrade via Refreshable Clone PDB

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



*Could be same
system as well*

Upgrade via Refreshable Clone PDB



`global.global_log_dir=/home/oracle/autoupgrade/logs`

`upg1.pdbs=SALES`

`global.global_log_dir=/home/oracle/autoupgrade/logs`

`upg1.pdbs=SALES`

`upg1.sid=CDB19`

`upg1.target_cdb=CDB26`

`global.global_log_dir=/home/oracle/autoupgrade/logs`

`upg1.pdbs=SALES`

`upg1.sid=CDB19`

`upg1.target_cdb=CDB26`

`upg1.source_home=/u01/app/oracle/product/dbhome_19_33`

`upg1.target_home=/u01/app/oracle/product/dbhome_26_4`

`global.global_log_dir=/home/oracle/autoupgrade/logs`

`upg1.pdbs=SALES`

`upg1.sid=CDB19`

`upg1.target_cdb=CDB26`

`upg1.source_home=/u01/app/oracle/product/dbhome_19_33`

`upg1.target_home=/u01/app/oracle/product/dbhome_26_4`

`upg1.source_dblink.SALES=CLONEPDB 1800`

`upg1.drop_dblink=yes`

`global.global_log_dir=/home/oracle/autoupgrade/logs`

`upg1.pdbs=SALES`

`upg1.sid=CDB19`

`upg1.target_cdb=CDB26`

`upg1.source_home=/u01/app/oracle/product/dbhome_19_33`

`upg1.target_home=/u01/app/oracle/product/dbhome_26_4`

`upg1.source_dblink.SALES=CLONEPDB 1800`

`upg1.drop_dblink=yes`

`upg1.target_pdb_name.SALES=SALES26`

```
global.global_log_dir=/home/oracle/autoupgrade/logs
```

```
upg1.pdbs=SALES
```

```
upg1.sid=CDB19
```

```
upg1.target_cdb=CDB26
```

```
upg1.source_home=/u01/app/oracle/product/dbhome_19_33
```

```
upg1.target_home=/u01/app/oracle/product/dbhome_26_4
```

```
upg1.source_dblink.SALES=CLONEPDB 1800
```

```
upg1.drop_dblink=yes
```

```
upg1.target_pdb_name.SALES=SALES26
```

```
upg1.parallel_pdb_creation_clause.SALES=2
```

```
upg1.target_pdb_copy_option.SALES=file_name_convert=NONE
```

```
global.global_log_dir=/home/oracle/autoupgrade/logs
```

```
upg1.pdbs=SALES
```

```
upg1.sid=CDB19
```

```
upg1.target_cdb=CDB26
```

```
upg1.source_home=/u01/app/oracle/product/dbhome_19_33
```

```
upg1.target_home=/u01/app/oracle/product/dbhome_26_4
```

```
upg1.source_dblink.SALES=CLONEPDB 1800
```

```
upg1.drop_dblink=yes
```

```
upg1.target_pdb_name.SALES=SALES26
```

```
upg1.parallel_pdb_creation_clause.SALES=2
```

```
upg1.target_pdb_copy_option.SALES=file_name_convert=NONE
```

```
upg1.start_time=19/01/2038 03:14:07
```

Refreshable Clone

1

Run on source

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

2

Run on target

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

Key Benefits



- 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



Check your standby database

- Check [webinar](#) for details

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

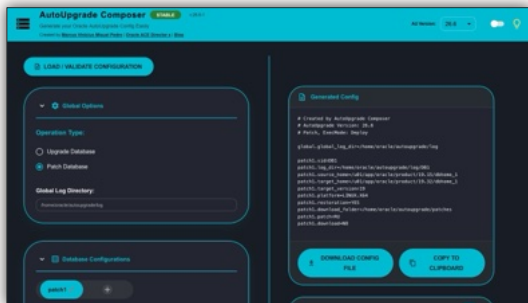
Downloading / Creating Oracle home / Gold image



- Webinar: [Move to Oracle Database 23ai – Everything you need to know about Oracle Multitenant – Part 1](#)
- Webinar: [Best Practices for Upgrading to Oracle AI Database 26ai](#)
- Blog post: [Upgrade to Oracle AI Database 26ai](#)

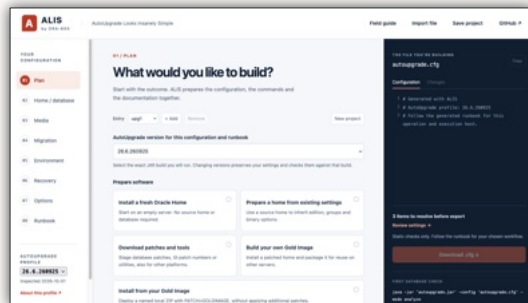
That's a lot of

CONFIG FILE PARAMETERS



AutoUpgrade Composer

<https://autoupgrade-composer.com>



ALIS

<https://ora600pl.github.io/alis>



Marcus Vinicius Miguel Pedro

ACE Director



Kamil Stawiarski

ACE Director



A few initialization parameters

--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 KB147694

```
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 KB147694

```
alter system set "_cursor_obsolete_threshold"=1024  
comment="Added 2026-10-27 - Advice from MOS Note: KB147694";
```

--Information from PDB\$SEED is hidden from CDB-views by default
--Set parameter and all CDB-views now display all information about PDB\$SEED

```
alter system set "_exclude_seed_cdb_view"=false  
comment="Always display PDB$SEED information";
```

--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;



Don't forget your clients

- Ensure they are compatible with Oracle AI Database 26ai

Client / Server Interoperability

Client Version			Server Version				
	26ai	21c	19c	18c	12.2.0	12.1.0	11.2.0
26ai#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 ^{#9}
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 ^{#9}	Was	Yes ^{#12}	Yes ^{#9}

MOS Note: KB141043 - 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#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#9
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#9	Was	Yes#12	Yes#9

MOS Note: KB141043 - Client / Server Interoperability Support Matrix



If possible, Oracle recommends upgrading clients to the **latest 26ai driver**



If you must use a 19c driver,
update to the latest version

--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 ([KB141043](#))
- Blog post: [Are Your Oracle Database Clients Ready for the next Database Upgrade?](#)

Key Learnings



- 1 Only use long-term support releases
- 2 Update database and clients
- 3 Use AutoUpgrade

Help shape our future events. Get rewarded.

- 1 Download the Oracle Events app**
- 2 Share your feedback in-app**
Scan the QR Code and complete all qualifying surveys
- 3 Earn a giveaway**
Proceed to the Swag Station in the Hub after completing your surveys



In-app surveys

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