

ORACLE
Data Deep Dive
at AI World

Patch Smarter, Not Harder

in Oracle Database 19c and 23ai



Oracle

DBAs

run the world



Speakers



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<https://mikedietchde.com>
<https://dohdatabase.com>
<https://dbarj.com.br>
<https://alexzaballa.com>

We made upgrading easy Now we make patching just as easy

AutoUpgrade functionality extended to patching

Just as easy as patching your smartphone

Our mission for patching Oracle Database



Compatible



Download

- Find the right patch numbers
- For the right platform
- Get latest OPatch



Install

- Install brand-new Oracle home
- Update OPatch
- Apply all patches



Patch

- Datapatch Sanity Check
- Move instances and files
- Datapatch
- Recompilation
- Post-tasks



Compatible



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Patch

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- Move instances and files
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AutoUpgrade Pathing Releases





Use wildcards for folder names

```
p1.target_home=/u01/ora/product/dbhome_%RELEASE%_%UPDATE%
```

Aliases

Example: 23.9.0.25.7

- %RELEASE% 23
- %UPDATE% 9
- %V1D% 23
- %V2D% 9
- %V3D% 0
- %V4D% 25
- %V5D% 7



DEMO

Using Wildcards



[Watch on YouTube](#)



--Create Oracle home path dynamically

```
global.global_log_dir=/home/oracle/autoupgrade-patching/log
global.keystore=/home/oracle/autoupgrade-patching/keystore
global.folder=/home/oracle/patch-repo
patch1.source_home=/u01/app/oracle/product/dbhome_19_27
patch1.target_home=/u01/app/oracle/product/dbhome_%RELEASE%_%UPDATE%
patch1.sid=FTEX
patch1.patch=RECOMMENDED
```



Support for Oracle Database 23ai and Oracle Database 21c

- From AutoUpgrade 25.5

DEMO

Download patches
for Oracle Database 23ai



[Watch on YouTube](#)



Download patches through a proxy

```
$ export https_proxy='https://user:pass@proxy.ex.com:8080'
```

DEMO

Download patches via a proxy



[Watch on YouTube](#)

Using Proxy to Download Patches

```
$ export https_proxy='https://proxy.example.com:8080'
```

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





Generate config file automatically

```
$ java -jar autoupgrade.jar -auto_config
```

DEMO

Generate config file automatically



[Watch on YouTube](#)

Auto Config

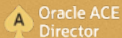
```
$ env | grep ORA
ORACLE_SID=UPGR
ORACLE_BASE=/u01/app/oracle
ORACLE_HOME=/u01/app/oracle/product/19

$ java -jar autoupgrade.jar -auto_config
```



AutoUpgrade Composer

Marcus Vinicius Miguel Pedro
Practice Director LATAM at Accenture



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viniciusdba.com.br

Vinicius DBA

Marcus Vinicius | Oracle ACE Director

HOME

AUTOUPGRADE-COMPOSER

ABOUT

ENGLISH

PORTUGUÊS (PORTUGUESE (BRAZIL))

OCI FS - How to Mount an Object Storage Bucket in your Compute VM as a File System?

OCI FS - How to Mount an Object Storage Bucket in your Compute VM as a File System?

OCTOBER 4, 2023

VINICIUS

Hi everyone, I hope you are doing well. The issue Recently I had an issue with my OCI Tenancy provided by the Oracle ACE Program where I was unable to...

AutoUpgrade-Composer

Performing a Regular Upgrade for a Non-CDB

AutoUpgrade-Composer

Performing a Regular Upgrade for a Non-CDB

SEPTEMBER 24, 2023

VINICIUS

Hi everyone, hope you're doing well. This is one more post in a series of blog posts exploring the potential of AutoUpgrade-Composer, as we may have dozens of scenarios. You...

AutoUpgrade-Composer

Updated to v.25.4-3

AutoUpgrade-Composer

Updated to v.25.4-3

AUGUST 27, 2023

VINICIUS

AutoUpgrade-Composer: Updated to v.25.4-3 - Added capability for Dynamic Path on Target Home

Oracle ACE Director

AutoUpgrade-Composer Posts

Disclaimer

My postings reflect my own views and do not necessarily represent the views of my employer, Accenture.

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CUSTOMER
REQUEST



Support for MRPs and JDKs

patch1.patch=RECOMMENDED, **JDK**, **MRP**



DEMO

Download and apply MRP / JDK



[Watch on YouTube](#)

Include Monthly Recommended Patches When Patching

```
global.keystore=/home/oracle/autoupgrade-patching/keystore
patch1.source_home=/u01/app/oracle/product/19/dbhome_19_25_0
patch1.target_home=/u01/app/oracle/product/19/dbhome_19_26_0
patch1.sid=DB19
patch1.folder=/home/oracle/autoupgrade-patching/patch
patch1.patch=RECOMMENDED,MRP
```

Also patch ORACLE_HOME JDK

```
global.keystore=/home/oracle/autoupgrade-patching/keystore
patch1.source_home=/u01/app/oracle/product/19/dbhome_19_25_0
patch1.target_home=/u01/app/oracle/product/19/dbhome_19_26_0
patch1.sid=DB19
patch1.folder=/home/oracle/autoupgrade-patching/patch
patch1.patch=RECOMMENDED, JDK
```



Patch Clusterware component in Oracle home

```
patch1.patch=RECOMMENDED,OCW
```

Recommended Patches

patch1.patch=**RECOMMENDED**

OPATCH

The latest OPatch

RU

The latest Release Update

OJVM

OJVM bundle matching Release Update

DPBP

Data Pump bundle patch matching RU



Recommended Patches

patch1.patch=**RECOMMENDED**

OPATCH

The latest OPatch

RU

The latest Release Update

OJVM

OJVM bundle matching Release Update

DPBP

Data Pump bundle patch matching RU

OCW

Oracle Clusterware
(only if source is RAC enabled)

AU

The latest AutoUpgrade (coming soon)



DEMO

Patch Clusterware component
in Oracle home



[Watch on YouTube](#)

Patch OCW Component In Oracle Home

```
global.global_log_dir=/home/oracle/autoupgrade-  
patching/log
```

```
global.keystore=/home/oracle/autoupgrade-patching/keystore
```

```
patch1.source_home=/u01/app/oracle/product/19
```

```
patch1.target_home=/u01/app/oracle/product/19_27
```

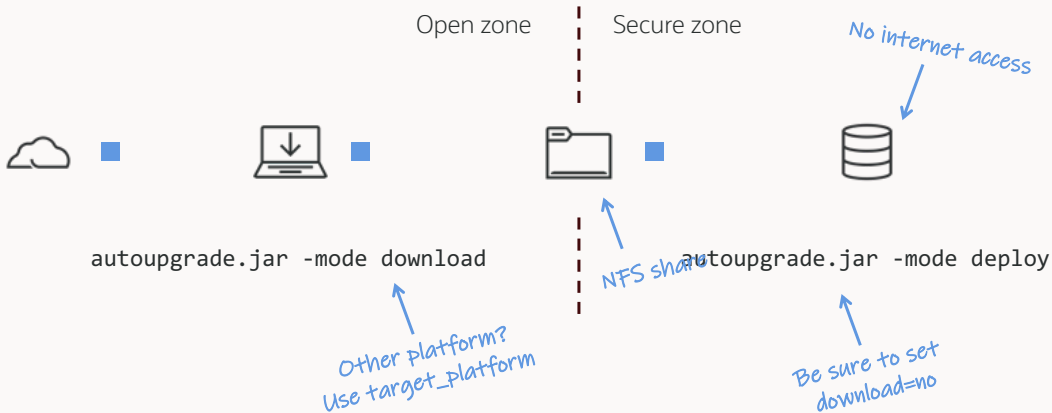
```
patch1.sid=FTEX
```

```
patch1.folder=/home/oracle/patch-repo
```

```
patch1.patch=OPATCH,RU,OCW,DPBP,OJVM
```



Using Download Mode



--Download patches from Windows machine to other platforms

global.keystore=c:\oracle\autoupgrade\keystore

global.patch=RU,OPATCH,OJVM,DPBP,OCW

patch1.platform=LINUX.X64

patch1.folder=f:\nfs\oracle\patches

DEMO

Download patches on Windows
for other platforms



[Watch on YouTube](#)

**CUSTOMER
REQUEST**



Download Grid Infrastructure Release Update

patch1.patch=[OCW](#)

DEMO

Download Grid Infrastructure Release Update



[Watch on YouTube](#)

--Download Patches for Oracle Grid Infrastructure

```
global.global_log_dir=/home/oracle/autoupgrade/logs
global.keystore=/home/oracle/autoupgrade/keystore
patch1.patch=OCW
patch1.target_version=19
patch1.platform=LINUX.X64
patch1.folder=/home/oracle/autoupgrade/patches
```



AutoUpgrade helps deploying the software on a new server

- Check [blog posts](#) for all detailed steps

DEMO

Deploy Oracle home on brand-new server



[Watch on YouTube](#)



Create Oracle home on Windows

DEMO

Create Oracle home on Windows



[Watch on YouTube](#)



Safely test and verify patches with Standby-First Patch Apply

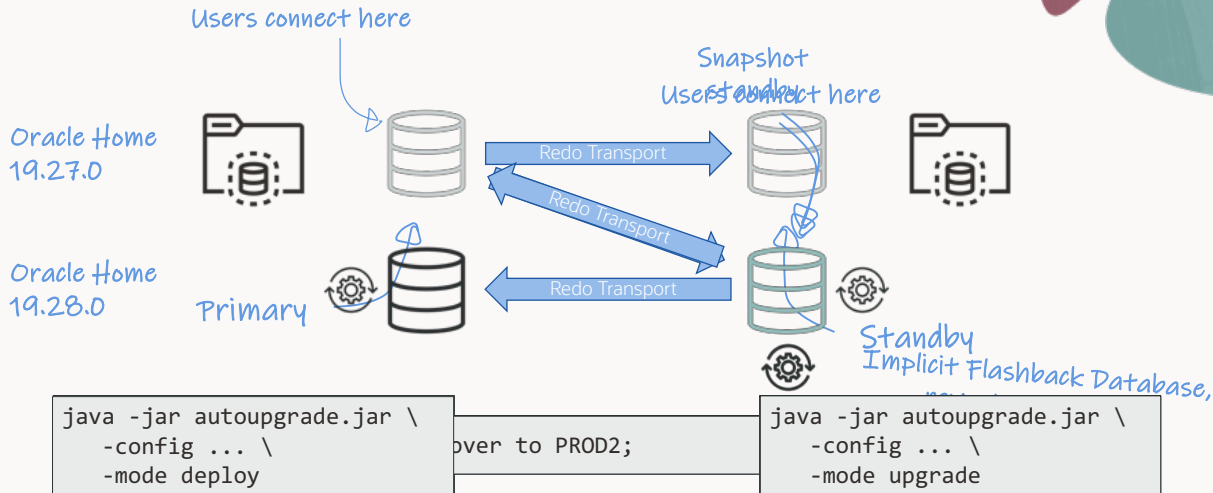
- [Data Guard Standby-First Patch Apply \(Doc ID 1265700.1\)](#)



Reduce downtime to the time it takes to perform a switchover

- [Data Guard Standby-First Patch Apply \(Doc ID 1265700.1\)](#)

Standby-First Patching





Use AutoUpgrade to patch your standby database

- Check [blog posts](#) for details



Purge old database patches from the dictionary

```
$ datapatch -purge_old_metadata
```

Datapatch Purge

- Removes the rollback scripts for all patches (except the currently applied)
- Doesn't prevent rolling back the currently applied patches
- Doesn't remove the patching history, just the rollback scripts

Major retailer in the US

Saved 20 TB/year in total:

- 5000 DBs
- 5 PDBs (3 PDBs + Root + Seed)
- 200 Mb in each per patch
- 4 patches annualy



Zero Downtime Grid Infrastructure Patching

Mark Rogers

Senior Oracle Applications Database Administrator at
Garmin International



Zero Downtime Grid Infrastructure Patching

Mark Rogers
Lead Database Administrator
Garmin

Agenda

(a) Overview of Zero Downtime Grid Patching.

(b) Tips and tricks Garmin has used to successfully implement Zero Downtime Grid Patching.

- **Garmin has locations around the world which rely on Oracle E-Business Suite for critical business processes.**
- **Reducing downtime is very important for our business. And keeping up-to-date with Oracle security patches is critical. We can do both using Zero Downtime Grid Infrastructure Patching (“ZDGIP”).**
- **We have eliminated downtime for Grid patching in each of our three production clusters with this approach.**

Benefits of Zero Downtime Grid Patching

- Can upgrade the Grid Infrastructure from one Release Update to another with NO database downtime. For example, we can upgrade the Grid from RU 19.25 to 19.27.
- It uses "Out-Of-Place patching" so the Old Grid Home is still available providing a fast and reliable Rollback option.

Pre-Patching Checks

Pre-Patching Checks

Make sure everything looks good before you start, including:

- **The patching state is NORMAL on all servers.**

```
$ crsctl query crs activeversion -f
```

```
Oracle Clusterware active version on the cluster is [19.0.0.0.0]. The cluster  
upgrade state is [NORMAL]. The cluster active patch level is [745457256].
```

- **Verify the cluster integrity:**

```
$ cluvfy stage -pre patch
```

```
Performing following verification checks ...  
cluster upgrade state ...PASSED  
OLR Integrity ...PASSED
```

Steps for Zero Downtime Grid Patching

There are essentially two basic steps:

- ☐ Install the Software
- ☐ Switch to the New software

Install the Desired Software

- ❖ Create an empty New Grid Home on each node in the cluster. Example:

```
mkdir -p /u01/app/19.27.0/grid/  
chown -R oracle:oinstall /u01/app/19.27.0/  
chmod -R 775 /u01/app/19.27.0/
```

- ❖ Unpack the Base Release (e.g.: 19.3 or 21.3) in the New Grid Home on node 1. Example:

```
cd ${NEW_GRID_HOME}  
unzip -oq /mnt/LINUX.X64_193000_grid_home.zip # Unpack the Base Release  
chmod -R g+w /u01/app/19.27.0/grid/  
chown -R oracle:oinstall /u01/app/19.27.0/grid
```

- ❖ **Tip:** I recommend you also copy the **config.c** file from the *Old Grid Home* to the *New Grid Home* to reduce manual changes for OSDBA, OSOPER, and OSASM groups. Example:

```
cp /u01/app/19.0.0/grid/rdbms/lib/config.c /u01/app/19.27.0/grid/rdbms/lib/config.c
```

Install the Desired Software

- ❖ Run **gridSetup.sh** as the grid or oracle user on node 1; this will apply the desired patches and copy the New Grid Home to all other nodes in the cluster. Example:

```
. /home/oracle/gi_19.27.0.env # Setup the New Grid Home.
```

```
$ORACLE_HOME/gridSetup.sh -ignorePrereq -waitforcompletion -silent \  
-applyRU /mnt/GI/37641958/37654975 \  
-applyOneOffs \  
/mnt/37641958/37643161,/mnt/37641958/37762426,/mnt/37641958/36758186,/mnt/37641958/37642901,/mnt/37771855, \  
/mnt/34672698,/mnt/38291248/38291248 \  
oracle.install.option=CRS_SWONLY \  
oracle.install.crs.config.ClusterConfiguration=STANDALONE \  
oracle.install.crs.config.configureAsExtendedCluster=false \  
oracle.install.crs.config.clusterName=$CLUSTER_NAME \  
oracle.install.crs.config.gpnp.configureGNS=false \  
oracle.install.crs.config.autoConfigureClusterNodeVIP=false \  
oracle.install.crs.config.clusterNodes=$CLUSTER_NODES
```

Install the Desired Software

❖ Output:

```
Preparing the home to patch...  
Applying the patch /mnt/nfs/oracle.patches/q3_2025/GI/37641958/37654975...  
Successfully applied the patch.
```

```
...
```

```
The log can be found at: /u01/app/oraInventory/logs/GridSetupActions2025-08-09_05-23-  
09PM/installerPatchActions_2025-08-09_05-23-09PM.log  
Launching Oracle Grid Infrastructure Setup Wizard...
```

You can find the log of this install session at:

```
/u01/app/oraInventory/logs/GridSetupActions2025-08-09_05-23-09PM/gridSetupActions2025-08-09_05-23-09PM.log
```

As a root user, execute the following script(s):

1. `/u01/app/19.27.0/grid/root.sh`

Execute `/u01/app/19.27.0/grid/root.sh` on the following nodes: [...,...]

Successfully Setup Software.

❖ **NOTE: DO NOT run root.sh now even though it tells you to. Otherwise, it will corrupt the environment because we are not switching to the New Home yet, per MOS Note 2865083.1.**

Install the Desired Software

- ❖ Verify the `inventory.xml` lists the New Grid Home.

```
$ cat /u01/app/oraInventory/ContentsXML/inventory.xml | grep grid
<HOME NAME="OraGI19Home1" LOC="/u01/app/19.0.0/grid" TYPE="O" IDX="1" CRS="true"/>
<HOME NAME="OraGI19Home2" LOC="/u01/app/19.27.0/grid" TYPE="O" IDX="9"/>
```

- ❖ The Inventory will also show the Current Grid Home with CRS="true" (above).

Now, all nodes in the cluster have the *New Grid software*. We are now ready to *switch* to the **New Grid Home** on each node.

Switch to the New Grid Home

Switch from the Current Grid Home to the New Grid Home using the following steps on each node:

- Switch the Inventory to the New Grid Home.
- Switch the Processes to the New Grid Home.

Switch the Inventory to the New Grid Home

As the grid or oracle user:

```
. /home/oracle/gi_19.27.0.env # Setup the New Grid Home.
```

```
$ORACLE_HOME/gridSetup.sh \  
-silent \  
-switchGridHome \  
oracle.install.option=CRS SWONLY \  
ORACLE_HOME=$ORACLE_HOME \  
oracle.install.crs.config.clusterNodes=`hostname` \  
oracle.install.crs.rootconfig.executeRootScript=false
```

Launching Oracle Grid Infrastructure Setup Wizard...

As a root user, execute the following script(s):

1. /u01/app/19.27.0/grid/root.sh

Execute /u01/app/19.27.0/grid/root.sh on the following nodes:
[cvlcpd-rac101]

You can find the log of this install session at:

/u01/app/oraInventory/logs/UpdateNodeList2025-08-09_08-21-02PM.log

Successfully Setup Software.

Switch the Inventory to the New Grid Home

- Confirm `inventory.xml` lists the New Grid Home as the Current Grid Home with `CRS="true"`:

```
$ cat /u01/app/oraInventory/ContentsXML/inventory.xml | grep grid
<HOME NAME="OraGI19Home1" LOC="/u01/app/19.0.0/grid" TYPE="O" IDX="1"/>
<HOME NAME="OraGI19Home3" LOC="/u01/app/19.27.0/grid" TYPE="O" IDX="9"
CRS="true"/>
```

Switch the Processes to the New Grid Home

- ✓ Recommended during low activity.
- ✓ On the *same node* run the `root.sh` in the New Grid Home as the root user:

```
$ ./root.sh -transparent -nodriverupdate
Check /u01/app/19.27.0/grid/install/root_cv1xpd-rac101.garmin.com_2025-08-09_20-24-39-
229319876.log for the output of root script
$ echo $?
0
```

- ✓ This stops all Old Grid processes and starts the New Grid processes.

Repeat the two Grid Switch steps (switch the Inventory and switch the OS Processes) on each node in the cluster, one node at a time.

That's basically it!

Tips for Implementing Zero Downtime Grid Patching

Tips

❑ **The Grid Infrastructure should be at least 19.19.**

❑ **The following Oracle Bugs should also be fixed; you may need to request Backports of these.**

- Bug 37033171 - Hang and Kernel Crash during Zero Downtime Grid Infrastructure patching. Versions believed to be affected: Below 23.1. (MOS Note 37033171.8)
- Bug 37827355 - Hang and Kernel Crash during Zero Downtime Grid Infrastructure patching with Bug 37033171 fix applied. Versions believed to be affected: Below 25.1. (MOS Note # 37827355.8)
- Bug 33777011 – Grid Home Switchover issues and possibly other issues. Fixed in 23.1. If no patch exists for your version, please contact Oracle Support for a backport request. (MOS Note 3078339.1)

❑ **ASM Filter Driver ("AFD") and ACFS should not be in use because these drivers significantly complicate this patching.**

Tips

❑ Make sure your OS session is in the:

1. correct account (root vs. grid/oracle)
2. correct Grid Home (Old Grid Home vs. New Grid Home)
3. correct machine

We found it very helpful to check *each of the above* before each command.

❑ Modify the Linux prompt to display the OS user and Grid Home.

Example:

```
$ echo $ORACLE_HOME
/u01/app/19.27.0/grid
$ export PS1="[\\u `echo $ORACLE_HOME | awk -F/ '{print $4 }'` ]\\$ "
[oracle 19.27.0 ]$
[oracle 19.27.0 ]$
```

More Information

See the below before proceeding with Zero Downtime Grid Infrastructure Patching.

- Oracle 19c Documentation: <https://docs.oracle.com/en/database/oracle/oracle-database/19/cwlin/about-zero-downtime-gi-patching.html>
- “Zero-Downtime Oracle Grid Infrastructure Patching (ZDGIP)” (Oracle Doc # 2635015.1).
- “Step by Step Zero Downtime Oracle Grid Infrastructure Patching in Silent Mode” (Oracle Doc # 2865083.1).
- “Zero Downtime Oracle Grid Infrastructure Patching Rollback from NEW_HOME to OLD_HOME” (Oracle Doc # 3013564.1).
- I also appreciate the helpful guidance I received from Daniel Overby Hansen, Distinguished Product Manager at Oracle.

IT REALLY WORKS!

Mark Rogers

Lead Database Administrator

Garmin

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GARMIN®



Help us **shape the future**

Coming next!



Planned for **next releases**

- AutoUpgrade auto-update
- RAC Rolling support
- Download and use Gold Images

Patch Me If You Can

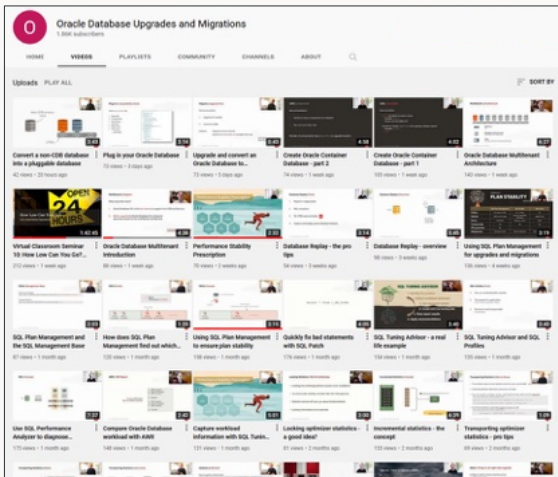


It's better to fail in our lab, than in production

[Access lab on Oracle Live Labs](#)



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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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