- **Oracle** Certified Master (OCM)
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- Co-author - 100+ **Oracle** Technology Network (OTN) - English, Portuguese & Spanish
- Speaker 2x @**Oracle** Open World (OOW), San Francisco, US
- Co-author (x3) books
- Technical Reviewer (x2) books

@yvrk1973
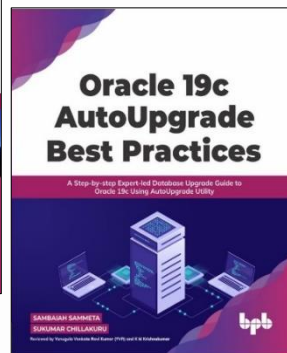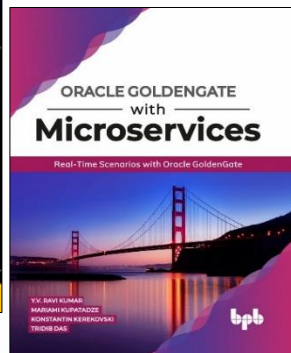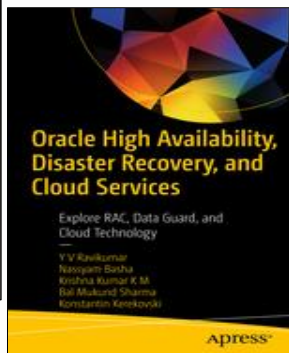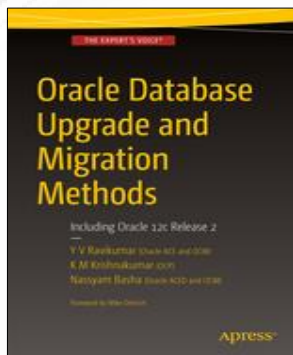
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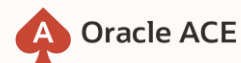
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Oracle Database 19c (Your next ORACLE_HOME)

19ᶜ

✅ Oracle 12c (Oracle 12.2.0.1), Oracle 18c (12.2.0.2), Oracle 19c (12.2.0.3)

o Upgrading from Oracle 11g (11.2.0.4), Oracle 12c (12.1.0.2) to Oracle 12cR2 family is a straight procedures/methods.

o Upgrading from Oracle 11g (11.2.0.4), Oracle 12c (12.1.0.2) to Oracle 19c (12.2.0.3), only name implies to Oracle 19c but it is Oracle 12cR2 family.

12.2.0.1	March 31, 2022 (Limited Error Correction from Dec 1, 2020 through March 31, 2022)	• Error Correction / Patching is available until Nov 30, 2020 • Limited Error Correction (Sev 1 and Security Updates only) See Note 161818.1 for details. • 12.2.0.1 is not eligible for Extended Support (ES)

19c Long Term Release	April 30, 2024 with no ES/ULA April 30, 2027 with ES/ULA	• Premier Support (PS) ends April 30, 2024, Extended Support (ES) fees will be required beginning May 01, 2024 through April 30, 2027 • Error Correction / Patching is available through April 30, 2027 with paid ES. Without paid ES, patching is only available until April 30, 2024

✓ Oracle 11g and Oracle 12c are in Market Driven Support (MDS) ending in **Y2023**.

✓ Oracle 19c (Oracle 12.2.0.3) current long term support ending in **Y2027.**

Database Releases and Support Timelines

Always check My Oracle Support (MOS) Note 742060.1 for the latest schedule
Oracle Database 11.2 Market Driven Support (MDS) - (Doc ID 2728619.1)

18c

latest Long Term Release   19c   EXTENDED

latest Innovation Release   21c

■ Premier Support   ■ Waived Extended Support Fee   ■ Paid Extended Support   ■ Limited Error Correction   ■ Market Driven Support (MDS)
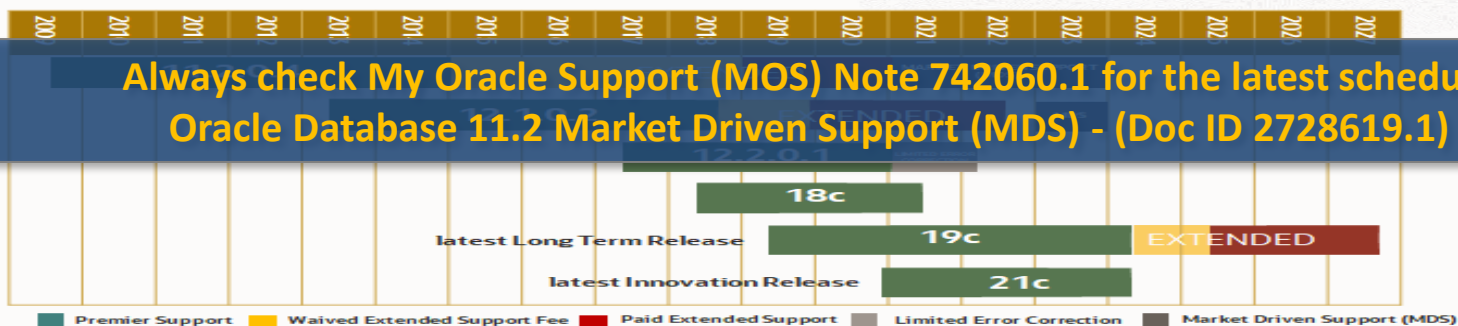
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MDS: This is a new limited type of support aimed for products that are about to leave Extended Support and move to Sustaining Support.

11.2.0.4

12.1.0.2

12.2.0.1

18c

19c

Ships with Oracle Database 19c (19.3), but should always download the latest via MOS Note 2485457.1
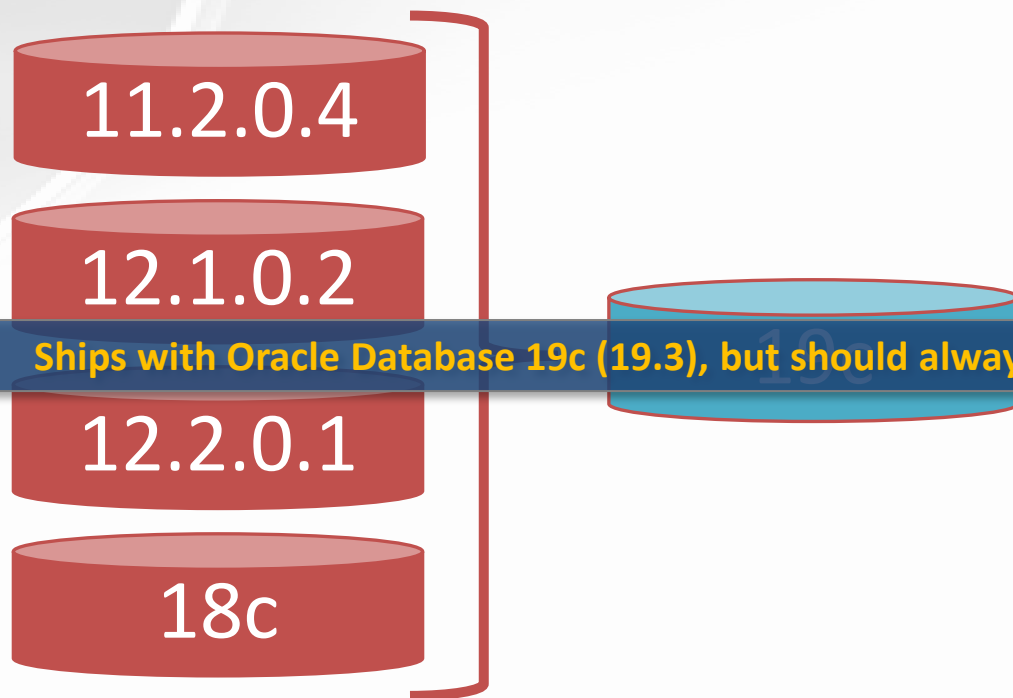
New AutoUpgrade Tool

Oracle Database Autoupgrade tool allows DBAs to upgrade one or many databases without human intervention.

The Autoupgrade utility identifies issues, performs post upgrade actions, and brings up the upgraded Oracle Database.

Supports upgrading from 11.2.0.4, 12.1.0.2, 12.2.0.1 and 18c source databases.

Backwards Compatible (Autougrade Tool)

❖ Autoupgrade made upgrading easy. Now Autoupgrade made patching just as easy.

❖ Autoupgrade functionality extended to patching.

❖ Autoupgrade functionality extended Refreshable Clone functionality.

Always use the latest version of AutoUpgrade Download from My Oracle Support (2485457.1)

```
build.version 22.5.221011
build.date 2022/10/11 14:23:59 -0400
build.hash e9428661
build.hash_date 2022/10/11 12:55:45 -0400
build.supported_target_versions 12.2,18,19,21
build.type production

[oracle@19c-src bin]$ 
```

❑ AutoUpgrade Patching feature extends the AutoUpgrade upgrade capabilities for patching process, which enables you to perform out-of-place patching for multiple databases using a single command.

19.14.0 → 19.17.0

❑ With the latest release of AutoUpgrade tool the AutoUpgrade Patching procedure can be used to apply Release Update (RU), Release Update Revision (RUR), and one-off patches to your databases by using out-of-place patching method.

Run the AutoUpgrade in Analyze mode
[oracle@19c-src]$ $ORACLE_HOME/jdk/bin/java -jar $ORACLE_HOME/rdbms/admin/autoupgrade.jar -config autoupg_19c_patch.cfg -mode analyze

Run the AutoUpgrade in Deploy mode
[oracle@19c-src]$ $ORACLE_HOME/jdk/bin/java -jar $ORACLE_HOME/rdbms/admin/autoupgrade.jar -config autoupg_19c_patch.cfg -mode deploy

Distributed Database Upgrade via RAC using Autoupgrade

❖ Distributed upgrade uses all nodes resulting in faster upgrades of CDBs.

❖ This feature spreads the upgrade workload of CDB databases across the RAC nodes. It reduces the number of upgrades performed on one specific nodes and spreads that workload across multiple nodes in the cluster taking advantage of available resources in the RAC nodes.

```
$ cat RACDB.cfg

global.autoupg_log_dir=/u01/app/oracle/cfgtoollogs/autoupgrade
upg1.log_dir=/u01/app/oracle/cfgtoollogs/autoupgrade/ RACDB
upg1.source_home=/u01/app/oracle/product/12.2.0.1
upg1.target_home=/u01/app/oracle/product/19
upg1.sid= RACDB
upg1.tune_setting=distributed_upgrade=true

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

❖ By default, AutoUpgrade uses two nodes. To enable more nodes.

❖ Specifies that AutoUpgrade performs a distributed upgrade. A distributed upgrade leverages the resources of the Oracle Clusterware cluster member nodes to perform the upgrades of PDBs more rapidly on the cluster.

    ❖ $ cat RACDB.cfg global.autoupg_log_dir=/u01/app/oracle/cfgtoollogs/autoupgrade

    ❖ upg1.log_dir=/u01/app/oracle/cfgtoollogs/autoupgrade/RACDB
    upg1.source_home=/u01/app/oracle/product/12.2.0.1
    upg1.target_home=/u01/app/oracle/product/19 upg1.sid=RACDB
    upg1.tune_setting=distributed_upgrade=true,***active_nodes_limit=n***

    ❖ $ java -jar autoupgrade.jar -config RACDB.cfg -mode deploy

Deprecated in Oracle 19c GI

The *addnode* script is deprecated in Oracle 19c Grid Infrastructure.
- The functionality of adding nodes to clusters is now available in the installer wizard.
- The installer wizard provides many enhancements over the *addnode* script.

Oracle 19c (19.3.0)

Oracle 12c (12.1.0.2)

Oracle 12c (12.1.0.2)

Oracle 12c (12.1.0.2)

```
[oracle@rac1-12c ~]$ ps -ef | grep pmon
oracle    5350     1  0 12:06 ?       00:00:00 asm_pmon_+ASM1
oracle    6025     1  0 12:06 ?       00:00:00 mdb_pmon_-MGMTDB
oracle    6219 13527  0 13:09 pts/1   00:00:00 grep pmon
oracle   11021     1  0 12:10 ?       00:00:00 ora_pmon_racdb1
[oracle@rac1-12c ~]$ . oraenv
ORACLE_SID = [ASM1] ? +ASM1
The Oracle base remains unchanged with value /u01/app/oracle
[oracle@rac1-12c ~]$ echo $ORACLE_HOME
/u01/app/12.1.0.2/grid
[oracle@rac1-12c ~]$ echo $ORACLE_SID
+ASM1
[oracle@rac1-12c ~]$ cd /u01/app/12.1.0.2/grid/addnode/
[oracle@rac1-12c addnode]$ ls -lrth add*
-rw-r--r-- 1 oracle oinstall 2.0K Jul  7 2014 addnode_oraparam.ini.sbs
-rwxr-xr-x 1 oracle oinstall 3.5K Oct  5 10:22 addnode.sh
-rw-r--r-- 1 oracle oinstall 2.0K Oct  5 10:22 addnode_oraparam.ini
[oracle@rac1-12c addnode]$ ./addnode.sh "CLUSTER_NEW_NODES={rac2-12c}" "CLUSTER_NEW_VIRTUAL_HOSTNAMES={rac2-12c-vip}"
```

INFOLOB

| Document Purpose | Upgrade Readiness | Verify Certification and Review Best Practices | Prepare Target Environment | Prepare Source Environment | Upgrade Initial Dev/Test Environments | Evaluate Performance on DEV/Test Environment | Upgrade PROD Environment | Recommended Training and Resources |

Search This Document | Print

Document Purpose
Document Purpose

Upgrade Readiness
Upgrade Readiness
  Collect Upgrade Details
  Key Readiness Topics to Consider
  Skills Needed
  Checklist

Verify Certification and Review Best Practices
Verify Certification and Review Best Practices
  Verify Certification
  General Best Practices for 19c
    Including Upgrade Tools - Support Tools
  Best Practices for Applications

Prepare Target Environment
Prepare Target Environment

Prepare Source Environment
Prepare Source Environment

Upgrade Initial Dev/Test Environments
Upgrade Initial Dev/Test Environments

Evaluate Performance on DEV/Test Environment
Evaluate Performance on DEV/Test environment

Upgrade PROD Environment
Upgrade PROD Environment

Recommended Training and Resources
Recommended Training and Additional Documentation
  Recommended Training
  Additional Resources

19^c ORACLE Database

19c ORACLE Database

Collect Upgrade Details

ACTION

Collect the general information on the overall project scope. Hint: This is useful to keep the larger picture in mind — have one already ready if you need to log an SR

- Identify the source and target OS/platform and version release

- Identify any additional features being used (Multitenant, RAC, SQL Tuning Advisor, etc, found in Features section of ORAchk -preupgrade) and other Oracle Products in the configuration (GoldenGate, Enterprise Manager, EBS, etc)

- Workload type - OLTP, DataWarehouse

- DataGuard used: Yes or No

- Install choices, AutoUgrade, DBUA, Manual upgrade as well as Export/Import

- Are the target and source on the same server or different servers

- If you are on different servers, are you migrating to a different OS platform (link)
- Are you on the same or a different endian

- Are you upgrading servers in parallel

- Make note of your timeline start and end dates for milestones (Test Upgrade Process, Production GO LIVE)

19c Database Self-Guided Upgrade with Best Practices (Doc ID 1919.2)

25 Years **Quest Oracle Community**

DryRun validation of Clusterware upgrade

✓ Oracle GI installation wizard, *gridsetup.sh* now enables you to perform a dry-run mode upgrade to check system's readiness for upgrade.

✓ In dry-run upgrade mode, the wizard performs all readiness checks that it performs in an actual upgrade, allowing you to verify if the system is ready for upgrade.

✓ To perform Oracle GI dry-run upgrade:

  a. Create a new Grid Home with the necessary user group permissions.
  b. Extract the Oracle GI 19c gold image
  c. Start the installer with –*DryRunForUpgrade*
  d. *./gridSetup.sh –applyRU /u01/software/32895426 -dryRunForUpgrade*

Hands-on Articles - > *https://yvrk1973.blogspot.com/***16**

DryRun validation of Clusterware upgrade

✅ Check the *gridSetupActions<timestamp>.log* file for errors and fix errors reported in the log file.
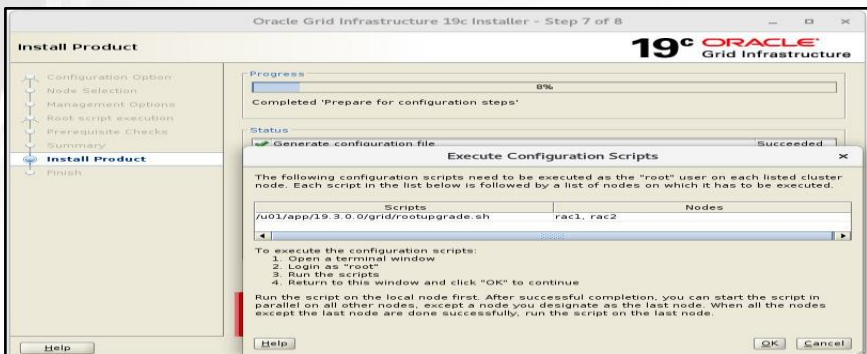
✅ [root@rac1 install]# sh /u01/app/19.3.0.0/grid/rootupgrade.sh

```
[root@rac1 install]# /u01/app/19.3.0.0/grid/rootupgrade.sh
Performing root user operation.

The following environment variables are set as:
    ORACLE_OWNER= oracle
    ORACLE_HOME=  /u01/app/19.3.0.0/grid

Enter the full pathname of the local bin directory: [/usr/local/bin]:
The contents of "dbhome" have not changed. No need to overwrite.
The file "oraenv" already exists in /usr/local/bin.  Overwrite it? (y/n)
[n]:
The file "coraenv" already exists in /usr/local/bin.  Overwrite it? (y/n)
[n]:
Entries will be added to the /etc/oratab file as needed by
Database Configuration Assistant when a database is created
Finished running generic part of root script.
Now product-specific root actions will be performed.
Relinking oracle with rac_on option
Performing Dry run of the Grid Infrastructure upgrade.
Using configuration parameter file: /u01/app/19.3.0.0/grid/crs/install/crsconfig_params
The log of current session can be found at:
  /u01/app/oracle/crsdata/rac1/crsconfig/rootcrs_rac1_2021-10-25_01-31-27PM.log
2021/10/25 13:31:34 CLSRSC-464: Starting retrieval of the cluster configuration data
2021/10/25 13:31:37 CLSRSC-729: Checking whether CRS entities are ready for upgrade, cluster upgrade will not be attempted now. This operation may take a few minutes.
2021/10/25 13:33:48 CLSRSC-693: CRS entities validation completed successfully.
[root@rac1 install]#
```

Quest Oracle Community

❖ Use dry-run upgrade mode of Oracle GI installation, gridSetup.sh, to configure the Grid Home and copy the binaries to the rest of the nodes.

❖ This step will take some time to complete, by doing it at this point, we are reducing the downtime required during the actual Grid Infrastructure Upgrade.

❖ Actual upgrade it will skip GI software copy to the other cluster nodes.

Execute Dry-Run Mode in Interactive Mode

Execute Dry-Run Mode in Silent Mode
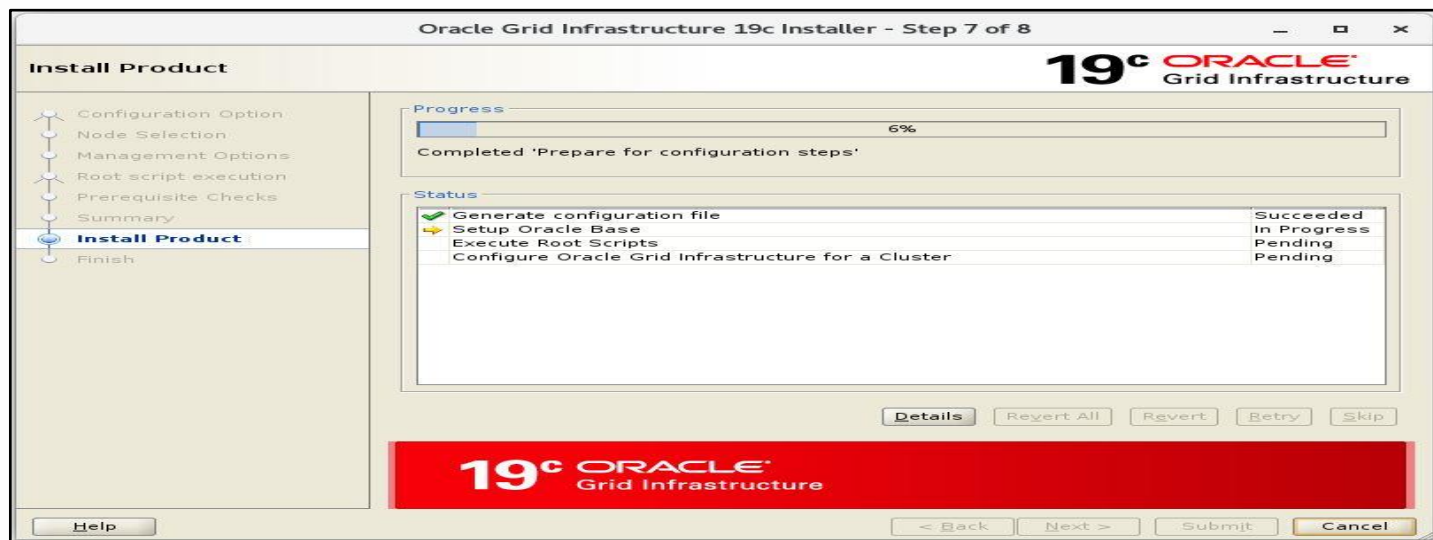
✅ Oracle 19c GI (19.6.0) running on Oracle Linux 8.0 *with no ACFS/AFD configured.*
- Existing GI Home: /u01/app/19.3.0/grid with applied Oracle 19c (19.6.0) RU
- Existing RDBMS Home: /u01/app/oracle/product/19.3.0/db_1 with applied Oracle 19c (19.6.0) RU

✅ Install Oracle 19c GI (19.3.0) and apply Oracle 19c (19.7.0) RU in a separate GI Home
- New GI Home: /u01/app/19.7.0/grid
- ./gridSetup.sh -applyPSU /home/oracle/30899722
- Chose the option "Install Software only" and select all the nodes.

Zero-Downtime Oracle Grid Infrastructure Patching (ZDOGIP) (Doc ID 2635015.1)

✅ Switching the Grid Infrastructure Home
- Run the gridSetup.sh from the target home
- /u01/app/19.7.0/grid/gridSetup.sh -SwitchGridhome
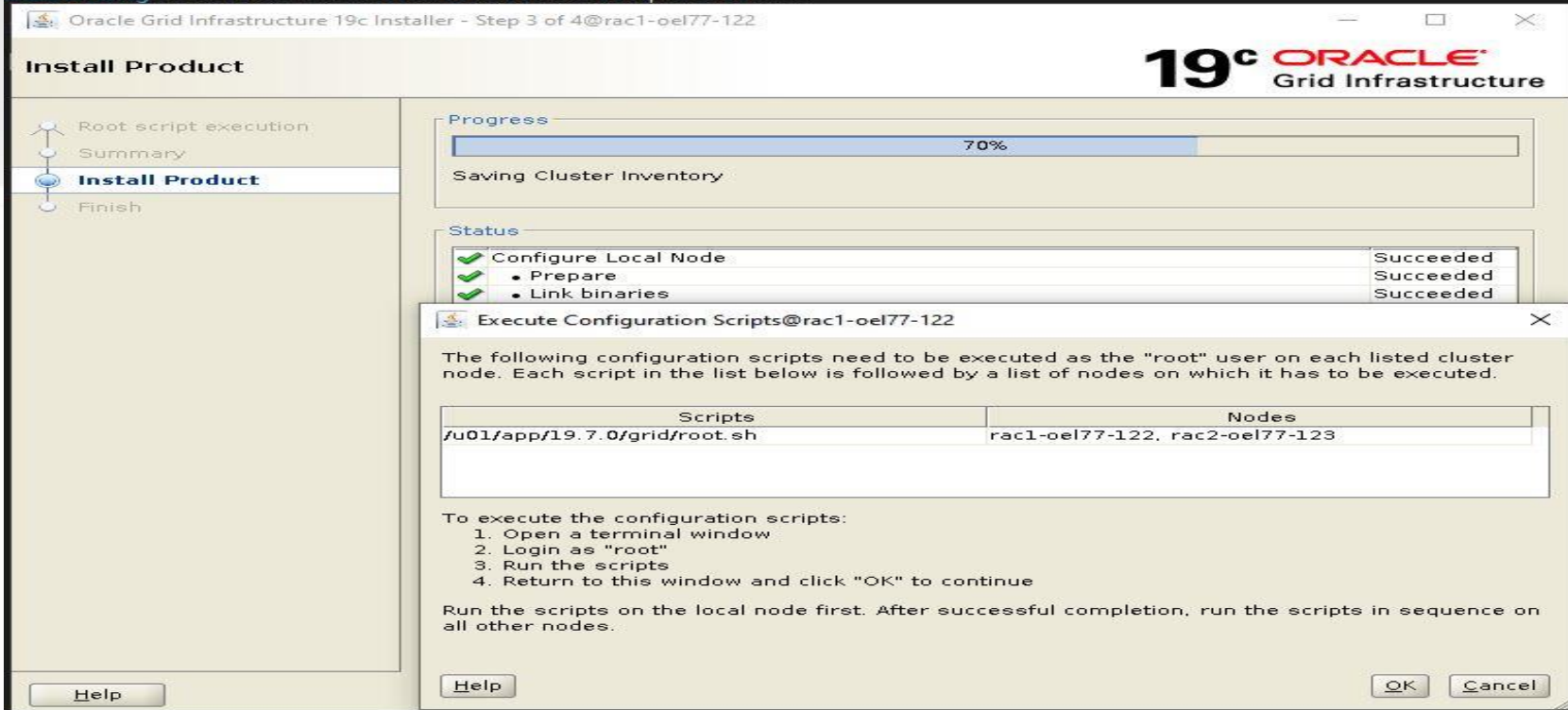- Execute the following script in all cluster nodes
- /u01/app/19.7.0/grid/root.sh *-transparent -nodriverupdate*

✅ Finally Oracle GI will be Oracle 19c (19.7.0) and Oracle RDBMS will be Oracle 19c (19.6.0)

```
[oracle@rac1-oel77-122 ~]$ export CV_ASSUME_DISTID=OEL7.6
[oracle@rac1-oel77-122 ~]$ grid_env
[oracle@rac1-oel77-122 ~]$ cd /u01/app/19.7.0/grid/
[oracle@rac1-oel77-122 grid]$ ./gridSetup.sh -SwitchGridhome
Launching Oracle Grid Infrastructure Setup Wizard...
```

Oracle Grid Infrastructure 19c Installer - Step 3 of 4@rac1-oel77-122

Install Product

19ᶜ ORACLE Grid Infrastructure

- Root script execution
- Summary
- **Install Product**
- Finish

Progress

70%

Saving Cluster Inventory

Status

✓ Configure Local Node	Succeeded
• Prepare	Succeeded
• Link binaries	Succeeded

Execute Configuration Scripts@rac1-oel77-122

The following configuration scripts need to be executed as the "root" user on each listed cluster node. Each script in the list below is followed by a list of nodes on which it has to be executed.

Scripts	Nodes
/u01/app/19.7.0/grid/root.sh	rac1-oel77-122, rac2-oel77-123

To execute the configuration scripts:
1. Open a terminal window
2. Login as "root"
3. Run the scripts
4. Return to this window and click "OK" to continue

Run the scripts on the local node first. After successful completion, run the scripts in sequence on all other nodes.

Help   OK   Cancel

> This script has to execute from target home only in one node

Zero-Downtime Oracle Grid Infrastructure Patching

```
[root@rac1-oel77-122 ~]# /u01/app/19.7.0/grid/root.sh -transparent -nodriverupdate
Performing root user operation.

The following environment variables are set as:
    ORACLE_OWNER= oracle
    ORACLE_HOME=  /u01/app/19.7.0/grid

Enter the full pathname of the local bin directory: [/usr/local/bin]:
The contents of "dbhome" have not changed. No need to overwrite.
The contents of "oraenv" have not changed. No need to overwrite.
The contents of "coraenv" have not changed. No need to overwrite.

Entries will be added to the /etc/oratab file as needed by
Database Configuration Assistant when a database is created
Finished running generic part of root script.
Now product-specific root actions will be performed.
Relinking oracle with rac_on option
LD_LIBRARY_PATH='/u01/app/19.3.0/grid/lib:/u01/app/19.7.0/grid/lib:'
Using configuration parameter file: /u01/app/19.7.0/grid/crs/install/crsconfig_params
The log of current session can be found at:
```

This feature is recommended for the configurations that do *not* have (ACFS/AFD/OKA/OLFS).

```
Using configuration parameter file: /u01/app/19.7.0/grid/crs/install/crsconfig_params
The log of current session can be found at:
    /u01/app/oracle/crsdata/rac1-oel77-122/crsconfig/crs_prepatch_rac1-oel77-122_2020-08-01_12-06-53AM.log
Using configuration parameter file: /u01/app/19.7.0/grid/crs/install/crsconfig_params
The log of current session can be found at:
    /u01/app/oracle/crsdata/rac1-oel77-122/crsconfig/crs_prepatch_rac1-oel77-122_2020-08-01_12-06-53AM.log
2020/08/01 12:07:10 CLSRSC-347: Successfully unlock /u01/app/19.7.0/grid
2020/08/01 12:07:12 CLSRSC-671: Pre-patch steps for patching GI home successfully completed.
Using configuration parameter file: /u01/app/19.7.0/grid/crs/install/crsconfig_params
The log of current session can be found at:
    /u01/app/oracle/crsdata/rac1-oel77-122/crsconfig/crs_postpatch_rac1-oel77-122_2020-08-01_12-07-12AM.log
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 [2701864972].
2020/08/01 12:07:32 CLSRSC-329: Replacing Clusterware entries in file 'oracle-ohasd_dummy.service'
2020/08/01 12:12:07 CLSRSC-329: Replacing Clusterware entries in file 'oracle-ohasd.service'
Oracle Clusterware active version on the cluster is [19.0.0.0.0]. The cluster upgrade state is [ROLLING PATCH]. The cluster active patch level is [2701864972].
2020/08/01 12:13:14 CLSRSC-4015: Performing install or upgrade action for Oracle Trace File Analyzer (TFA) Collector.
2020/08/01 12:13:15 CLSRSC-672: Post-patch steps for patching GI home successfully completed.
[root@rac1-oel77-122 ~]# 2020/08/01 12:14:59 CLSRSC-4003: Successfully patched Oracle Trace File Analyzer (TFA) Collector.

[root@rac1-oel77-122 ~]#
```

This script execute in all the cluster nodes with specified options

```
[oracle@rac1-oel77-122 ~]$ ps -ef | grep pmon
oracle    12184     1  0 Jul31 ?        00:00:01 asm_pmon_+ASM1
oracle    15010     1  0 01:25 ?        00:00:01 ora_pmon_orcldb1
oracle    24823 10982  0 12:11 pts/2    00:00:00 grep --color=auto pmon
[oracle@rac1-oel77-122 ~]$ ps -ef | grep pmon
oracle    15010     1  0 01:25 ?        00:00:02 ora_pmon_orcldb1
oracle    26086 10982  0 12:12 pts/2    00:00:00 grep --color=auto pmon
[oracle@rac1-oel77-122 ~]$ ps -ef | grep pmon
oracle    15010     1  0 01:25 ?        00:00:02 ora_pmon_orcldb1
oracle    26150 10982  0 12:12 pts/2    00:00:00 grep --color=auto pmon
[oracle@rac1-oel77-122 ~]$ ps -ef | grep pmon
oracle    15010     1  0 01:25 ?        00:00:02 ora_pmon_orcldb1
oracle    26872 10982  0 12:12 pts/2    00:00:00 grep --color=auto pmon
[oracle@rac1-oel77-122 ~]$ ps -ef | grep pmon
oracle    15010     1  0 01:25 ?        00:00:02 ora_pmon_orcldb1
oracle    27189 10982  0 12:12 pts/2    00:00:00 grep --color=auto pmon
[oracle@rac1-oel77-122 ~]$ ps -ef | grep pmon
oracle    15010     1  0 01:25 ?        00:00:02 ora_pmon_orcldb1
oracle    27241     1  0 12:12 ?        00:00:00 asm_pmon_+ASM1
oracle    28643 10982  0 12:13 pts/2    00:00:00 grep --color=auto pmon
[oracle@rac1-oel77-122 ~]$
```

```
[oracle@19c-rac1 ~]$ cd $ORACLE_HOME/OPatch
[oracle@19c-rac1 OPatch]$ ./opatch lspatches
30655595;TOMCAT RELEASE UPDATE 19.0.0.0.0 (30655595)
30557433;Database Release Update : 19.6.0.0.200114 (30557433)
30489632;ACFS RELEASE UPDATE 19.6.0.0.0 (30489632)
30489227;OCW RELEASE UPDATE 19.6.0.0.0 (30489227)
OPatch succeeded.
[oracle@19c-rac1 ~]$
[oracle@19c-rac1 ~]$ export ORACLE_HOME=/u01/app/19.7.0/grid
[oracle@19c-rac1 ~]$ cd /u01/app/19.7.0/grid/OPatch/
[oracle@19c-rac1 OPatch]$ ./opatch lspatches
30898856;TOMCAT RELEASE UPDATE 19.0.0.0.0 (30898856)
30894985;OCW RELEASE UPDATE 19.7.0.0.0 (30894985)
30869304;ACFS RELEASE UPDATE 19.7.0.0.0 (30869304)
30869156;Database Release Update : 19.7.0.0.200414 (30869156)
OPatch succeeded.
[oracle@19c-rac1 OPatch]$
```

https://yvrk1973.blogspot.com/2020/08/oracle-19c-1960-zero-downtime-oracle.html

INFOLOB

The information below lists additional patches(includes both rolling and non-rolling) recommended to be installed on top of each RU.

NOTE: Latest five RUs.

❖ 19.17 GI RU - Patch 34416665 (for Grid Infrastructure), 19.17 DB RU - Patch 34419443 (for DB Home)
❖ 19.16 GI RU - Patch 34130714 (for Grid Infrastructure), 19.16 DB RU - Patch 34133642 (for DB Home)
❖ 19.15 GI RU - Patch 33803476 (for Grid Infrastructure), 19.15 DB RU - Patch 33806152 (for DB Home)
❖ 19.14 GI RU - Patch 33509923 (for Grid Infrastructure), 19.14 DB RU - Patch 33515361 (for DB Home)
❖ 19.13 GI RU - Patch 33182768 (for Grid Infrastructure), 19.13 DB RU - Patch 33192793 (for DB Home)

Oracle Database 19c Important Recommended One-off Patches (Doc ID 555.1)

❖ Recommended Patches for 19.17 DB Home
❖ Recommended Patches for 19.17 GI Home
❖ Recommended Patches for 19.16 DB Home
❖ Recommended Patches for 19.16 GI Home
❖ Recommended Patches for 19.15 DB Home
❖ Recommended Patches for 19.15 GI Home
❖ Recommended Patches for 19.14 DB Home
❖ Recommended Patches for 19.14 GI Home

Data Pump Recommended Proactive Patches (DPBPs)

❖ The Data Pump Bundled Patch (DPBP)can be installed while the database is running, provided that Data Pump or the DBMS_METADATA procedures are not currently in use. It is a Non-Binary Online Patch, but it is not a RAC Rolling Patch.

Version	Patch Number (click to download)	Link To Table of Bug Fixes Contained in Each Patch	Windows Patch Available?	Number of Bugs Fixed	Comments
19.17.0	34734035*		No**		Work in progress
19.16.1 RUR	34689686*	Table 2	No	49	Work in progress
19.16.0	34620690	Table 2	Yes	49	
19.15.2 RUR	34689589*	Table 3	No	38	Work in progress
19.15.1 RUR	34689563	Table 3	No	38	
19.15.0	34547013	Table 3	Yes	38	
19.14.2 RUR	34615568	Table 4	No	33	
19.14.1 RUR	33735435	Table 4	No	33	
19.14.0	34423086	Table 4	Yes	33	Replaces 33976098 (see Alert 2871027.1)
19.13.0	33952087	Table 5	Yes	25	
19.11.0	32958059	Table 7	No		
19.10.0	32583144	Table 8	No	6	

Data Pump Recommended Proactive Patches For 19.10 and Above (Doc ID 2819284.1)

- **Oracle Database 19c**
  - Database Release Update 19.17.0.0.221018 Patch 34419443 for UNIX
    - README
    - List of fixes: MOS Note: 2523220.1
    - Contents: 654 fixes on top of 19.16.0
  - OJVM Release Update 19.17.0.0.221018 Patch 34411846 for all platforms
    - README
    - Contents: 7 fixes on top of OJVM 19.16.0
  - Data Pump Bundle Patch 19.17.0 Patch 34734035 for all platforms
    - README
    - Contents: 75 fixes

File Download ✕

ⓘ Click each file name to download the selected files.
Tip: Use a Download Manager Learn More...

☐ Include Prerequisites

MERGE ON DATABASE RU 19.17.0.0.0 OF 34650250 34660465 24338134 25143018 26565187 (Patch)
⬇ p34734035_1917000DBRU_Generic.zip   2.0 MB

Total 1 File (1 Patch)   About 2+ seconds (at 1024 KB/sec)   2.0 MB

Note: A Single patch or product bundle can contain multiple files.

- ❖ Customer get access to recommended, well-tested, one-off patches without having to request a patch bundle after the release of an RU.
- ❖ MRPs replace Release Update Revisions (RURs).
- ❖ MRPs are available on Linux only.
- ❖ MRP1 for Oracle 19c (19.17) ships in Nov 2022.
- ❖ *Reducing the number of one-off patches*

	2022		2023										
			Introducing Monthly Recommended Patches (MRPs) and FAQ (Doc ID 2898740.1)										
19.17.0	19.17.0	MRP1	MRP2	MRP3	MRP4	MRP5	MRP6						
19.18.0			19.18.0	MRP1	MRP2	MRP3	MRP4	MRP5	MRP6				
19.19.0					19.19.0	MRP1	MRP2	MRP3	MRP4	MRP5	MRP6		
19.20.0							19.20.0	MRP1	MRP2	MRP3	MRP4		
19.21.0										19.21.0	MRP1		

Monthly Recommended Patches (MRPs)

File Download

Click each file name to download the selected files.
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☐ Include Prerequisites

DATABASE MRP 19.17.0.0.221115 (Patch)
p34737974_1917000DBRU_Linux-x86-64.zip   126.8 MB

Total 1 File (1 Patch)   About 2+ minutes (at 1024 KB/sec)   126.8 MB

Note: A Single patch or product bundle can contain multiple files.

Download File Metadata   View Digest Details   WGET Options

Primary Database: orcldb

```
[oracle@prim01 OPatch]$ ./opatch lsinventory | grep -i "Patch Description"
Patch description:  "MERGE ON DATABASE RU 19.17.0.0.0 OF 34650250 34660465 24338134 25143018 26565187"
Patch description:  "Fix for bug 34724125"
Patch description:  "POD EEHO-DEV5 UNABLE TO SWITCHOVER ODS DB"
Patch description:  "AFTER GI PATCHING AND DB UPGRADE TO 19.16 SESSIONS ARE CONSUMING TEMPTABLESPACE."
Patch description:  "DNFS IO HANG  DURING STRESS TEST"
Patch description:  "AIM ORA-600 [KTUSCV1 CV BUF TOO BIG] - KTUSCV1"
Patch description:  "FLUSH OUT STALE ANTILOCKS AND CONVERT KCLCLS_2 AND  KCLANTILOCK_17 TO SOFT ASSERT"
Patch description:  "SYD  E1POD DBHOME PATCHING COMPLETELY HUNG WITH KPDBHASHTABLE_FIND MULTIPLE INSTANCE HANG"
Patch description:  "Database Release Update : 19.17.0.0.221018 (34419443)"
Patch description:  "OCW RELEASE UPDATE 19.3.0.0.0 (29585399)"
[oracle@prim01 OPatch]$
```

```
[oracle@prim01 OPatch]$ ./opatch lspatches
34734035;MERGE ON DATABASE RU 19.17.0.0.0 OF 34650250 34660465 24338134 25143018 26565187
34724125;Fix for bug 34724125
34574048;POD EEHO-DEV5 UNABLE TO SWITCHOVER ODS DB
34538232;AFTER GI PATCHING AND DB UPGRADE TO 19.16 SESSIONS ARE CONSUMING TEMPTABLESPACE.
34366627;DNFS IO HANG  DURING STRESS TEST
34333986;AIM ORA-600 [KTUSCV1 CV BUF TOO BIG] - KTUSCV1
33896423;FLUSH OUT STALE ANTILOCKS AND CONVERT KCLCLS_2 AND  KCLANTILOCK_17 TO SOFT ASSERT
30691454;SYD  E1POD DBHOME PATCHING COMPLETELY HUNG WITH KPDBHASHTABLE_FIND MULTIPLE INSTANCE HANG
34419443;Database Release Update : 19.17.0.0.221018 (34419443)
29585399;OCW RELEASE UPDATE 19.3.0.0.0 (29585399)

OPatch succeeded.
[oracle@prim01 OPatch]$
```

Physical Standby Database-1: orcldbp

```
[oracle@stbyh01 OPatch]$ ./opatch lsinventory | grep -i "Patch Description"
Patch description:  "MERGE ON DATABASE RU 19.17.0.0.0 OF 34650250 34660465 24338134 25143018 26565187"
Patch description:  "Fix for bug 34724125"
Patch description:  "POD EEHO-DEV5 UNABLE TO SWITCHOVER ODS DB"
Patch description:  "AFTER GI PATCHING AND DB UPGRADE TO 19.16 SESSIONS ARE CONSUMING TEMPTABLESPACE."
Patch description:  "DNFS IO HANG  DURING STRESS TEST"
Patch description:  "AIM ORA-600 [KTUSCV1 CV BUF TOO BIG] - KTUSCV1"
Patch description:  "FLUSH OUT STALE ANTILOCKS AND CONVERT KCLCLS_2 AND  KCLANTILOCK_17 TO SOFT ASSERT"
Patch description:  "SYD  E1POD DBHOME PATCHING COMPLETELY HUNG WITH KPDBHASHTABLE_FIND MULTIPLE INSTANCE HANG"
Patch description:  "Database Release Update : 19.17.0.0.221018 (34419443)"
Patch description:  "OCW RELEASE UPDATE 19.3.0.0.0 (29585399)"
[oracle@stbyh01 OPatch]$
```

```
34737974/
    ── 30691454
    ── 33896423
    ── 34333986
    ── 34366627
    ── 34538232
    ── 34574048
    ── 34724125
```

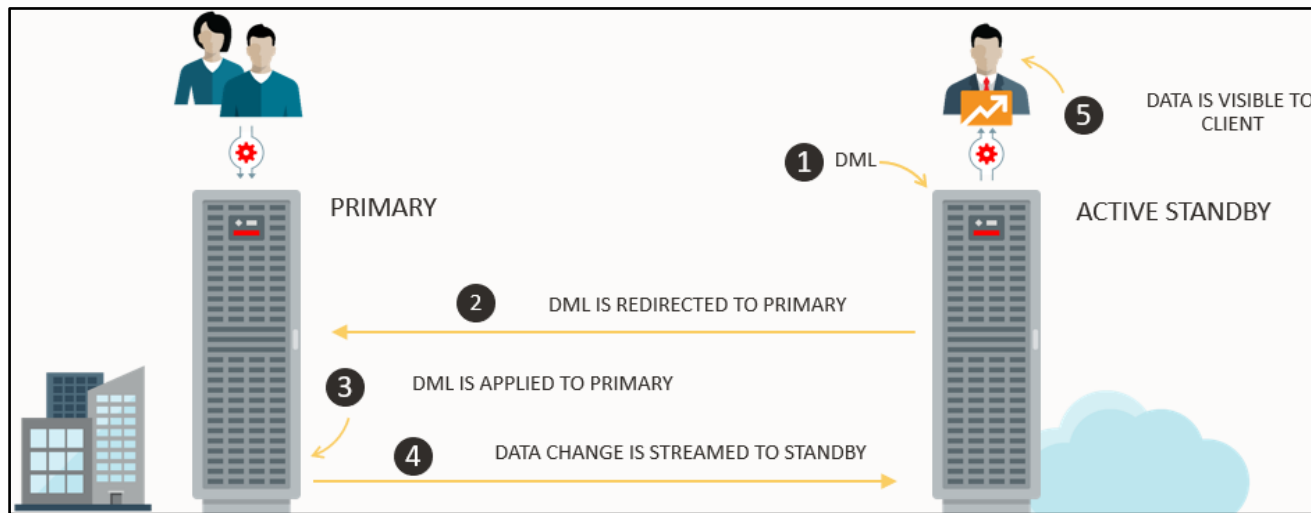**Physical Standby Database-2: orcldbs**

```
[oracle@cstbyh01 OPatch]$ ./opatch lsinventory | grep -i "Patch Description"
Patch Description:  "Fix for bug 34724125"
Patch description:  "POD EEHO-DEV5 UNABLE TO SWITCHOVER ODS DB"
Patch description:  "AFTER GI PATCHING AND DB UPGRADE TO 19.16 SESSIONS ARE CONSUMING TEMPTABLESPACE."
Patch description:  "DNFS IO HANG  DURING STRESS TEST"
Patch description:  "AIM ORA-600 [KTUSCV1 CV BUF TOO BIG] - KTUSCV1"
Patch description:  "FLUSH OUT STALE ANTILOCKS AND CONVERT KCLCLS_2 AND  KCLANTILOCK_17 TO SOFT ASSERT"
Patch description:  "SYD  E1POD DBHOME PATCHING COMPLETELY HUNG WITH KPDBHASHTABLE_FIND MULTIPLE INSTANCE HANG"
Patch description:  "Database Release Update : 19.17.0.0.221018 (34419443)"
Patch description:  "OCW RELEASE UPDATE 19.3.0.0.0 (29585399)"
[oracle@cstbyh01 OPatch]$
```

✅ DML Re-direction is automatically performed from an ADG standby to the primary without compromising *Atomicity, Consistency, Isolation, and Durability (ACID).*

✅ Incidental Data Manipulation Language (DML) operations can be run on Active Data Guard standby databases. This allows more applications to benefit from using an Active Data Guard standby database when some writes are required.

✅ New documented parameter *ADG_REDIRECT_DML* controls DML Redirection.

Oracle 19c - Active Data Guard DML Redirection

Oracle 19c - Active Data Guard DML Redirection

❖ DML redirection helps in load balancing between the primary and standby databases. When incidental DML is issued on an Active Data Guard standby database, the update is passed to the primary database where it is executed. The resulting redo of the transaction updates the standby database after which control is returned to the application.

```
SQL> select open_mode, database_role from v$database;

OPEN_MODE              DATABASE_ROLE
-------------------    ----------------
READ ONLY WITH APPLY   PHYSICAL STANDBY

SQL> select * from dgtest;

        NO NAME
---------- --------------------
         1 ORACLE

SQL> show parameter adg_re

NAME                                 TYPE        VALUE
------------------------------------ ----------- ------
adg_redirect_dml                     boolean     TRUE
SQL>
SQL> insert into dgtest values (2, 'MYSQL');

1 row created.

SQL> commit;

Commit complete.

SQL> select * from dgtest;

        NO NAME
---------- --------------------
         1 ORACLE
         2 MYSQL

SQL> ▮
```

```
SQL> select * from dgtest;

        NO NAME
---------- --------------------
         1 ORACLE

SQL> select open_mode,database_role from v$database;

OPEN_MODE              DATABASE_ROLE
-------------------    ----------------
READ WRITE             PRIMARY

SQL> select * from dgtest;

        NO NAME
---------- --------------------
         1 ORACLE
         2 MYSQL

SQL> SQL> select open_mode,database_role from v$database;

OPEN_MODE              DATABASE_ROLE
-------------------    ----------------
READ WRITE             PRIMARY

SQL> select * from dgtest;

        NO NAME
---------- --------------------
         1 ORACLE
         2 MYSQL

SQL>
```

- PL/SQL blocks that you run on Active Data Guard Standby databases can be redirected to and run on the primary database.

- The PL/SQL blocks should not contain bind variables.

- To redirect PL/SQL operations that are run on a standby to the primary , configure automatic redirection on the standby database:

  SQL> ALTER SESSION ENABLE ADG_REDIRECT_PLSQL;

- You can configure automatic redirection for PL/SQL operations only at the session level.

✅ A Service fails over to an available instance when there are no preferred instances available.

✅ For a dynamic service that is placed using preferred and available settings, you can now specify that the service should fall back to a preferred instance when it becomes available.

✅ This option allows for more control in placing dynamic database services and ensures that a given service is available on a preferred instance as much as possible.

```
[oracle@oel70-base1 ~]$ srvctl status database -d orcl
Instance orcl1 is running on node oel70-base1
Instance orcl2 is running on node oel70-base2
[oracle@oel70-base1 ~]$
[oracle@oel70-base1 ~]$ srvctl add service -db orcl -service serv1 -preferred orcl1 -available orcl2 -failback yes
[oracle@oel70-base1 ~]$
[oracle@oel70-base1 ~]$ srvctl status service -db orcl -service serv1
Service serv1 is not running.
[oracle@oel70-base1 ~]$
```

```
[oracle@oel70-base1 ~]$ srvctl start service -db orcl -service serv1
[oracle@oel70-base1 ~]$
[oracle@oel70-base1 ~]$ srvctl status service -db orcl -service serv1
Service serv1 is running on instance(s) orcl1
[oracle@oel70-base1 ~]$
```

Dynamic Services Fallback Option in 19c

INFOLOB

```
[oracle@oel70-base1 ~]$ srvctl config service -d orcl -s serv1 | grep -i fail
Failover type:
Failover method:
Failover retries:
Failover delay:
Failover restore: NONE
Failback :   true
[oracle@oel70-base1 ~]$ srvctl config service -d orcl -s serv2 | grep -i fail
Failover type:
Failover method:
Failover retries:
Failover delay:
Failover restore: NONE
[oracle@oel70-base1 ~]$
```

The fix for 29891936 is included 21c.

Note: srvctl config service does not report state of failback when it is "NO".

```
[oracle@oel70-base1 ~]$ srvctl config service -d orcl -s serv2 | grep -i fail
Failover type:
Failover method:
Failover retries:
Failover delay:
Failover restore: NONE
[oracle@oel70-base1 ~]$
[oracle@oel70-base1 ~]$ srvctl modify service -d orcl -s serv2 -failback yes
[oracle@oel70-base1 ~]$
[oracle@oel70-base1 ~]$ srvctl config service -d orcl -s serv2 | grep -i fail
Failover type:
Failover method:
Failover retries:
Failover delay:
Failover restore: NONE
Failback :   true
[oracle@oel70-base1 ~]$
```

✓ Parallel redo log apply on Oracle RAC physical standby database.

✓ Multi-Instance Redo Apply (MIRA) starting with Oracle 12cR2 (12.2), MIRA greatly improves scalability of redo apply for Oracle RAC databases

✓ Oracle Database 19c supports the In Memory Column Store (IMCS)

✓ The ApplyInstances property lets you specify how many physical standby instances run Redo Apply.

Activation the number of apply instances is controlled by the Data Guard Broker database property *ApplyInstances* or the following SQL*Plus command

SQL> ALTER DATABASE RECOVER MANAGED STANDBY DATABASE INSTANCES [ALL|integer];
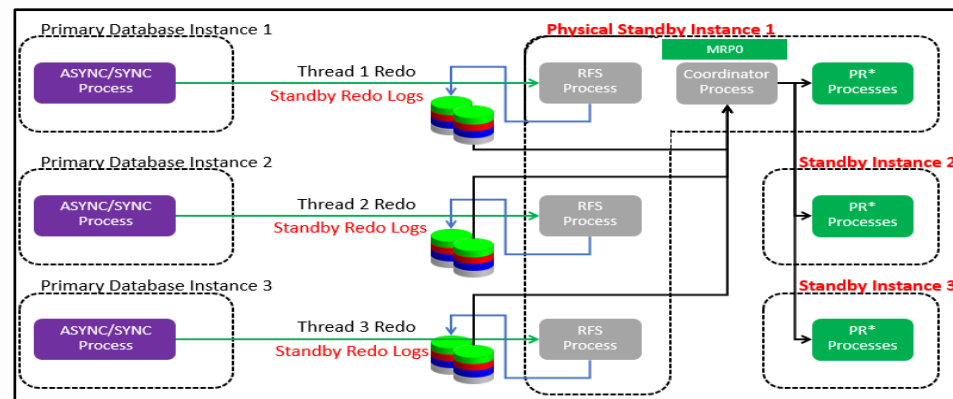
```
Apply-Related Property Settings:
  Property                         Value               Value
  DelayMins                        0                   0
  ApplyParallel                    AUTO                AUTO
  ApplyInstances                   0                   3

Transport-Related Property Settings:
  Property                         Value               Value
  LogXptMode                       ASYNC               ASYNC
  Dependency                       <empty>             <empty>
  DelayMins                        0                   0
  Binding                          optional            optional
  MaxFailure                       0                   0
  MaxConnections                   1                   1
  ReopenSecs                       300                 300
  NetTimeout                       30                  30
  RedoCompression                  DISABLE             DISABLE
  LogShipping                      ON                  ON

Automatic Diagnostic Repository Errors:
  Error
  No logging operation             NO        NO
  Control file corruptions         NO        NO
  SRL Group Unavailable            NO        NO
  System data file missing         NO        NO
  System data file corrupt         NO        NO
  System data fil                  NO        NO
  User data file                   NO        NO
  User data file offline           NO        NO
  Block Corruptions found          NO        NO

DGMGRL>
```

SQL> alter database recover managed standby database disconnect using instances 3;

Database altered.

```
alter database recover managed standby database disconnect using instances 3
Attempt to start background Managed Standby Recovery process (    )
Starting background process MRP0
MRP0 started with pid=133, OS id=17036
MRP0: Background Managed Standby Recovery process started (    )
2019-08-08 13:59:42.963000 -04:00
Started logmerger process on instance id 1
Started logmerger process on instance id 2
Started logmerger process on instance id 3
Starting Multi Instance  Apply (MIRA) on instance
Managed Standby Recovery starting Real Time Apply     default 5 minutes
Reconfiguration started (old inc 106, new inc 108)
List of instances (total 3) :
  1 2 3
My inst 1
  Global Resource Directory frozen
  Communication channels reestablished
  Master broadcasted resource hash value bitmaps
  Non-local Process blocks cleaned out
  LMS 0: 0 GCS shadows cancelled, 0 closed, 0 Xw survived, skipped 0
  LMS 1: 0 GCS shadows cancelled, 0 closed, 0 Xw survived, skipped 0
  Set master node info
  Submitted all remote-enqueue requests
  Dwn-cvts replayed, VALBLKs dubious
  All grantable enqueues granted
  Submitted all GCS remote-cache requests
  Fix write in gcs resources
Reconfiguration complete (total time 0.1 secs)
2019-08-08 13:59:45.100000 -04:00
Started 16 apply slaves on instance id 1
2019-08-08 13:59:46.707000 -04:00
Started 16 apply slaves on instance id 2
2019-08-08 13:59:48.316000 -04:00
Started 16 apply slaves on instance id 3
2019-08-08 13:59:50.832000 -04:00
Completed: alter database recover managed standby database disconnect using instances 3
Recovery of Online Redo Log: Thread 1 Group 102 Seq 3259 Reading mem 0
  Mem# 0: +RMAN_FRA/RCAT_DR/ONLINELOG/group_102.367.995365333
2019-08-08 14:00:10.449000 -04:00
```

https://www.oracle.com/br/technical-resources/articles/multi-instances-redo-apply.html

DGMGRL> edit database "RCVCAT_DR" set property 'ApplyInstances'='3';

Property "ApplyInstances" updated

✓ Restore points that are created on a primary database are automatically replicated to the physical standby database.

✓ The Restore points created on the physical standby database are called *replicated restore points.*

✓ Oracle database automatically replicates restore points from a primary database to the physical standby database when the following conditions are met:
- The *compatible* parameter should be set to 19.0.0 or higher.
- The primary database is open.

```
SQL> select open_mode,database_role from gv$database;

OPEN_MODE               DATABASE_ROLE
--------------------    --------------------
READ WRITE              PRIMARY
READ WRITE              PRIMARY

SQL> show parameter compatible

NAME                          TYPE         VALUE
--------------------------    ---------    ---------
compatible                    string       19.0.0
noncdb_compatible             boolean      FALSE
SQL>
```

```
SQL> select open_mode,database_role from gv$database;

OPEN_MODE               DATABASE_ROLE
--------------------    --------------------
READ ONLY WITH APPLY    PHYSICAL STANDBY
READ ONLY WITH APPLY    PHYSICAL STANDBY

SQL> show parameter compatible

NAME                          TYPE         VALUE
--------------------------    ---------    ---------
compatible                    string       19.0.0
noncdb_compatible             boolean      FALSE
SQL>
```

✓ The naming convention for a replicated restore point uses the name of the restore point on the physical standby database suffixed with _PRIMARY

✓ The MRP manages the creation and maintenance of replicated restore points.

```
SQL> create restore point grp_test guarantee flashback database;

Restore point created.

SQL> select SCN, GUARANTEE_FLASHBACK_DATABASE, TIME, NAME, REPLICATED from gv$restore_point;

     SCN GUARANTEE_ TIME                                  NAME                 REPLICATED
-------- ---------- ------------------------------------- -------------------- ----------
 3422905 YES        28-OCT-21 01.45.16.000000000 PM       GRP_TEST             NO
 3422905 YES        28-OCT-21 01.45.16.000000000 PM       GRP_TEST             NO

SQL> select SCN, GUARANTEE_FLASHBACK_DATABASE, TIME, NAME, REPLICATED from v$restore_point;

     SCN GUARANTEE_ TIME                                  NAME                 REPLICATED
-------- ---------- ------------------------------------- -------------------- ----------
 3422905 YES        28-OCT-21 01.45.16.000000000 PM       GRP_TEST             NO

SQL>
```

```
SQL> select SCN, GUARANTEE_FLASHBACK_DATABASE, TIME, NAME, REPLICATED from v$restore_point;

     SCN GUARANTEE_ TIME                                  NAME                 REPLICATED
-------- ---------- ------------------------------------- -------------------- ----------
 3422905 NO         28-OCT-21 01.45.16.000000000 PM       GRP_TEST_PRIMARY     YES

SQL>
```

INFOLOB

```
DGMGRL> show configuration;

Configuration - dg_19c

  Protection Mode: MaxPerformance
  Members:
  orcl  - Primary database
    orcls - Physical standby database

Fast-Start Failover:  Disabled

Configuration Status:
SUCCESS   (status updated 48 seconds ago)

DGMGRL> remove configuration;
Removed configuration
DGMGRL> exit
[oracle@oel70-base1 ~]$ dgmgrl
DGMGRL for Linux: Release 19.0.0.0.0 - Production on Mon Nov 1 15:14:42 2021
Version 19.12.0.0.0

Copyright (c) 1982, 2019, Oracle and/or its affiliates.  All rights reserved.

Welcome to DGMGRL, type "help" for information.
DGMGRL> connect / as sysdg
Connected to "orcl"
Connected as SYSDG.
DGMGRL> import configuration from 'dgconfig.xml';
Succeeded. Run ENABLE CONFIGURATION to enable the imported configuration.
DGMGRL> enable configuration;
Enabled.
DGMGRL>
DGMGRL> show configuration;

Configuration - dg_19c

  Protection Mode: MaxPerformance
  Members:
  orcl  - Primary database
    orcls - Physical standby database

Fast-Start Failover:  Disabled

Configuration Status:
SUCCESS   (status updated 0 seconds ago)
```

```
DGMGRL> export configuration to 'dgconfig.xml';
Succeeded.
DGMGRL> !
[oracle@oel70-base1 ~]$ ls -lrt /u01/app/oracle/diag/rdbms/orcl/orcl1/trace/dgconfig.xml
-rw-r--r--. 1 oracle asmadmin 6825 Nov  1 14:49 /u01/app/oracle/diag/rdbms/orcl/orcl1/trace/dgconfig.xml
[oracle@oel70-base1 ~]$
```

Export and Import the Broker Metadata File without any issues

Oracle 19c – Starting Observers as Background Processes

❖ To run an observer as a background process, use the DGMGRL command START OBSERVER IN BACKGROUND.

```
DGMGRL> start observer orcldbcfg_obs in BACKGROUND file is '/u01/orcldbcfg_obs.dat' logfile is '/u01/orcldbcfg_obs.log' connect identifier is orcldb;
Connected to "orcldb"
Submitted command "START OBSERVER" using connect identifier "orcldb"
DGMGRL> DGMGRL for Linux: Release 19.0.0.0.0 - Production on Tue Nov 15 20:21:57 2022
Version 19.17.0.0.0

Copyright (c) 1982, 2019, Oracle and/or its affiliates.  All rights reserved.

Welcome to DGMGRL, type "help" for information.
Connected to "orcldb"
Connected as SYSDBA.
Succeeded in opening the observer file "/u01/orcldbcfg_obs.dat".
[W000 2022-11-15T20:21:58.540-06:00] FSFO target standby is orcldbp
Observer 'orcldbcfg_obs' started
The observer log file is '/u01/orcldbcfg_obs.log'.
```

```
DGMGRL> show observer;

Configuration - orcldbcfg

  Primary:            orcldb
  Active Target:      orcldbp

Observer "orcldbcfg_obs" - Master

  Host Name:                    prim01.localdomain
  Last Ping to Primary:         1 second ago
  Last Ping to Target:          0 seconds ago

DGMGRL> 
```

Oracle 19c – Starting Observers as Background Processes

❖ To run an observer as a background process, use the DGMGRL command START OBSERVER IN BACKGROUND.

```
SQL> select * from V$FS_FAILOVER_OBSERVERS;

NAME              REGI HOST                ISMASTER  TIME_SELECTED                   PINGI PINGI CON_ID
--------------    ---- ----------------    --------  --------------------------      ----- ----- ------
orcldbcfg_obs     YES  prim01.localdomain  YES                                       YES   YES        0
                  NO                       NO        01-JAN-90 12.00.00.000000000 AM  NO    NO         0
                  NO                       NO        01-JAN-90 12.00.00.000000000 AM  NO    NO         0
```

```
DGMGRL> show configuration;

Configuration - orcldbcfg

  Protection Mode: MaxAvailability
  Members:
  orcldb  - Primary database
    orcldbp - (*) Physical standby database
      orcldbs - Physical standby database (receiving current redo)

Fast-Start Failover: Enabled in Zero Data Loss Mode

Configuration Status:
SUCCESS   (status updated 59 seconds ago)

DGMGRL>
```

```
DGMGRL> show configuration lag;

Configuration - orcldbcfg

  Protection Mode: MaxAvailability
  Members:
  orcldb  - Primary database
    orcldbp - (*) Physical standby database
            Transport Lag:      0 seconds (computed 0 seconds ago)
            Apply Lag:          0 seconds (computed 0 seconds ago)
      orcldbs - Physical standby database (receiving current redo)
            Transport Lag:      0 seconds (computed 0 seconds ago)
            Apply Lag:          0 seconds (computed 0 seconds ago)

Fast-Start Failover: Enabled in Zero Data Loss Mode

Configuration Status:
SUCCESS   (status updated 28 seconds ago)

DGMGRL>
```

The observe-only mode for fast-start failover enables you to test how fast-start failover will work in your environment.
- Observe-only mode has no impact on your current configuration or on applications.
- In this mode, no actual changes are made to you broker configuration.

```
DGMGRL> enable fast_start failover observe only;
Enabled in Observe-Only Mode.
DGMGRL>
```

```
DGMGRL> show configuration lag;

Configuration - dg_19c

  Protection Mode: MaxPerformance
  Members:
  orcl  - Primary database
    orcls - (*) Physical standby database
            Transport Lag:      0 seconds (computed 1 second ago)
            Apply Lag:          0 seconds (computed 1 second ago)

Fast-Start Failover: Enabled in Observe-Only Mode

Configuration Status:
SUCCESS   (status updated 12 seconds ago)
```

```
DGMGRL> start observer;
[W000 2022-10-05T07:40:12.680-05:00] FSFO target standby is orcls
Observer 'oel70-base1' started
[W000 2022-10-05T07:40:13.191-05:00] Observer trace level is set to USER
[W000 2022-10-05T07:40:13.191-05:00] Try to connect to the primary.
[W000 2022-10-05T07:40:13.191-05:00] Try to connect to the primary orcl.
[W000 2022-10-05T07:40:13.221-05:00] The standby orcls is ready to be a FSFO target
[W000 2022-10-05T07:40:14.222-05:00] Connection to the primary restored!
[W000 2022-10-05T07:40:16.223-05:00] Disconnecting from database orcl.
```

```
DGMGRL> show configuration;

Configuration - dg_19c

  Protection Mode: MaxPerformance
  Members:
  orcl  - Primary database
    orcls - Physical standby database

Fast-Start Failover:   Disabled

Configuration Status:
SUCCESS   (status updated 10 seconds ago)

DGMGRL> exit
```

Oracle 19c – Data Guard Broker – New Commands

✓ New commands are available to *set, modify, and display* the value of initialization parameters.

- o EDIT DATABASE PARAMETER
- o EDIT DATABASE RESET PARAMETER
- o EDIT FAR_SYNC REST PARAMETER
- o EDIT RECOVERY_APPLIANCE PARAMETER
- o EDIT RECOVERY_APPLIANCE RESET PARAMETER
- o SET TRACE_LEVEL

```
DGMGRL> show configuration lag;

Configuration - dg_19c

  Protection Mode: MaxPerformance
  Members:
  orcl  - Primary database
    orcls - (*) Physical standby database
          Transport Lag:      0 seconds (computed 0 seconds ago)
          Apply Lag:          0 seconds (computed 0 seconds ago)

Fast-Start Failover: Enabled in Observe-Only Mode

Configuration Status:
SUCCESS   (status updated 60 seconds ago)

DGMGRL>
DGMGRL>
DGMGRL>
DGMGRL>
DGMGRL> edit database 'orcl' set parameter log_archive_trace = 1 'scope=both';
Parameter "log_archive_trace" updated
DGMGRL>
```

```
SQL> show parameter log_archive_trace

NAME                             TYPE         VALUE
-------------------------------- ------------ ------
log_archive_trace                integer      0
SQL>
```

```
SQL> show parameter log_archive_trace

NAME                             TYPE         VALUE
-------------------------------- ------------ ------
log_archive_trace                integer      1
SQL>
```

Standby Nologging for Load Performance
- Ensures that standbys will receive the nonlogged data changes with minimum impact to the speed of loading at the primary.
- The standby can transiently have nonlogged blocks.
- These nonlogged blocks will be automatically resolved by managed standby recovery.

Standby Nologging for Data availability
- Ensures that all standbys have the data when the primary load commits, but at the cost of throttling the speed of loading data at the primary.
- The standbys will never have any nonlogged blocks.

Note: You Cannot use Multi-Instance Redo Apply (MIRA) when *Standby Nologging for Data availability (OR) Standby Nologging for Load Performance* are enabled on the primary.

Data Guard Database Nologging Improvements

```
Oracle Database 19c Enterprise Edition Release 19.0.0.0.0 - Production
Version 19.4.0.0.0

SQL> select open_mode,database_role from gv$database;

OPEN_MODE            DATABASE_ROLE
-------------------  ----------------
READ WRITE           PRIMARY
READ WRITE           PRIMARY

SQL> select force_logging from gv$database;

FORCE_LOGGING
------------------------------------
YES
YES

SQL> alter database no force logging;

Database altered.

SQL>
SQL> select force_logging from gv$database;

FORCE_LOGGING
------------------------------------
NO
NO

SQL>
SQL> alter database set standby nologging for data availability;

Database altered.
```

```
SQL> create table dgtest_nolog (no number, name varchar2(10)) nologging;

Table created.

SQL>
SQL> insert into dgtest_nolog values (1,'ORACLE');

1 row created.

SQL> commit;

Commit complete.

SQL>
```

```
Oracle Database 19c Enterprise Edition Release 19.0.0.0.0 - Production
Version 19.4.0.0.0

SQL> select open_mode,database_role from gv$database;

OPEN_MODE            DATABASE_ROLE
-------------------  ----------------
READ ONLY WITH APPLY PHYSICAL STANDBY
READ ONLY WITH APPLY PHYSICAL STANDBY

SQL>
SQL> select * from dgtest_nolog;

        NO NAME
---------- -----------
         1 ORACLE

SQL>
```

Hands-on Articles - > *https://yvrk1973.blogspot.com/*

A physical standby database that is in a mounted state can automatically follow the primary database after a RESETLOGS operation on the primary database.

When flashback or point-in-time recovery is performed either on a primary database or a PDB in the primary database.
- The primary database or PDB is moved to previous point in time.
- The primary database is then opened with the RESETLOGS option.

https://yvrk1973.blogspot.com/2021/10/oracle-19c-automatic-flashback-of.html

For the physical standby database to automatically follow the primary, the MRP:
- Detects the new incarnation
- Flashes back the standby or the PDB on the standby to the same point in time as that of the primary or the PDB on the primary
- Restarts the standby recovery and moves the standby to the new branch of redo

Note: Oracle 19c (19.10) and later

Performance Issues when using PDBs with Oracle RAC 19c

✓ Oracle RAC sizes its internal data structures to accommodate hundreds of PDBs in the same Container Database (CDB) instance.

✓ Container Database running smaller number of PDBs need to consider the following best practices in order to ensure good performance and availability.

✓ Oracle Real Application Clusters (RAC) CDBs where the number of actual PDB's is lower than the *TARGET_PDBS* parameter setting can inadvertently be subject to a negative performance.

Versions 18.1 to 19.7

✓ Set the parameter *TARGET_PDBS* to the number of PDBs that are planned to be running in the CDB. Please do not add seed and root in this count.

```
Oracle Database 19c Enterprise Edition Release 19.0.0.0.0 - Production
Version 19.12.0.0.0

SQL> show pdbs

    CON_ID CON_NAME                       OPEN MODE  RESTRICTED
---------- ------------------------------ ---------- ----------
         2 PDB$SEED                       READ ONLY  NO
         3 PDB1                           READ WRITE NO
         4 PDB2                           READ WRITE NO
SQL> show parameter target_pdbs

NAME                                 TYPE        VALUE
------------------------------------ ----------- ------------------------------
target_pdbs                          integer     5
SQL>
```

```
[oracle@oel70-base1 OPatch]$ ./opatch lsinventory | grep 30592555
[oracle@oel70-base1 OPatch]$ ./opatch lsinventory | grep 29351044
       29350762, 29350868, 29351044, 29351386, 29351662, 29351716, 29351735
[oracle@oel70-base1 OPatch]$
[oracle@oel70-base1 OPatch]$ ./opatch lspatches
32904851;Database Release Update : 19.12.0.0.210720 (32904851)
29585399;OCW RELEASE UPDATE 19.3.0.0.0 (29585399)

OPatch succeeded.
[oracle@oel70-base1 OPatch]$
```
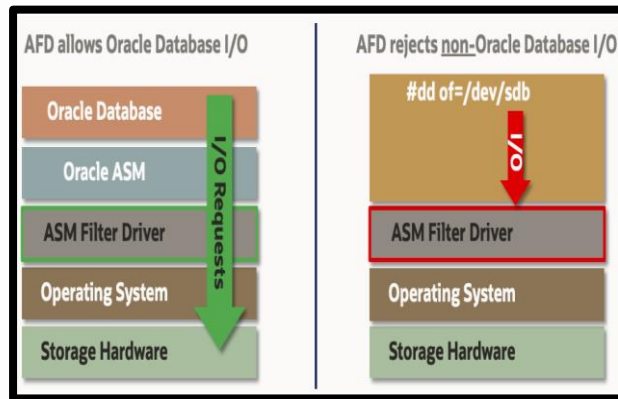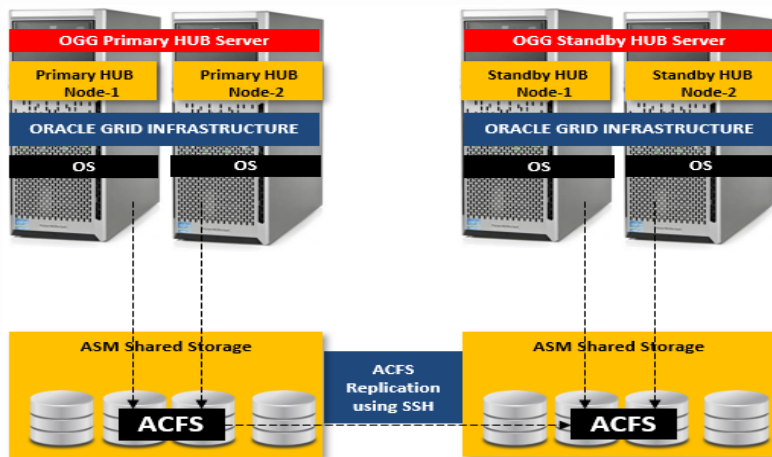
ASM Filter Driver (ASMFD) for Device Management

OS Kernel Driver
- Reject non-Oracle I/O
- Stops OS utilities from overwriting ASM disks
- Protects database files
- Configure during installation
- Reduce OS resource usage
- Fewer open file descriptors
- Faster node recovery

Replacement for ASMLib

Quest Oracle Community

✓ Oracle ACFS and AFD 19c supported platforms.

ACFS and AFD 19c Supported Platforms					
Vendor	**Version**	**Update/Kernel**	**Architecture**	**ACFS Bug or RU/RUR**	**AFD Bug or RU/RUR**
Oracle Linux – RedHat Compatible Kernel	7	Update 5 3.10.0-862	X86_64	Base	Base
Oracle Linux – RedHat Compatible Kernel	7	Update 6 3.10.0-957 and later 3.10.0 Red Hat Compatible kernels	X86_64	19.5.191015 (Base Bug 29963428)	19.5.191015 (Base Bug 29963428)
Oracle Linux - RedHat Compatible Kernel	8	GA, U1, U2, U3 Updates, 4.18.0-32 through 4.18.0-240 RedHat Compatible Kernels	X86_64	19.12.210720 (Base Bug 29557768, 31019017, 31480077, 31838226, 32408255)	19.12.210720 (Base Bug 29557768, 31019017, 31480077, 31838226 32408255)
Oracle Linux - RedHat Compatible Kernel		U4 Update 4.18.0-305 and later Compatible Kernels	X86_64	19.14.220118 (Base Bug 32848142)	19.14.220118 (Base Bug 32848142)
Oracle Linux - RedHat Compatible Kernel	8	U5 Update 4.18.0-348 and later RedHat Kernels	X86_64	19.15.0.0.220419ACFSRU(Base Bug 33535435)	19.15.220419ACFSRU (Base Bug 33535435)
Oracle Linux - Unbreakable Enterprise Kernel	7	All Updates, 4.1.12-112.16.4 and later UEK 4.1.12 kernels	X86_64	Base	Base
Oracle Linux - Unbreakable Enterprise Kernel	7	All Updates, 4.14.35-1902 and later UEK 4.14.35 kernels	X86_64	19.4.190716 (Base Bug 27494830)	19.4.190716 (Base Bug 27494830)
Oracle Linux - Unbreakable Enterprise Kernel	7	All Updates, 5.4.17-2011 and later UEK 5.4.17 kernels, except 5.4.17-2136.300 through 5.4.17-2136.301.1.4	X86_64	19.10.210119 (Base Bug 30590023)	19.10.210119 (Base Bug 30590023)
Oracle Linux - Unbreakable Enterprise Kernel	8	All Updates, 5.4.17-2011 and later UEK 5.4.17 kernels, except 5.4.17-2136.300 through 5.4.17-2136.301.1.4	X86_64	19.10.210119 (Base Bug 30590023)	19.10.210119 (Base Bug 30590023)

Always check ACFS Support On OS Platforms (Certification Matrix). (Doc ID 1369107.1)

INFOLOB

✓ Oracle ACFS, as part of Oracle Grid Infrastructure, is integrated with Oracle ASM, Oracle ADVM and Oracle Clusterware.

✓ Oracle Golden Gate deployments stored on ACFS with continuous snapshot replication.

✓ Starting with Oracle ACFS 12c R1, ACFS can be used to store Oracle Database files

Oracle ACFS offers support for multiple Operating Systems such as Oracle Linux, Redhat, Novell SLES, Solaris and IBM AIX.

» acfsutil repl info (except with –c –u options)
» acfsutil repl init
» acfsutil repl pause
» acfsutil repl resume
» acfsutil repl reverse
» acfsutil repl sync
» acfsutil repl terminate
» acfsutil repl trace
» acfsutil repl update
» acfsutil repl upgrade

✓ Acfsutil repl commands can be run as non-root user (19c)

✓ The combination of RAC, Data Guard and ACFS Replication provides comprehensive site and Disaster Recovery policies for *all files inside and outside* of the database.

Oracle 19c GI with ASMFD, Kernel 4.1.12 & Oracle Linux 7.8

- **Oracle 19c GI (19.9) with ASMFD**
- **Oracle Linux 7.8**
- **Kernel 4.1.12**

```
[oracle@rac1-19c ~]$ sqlplus / as sysasm

SQL*Plus: Release 19.0.0.0.0 - Production on Mon Nov 9 15:14:44 2020
Version 19.9.0.0.0

Copyright (c) 1982, 2020, Oracle.  All rights reserved.


Connected to:
Oracle Database 19c Enterprise Edition Release 19.0.0.0.0 - Production
Version 19.9.0.0.0

SQL> col name for a20
col path for a18
col library for a60
set lines 160
SQL> SQL> SQL> SQL>
SQL> select name, path, library from v$asm_disk where group_number <> 0;

NAME                 PATH               LIBRARY
-------------------- ------------------ ------------------------------------------------------------
ACFSDG02             AFD:ACFSDG02       AFD Library - Generic , version 3 (KABI_V3)
ACFSDG01             AFD:ACFSDG01       AFD Library - Generic , version 3 (KABI_V3)
DATADG01             AFD:DATADG01       AFD Library - Generic , version 3 (KABI_V3)
DATADG02             AFD:DATADG02       AFD Library - Generic , version 3 (KABI_V3)

SQL>
```

```
[root@rac1-19c ~]# . oraenv
ORACLE_SID = [+ASM1] ?
The Oracle base remains unchanged with value /u01/app/oracle
[root@rac1-19c ~]# export ORACLE_BASE=/u01/app/oracle
[root@rac1-19c ~]# export ORACLE_HOME=/u01/app/19.3.0/grid
[root@rac1-19c ~]# cd $ORACLE_HOME/bin
[root@rac1-19c bin]# ./afddriverstate supported
AFD-9200: Supported
[root@rac1-19c bin]#
[root@rac1-19c bin]# ./asmcmd afd_state
ASMCMD-9526: The AFD state is 'LOADED' and filtering is 'ENABLED' on host 'rac1-19c.localdomain'
[root@rac1-19c bin]#
[root@rac1-19c bin]# lsmod | grep acfs
oracleacfs           5607424  0
oracleoks             724992  2 oracleacfs,oracleadvm
[root@rac1-19c bin]#
[root@rac1-19c bin]# lsmod|grep oracle
oracleafd             217088  1
oracleacfs           5607424  0
oracleadvm           1241088  0
oracleoks             724992  2 oracleacfs,oracleadvm
[root@rac1-19c bin]#
[root@rac1-19c bin]# ./acfsdriverstate -orahome /u01/app/19.3.0/grid installed
ACFS-9203: true
[root@rac1-19c bin]# ./acfsdriverstate -orahome /u01/app/19.3.0/grid loaded
ACFS-9203: true
[root@rac1-19c bin]# ./acfsdriverstate -orahome /u01/app/19.3.0/grid supported
ACFS-9200: Supported
[root@rac1-19c bin]# ./acfsdriverstate -orahome /u01/app/19.3.0/grid version
ACFS-9325:     Driver OS kernel version = 4.1.12-112.16.4.el7uek.x86_64.
ACFS-9326:     Driver build number = 190222.
ACFS-9212:     Driver build version = 19.0.0.0.0 (19.3.0.0.0).
ACFS-9547:     Driver available build number = 190222.
ACFS-9548:     Driver available build version = 19.0.0.0.0 (19.3.0.0.0).
[root@rac1-19c bin]#
[root@rac1-19c bin]# uname -r
4.1.12-124.41.5.el7uek.x86_64
[root@rac1-19c bin]#
[root@rac1-19c bin]# uname -a
Linux rac1-19c.localdomain 4.1.12-124.41.5.el7uek.x86_64 #2 SMP Fri Aug 28 09:37:38 PDT 2020 x86_64
[root@rac1-19c bin]#
[root@rac1-19c bin]# cat /etc/os-release
NAME="Oracle Linux Server"
VERSION="7.8"
ID="ol"
```

- ***Oracle 19c GI (19.9) with ASMFD Driver***
- ***Oracle Linux 8.2***
- ***Kernel 5.4.17***

Patch Name ✓	Description	Release ▲▽
30590023	UEK6 SUPPORT FOR ACFS/AFD (System Patch)	19.8.0.0.0ACFSRU
30590023	UEK6 SUPPORT FOR ACFS/AFD (System Patch)	19.9.0.0.0ACFSRU

```
[oracle@19c-rac1 grid]$ ./gridSetup.sh -applyPSU /home/oracle/31305339/
Preparing the home to patch...
Applying the patch /home/oracle/31305339/...
Successfully applied the patch.
The log can be found at: /tmp/GridSetupActions2020-11-12_09-01-20PM/installerPatchActions_2020-
11-12_09-01-20PM.log
Launching Oracle Grid Infrastructure Setup Wizard...
The response file for this session can be found at:
 /u01/app/19.3.0/grid/install/response/grid_2020-11-12_09-01-20PM.rsp
You can find the log of this install session at:
 /tmp/GridSetupActions2020-11-12_09-01-20PM/gridSetupActions2020-11-12_09-01-20PM.log
Moved the install session logs to:
 /u01/app/oraInventory/logs/GridSetupActions2020-11-12_09-01-20PM
[oracle@19c-rac1 grid]$
```

```
[oracle@19c-rac1 bin]$ afddriverstate installed
AFD-620: AFD is not supported on this operating system version: 'unknown'
AFD-9204: AFD device driver installed status: 'false'
[oracle@19c-rac1 bin]$

[oracle@19c-rac1 bin]$ afddriverstate loaded
AFD-620: AFD is not supported on this operating system version: 'unknown'
AFD-9206: AFD device driver loaded status: 'false'
[oracle@19c-rac1 bin]$

[oracle@19c-rac1 bin]$ afddriverstate version
AFD-620: AFD is not supported on this operating system version: 'unknown'
AFD-642: AFD not installed
[oracle@19c-rac1 bin]$

[oracle@19c-rac1 bin]$ cat /etc/oracle-release
Oracle Linux Server release 8.2
[oracle@19c-rac1 bin]$

[oracle@19c-rac1 bin]$ uname -r
5.4.17-2036.100.6.1.el8uek.x86_64
[oracle@19c-rac1 bin]$
```

https://yvrk1973.blogspot.com/2020/12/oracle-19c-199-with-asmfd-kernel-5417.html

ACFS Replication between Primary HUB and Standby HUB

Primary RAC: Oracle 19c (19.8)

```
[oracle@oel82-rac1 ~]$ uname -r
5.4.17-2011.1.2.el8uek.x86_64
[oracle@oel82-rac1 ~]$
[oracle@oel82-rac1 ~]$ cat /etc/os-release | grep -i pretty
PRETTY_NAME="Oracle Linux Server 8.2"
[oracle@oel82-rac1 ~]$
[oracle@oel82-rac1 ~]$ /sbin/acfsutil repl info -c /acfs_vol/
Site:                              Primary
Primary hostname:                  oel82-rac1
Primary path:                      /acfs_vol
Primary status:                    Running
Background Resources:              Active

Standby connect string:            oracle@oel82-rac3
Standby path:                      /acfs_vol
Replication interval:              0 days, 0 hours, 0 minutes, 0 seconds
Sending primary as of:             Sun Oct 03 19:13:49 2021
Status:                            Send Completed
Lag Time:                          00:00:00
Retries made:                      0
Last send started at:              Sun Oct 03 19:13:50 2021
Last send completed at:            Sun Oct 03 19:13:59 2021
Elapsed time for last send:        0 days, 0 hours, 0 minutes, 9 seconds
Next send starts at:               now
Replicated tags:
Data transfer compression:         Off
ssh strict host key checking:      On
Debug log level:                   3

[oracle@oel82-rac1 ~]$
```

Physical Standby RAC: Oracle 19c (19.8)

```
[oracle@oel82-rac3 ~]$ uname -r
5.4.17-2011.1.2.el8uek.x86_64
[oracle@oel82-rac3 ~]$
[oracle@oel82-rac3 ~]$ cat /etc/os-release | grep -i pretty
PRETTY_NAME="Oracle Linux Server 8.2"
[oracle@oel82-rac3 ~]$
[oracle@oel82-rac3 ~]$ /sbin/acfsutil repl info -c /acfs_vol/
Site:                              Standby
Primary hostname:                  oel82-rac1
Primary path:                      /acfs_vol

Standby connect string:            oracle@oel82-rac3
Standby path:                      /acfs_vol
Replication interval:              0 days, 0 hours, 0 minutes, 0 seconds
Last sync time with primary:       Sun Oct 03 19:13:49 2021
Receiving primary as of:           Sun Oct 03 19:13:49 2021
Last receive started at:           Sun Oct 03 19:07:32 2021
Last receive completed at:         Sun Oct 03 19:07:36 2021
Elapsed time for last receive:     0 days, 0 hours, 0 minutes, 4 seconds
Data transfer compression:         Off
ssh strict host key checking:      On
Debug log level:                   3

[oracle@oel82-rac3 ~]$
```

```
[oracle@19c-rac1 ~]$ cat /etc/oracle-release
Oracle Linux Server release 8.2
[oracle@19c-rac1 ~]$
[oracle@19c-rac1 ~]$ uname -r
5.4.17-2036.100.6.1.el8uek.x86_64
[oracle@19c-rac1 ~]$
[oracle@19c-rac1 ~]$ sqlplus / as sysasm

SQL*Plus: Release 19.0.0.0.0 - Production on Fri Dec 18 23:02:01 2020
Version 19.8.0.0.0

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Connected to:
Oracle Database 19c Enterprise Edition Release 19.0.0.0.0 - Production
Version 19.8.0.0.0

SQL> select instance_name,instance_number from gv$instance;

INSTANCE_NAME    INSTANCE_NUMBER
---------------- ---------------
+ASM1                          1
+ASM2                          2
+ASM3                          3

SQL> set lines 100 pages 100
SQL> col name for a20
SQL> col path for a18
SQL> col library for a60
SQL> select name, path, library from v$asm_disk where group_number > 0;

NAME                 PATH               LIBRARY
-------------------- ------------------ ------------------------------------------
OCRVD_0002           /dev/sdl1          System
OCRVD_0003           /dev/sdm1          System
OCRVD_0000           /dev/sdj1          System
OCRVD_0001           /dev/sdk1          System
ACFSDG01             AFD:ACFSDG01       AFD Library - Generic , version 3 (KABI_V3)
ACFSDG02             AFD:ACFSDG02       AFD Library - Generic , version 3 (KABI_V3)

6 rows selected.

SQL> exit
Disconnected from Oracle Database 19c Enterprise Edition Release 19.0.0.0.0 - Production
Version 19.8.0.0.0
[oracle@19c-rac1 ~]$ cd $ORACLE_HOME/bin
[oracle@19c-rac1 bin]$ ./asmcmd afd_lsdsk
------------------------------------------------------------------------
Label                      Filtering   Path
========================================================================
ACFSDG01                   ENABLED     /dev/sdp1
ACFSDG02                   ENABLED     /dev/sdq1
[oracle@19c-rac1 bin]$
```

```
[oracle@oel70-base1 OPatch]$ ./opatch lspatches
32918050;TOMCAT RELEASE UPDATE 19.0.0.0.0 (32918050)
32916816;OCW RELEASE UPDATE 19.12.0.0.0 (32916816)
32915586;ACFS RELEASE UPDATE 19.12.0.0.0 (32915586)
32904851;Database Release Update : 19.12.0.0.210720 (32904851)
32585572;DBWLM RELEASE UPDATE 19.0.0.0.0 (32585572)

OPatch succeeded.
[oracle@oel70-base1 OPatch]$
[oracle@oel70-base1 OPatch]$ ./opatch lsinventory |grep 30590023
   30590023, 30594125, 30594946, 30595240, 30602851, 30645129, 30650828
[oracle@oel70-base1 OPatch]$
```

■ Mounting ACFS Standby Filesystems ACFS standby filesystems may be mounted on only one node at a time. As such, ensure that it is not mounted on the second node of the cluster; otherwise, you will receive the following error when attempting to initialize the filesystem for replication.

```
[root@rac-s1 ~]# /sbin/acfsutil repl init standby -u oracle /acfs_vol
acfsutil repl init: ACFS-05054: standby replication file system is mounted on more than one cluster node

[root@rac-s1 ~]# srvctl config filesystem -d /dev/asm/acfs_vol-269
Volume device: /dev/asm/acfs_vol-269
Diskgroup name: acfs
Volume name: acfs_vol
Canonical volume device: /dev/asm/acfs_vol-269
Accelerator volume devices:
Mountpoint path: /acfs_vol
Mount point owner:
Mount users:
Type: ACFS
Mount options:
Description:
ACFS file system is enabled
ACFS file system is individually enabled on nodes:
ACFS file system is individually disabled on nodes:
[root@rac-s1 ~]#

[root@rac-s1 ~]# srvctl stop filesystem -d /dev/asm/acfs_vol-269 -n rac-s2

[root@rac-s1 ~]# srvctl status filesystem -d /dev/asm/acfs_vol-269
ACFS file system /acfs_vol is mounted on nodes rac-s1
```

- When you restart secondary RAC, ACFS Secondary Filesystems will be mounted on both the nodes automatically.

- Ensure it will be mounted on only one node.

- We have started replication from Primary ACFS Filesystems using one of the cluster node.

```
Secondary RAC:

[oracle@rac-s1 ~]$ df -h | grep acfs
/dev/asm/acfs_vol-269        19G  267M  19G  2% /acfs_vol

[oracle@rac-s2 ~]$ df -h | grep acfs
/dev/asm/acfs_vol-269        19G  267M  19G  2% /acfs_vol

[root@rac-s2 ~]# srvctl stop filesystem -d /dev/asm/acfs_vol-269 -n rac-s2

[root@rac-s2 ~]# df -h
Filesystem               Size  Used Avail Use% Mounted on
/dev/mapper/vg_racs2-lv_root   77G  44G  30G  61% /
tmpfs                    4.9G  1.3G  3.7G  26% /dev/shm
/dev/sda1                477M  56M  396M  13% /boot
/dev/mapper/vg_racs2-lv_home   27G  2.2G  23G  9% /home
[root@rac-s2 ~]#

Primary RAC:

[root@rac-p1 ~]# /sbin/acfsutil repl init primary -C -s oracle@rac-s1 -m /acfs_vol/ /acfs_vol/
[root@rac-p1 ~]#
```

- ✓ Single table contains both internal (RDBMS) and external partitions

- ✓ Full functional support, such as partial indexing, partial read only, constraints, materialized views, etc.

- ✓ DBAs can now select which partitions should be held in the database for fast querying and updating, and which partitions can be made read only and stored in external partitions.

- ✓ These external partitions can be held on on-premises in standard files systems or HDFS.

- ✓ DBAs can also choose to place the data in cloud-based object stores, thereby 'stretching' tables to the cloud.

```
CREATE TABLE orders
(
order_id number,
order_date DATE
)
EXTERNAL PARTITION ATTRIBUTES
(
TYPE oracle_loader
DEFAULT DIRECTORY data_directory
ACCESS PARAMETERS (FIELDS
TERMINATED BY ',')
REJECT LIMIT unlimited
)
PARTITION BY RANGE(order_date)
(
partition q1_2020 values less than ('2019-
10-01')
EXTERNAL LOCATION
('order_q1_2020.txt'),
partition q2_2020 values less than ('2020-
01-01'),
partition q3_2020 values less than ('2020-
04-01'),
partition q4_2020 values less than ('2020-
07-01')
);
```

❖ Always check My Oracle Support (MOS) Note 742060.1 for the latest schedule

❖ Oracle Database 11.2 Market Driven Support (MDS) Note 2728619.1

❖ Always use the latest version of Autoupgrade Download Note 2485457.1

❖ 19c Database Self-Guided Upgrade with Best Practices Note 1919.2

❖ Oracle Database 19c Important Recommended One-off Patches Note 555.1

❖ Data Pump Recommended Proactive Patches For 19.10 and Above Note 2819284.1

❖ Introducing Monthly Recommended Patches (MRPs) and FAQ Note 2898740.1

❖ Always check ACFS Support On OS Platforms (Certification Matrix) Note 1369107.1

Thanks for your TIME

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