RAC Rolling Patching without downtime

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1 Executive Summary

Patching is the process of bringing the currently installed release from one release update (RU) to another release update, e.g. 19.8.0 to 19.10.0. In contrast, **upgrading** is the process of bringing the database system to the next release, e.g. 18.x.0 to 19.x.0.

This paper is describing the steps and considerations when **patching** a mission critical Oracle Real Application Cluster Database system from version 19.8.0 to 19.10.0 **without downtime**. In earlier releases if there was OJVM (Oracle Java Virtual Machine) installed as database component, the patch required downtime and could not be applied in a rolling manner. This requirement was recently removed and beginning with Release 18.4.0, there is even an automation for patching OJVM in a rolling fashion. This approach requires out-of-place patching of RDBMS Home, which means that the new oracle home must be prepared seperately from the currently in-use Oracle home. When aiming for Rolling Patching without downtime, it needs to be verified that all the required patches are capable of being applied in a rolling manner. This paper gives instructions on how to validate this requirement.

2 Research

Review MOS Notes:

- Oracle Database 19c Important Recommended One-off Patches (Doc ID 2720807.1)
- Mandatory patches for 19.8 and 19.9 Grid Infrastructure (GI) [2730332.1]
- Things to Consider to Avoid Prominent Wrong Result Problems on 19C Proactively (Doc ID 2606585.1)
- Master Note for Database Proactive Patch Program (Doc ID 756671.1)
- Oracle Text Mandatory Patches (Doc ID 2644957.1)
- Checklist For Slow Performance Of DataPump Export (expdp) And Import (impdp) (Doc ID 453895.1)
- Disable Statistics Advisor Task after applying 26749785: exec dbms_stats.set_global_prefs('AUTO_STATS_ADVISOR_TASK','FALSE');
- Mandatory patches for 19.8 and 19.9 Grid Infrastructure (GI) (Doc ID 2730332.1)
- Oracle Database 19c Release Update & Release Update Revision October 2020 Known Issues (Doc ID 2694903.1)
- Oracle Database 19c Release Update & Release Update Revision January 2021 Critical Issues (Doc ID 2725758.1)
- RAC Rolling Install Process for the "Oracle JavaVM Component Database PSU/RU" (OJVM PSU/RU) Patches (Doc ID 2217053.1)

3 Preparation RDBMS Home (pre Patching)

These steps can be prepared some days before the actual patching.

3.1 Clone RDBMS 19.8.0 Home to 19.10.0

First Node:

```
# Check FS Space
df -h

cd /u01/app/oracle/product
rsync -a -v -t 19.8.0/ 19.10.0
```

3.2 Inventory Registration

*) Although clone.pl gives a warning in 19c and describes that gold image should be used instead, the clone.pl is still working.

```
cp ~/env/db.env ~/env/db19_10_0.env
vi ~/env/db19_10_0.env
. ~/env/db19_10_0.env

 $ORACLE_HOME/clone/bin/do_clone.sh:

[oracle@ol7n1 ~]$ cat  $ORACLE_HOME/clone/bin/do_clone.sh
#!/bin/bash

ORACLE_BASE=/u01/app/oracle
ORACLE_HOME=/u01/app/oracle/product/19.10.0/dbhome_1
cd $ORACLE_HOME/clone
THISNODE='ol7n1'

E01=ORACLE_HOME=/u01/app/oracle/product/19.10.0/dbhome_1
E02=ORACLE_HOME_NAME=OraDB19Home4
E03=ORACLE_BASE=/u01/app/oracle
C01="CLUSTER_NODES={ol7n1,ol7n2}"
C02="LOCAL_NODE=$THISNODE"

$ORACLE_HOME/perl/bin/perl $ORACLE_HOME/clone/bin/clone.pl $E01 $E02 $E03 $C01 $C02

sudo /u01/app/oracle/product/19.10.0/dbhome_1/root.sh
```

3.3 Patching RDMBS Home 19.10.0

Unzip GI Release Update 19.10.0:

```
cd /u01/install/19.10.0
unzip -d /u01/install/19.10.0/GI_19_10_0 /u01/install/19.10.0/p32226239_190000_Linux-x86-
64.zip
```

3.4 Updating OPatch 12.2.0.1.23

```
. ~/env/grid.env
unzip -d $ORACLE_HOME /u01/install/19.10.0/p6880880_190000_Linux-x86-64.zip
```

3.5 Conflict Check:

GI:

```
. ~/env/grid.env
/u01/app/19.0.0/grid/OPatch/opatch prereq CheckConflictAgainstOHWithDetail -phBaseDir
/u01/install/19.10.0/GI_19_10_0/32226239/32218454
/u01/app/19.0.0/grid/OPatch/opatch prereq CheckConflictAgainstOHWithDetail -phBaseDir
/u01/install/19.10.0/GI_19_10_0/32226239/32222571
/u01/app/19.0.0/grid/OPatch/opatch prereq CheckConflictAgainstOHWithDetail -phBaseDir
/u01/install/19.10.0/GI_19_10_0/32226239/32218663
/u01/app/19.0.0/grid/OPatch/opatch prereq CheckConflictAgainstOHWithDetail -phBaseDir
/u01/install/19.10.0/GI_19_10_0/32226239/29340594
/u01/app/19.0.0/grid/OPatch/opatch prereq CheckConflictAgainstOHWithDetail -phBaseDir
/u01/install/19.10.0/GI_19_10_0/32226239/32240590
```

RDBMS:

```
. ~/env/db19_10_0.env
/u01/app/oracle/product/19.10.0/dbhome_1/OPatch/opatch prereq
CheckConflictAgainstOHWithDetail -phBaseDir /u01/install/19.10.0/GI_19_10_0/32226239/32218454
/u01/app/oracle/product/19.10.0/dbhome_1/OPatch/opatch prereq
CheckConflictAgainstOHWithDetail -phBaseDir /u01/install/19.10.0/GI_19_10_0/32226239/32222571


Following patches have conflicts. Please contact Oracle Support and get the merged patch of
the patches :
28802066, 31598355, 31598393, 32218454

Following patches will be rolled back from Oracle Home on application of the patches in the
given list :
31598389, 30295137, 29555105
```

3.6 Prepatch

At this point, GI is still at version 19.8.0 and therefore, patch automation with opatchauto can not be used but the manual approach is needed. Another reason for the manual approach could be that multiple interim patches need to be applied together with RU 19.10.0.

```
/u01/install/19.10.0/GI_19_10_0/32226239/32222571/custom/scripts/prepatch.sh -dbhome
/u01/app/oracle/product/19.10.0/dbhome_1
```

3.7 Rollback currently installed patches that conflict with Release Update 19.10.0:

```
/u01/app/oracle/product/19.10.0/dbhome_1/OPatch/opatch rollback -silent -id 31598393  -oh
/u01/app/oracle/product/19.10.0/dbhome_1
/u01/app/oracle/product/19.10.0/dbhome_1/OPatch/opatch rollback -silent -id 31598389  -oh
/u01/app/oracle/product/19.10.0/dbhome_1
/u01/app/oracle/product/19.10.0/dbhome_1/OPatch/opatch rollback -silent -id 31598355  -oh
/u01/app/oracle/product/19.10.0/dbhome_1
/u01/app/oracle/product/19.10.0/dbhome_1/OPatch/opatch rollback -silent -id 30295137  -oh
/u01/app/oracle/product/19.10.0/dbhome_1
/u01/app/oracle/product/19.10.0/dbhome_1/OPatch/opatch rollback -silent -id 28802066  -oh
/u01/app/oracle/product/19.10.0/dbhome_1
/u01/app/oracle/product/19.10.0/dbhome_1/OPatch/opatch rollback -silent -id 29555105  -oh
/u01/app/oracle/product/19.10.0/dbhome_1
/u01/app/oracle/product/19.10.0/dbhome_1/OPatch/opatch rollback -silent -id 29959025  -oh
/u01/app/oracle/product/19.10.0/dbhome_1
```

3.8 Apply of OCW Bundle und DB RU Patch:

```
/u01/app/oracle/product/19.10.0/dbhome_1/OPatch/opatch apply -oh
/u01/app/oracle/product/19.10.0/dbhome_1 -local
/u01/install/19.10.0/GI_19_10_0/32226239/32222571
/u01/app/oracle/product/19.10.0/dbhome_1/OPatch/opatch apply -oh
/u01/app/oracle/product/19.10.0/dbhome_1 -local
/u01/install/19.10.0/GI_19_10_0/32226239/32218454
```

3.9 Apply Interim Patches:

```
[oracle@ol7n1 19.10.0]$ ls -la *.zip
-rwxr-xr-x. 1 oracle oinstall    365346 Mar  3 18:47 p28505321_1910000DBRU_Linux-x86-64.zip
-rwxr-xr-x. 1 oracle oinstall     28468 Mar  3 18:47 p28802066_1910000DBRU_Linux-x86-64.zip
-rwxr-xr-x. 1 oracle oinstall   1568159 Mar  3 18:52 p29780459_1910000DBRU_Linux-x86-64.zip
-rwxr-xr-x. 1 oracle oinstall    379763 Mar  3 18:48 p29867728_1910000DBRU_Linux-x86-64.zip
-rwxr-xr-x. 1 oracle oinstall    400713 Mar  3 18:48 p29997937_190000_Linux-x86-64.zip
-rwxr-xr-x. 1 oracle oinstall     61861 Mar  3 18:48 p30361070_1910000DBRU_Linux-x86-64.zip
-rwxr-xr-x. 1 oracle oinstall    754300 Mar  3 18:48 p30381614_1910000DBRU_Linux-x86-64.zip
-rwxr-xr-x. 1 oracle oinstall    268629 Mar  3 18:49 p30696821_1910000DBRU_Linux-x86-64.zip
-rwxr-xr-x. 1 oracle oinstall    712872 Mar  3 18:49 p31031240_1910000DBRU_Linux-x86-64.zip
-rwxr-xr-x. 1 oracle oinstall    113459 Mar  3 18:51 p31211220_1910000DBRU_Linux-x86-64.zip
-rwxr-xr-x. 1 oracle oinstall    576637 Mar  3 18:49 p31215854_1910000DBRU_Linux-x86-64.zip
-rwxr-xr-x. 1 oracle oinstall     47155 Mar  3 18:49 p31292951_190000_Generic.zip
-rwxr-xr-x. 1 oracle oinstall    213685 Mar  3 18:50 p31405300_1910000DBRU_Linux-x86-64.zip
-rwxr-xr-x. 1 oracle oinstall    625496 Mar  3 18:52 p31464691_1910000DBRU_Generic.zip
-rwxr-xr-x. 1 oracle oinstall  27670112 Mar  3 19:54 p31732095_190000_Linux-x86-64.zip
-rwxr-xr-x. 1 oracle oinstall     17445 Mar  3 18:50 p31805812_1910000DBRU_Linux-x86-64.zip
-rwxr-xr-x. 1 oracle oinstall    127558 Mar  3 18:50 p31828378_1910000DBRU_Linux-x86-64.zip
-rwxr-xr-x. 1 oracle oinstall    496974 Mar  3 18:50 p31850227_1910000DBRU_Linux-x86-64.zip
-rwxr-xr-x. 1 oracle oinstall      7078 Mar  3 18:51 p31862593_1910000DBRU_Generic.zip
-rwxr-xr-x. 1 oracle oinstall    916342 Mar  3 18:50 p31933451_1910000DBRU_Linux-x86-64.zip
-rwxr-xr-x. 1 oracle oinstall    148338 Mar  3 18:50 p31959253_1910000DBRU_Linux-x86-64.zip
-rwxr-xr-x. 1 oracle oinstall     35339 Mar  3 18:50 p32009203_190000_Linux-x86-64.zip
-rwxr-xr-x. 1 oracle oinstall    517773 Mar  3 18:51 p32013403_1910000DBRU_Linux-x86-64.zip
-rwxr-xr-x. 1 oracle oinstall    539400 Mar  3 18:51 p32047226_1910000DBRU_Linux-x86-64.zip
-rwxr-xr-x. 1 oracle oinstall 125586988 Mar  3 18:51 p32067171_190000_Linux-x86-64.zip
-rwxr-xr-x. 1 oracle oinstall 124576723 Mar  3 18:51 p32162391_190000_Linux-x86-64.zip
-rwxr-xr-x. 1 oracle oinstall    396242 Mar  3 18:51 p32325733_1910000DBRU_Linux-x86-64.zip
-rwxr-xr-x. 1 oracle oinstall   1657163 Mar  3 18:50 p32480961_1910000DBRU_Linux-x86-64.zip
```

Oracle SR for Merge Patches:

If the required are not available, it is necessary to request them with service requests. This is the list of patches we want to apply on top of 19.10.0:

```
[oracle@ol7n1 19.10.0]$ find */* -type f -name "README.txt" | grep -v online | xargs grep "Rolling Installable." |
cut -d "-" -f 1
p28505321_1910000DBRU/28505321/README.txt:This patch is RAC Rolling Installable
p28802066_1910000DBRU/28802066/README.txt:This patch is RAC Rolling Installable
p29780459_1910000DBRU/29780459/README.txt:This patch is RAC Rolling Installable
p29867728_1910000DBRU/29867728/README.txt:This patch is RAC Rolling Installable
p30361070_1910000DBRU/30361070/README.txt:This patch is RAC Rolling Installable
p30381614_1910000DBRU/30381614/README.txt:This patch is RAC Rolling Installable
p30696821_1910000DBRU/30696821/README.txt:This patch is RAC Rolling Installable
p31031240_1910000DBRU/31031240/README.txt:This patch is RAC Rolling Installable
p31211220_1910000DBRU/31211220/README.txt:This patch is RAC Rolling Installable
p31215854_1910000DBRU/31215854/README.txt:This patch is RAC Rolling Installable
p31292951_190000/31292951/README.txt:This patch is RAC Rolling Installable
p31405300_1910000DBRU/31405300/README.txt:This patch is RAC Rolling Installable
p31464691_1910000DBRU/31464691/README.txt:This patch is RAC Rolling Installable
p31805812_1910000DBRU/31805812/README.txt:This patch is RAC Rolling Installable
p31828378_1910000DBRU/31828378/README.txt:This patch is RAC Rolling Installable
p31850227_1910000DBRU/31850227/README.txt:This patch is RAC Rolling Installable
p31933451_1910000DBRU/31933451/README.txt:This patch is RAC Rolling Installable
p31959253_1910000DBRU/31959253/README.txt:This patch is RAC Rolling Installable
p32009203_190000/32009203/README.txt:This patch is RAC Rolling Installable
p32013403_1910000DBRU/32013403/README.txt:This patch is RAC Rolling Installable
p32047226_1910000DBRU/32047226/README.txt:This patch is RAC Rolling Installable
p32325733_1910000DBRU/32325733/README.txt:This patch is RAC Rolling Installable
p32480961_1910000DBRU/32480961/README.txt:This patch is RAC Rolling Installable
p32325778_1910000DBRU/32325778/README.txt:This patch is non
=> Patch has conflict and is therefore not installable at the moment. Request merge patch with Oracle SR.

p31862593_1910000DBRU/31862593/README.txt:This patch is non
=> I guess patch readme is not correct. Patch should be rolling installable as per inventory.xml

p29997937_190000/29997937/README.txt:This patch is non
=> Timezone patch already installed in 19.8.0, therefore not relevant
```

The next question is, whether all relevant patches can be installed in an online rolling manner. One place to check this is README.txt of the interim patch. If a patch is marked as non-RAC rolling in README.txt, it makes sense to double-check in patch inventory.xml file:

For patch 32325778 we can see that it is NOT online_rac_installable:

```
[oracle@ol7n1 32325778]$ pwd
/u01/install/19.10.0/p32325778_1910000DBRU/32325778
[oracle@ol7n1 32325778]$ find . -name "inventory.xml"
./etc/config/inventory.xml

[oracle@ol7n1 32325778]$ cat ./etc/config/inventory.xml | grep -e online_rac_installable -e
instance_shutdown -e sql_patch_database_startup_mode
    <instance_shutdown>false</instance_shutdown>
    <instance_shutdown_message/>
    <online_rac_installable>false</online_rac_installable>
    <sql_patch_database_startup_mode>normal</sql_patch_database_startup_mode>
```

For patch 31862593 however, although README.txt shows non RAC-rolling, the inventory.xml contradicts:

```
[oracle@ol7n1 31862593]$ cat ./etc/config/inventory.xml | grep -e online_rac_installable -e
instance_shutdown -e sql_patch_database_startup_mode
    <instance_shutdown>false</instance_shutdown>
    <instance_shutdown_message/>
    <online_rac_installable>true</online_rac_installable>
```

Patch 32067171 - Oracle JavaVM Component Release Update 19.10.0.0.210119

This patch is now Oracle RAC Rolling installable. To use the Oracle RAC Rolling approach, out-of-place patching of the Oracle home is mandatory, as is the use of database services and SRVCTL to control instance and service operations. For further information, refer to MOS NOTE 2217053.1, RAC Rolling Install Process for the "Oracle JavaVM Component Database PSU/RU" (OJVM PSU/RU) Patches.

3.10 Postpatch

```
/u01/install/19.10.0/GI_19_10_0/32226239/32222571/custom/scripts/postpatch.sh -dbhome
/u01/app/oracle/product/19.10.0/dbhome_1
```

3.11 Copy of OH to other node:

```
[root@ol7n1 ~]# cd /u01/app/oracle/product/
[root@ol7n1 product]# ls
12.1.0.2_190716  19.10.0  19.8.0  19.9.0
[root@ol7n1 product]# ll
total 0
drwxr-xr-x. 3 oracle oinstall 22 Jun 10  2020 12.1.0.2_190716
drwxr-xr-x. 3 oracle oinstall 22 Jul 22  2020 19.10.0
drwxr-xr-x. 3 oracle oinstall 22 Jul 22  2020 19.8.0
drwxr-xr-x. 3 oracle oinstall 22 Jul 22  2020 19.9.0
[root@ol7n1 product]# rsync -a -v -t -e ssh 19.10.0 ol7n2:$PWD/
```

3.12 Registration of new OH on second node

```
vi /u01/app/oracle/product/19.10.0/dbhome_1/clone/bin/do_clone.sh:

#!/bin/bash

ORACLE_BASE=/u01/app/oracle
ORACLE_HOME=/u01/app/oracle/product/19.10.0/dbhome_1
cd $ORACLE_HOME/clone
THISNODE='ol7n2'
```

```
E01=ORACLE_HOME=/u01/app/oracle/product/19.10.0/dbhome_1
E02=ORACLE_HOME_NAME=OraDB19Home4
E03=ORACLE_BASE=/u01/app/oracle
C01="CLUSTER_NODES={ol7n1,ol7n2}"
C02="LOCAL_NODE=$THISNODE"

$ORACLE_HOME/perl/bin/perl $ORACLE_HOME/clone/bin/clone.pl $E01 $E02 $E03 $C01 $C02


. ~/env/db19_10_0.env

[oracle@ol7n2 env]$ sudo /u01/app/oracle/product/19.10.0/dbhome_1/root.sh
```

4 DB Preparations

4.1 Services

Let´s say that we have singleton and regular services and that some of them use OJVM and others do not.

```
[oracle@ol7n1 ~]$ srvctl add service -d DEMO -s JAVA_ALL -preferred DEMO1,DEMO2
[oracle@ol7n1 ~]$ srvctl add service -d DEMO -s JAVA_SINGLETON -preferred DEMO1 -available
DEMO2
[oracle@ol7n1 ~]$ srvctl add service -d DEMO -s NONJAVA_ALL -preferred DEMO1,DEMO2
[oracle@ol7n1 ~]$ srvctl add service -d DEMO -s NONJAVA_SINGLETON -preferred DEMO1 -available
DEMO2
[oracle@ol7n1 ~]$ srvctl start service -d DEMO -s JAVA_ALL
[oracle@ol7n1 ~]$ srvctl start service -d DEMO -s JAVA_SINGLETON
[oracle@ol7n1 ~]$ srvctl start service -d DEMO -s NONJAVA_SINGLETON
[oracle@ol7n1 ~]$ srvctl start service -d DEMO -s NONJAVA_ALL
```

4.2 Checks

```
select * from dba_registry;
select * from dba_registry_sqlpatch;
select owner, object_name, object_type from dba_objects where status != 'VALID';

SELECT version, status FROM dba_registry WHERE comp_id='JAVAVM';

-- JAVAVM in use:
select count(*) from x$kglob where KGLOBTYP = 29 OR KGLOBTYP = 56;

col service_name format a20
col username format a20
col program format a20
set num 8

select sess.service_name, sess.username,sess.program, count(*)
from
v$session sess,
x$kgllk lk,
x$kglob
where kgllkuse=saddr
and kgllkhdl=kglhdadr
and kglobtyp in (29,56)
group by sess.service_name, sess.username, sess.program
order by sess.service_name, sess.username, sess.program;

select * from gv$java_services;
```

4.3 Databases:

4.3.1 DEMO

```
--------------------------------------------------------------------------------
Cluster Resources
--------------------------------------------------------------------------------

ora.demo.db
      1        ONLINE  ONLINE       ol7n1                    Open,HOME=/u01/app/o
                                                             racle/product/19.8.0
                                                             /dbhome_1,STABLE
      2        ONLINE  ONLINE       ol7n2                    Open,HOME=/u01/app/o
                                                             racle/product/19.8.0
                                                             /dbhome_1,STABLE
ora.demo.java_all.svc
      1        ONLINE  ONLINE       ol7n1                    STABLE
      2        ONLINE  ONLINE       ol7n2                    STABLE
```

```
ora.demo.java_singleton.svc
      1        ONLINE  ONLINE       ol7n1                    STABLE
```

TNS Configuration:

```
TNS:


DEMO_JAVA_ALL =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP)(HOST = ol7n-scan)(PORT = 10240))
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SERVICE_NAME = JAVA_ALL)
    )
  )

DEMO_JAVA_SINGLETON =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP)(HOST = ol7n-scan)(PORT = 10240))
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SERVICE_NAME = JAVA_SINGLETON)
    )
  )


DEMO_NONJAVA_ALL =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP)(HOST = ol7n-scan)(PORT = 10240))
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SERVICE_NAME = NONJAVA_ALL)
    )
  )

DEMO_NONJAVA_SINGLETON =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP)(HOST = ol7n-scan)(PORT = 10240))
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SERVICE_NAME = NONJAVA_SINGLETON)
    )
  )
```

Lets say that we are using OJVM with this dummy procedure:

```
create user demo1 identified by demo1;
grant dba to demo1;

conn  demo1/demo1

DEMO:DEMO> set define ?

create or replace and compile java source named "my.Sleep" as
package my;
import java.lang.Thread;
public class Sleep {
public static void main(String []args) throws java.lang.InterruptedException {
if (args != null && args.length>0) {
int s = Integer.parseInt(args[0]);
Thread.sleep(s*1000);
} else
Thread.sleep(1000);
}
}
/

Java created.

create or replace procedure waitSeconds(seconds IN VARCHAR2) as LANGUAGE JAVA NAME
'my.Sleep.main(java.lang.String [])';
```

```
/

Procedure created.


conn  demo1/demo1@DEMO_JAVA_ALL
exec waitSeconds('300');


conn  demo1/demo1@DEMO_JAVA_SINGLETON
exec waitSeconds('300');

conn  demo1/demo1@DEMO_NONJAVA_ALL
exec dbms_lock.sleep(300);


conn  demo1/demo1@DEMO_NONJAVA_SINGLETON
exec dbms_lock.sleep(300);
```

When OJVM is in use, this SQL reports some lines:

```
SQL> select count(*) from x$kglob where KGLOBTYP = 29 OR KGLOBTYP = 56;

  COUNT(*)
----------
      1027


select sess.service_name, sess.username,sess.program, count(*)
from
v$session sess,
x$kgllk lk,
x$kglob
where kgllkuse=saddr
and kgllkhdl=kglhdadr
and kglobtyp in (29,56)
group by sess.service_name, sess.username, sess.program
order by sess.service_name, sess.username, sess.program;

SERVICE_NAME             USERNAME            PROGRAM
COUNT(*)
------------------------- -------------------- ----------------------------------------------
-- ----------
JAVA_SINGLETON           DEMO1               sqlplus@ol7n1.intra (TNS V1-V3)
               3
SYS$BACKGROUND                               oracle@ol7n1.intra (MZ00)
         2
```

Moreover, the service is flagged as being OJVM related:

```
SQL> select * from gv$java_services;

   INST_ID NAME                                                             CON_ID
---------- ---------------------------------------------------------------- ----------
         1 JAVA_SINGLETON                                                          0
```

5 Rolling Patching GI Home 19.10.0

5.1 Aktualisierung opatch

```
. ./env/grid.env
unzip -d /u01/app/19.0.0/grid /u01/install/19.10.0/p6880880_190000_Linux-x86-64.zip
```

5.2 Check Long Running Transaction

```
set lines 300 pages 100
col service_name format a25
col program format a40
col machine format a35
select sys_context('USERENV','DB_NAME') as DB from dual;
alter session set nls_date_format = 'DD.MM.YYYY HH24:MI:SS';
select s.service_name, s.program, s.machine, s.logon_time,t.start_time,s.event,s.state from
gv$transaction t, gv$session s where t.inst_id = s.inst_id and t.addr = s.taddr and s.type =
'USER' order by start_time;
```

5.3 First Node Apply GI Home

Draining DB Sessions von ol7n1:
- transactional: wait until sessions have comitted
- allow 300 seconds before killing instance

```
srvctl stop instance -db DEMO -i DEMO1 -drain_timeout 300 -stopoption transactional -force -
failover
```

Stop OEM Agent

```
/opt/agent/agent_inst/bin/emctl stop agent

# . /home/oracle/env/grid.env
opatchauto apply . -oh /u01/app/19.0.0/grid

From last execution: Time taken to complete the session 19 minutes, 0 second


srvctl start instance -db DEMO -i DEMO1

crsctl stat res -t

Check all Services

/opt/agent/agent_inst/bin/emctl start  agent
```

5.4 Second Node Apply GI Home:

Draining DB Sessions von ol7n2:
- transactional: wait until sessions have comitted
- allow 300 seconds before killing instance

```
srvctl stop instance -db DEMO -i DEMO2 -drain_timeout 300 -stopoption transactional -force -
failover
```

Stop OEM Agent

```
/opt/agent/agent_inst/bin/emctl stop agent

. /home/oracle/env/grid.env
[opatchauto apply . -oh /u01/app/19.0.0/grid
Time taken to complete the session 21 minutes, 15 seconds

srvctl start instance -db DEMO -i DEMO2

crsctl stat res -t

Check all Services


/opt/agent/agent_inst/bin/emctl start  agent
```

6 Patching RDBMS Home

6.1 Checks

```
select * from dba_registry;
select * from dba_registry_sqlpatch;
select owner, object_name, object_type from dba_objects where status != 'VALID';

SELECT version, status FROM dba_registry WHERE comp_id='JAVAVM';

-- JAVAVM in use:
select count(*) from x$kglob where KGLOBTYP = 29 OR KGLOBTYP = 56;

col service_name format a20
col username format a20
col program format a20
set num 8

select sess.service_name, sess.username,sess.program, count(*)
from
v$session sess,
x$kgllk lk,
x$kglob
where kgllkuse=saddr
and kgllkhdl=kglhdadr
and kglobtyp in (29,56)
group by sess.service_name, sess.username, sess.program
order by sess.service_name, sess.username, sess.program;

select * from gv$java_services;
```

6.2 Check Long Running Transaction

```
set lines 300 pages 100
col service_name format a25
col program format a40
col machine format a35
select sys_context('USERENV','DB_NAME') as DB from dual;
alter session set nls_date_format = 'DD.MM.YYYY HH24:MI:SS';
select s.service_name, s.program, s.machine, s.logon_time,t.start_time,s.event,s.state from
gv$transaction t, gv$session s where t.inst_id = s.inst_id and t.addr = s.taddr and s.type =
'USER' order by start_time;
```

6.3 Rolling RDBMS Patching

```
. ~/env/grid.env

[oracle@ol7n1 ~]$ crsctl stat res -t -w "TYPE = ora.service.type"
--------------------------------------------------------------------------------
Name           Target  State        Server                   State details
--------------------------------------------------------------------------------
Cluster Resources
--------------------------------------------------------------------------------
ora.demo.java_all.svc
      1        ONLINE  ONLINE       ol7n1                    STABLE
      2        ONLINE  ONLINE       ol7n2                    STABLE
ora.demo.java_singleton.svc
      1        ONLINE  ONLINE       ol7n1                    STABLE
ora.demo.nonjava_all.svc
      1        ONLINE  ONLINE       ol7n1                    STABLE
      2        ONLINE  ONLINE       ol7n2                    STABLE
ora.demo.nonjava_singleton.svc
      1        ONLINE  ONLINE       ol7n1                    STABLE
```

Change of Oracle Home:

```
srvctl modify database -d DEMO -oraclehome /u01/app/oracle/product/19.10.0/dbhome_1
```

Singleton Service: (if exists)

```
srvctl relocate service -d DEMO -s JAVA_SINGLETON -oldinst DEMO1 -newinst DEMO2 -
drain_timeout 60
srvctl relocate service -d DEMO -s NONJAVA_SINGLETON -oldinst DEMO1 -newinst DEMO2 -
drain_timeout 60
```

Active/Active services:

```
srvctl stop service -d DEMO -s JAVA_ALL -i DEMO1 -drain_timeout 60
srvctl stop service -d DEMO -s NONJAVA_ALL -i DEMO1 -drain_timeout 60
```

Check:

```
crsctl stat res -t -w "(TYPE = ora.service.type)"


ora.demo.java_all.svc
      1        OFFLINE OFFLINE                               STABLE
      2        ONLINE  ONLINE       ol7n2                    STABLE
ora.demo.java_singleton.svc
      2        ONLINE  ONLINE       ol7n2                    STABLE
ora.demo.nonjava_all.svc
      1        OFFLINE OFFLINE                               STABLE
      2        ONLINE  ONLINE       ol7n2                    STABLE
ora.demo.nonjava_singleton.svc
      2        ONLINE  ONLINE       ol7n2                    STABLE
```

Stop DEMO1:

```
srvctl stop instance -db DEMO -i DEMO1 -drain_timeout 300 -stopoption transactional
```

Start DEMO1 with new Oracle Home

```
# Edit environment variable ORACLE_HOME
vi ~/DEMO.env
export ORACLE_HOME=/u01/app/oracle/product/19.10.0/dbhome_1

. ~/DEMO.env
srvctl start instance -db DEMO -i DEMO1
```

alertDEMO1.log:

```
2021-03-04T17:16:30.119371+01:00
Started service NONJAVA_ALL/NONJAVA_ALL/NONJAVA_ALL

jox_pujs ending in pid 25669 cid 0
2021-03-04T17:16:47.974319+01:00
## jox_ujs_status: op_instance_patched: returning TRUE in pid 25274
2021-03-04T17:16:47.981281+01:00
Java patching prepare phase completed.
2021-03-04T17:16:53.200516+01:00
```

alertDEMO2.log:

```
2021-03-04T17:16:47.329078+01:00
## jox_ujs_status: op_instance_patched: UJS active in root, ujs state present, its version
does not match executable version, returning FALSE in pid 15346
2021-03-04T17:16:47.330828+01:00
Java patching prepare phase completed.
```

Check Services:

```
crsctl stat res -t -w "(TYPE = ora.service.type)"

ora.demo.java_all.svc
      1        OFFLINE OFFLINE                               STABLE
```

```
      2        ONLINE  ONLINE       ol7n2                    STABLE
ora.demo.java_singleton.svc
      2        ONLINE  ONLINE       ol7n2                    STABLE
ora.demo.nonjava_all.svc
      1        ONLINE  ONLINE       ol7n1                    STABLE  <<<<<<<<<<<<<<<<<<<<<<
      2        ONLINE  ONLINE       ol7n2                    STABLE
ora.demo.nonjava_singleton.svc
      2        ONLINE  ONLINE       ol7n2                    STABLE
```

At this point, instance DEMO1 is running out of new Oracle Home and instance DEMO2 is running out of old Oracle Home. Please note that the OJVM flagged service JAVA_ALL is not running on DEMO1, whereas the non-flagged service NONJAVA_ALL was automatically started.

Relocation of non-JAVA singleton service from DEMO2 to DEMO1:

```
srvctl relocate service -d DEMO -s NONJAVA_SINGLETON -oldinst DEMO2 -newinst DEMO1
```

Stop of non-JAVA Service on DEMO2:

```
srvctl stop service -d DEMO -s NONJAVA_ALL -instance DEMO2 -drain_timeout 60
```

Stop DEMO2: (old Home)

```
srvctl stop instance -db DEMO -i DEMO2 -drain_timeout 300 -stopoption immediate
```

At this step, the automation kicks in, will recreate JAVA VM component and will automatically restart DEMO2 in new oracle home! During the recreation of the OJVM component, all OJVM execution is hanging. This is expected to last around 10-15 seconds only!

alertDEMO1.log:

```
2021-03-04T17:21:52.779791+01:00
Started service JAVA_ALL/JAVA_ALL/JAVA_ALL
2021-03-04T17:21:52.844843+01:00
Started service JAVA_SINGLETON/JAVA_SINGLETON/JAVA_SINGLETON
2021-03-04T17:21:53.450527+01:00
Java patching execute phase started.
2021-03-04T17:21:53.454256+01:00
## jox_eujs starting in pid 25669 cid 0
JIT: pid 25669 requesting full stop
2021-03-04T17:22:00.796682+01:00
## jox_cujs starting in pid 25669 cid 1
2021-03-04T17:22:06.625743+01:00
## jox_cujs ending in pid 25669 cid 1
## jox_eujs ending in pid 25669 cid 0
2021-03-04T17:22:06.630293+01:00
Java patching execute phase completed.
2021-03-04T17:22:06.630891+01:00
Java patching cleanup phase completed.

2021-03-04T17:22:24.811450+01:00
Instance shutdown complete (OS id: 19036)

2021-03-04T17:22:26.673448+01:00
Starting ORACLE instance (normal) (OS id: 831)

2021-03-04T17:22:43.025044+01:00
## jox_ujs_status: classes.bin in db and executable versions match 19.0.0.0.210119 1.8,
returning FALSE in pid 1210
2021-03-04T17:22:43.028009+01:00
Set LMHB to elevated priority
```

```
2021-03-04T17:22:43.045778+01:00
QPI: opatch file present, opatch
QPI: qopiprep.bat file present
QPI: Cleaning and refreshing metadata..
2021-03-04T17:22:43.379822+01:00
Started service NONJAVA_ALL/NONJAVA_ALL/NONJAVA_ALL
2021-03-04T17:22:43.383758+01:00
Started service JAVA_ALL/JAVA_ALL/JAVA_ALL

2021-03-04T17:22:43.842788+01:00
Java patching completed.
```

Check Services:

```
crsctl stat res -t -w "(TYPE = ora.service.type)"


ora.demo.java_all.svc
      1        ONLINE  ONLINE       ol7n1                    STABLE
      2        ONLINE  ONLINE       ol7n2                    STABLE
ora.demo.java_singleton.svc
      1        ONLINE  ONLINE       ol7n1                    STABLE
ora.demo.nonjava_all.svc
      1        ONLINE  ONLINE       ol7n1                    STABLE
      2        ONLINE  ONLINE       ol7n2                    STABLE
ora.demo.nonjava_singleton.svc
      1        ONLINE  ONLINE       ol7n1                    STABLE
```

6.4 Datapatch

If datapach was used for earlier Release updates or patches in "UPGRADE MODE", then the clause "-skip_upgrade_check" is required.

```
cd $ORACLE_HOME/OPatch
./datapatch -verbose -skip_upgrade_check


[oracle@ol7n1 OPatch]$ time ./datapatch -verbose
SQL Patching tool version 19.10.0.0.0 Production on Thu Mar  4 17:23:08 2021
Copyright (c) 2012, 2020, Oracle.  All rights reserved.

Log file for this invocation:
/u01/app/oracle/cfgtoollogs/sqlpatch/sqlpatch_1594_2021_03_04_17_23_08/sqlpatch_invocation.lo
g

Connecting to database...OK
Gathering database info...done
Bootstrapping registry and package to current versions...done
Determining current state...done

Current state of interim SQL patches:
Interim patch 29213893 (DBMS_STATS FAILING WITH ERROR ORA-01422 WHEN GATHERING STATS FOR
USER$ TABLE):
  Binary registry: Not installed
  SQL registry: Not installed
Interim patch 31219897 (OJVM RELEASE UPDATE: 19.8.0.0.200714 (31219897)):
  Binary registry: Not installed
  SQL registry: Applied successfully on 04-MAR-21 03.43.45.146628 PM
Interim patch 31292951 (DETERMINE FEASIBILITY OF ALL-OR-NOTHING PROCESSWAITING DURING INDEX
SYNC):
  Binary registry: Installed
  SQL registry: Not installed
Interim patch 31464691 (COPIED STATISTICS ARE OVERWRITTEN TO ZERO BY THE AUTOMATIC STATISTIC
JOB COLLECTION):
  Binary registry: Installed
  SQL registry: Not installed
Interim patch 31598355 (MERGE ON DATABASE RU 19.8.0.0.0 OF 31395764):
  Binary registry: Not installed
  SQL registry: Applied successfully on 04-MAR-21 03.43.45.201191 PM
Interim patch 31598393 (MERGE ON DATABASE RU 19.8.0.0.0 OF 31178348):
```

```
  Binary registry: Not installed
  SQL registry: Applied successfully on 04-MAR-21 03.43.46.156810 PM
Interim patch 31668882 (OJVM RELEASE UPDATE: 19.9.0.0.201020 (31668882)):
  Binary registry: Not installed
  SQL registry: Not installed
Interim patch 32044249 (MERGE ON DATABASE RU 19.9.0.0.0 OF 31898593):
  Binary registry: Not installed
  SQL registry: Not installed
Interim patch 32067171 (OJVM RELEASE UPDATE: 19.10.0.0.210119 (32067171)):
  Binary registry: Installed
  SQL registry: Not installed
Interim patch 32126594 (MERGE ON DATABASE RU 19.9.0.0.0 OF 31911213):
  Binary registry: Not installed
  SQL registry: Not installed
Interim patch 32325742 (MERGE ON DATABASE RU 19.10.0.0.0 OF 32044807):
  Binary registry: Installed
  SQL registry: Not installed

Current state of release update SQL patches:
  Binary registry:
    19.10.0.0.0 Release_Update 210108185017: Installed
  SQL registry:
    Applied 19.8.0.0.0 Release_Update 200703031501 with errors on 04-MAR-21 03.47.58.026080
PM

Adding patches to installation queue and performing prereq checks...done
Installation queue:
  The following interim patches will be rolled back:
    31219897 (OJVM RELEASE UPDATE: 19.8.0.0.200714 (31219897))
    31598355 (MERGE ON DATABASE RU 19.8.0.0.0 OF 31395764)
    31598393 (MERGE ON DATABASE RU 19.8.0.0.0 OF 31178348)
  Patch 31281355 (Database Release Update : 19.8.0.0.200714 (31281355)):
    Rollback from 19.8.0.0.0 Release_Update 200703031501 to 19.1.0.0.0 Feature Release
  Patch 32218454 (Database Release Update : 19.10.0.0.210119 (32218454)):
    Apply from 19.1.0.0.0 Feature Release to 19.10.0.0.0 Release_Update 210108185017
  The following interim patches will be applied:
    32067171 (OJVM RELEASE UPDATE: 19.10.0.0.210119 (32067171))
    31292951 (DETERMINE FEASIBILITY OF ALL-OR-NOTHING PROCESSWAITING DURING INDEX SYNC)
    31464691 (COPIED STATISTICS ARE OVERWRITTEN TO ZERO BY THE AUTOMATIC STATISTIC JOB
COLLECTION)
    32325742 (MERGE ON DATABASE RU 19.10.0.0.0 OF 32044807)

Installing patches...



Patch installation complete.  Total patches installed: 9

Validating logfiles...done
Patch 31219897 rollback: SUCCESS
  logfile:
/u01/app/oracle/cfgtoollogs/sqlpatch/31219897/23619699/31219897_rollback_DEMO_2021Mar04_17_23
_25.log (no errors)
Patch 31598355 rollback: SUCCESS
  logfile:
/u01/app/oracle/cfgtoollogs/sqlpatch/31598355/23691838/31598355_rollback_DEMO_2021Mar04_17_23
_25.log (no errors)
Patch 31598393 rollback: SUCCESS
  logfile:
/u01/app/oracle/cfgtoollogs/sqlpatch/31598393/23691557/31598393_rollback_DEMO_2021Mar04_17_23
_25.log (no errors)
Patch 31281355 rollback: SUCCESS
  logfile:
/u01/app/oracle/cfgtoollogs/sqlpatch/31281355/23688465/31281355_rollback_DEMO_2021Mar04_17_27
_39.log (no errors)
Patch 32218454 apply: SUCCESS
  logfile:
/u01/app/oracle/cfgtoollogs/sqlpatch/32218454/24018797/32218454_apply_DEMO_2021Mar04_17_33_19
.log (no errors)
Patch 32067171 apply: SUCCESS
  logfile:
/u01/app/oracle/cfgtoollogs/sqlpatch/32067171/23947975/32067171_apply_DEMO_2021Mar04_17_23_25
.log (no errors)
Patch 31292951 apply: SUCCESS
  logfile:
/u01/app/oracle/cfgtoollogs/sqlpatch/31292951/23604800/31292951_apply_DEMO_2021Mar04_17_40_31
.log (no errors)
```

```
Patch 31464691 apply: SUCCESS
  logfile:
/u01/app/oracle/cfgtoollogs/sqlpatch/31464691/23989975/31464691_apply_DEMO_2021Mar04_17_40_32
.log (no errors)
Patch 32325742 apply: SUCCESS
  logfile:
/u01/app/oracle/cfgtoollogs/sqlpatch/32325742/23989064/32325742_apply_DEMO_2021Mar04_17_40_32
.log (no errors)
SQL Patching tool complete on Thu Mar  4 17:41:05 2021

real    17m57.047s
user    0m15.798s
sys     0m1.331s


sqlplus/ as sysdba <<EOF
@?/rdbms/admin/utlrp
EOF

Alert Log:


2021-03-04T17:42:28.974212+01:00
SERVER COMPONENT id=UTLRP_BGN: timestamp=2021-03-04 17:42:28
SERVER COMPONENT id=UTLRP_END: timestamp=2021-03-04 17:42:29
```

Checks:

```
select * from dba_registry;
select * from dba_registry_sqlpatch;
select owner, object_name, object_type from dba_objects where status != 'VALID';
```

6.5 RMAN Catalog Upgrade

```
rman target / catalog .../...@....
upgrade catalog;
```

6.6 OEM

```
Monitoring Configuration: Change Oracle Home Property
```

7 Currently recommended patches

A list of recommeded patches can be found here:

https://www.ora-solutions.net/web/resources/patch-recommendations/

If you need assistance or an updated list of recommended patches, please contact me.