Name of procedure:	Oracle Database and Grid Infrastructure Patching
Level:	Stanbic IBTC Bank Plc
Type:	Internal Use Only
Department:	Technology and Operations
Unit:	Database Administration
Owner:	Head, Database Administration
Approved By:	Head, Technology Infrastructure Services
Approval Date:	July 2022
Next Review Date:	2 years from approval date

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REVISION HISTORY

Date	Version	Changes	Author
18-07-2022	V1.0	Review and Update	Ernest Oduba

Contents

Introduction

This document details the step by step procedure for patching the Oracle grid and database at Standard Bank.

The procedure includes the following:

- Downloading the Oracle Critical Patch Update (CPU)
- Downloading the Oracle Patch Utility (OPatch)
- Moving the Oracle CPU and OPatch to the server
- Installing OPatch
- Patching the Grid and Oracle Database

Procedures

ORACLE CRITICAL PATCH UPDATE (CPU)

Oracle releases critical patches on a quarterly basis to address bug fixes, introduce new features and capabilities.

DOWNLOAD THE ORACLE CRITICAL PATCH UPDATE (CPU)

To download Oracle CPU, do the following:

1. Use the link below to go to Oracle website: https://www.oracle.com/security-alerts/
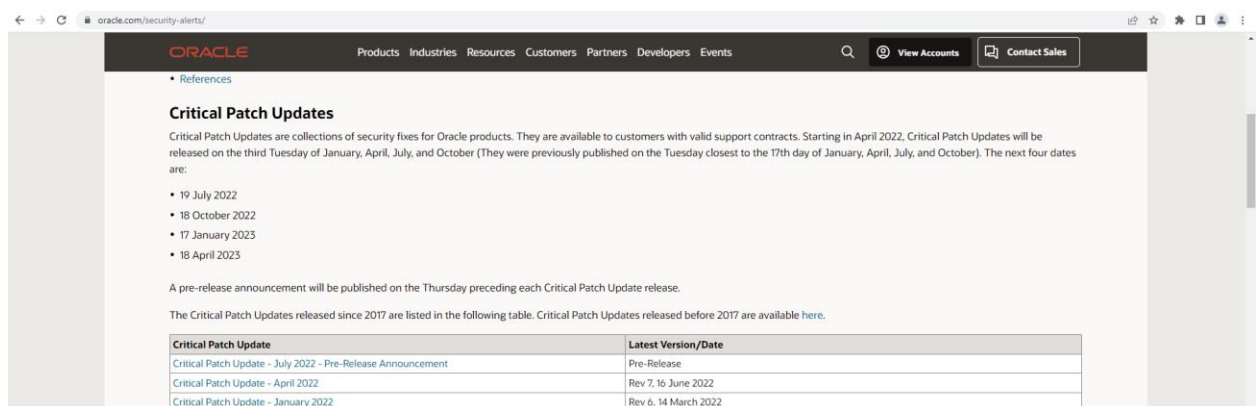
2. Click on the latest CPU e.g. **Critical Patch Update – April 2022**
3. On the next page, scroll down to **Oracle Database Server, versions 12.1.0.2, 19c, 21c** on the column beside it click on **Databases**

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Oracle Communications Performance Intelligence Center (PIC) Software, versions 10.3.0.0.0-10.3.0.2.1, 10.4.0.1.0-10.4.0.3.1	Oracle Communications Performance Intelligence Center (PIC) Software
Oracle Communications Policy Management, versions 12.5.0.0.0, 12.6.0.0.0	Oracle Communications Policy Management
Oracle Communications Pricing Design Center, versions 12.0.0.4, 12.0.0.5	Oracle Communications Pricing Design Center
Oracle Communications Services Gatekeeper, version 7.0.0.0.0	Oracle Communications Services Gatekeeper
Oracle Communications Session Border Controller, versions 8.4, 9.0	Oracle Communications Session Border Controller
Oracle Communications Session Report Manager, versions prior to 9.0	Oracle Communications Session Report Manager
Oracle Communications Session Route Manager, versions prior to 9.0	Oracle Communications Session Route Manager
Oracle Communications Unified Inventory Management, versions 7.3.4-7.3.5, 7.4.1-7.4.2	Oracle Communications Unified Inventory Management
Oracle Communications Unified Session Manager, versions 8.2.5, 8.4.5	Oracle Communications Unified Session Manager
Oracle Communications User Data Repository, version 12.4	Oracle Communications User Data Repository
Oracle Communications WebRTC Session Controller, version 7.2.1	Oracle Communications WebRTC Session Controller
Oracle Data Integrator, versions 12.2.1.3.0, 12.2.1.4.0	Fusion Middleware
Oracle Database Server, versions 12.1.0.2, 19c, 21c	Database

4. On the next page, scroll to the section **Oracle Database 19,** click on the patch from the list of patches specific to the version/platform. For the example below the GI Release Update 19.15.0.0.220419 **Patch 33803476** was clicked.

3.1.7.3 Oracle Database 19

Patch Information	19	Comments
Final CPU	See Note 742060.1	
On-Request platforms	32-bit client-only platforms	

Patch Availability for Oracle Database 19

Product Home	Patch	Advisory Number	Comments
Oracle Database Server home	Combo OJVM Release Update 19.15.0.0.220419 and Database Release Update 19.15.0.0.220419 Patch 33859194 for UNIX, or Combo OJVM Release Update 19.15.0.0.220419 and GI Release Update 19.15.0.0.220419 Patch 33859214, or Quarterly Full Stack download for Exadata (Apr2022) 19.15 Patch 33881712 for Linux x86-64	CVE-2021-22569, CVE-2022-21410, CVE-2021-2464, CVE-2022-21498, CVE-2021-42340	See Note 1929745.1, Oracle Recommended Patches -- Oracle JavaVM Component Database PSU (OJVM PSU) Patches. For patch availability, see section 2.2 Post Release Patches
Oracle Database Server home	Database Release Update 19.15.0.0.220419 Patch 33806152 for UNIX, or GI Release Update 19.15.0.0.220419 Patch 33803476, or Microsoft Windows 32-Bit and x86-64 BP 19.15.0.0.220419 Patch 33829175 or later, or Database Release Update Revision 19.14.1.0.220419 Patch 33806138 for UNIX, or GI Release Update Revision 19.14.1.0.220419 Patch 33785101, or Database Release Update Revision 19.13.2.0.220419 Patch 33783771 for UNIX, or GI Release Update Revision 19.13.2.0.220419 Patch 33881789, or Quarterly Full Stack download for Exadata (Apr2022) 19.15 Patch 33881712 for Linux x86-64, or Quarterly Full Stack download for SuperCluster (Q2.2022) Patch 33881722 for Solaris SPARC 64-Bit	CVE-2021-22569, CVE-2022-21410, CVE-2021-2464	From Jan2020 onwards the Database and GI Update and Revision patches include the JDK fixes released in the prior cycle. For the most recent JDK fixes a separate patch is available (see below) and needs to be installed in addition to the Database and GI patches. From Jan2021 onwards the Database and GI Update and Revision patches include updates to the Crypto libraries. See "MES v4.1.6 to v4.5 update 18c / 19c databases (Note 2746801.1)" for more details. From July 2021 onwards the Database and GI Update and Revision patches introduce a number of Native Network Encryption changes to deal with vulnerability CVE-2021-2351 and prevent the use of weaker ciphers. Customers should review: "Changes in Native Network Encryption with the July 2021 Critical Patch Update" Note 2791571.1 For patch availability, see section 2.2 Post Release Patches

5. On the next page click on the specific patch for the current database environment. In the screenshot below, the patch downloaded is for the **Linux x86-64 (American English)**

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Patch: 33803476 >

Patch Search

Patch Simple Search Results

Filters: Patch Name or Number is 33803476;   Edit Search

Table ▾ View ▾ 📄 Detach 🔗 Share Link

Patch ▲▾ Name	Description	Release	Platform (Language)	Recommended	Classification	Product		Updated	Size	Download Access
33803476	GI RELEASE UPDATE 19.15.0.0.0 (System Patch)	19.0.0.0.0	Oracle Solaris on x86-64 (64-bit) (American English)	🔵	Security	Oracle Database - Enterprise Edition (More...)		2+ months ago	2.0 GB	Software
33803476	GI RELEASE UPDATE 19.15.0.0.0 (System Patch)	19.0.0.0.0	Oracle Solaris on SPARC (64-bit) (American English)	🔵	Security	Oracle Database - Enterprise Edition (More...)		2+ months ago	2.1 GB	Software
33803476	GI RELEASE UPDATE 19.15.0.0.0 (System Patch)	19.0.0.0.0	HP-UX Itanium (American English)	🔵	Security	Oracle Database - Enterprise Edition (More...)		2+ months ago	2.9 GB	Software
33803476	GI RELEASE UPDATE 19.15.0.0.0 (System Patch)	19.0.0.0.0	IBM AIX on POWER Systems (64-bit) (American English)	🔵	Security	Oracle Database - Enterprise Edition (More...)		2+ months ago	3.0 GB	Software
33803476	GI RELEASE UPDATE 19.15.0.0.0 (System Patch)	19.0.0.0.0	IBM: Linux on System z (American English)	🔵	Security	Oracle Database - Enterprise Edition (More...)		2+ months ago	2.0 GB	Software
33803476	GI RELEASE UPDATE 19.15.0.0.0 (System Patch)	19.0.0.0.0	Linux x86-64 (American English)	🔵	Security	Oracle Database - Enterprise Edition (More...)		2+ months ago	2.6 GB	Software

6. On the next page, click on the download button to download the critical patch update (CPU)
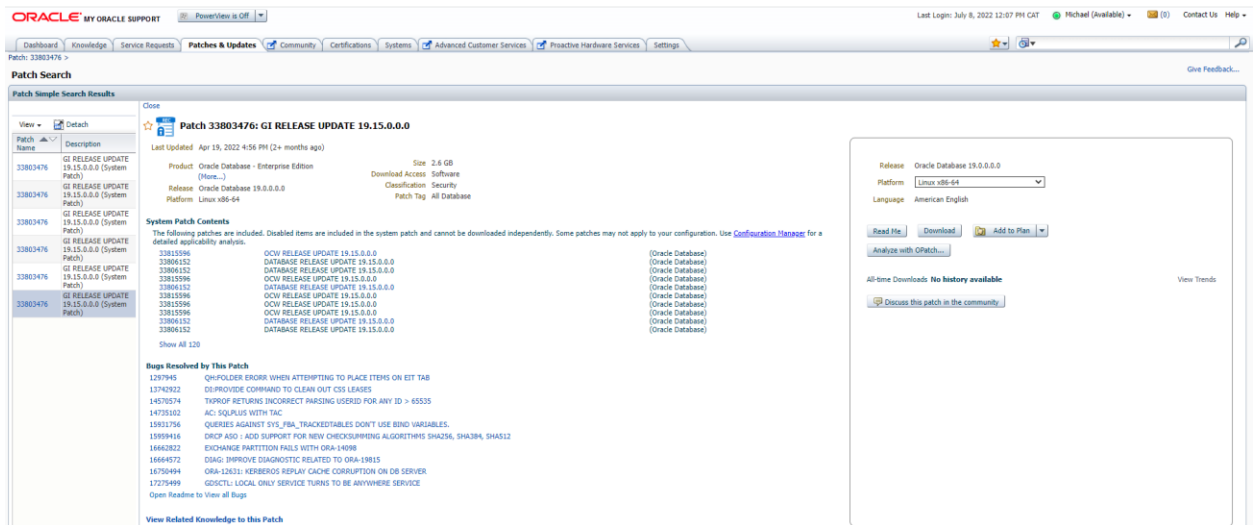
7. After successful completion of download, copy the zipped download to the database server in the path below:

DOWNLOAD ORACLE PATCH UTILITY (OPATCH)

To download the Oracle Patch Utility (OPatch) do the following:

1. From the Page in the screenshot above, click on the Readme button to open another page.
2. On the readme page, scroll down to OPatch Utility Information as seen in the screenshot below:
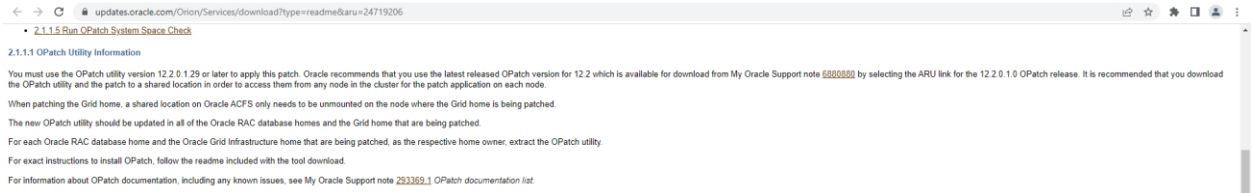
3. Click on the link **6880880,** to open a new page to download the Oracle Patch Utility (OPatch). Ensure that the Platform or Language is set to **Linux x86-64,** then click on download.

4. After successful download copy the patch utility to the Oracle database server in the path below as seen in the screenshot:

INSTALL ORACLE PATCH UTILITY (OPATCH)

Oracle patch utility (OPatch) is a tool provided by Oracle to help with the automation of patch installation for Oracle software. To patch the Oracle database and grid, OPatch needs to be installed in both the Oracle home and grid home.

To install Oracle Patch Utility in Oracle and Grid home follow the steps below:

1. Login to the database server using **root.** Go to grid home by running the Linux command below:
   [root@ungcorora2 grid]# cd /u01/app/19.0.0/grid/
2. Run the command ls -lrt to list the contents of the directory. Run the command below to backup the existing OPatch installation.
   mv OPatch OPatch_bkp
3. Go to the path where the downloaded Oracle OPatch zipped file was copied to from the previous section by running the command cd /u01/app, list the content of the directory

```
root@ungcorora2:/u01/app
[root@ungcorora2 app]# ls -lrt
total 5647800
drwxrwxr-x   3 grid oinstall          18 Dec   4  2020 19.0.0
drwxrwxr-x   7 grid oinstall          84 Dec   4  2020 grid
drwxr-x---   8 grid oinstall         159 Apr   7 06:04 33803476
drwxr-x---  15 root root            4096 Apr  13 18:40 OPatch
-rw-rw-r--   1 root root         1581224 Apr  19 19:55 PatchSearch.xml
drwxr-x---   8 grid grid             159 Apr  21 09:57 33785101
-rw-rw-r--   1 grid grid       124109254 May  13 10:08 p6880880_122010_Linux-x86-64.zip
-rw-rw-r--   1 grid grid      2825253858 May  13 10:33 p33785101_190000_Linux-x86-64.zip
drwxrwxr-x   9 grid oinstall         151 May  13 11:33 oracle
-rw-rw-r--   1 grid grid      2832388023 May  13 19:37 p33803476_190000_Linux-x86-64.zip
drwxrwx---   5 grid grid              92 Jul  18 10:54 oraInventory
[root@ungcorora2 app]# 
```

4. Run the command unzip p6880880_122010_Linux-x86-64.zip to unzip the contents of the zipped file to the path. The unzipped folder will be **OPatch**

```
root@ungcorora2:/u01/app
[root@ungcorora2 app]# ls -lrt
total 5647800
drwxrwxr-x   3 grid oinstall          18 Dec   4  2020 19.0.0
drwxrwxr-x   7 grid oinstall          84 Dec   4  2020 grid
drwxr-x---   8 grid oinstall         159 Apr   7 06:04 33803476
drwxr-x---  15 root root            4096 Apr  13 18:40 OPatch
-rw-rw-r--   1 root root         1581224 Apr  19 19:55 PatchSearch.xml
```

5. Copy the folder **OPatch** to the **Grid Home: /u01/app/19.0.0/grid/** using the command below:
   cp -r OPatch /u01/app/19.0.0/grid/

6. Go to the grid home using the command: cd /u01/app/19.0.0/grid/
7. Run the command chown -R grid:oinstall OPatch to change the ownership and group of the OPatch directory.
8. Go to Oracle home by running the command cd /u01/app/oracle/product/19.0.0/db_1/
9. Run the command ls -lrt to list the content of the directory

```
drwxr-xr-x  4 oracle oinstall      32 Feb 12  2021 has
drwxr-xr-x  5 oracle oinstall    4096 Nov 26  2021 apex
drwxr-xr-x  4 oracle oinstall      34 Nov 26  2021 suptools
drwxr-x--- 15 oracle oinstall    4096 Jan 29 07:47 OPatch_bkp
drwxr-x--- 15 oracle oinstall    4096 May 13 11:34 OPatch
drwxr-xr-x 13 oracle oinstall    4096 May 13 20:03 sqlpatch
drwxr-xr-x  2 oracle oinstall    4096 Jun 25 02:14 jlib
drwxr-xr-x  7 oracle grid         247 Jun 25 02:14 jdk
drwxr-xr-x  2 oracle grid         149 Jun 25 02:15 lib32
drwxr-xr-x  4 oracle oinstall   12288 Jun 25 02:15 lib
drwxr-xr-x  2 oracle oinstall    8192 Jun 25 02:15 bin
drwxr-xr-x 11 oracle asmadmin     141 Jul 13 21:13 admin
drwxr-xr-x  3 oracle oinstall   40960 Jul 18 10:53 dbs
[root@ungcorora2 db_1]#
```

10. Run the command mv OPatch OPatch_bkp
11. Go to the path where the downloaded Oracle OPatch zipped file was copied to from the previous section by running the command cd /u01/app, list the content of the directory

root@ungcorora2:/u01/app

```
[root@ungcorora2 app]# ls -lrt
total 5647800
drwxrwxr-x  3 grid oinstall          18 Dec  4  2020 19.0.0
drwxrwxr-x  7 grid oinstall          84 Dec  4  2020 grid
drwxr-x---  8 grid oinstall         159 Apr  7 06:04 33803476
drwxr-x--- 15 root root            4096 Apr 13 18:40 OPatch
-rw-rw-r--  1 root root         1581224 Apr 19 19:55 PatchSearch.xml
drwxr-x---  8 grid grid            159 Apr 21 09:57 33785101
-rw-rw-r--  1 grid grid       124109254 May 13 10:08 p6880880_122010_Linux-x86-64.zip
-rw-rw-r--  1 grid grid      2825253858 May 13 10:33 p33785101_190000_Linux-x86-64.zip
drwxrwxr-x  9 grid oinstall         151 May 13 11:33 oracle
-rw-rw-r--  1 grid grid      2832388023 May 13 19:37 p33803476_190000_Linux-x86-64.zip
drwxrwx---  5 grid grid             92 Jul 18 10:54 oraInventory
[root@ungcorora2 app]#
```

12. Copy the folder OPatch to the Oracle Home: /u01/app/oracle/product/19.0.0/db_1/ using the command below:
cp -r OPatch /u01/app/oracle/product/19.0.0/db_1/
13. Go to the oracle home using the command: cd /u01/app/oracle/product/19.0.0/db_1/
14. Run the command chown -R oracle:oinstall OPatch to change the ownership and group of the OPatch directory.

PATCH THE GRID AND ORACLE DATABASE

To patch the grid infrastructure and oracle database follow the steps below:

Prerequisite: Ensure that there is enough space on the database server on all directories

1. Login to the database server using **root**, go to the path where the zipped patch was copied to after successful download from Oracle support site. cd /u01/app
2. Run the unzip command to extract the patch. unzip p33803476_190000_Linux-x86-64.zip

```
root@ungcorora2:/u01/app
[root@ungcorora2 app]# ls -lrt
total 5647800
drwxrwxr-x  3 grid oinstall          18 Dec  4  2020 19.0.0
drwxrwxr-x  7 grid oinstall          84 Dec  4  2020 grid
drwxr-x---  8 grid oinstall         159 Apr  7 06:04 33803476
drwxr-x--- 15 root root            4096 Apr 13 18:40 OPatch
-rw-rw-r--  1 root root         1581224 Apr 19 19:55 PatchSearch.xml
drwxr-x---  8 grid grid            159 Apr 21 09:57 33785101
-rw-rw-r--  1 grid grid       124109254 May 13 10:08 p6880880_122010_Linux-x86-64.zip
-rw-rw-r--  1 grid grid      2825253858 May 13 10:33 p33785101_190000_Linux-x86-64.zip
drwxrwxr-x  9 grid oinstall         151 May 13 11:33 oracle
-rw-rw-r--  1 grid grid      2832388023 May 13 19:37 p33803476_190000_Linux-x86-64.zip
drwxrwx---  5 grid grid             92 Jul 18 10:54 oraInventory
drwxr-xr-x  3 root root             20 Jul 18 14:34 test
[root@ungcorora2 app]# unzip p33803476_190000_Linux-x86-64.zip
```

3. After unzipping is complete, login to the database server as oracle and shutdown all the databases or use svrctl command to shutdown all databases instances running.
4. Login to the database server as root user, and run the command below to patch the grid and oracle database binaries:
    /u01/app/19.0.0/grid/OPatch/opatchauto apply /u01/app/33803476
5. Once the patching is completed successfully, check that the cluster services are all up and running.
6. Login to the database server as oracle and start up all the databases.

LOADING MODIFIED SQL FILES INTO THE DATABASE

The following steps load modified SQL files into the database. For an Oracle RAC environment, perform these steps on only one node.

Datapatch is run to complete the post-install SQL deployment for the PSU.

1. For each separate database running on the same shared Oracle home being patched, run the datapatch utility as described in the table.

Steps	Standalone DB
1	% sqlplus /nolog
2	SQL> Connect / as sysdba
3	SQL> startup
4	SQL> quit
5	% cd $ORACLE_HOME/OPatch
6	% ./datapatch -verbose

2. Check the following log files in $ORACLE_BASE/cfgtoollogs/sqlpatch/33806152/<unique patch ID> for errors:

    33806152_apply_<database SID>_<CDB name>_<timestamp>.log

where database SID is the database SID, CDB name is the name of the multitenant container database, and timestamp is of the form YYYYMMDD_HH_MM_SS.

3. Any database that has invalid objects after the execution of datapatch should have utlrp.sql run to revalidate those objects.

For example:
cd $ORACLE_HOME/rdbms/admin
sqlplus /nolog
SQL> CONNECT / AS SYSDBA
SQL> @utlrp.sql

APPROVALS

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Oracle Database and Grid Patching Procedure

Final Audit Report   2022-07-21

Created:	2022-07-19
By:	ITInfrastructure ITInfrastructure (ITInfrastructure-Echosign@stanbicibtc.com)
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"Oracle Database and Grid Patching Procedure" History

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