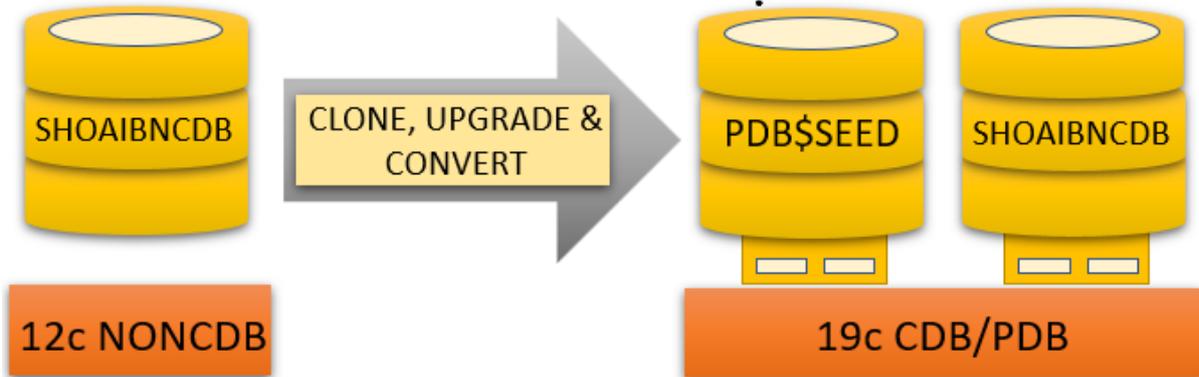


12c NON-CONTAINER DATABASE TO 19c PLUGGABLE DATABASE

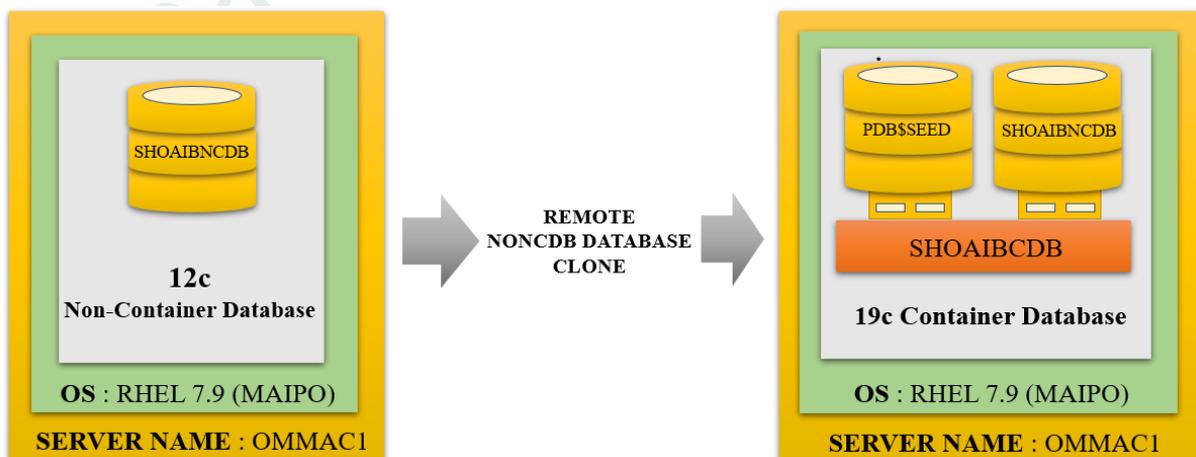
CLONE → UPGRADE → CONVERT



In this article we are converting a 12c non-container oracle database to 19c container database using cloning a REMOTE NONCDB. With this there is an oracle version change from 12c to 19c, so we will upgrade the database and then convert to pluggable database.

OUR TESTING ENVIRONMENT

For this upgrade I have prepared a virtual machine using (oracle virtual box) and Installed RedHat Enterprise Linux 7.9 on which Oracle 12c non-container database and oracle 19c container database is running.



HIGH LEVEL STEPS:

- CONNECT TO REMOTE 12c NON-CDB (SHOAIBNCDB) DATABASE
- PREPARE REMOTE 12c NON-CDB (SHOAIBNCDB) DATABASE FOR CLONING
 - a. CREATE USER
- ON REMOTE 12c NON-CDB (SHOAIBNCDB) DATABASE
 - a. CHECK DATAFILE LOCATION
- ON REMOTE 12c NON-CDB (SHOAIBNCDB) DATABASE
 - a. OPEN TO READ ONLY
- ON REMOTE NON-CDB (SHOAIBNCDB) DATABASE
 - a. CHECK LISTENER STATUS
- FROM 19c ORACLE HOME
 - a. CREATE TNSNAMES POINTING TO REMOTE 12c NON-CDB (SHOAIBNCDB)
 - b. CHECK TNSPING TO REMOTE 12c NON-CDB (SHOAIBNCDB) DATABASE
- CONNECT TO 19c CDB (SHOAIBNCDB) DATABASE
 - a. CREATE DBLINK TO 12c NON-CDB (SHOAIBNCDB) DATABASE
 - b. CREATE PDB (SHOAIBNCDB) USING ABOVE DBLINK
 - c. CHECK NEW PDB (SHOAIBNCDB) STATUS
 - d. OPEN PDB (SHOAIBNCDB) IN MIGRATE MODE
- FROM 19c ORACLE HOME
 - a. UPGRADE NEW PDB (SHOAIBNCDB)
- CONNECT TO 19c PDB (SHOAIBNCDB)
 - a. RUN NONCDB_TO_PDB.SQL SCRIPT
 - b. CHECK 19c CDB – PDB (SHOAIBNCDB) FINAL STATUS

12c NON-CONTAINER DATABASE TO 19c PLUGGABLE DATABASE

CLONE → UPGRADE → CONVERT

1. CONNECT TO REMOTE 12c NON-CDB (SHOAIBNCDB) DATABASE

```
SELECT NAME, OPEN_MODE, DATABASE_ROLE, CDB FROM V$DATABASE;
```

```
[oracle@OMmac1 ~]$ 12ce
[oracle@OMmac1 ~]$ . oraenv
ORACLE_SID = [SHOAIBNCD] ?
The Oracle base remains unchanged with value /u01/app/oracle
[oracle@OMmac1 ~]$ sqlplus "/" as sysdba

SQL*Plus: Release 12.2.0.1.0 Production on Mon May 30 18:39:53 2022
Copyright (c) 1982, 2016, Oracle. All rights reserved.

Connected to:
Oracle Database 12c Enterprise Edition Release 12.2.0.1.0 - 64bit Production

SYS@SHOAIBNCD 30-MAY-22>select name,open_mode,database_role,cdb from v$database;

NAME          OPEN_MODE          DATABASE_ROLE      CDB
-----
SHOAIBNC     READ WRITE         PRIMARY            NO

SYS@SHOAIBNCD 30-MAY-22>
```

2. PREPARE REMOTE 12c NON-CDB (SHOAIBNCDB) DATABASE FOR CLONING - CREATE USER

```
CREATE USER USER4CLONE IDENTIFIED BY USER4CLONE;
GRANT CREATE SESSION, CREATE PLUGGABLE DATABASE TO USER4CLONE;
```

```
SYS@SHOAIBNCD 30-MAY-22>select name,open_mode,database_role,cdb from v$database;

NAME          OPEN_MODE          DATABASE_ROLE      CDB
-----
SHOAIBNC     READ WRITE         PRIMARY            NO

SYS@SHOAIBNCD 30-MAY-22>CREATE USER USER4CLONE IDENTIFIED BY USER4CLONE;

User created.

SYS@SHOAIBNCD 30-MAY-22>GRANT CREATE SESSION, CREATE PLUGGABLE DATABASE TO USER4CLONE;

Grant succeeded.

SYS@SHOAIBNCD 30-MAY-22>
```

3. ON REMOTE 12c NON-CDB (SHOAIBNCDB) DATABASE – CHECK DATAFILE LOCATION

SELECT NAME FROM V\$DATAFILE;

```
SYS@SHOAIBNCD 30-MAY-22>
SYS@SHOAIBNCD 30-MAY-22>select name,open_mode,database_role,cdb from v$database;
```

NAME	OPEN_MODE	DATABASE_ROLE	CDB
SHOAIBNC	READ ONLY	PRIMARY	NO

```
SYS@SHOAIBNCD 30-MAY-22>select name from v$datafile;
```

NAME
/u01/app/oracle/oradata/SHOAIBNCD/system01.dbf
/u01/app/oracle/oradata/SHOAIBNCD/sysaux01.dbf
/u01/app/oracle/oradata/SHOAIBNCD/undotbs01.dbf
/u01/app/oracle/oradata/SHOAIBNCD/users01.dbf

```
SYS@SHOAIBNCD 30-MAY-22>
```

4. OPEN REMOTE 12c NON-CDB (SHOAIBNCDB) DATABASE – TO READ ONLY

SHUTDOWN IMMEDIATE

STARTUP MOUNT

ALTER DATABASE OPEN READ ONLY;

SELECT NAME, OPEN_MODE, DATABASE_ROLE, CDB FROM V\$DATABASE;

```
SYS@SHOAIBNCD 30-MAY-22>shutdown immediate
Database closed.
Database dismounted.
ORACLE instance shut down.
SYS@SHOAIBNCD 30-MAY-22>
SYS@SHOAIBNCD 30-MAY-22>startup mount
ORACLE instance started.

Total System Global Area 3623878656 bytes
Fixed Size                  8627008 bytes
Variable Size              838864064 bytes
Database Buffers          2768240640 bytes
Redo Buffers                8146944 bytes
Database mounted.
SYS@SHOAIBNCD 30-MAY-22>
SYS@SHOAIBNCD 30-MAY-22>alter database open read only;

Database altered.

SYS@SHOAIBNCD 30-MAY-22>select name,open_mode,database_role,cdb from v$database;
```

NAME	OPEN_MODE	DATABASE_ROLE	CDB
SHOAIBNC	READ ONLY	PRIMARY	NO

```
SYS@SHOAIBNCD 30-MAY-22>
```

5. ON REMOTE NON-CDB (SHOAIBNCDB) DATABASE – CHECK LISTENER STATUS

```
LSNRCTL STATUS <LISTENER_NAME>
```

```
LSNRCTL STATUS LIS_12C
```

```
[oracle@OMmac1 admin]$ lsnrctl status LIS_12C

LSNRCTL for Linux: Version 12.2.0.1.0 - Production on 30-MAY-2022 18:54:40

Copyright (c) 1991, 2016, Oracle. All rights reserved.

Connecting to (DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=OMMAC1.localdomain)(PORT=1521)))
STATUS of the LISTENER
-----
Alias                     LIS_12C
Version                   TNSLSNR for Linux: Version 12.2.0.1.0 - Production
Start Date                30-MAY-2022 17:49:14
Uptime                    0 days 1 hr. 5 min. 26 sec
Trace Level               off
Security                  ON: Local OS Authentication
SNMP                      OFF
Listener Parameter File  /u01/app/oracle/product/12.2.0.1/db_1/network/admin/listener.ora
Listener Log File        /u01/app/oracle/diag/tnslsnr/OMmac1/lis_12c/alert/log.xml
Listening Endpoints Summary...
  (DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=OMmac1)(PORT=1521)))
  (DESCRIPTION=(ADDRESS=(PROTOCOL=tcps)(HOST=OMmac1)(PORT=5500))(Security=(my_wallet_direct
Services Summary...
Service "SHOAIBNCD" has 1 instance(s).
  Instance "SHOAIBNCD", status READY, has 1 handler(s) for this service...
Service "SHOAIBNCXDB" has 1 instance(s).
  Instance "SHOAIBNCD", status READY, has 1 handler(s) for this service...
The command completed successfully
[oracle@OMmac1 admin]$ █
```

6. FROM 19c OH – CREATE TNSNAMES POINTING TO REMOTE 12c NON-CDB (SHOAIBNCDB) DATABASE

```
SHOAIBNCDB12C =
(DESCRIPTION =
(AADDRESS = (PROTOCOL = TCP) (HOST = OMMAC1.localdomain) (PORT = 1521))
(CONNECT_DATA =
(SERVER = DEDICATED)
(SERVICE_NAME = SHOAIBNCD)
)
)
```

Service name must match with the service name in above listener output.

```

[oracle@OMmac1 admin]$ pwd
/u02/app/oracle/product/19.0.0/dbhome_1/network/admin
[oracle@OMmac1 admin]$ cat tnsnames.ora
# tnsnames.ora Network Configuration File: /u02/app/oracle/product/19.0.0/db
# Generated by Oracle configuration tools.

LISTENER_SHOAIBCDB =
  (ADDRESS = (PROTOCOL = TCP)(HOST = OMMAC1.localdomain)(PORT = 1522))

SHOAIBCDB =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP)(HOST = OMMAC1.localdomain)(PORT = 1522))
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SERVICE_NAME = SHOAIBCDB)
    )
  )

SHOAIBNCDB12C =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP)(HOST = OMMAC1.localdomain)(PORT = 1521))
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SERVICE_NAME = SHOAIBNCD)
    )
  )

[oracle@OMmac1 admin]$

```

7. FROM 19c OH – CHECK TNSPING TO REMOTE 12c NON-CDB (SHOAIBNCDB) DATABASE

tnsping SHOAIBNCDB12C

```

[oracle@OMmac1 ~]$
[oracle@OMmac1 ~]$ tns ping SHOAIBNCDB12C

TNS Ping Utility for Linux: Version 19.0.0.0.0 - Production on 30-MAY-2022 19:13:13

Copyright (c) 1997, 2019, Oracle. All rights reserved.

Used parameter files:
/u02/app/oracle/product/19.0.0/dbhome_1/network/admin/sqlnet.ora

Used TNSNAMES adapter to resolve the alias
Attempting to contact (DESCRIPTION = (ADDRESS = (PROTOCOL = TCP)(HOST = OMMAC1.localdomain)(PORT = 1521))
OK (0 msec)
[oracle@OMmac1 ~]$
[oracle@OMmac1 ~]$

```

8. CONNECT TO 19c CDB (SHOAIBCDB) DATABASE

SET 19c ENVIRONMENT**SELECT NAME, OPEN_MODE, DATABASE_ROLE, CDB FROM V\$DATABASE;****SHOW PDBS**

```
[oracle@OMmac1 ~]$ 19ce
[oracle@OMmac1 ~]$ . oraenv
ORACLE_SID = [SHOAIBCDB] ?
The Oracle base remains unchanged with value /u02/app/oracle
[oracle@OMmac1 ~]$ sqlplus "/" as sysdba"

SQL*Plus: Release 19.0.0.0.0 - Production on Mon May 30 18:59:19 2022
Version 19.3.0.0.0

Copyright (c) 1982, 2019, Oracle. All rights reserved.
```

```
Connected to:
Oracle Database 19c Enterprise Edition Release 19.0.0.0.0 - Production
Version 19.3.0.0.0
```

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

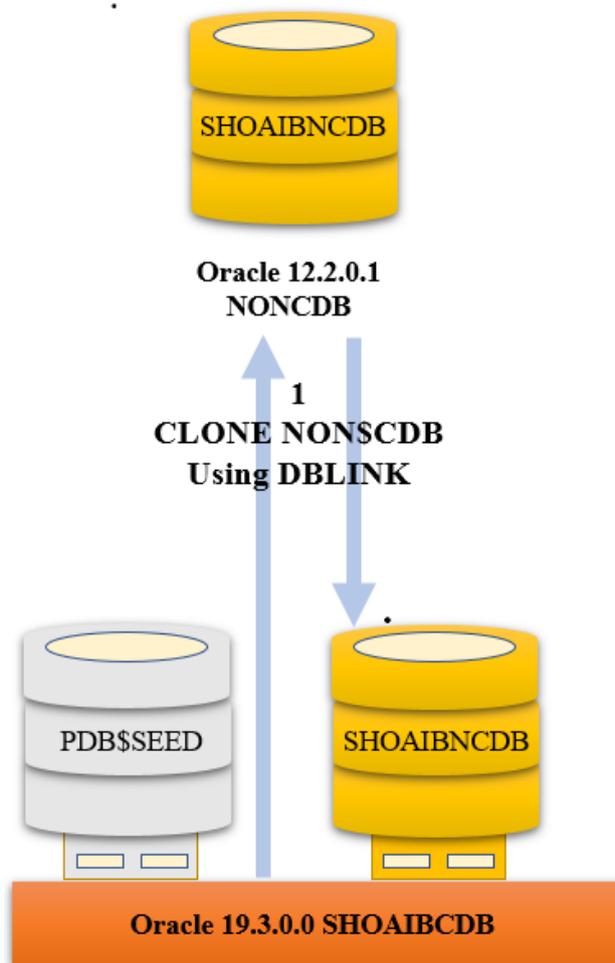
NAME	OPEN_MODE	DATABASE_ROLE	CDB
SHOAIBCD	READ WRITE	PRIMARY	YES

```
SQL> show pdbs
```

CON_ID	CON_NAME	OPEN MODE	RESTRICTED
2	PDB\$SEED	READ ONLY	NO

```
SQL>
```

9. CONNECT TO 19c CDB (SHOAIBCDB) DATABASE - CREATE DBLINK TO 12c NON-CDB (SHOAIBNCDB) DATABASE



DROP DATABASE LINK dblink4clone;

CREATE DATABASE LINK dblink4clone CONNECT TO USER4CLONE IDENTIFIED BY USER4CLONE USING 'SHOAIBNCDB12C';

```
Connected to:
Oracle Database 19c Enterprise Edition Release 19.0.0.0.0 - Production
Version 19.3.0.0.0
```

```
SQL> drop database link dblink4clone;
```

```
Database link dropped.
```

```
SQL> CREATE DATABASE LINK dblink4clone CONNECT TO USER4CLONE IDENTIFIED BY USER4CLONE USING 'SHOAIBNCDB12C';
```

```
Database link created.
```

```
SQL> █
```

10. CONNECT TO 19c CDB (SHOAIBCD) – CREATE PDB (SHOAIBNCDB) USING ABOVE DBLINK

```
CREATE PLUGGABLE DATABASE shoaibncdb from NON$CDB@ dblink4clone
FILE_NAME_CONVERT=(('<REMOTE NCDB DATAFILE LOC>', '<PDB DATAFILE LOC>');
```

```
CREATE PLUGGABLE DATABASE shoaibncdb from NON$CDB@ dblink4clone
FILE_NAME_CONVERT=('/u01/app/oracle/oradata/SHOAIBNCD/', '/u02/app/oracle/SHOAIBCD
B/shoaibncdb/shoaibncdb');
```

```
SQL>
SQL> create pluggable database shoaibncdb from NON$CDB@dblink4clone
FILE_NAME_CONVERT=('/u01/app/oracle/oradata/SHOAIBNCD/', '/u02/app/oracle/oradata/SHOAIBNCD/shoaibncdb/shoaibncdb');
```

Pluggable database created.

```
SQL> show pdbs
```

CON_ID	CON_NAME	OPEN MODE	RESTRICTED
2	PDB\$SEED	READ ONLY	NO
3	SHOAIBNCDB	MOUNTED	

```
SQL> █
```

Here we see that the PDB is created and is opened in mounted mode.

11. CONNECT TO 19c CDB (SHOAIBCD) – CHECK NEW PDB (SHOAIBNCDB) STATUS

```
SELECT NAME, OPEN_MODE, DATABASE_ROLE FROM V$DATABASE;
```

```
SELECT NAME, OPEN_MODE FROM V$PDBS WHERE NAME='SHOAIBNCDB';
```

```
Connected to:
Oracle Database 19c Enterprise Edition Release 19.0.0.0.0 - Production
Version 19.3.0.0.0
```

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

NAME	OPEN_MODE	DATABASE_ROLE	CDB
SHOAIBCD	READ WRITE	PRIMARY	YES

```
SQL> col name for a10
```

```
SQL> SELECT name, open_mode FROM v$pdb WHERE name = 'SHOAIBNCDB';
```

NAME	OPEN_MODE
SHOAIBNCDB	MOUNTED

12. CONNECT TO 19c CDB (SHOAIBCDB) – OPEN PDB (SHOAIBNCDB) IN MIGRATE MODE

ALTER PLUGGABLE DATABASE SHOAIBNCDB OPEN;

SQL> alter pluggable database SHOAIBNCDB open;

Warning: PDB altered with errors.

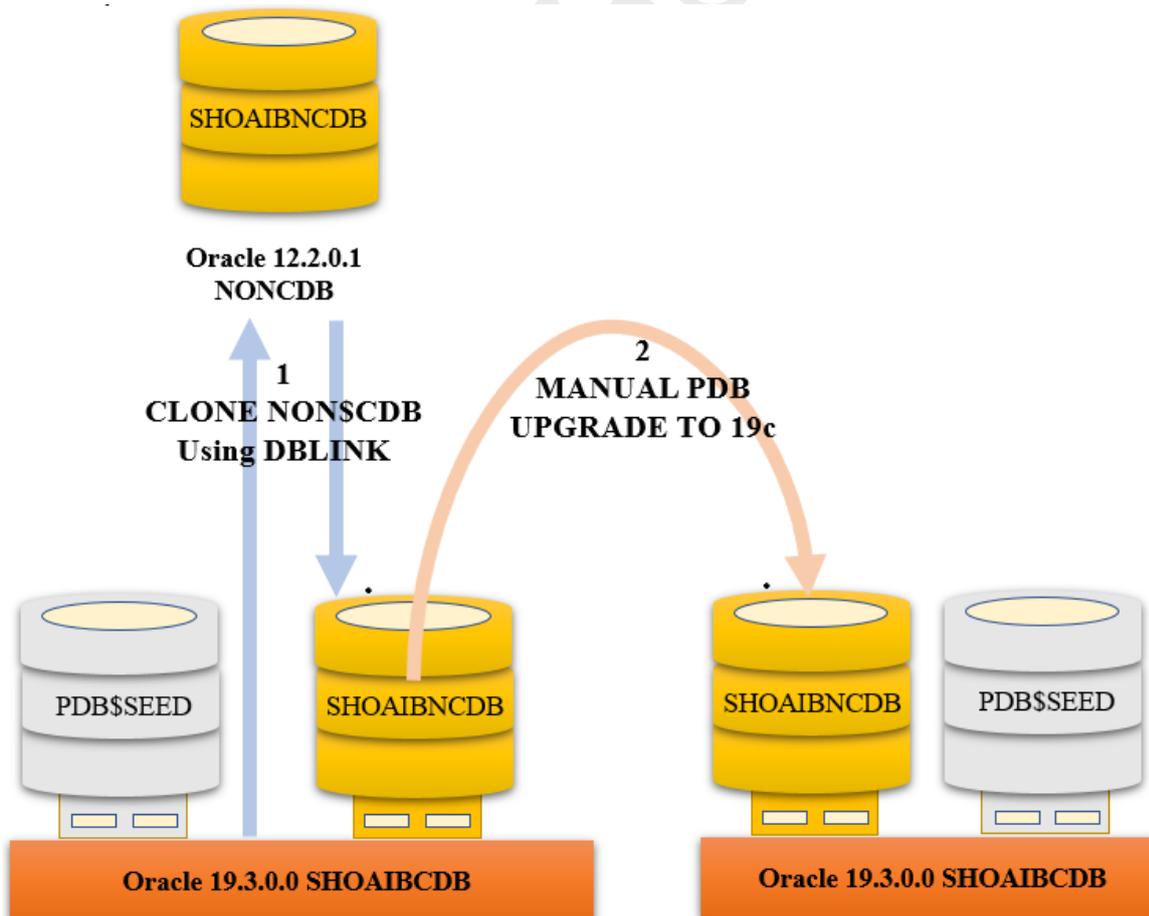
SQL> show pdbs

CON_ID	CON_NAME	OPEN MODE	RESTRICTED
2	PDB\$SEED	READ ONLY	NO
3	SHOAIBNCDB	MIGRATE	YES

SQL>

Here we see that the PDB is open in migrate mode so now we can upgrade the PDB

13. FROM 19c OH - UPGRADE NEW PDB (SHOAIBNCDB)



dbupgrade -l /u02 -c "SHOAIBNCDB"

```

[oracle@OMmac1 ~]$
[oracle@OMmac1 ~]$ which dbupgrade
/u02/app/oracle/product/19.0.0/dbhome_1/bin/dbupgrade
[oracle@OMmac1 ~]$
[oracle@OMmac1 ~]$ dbupgrade -l /u02 -c "SHOAIBNCDB"

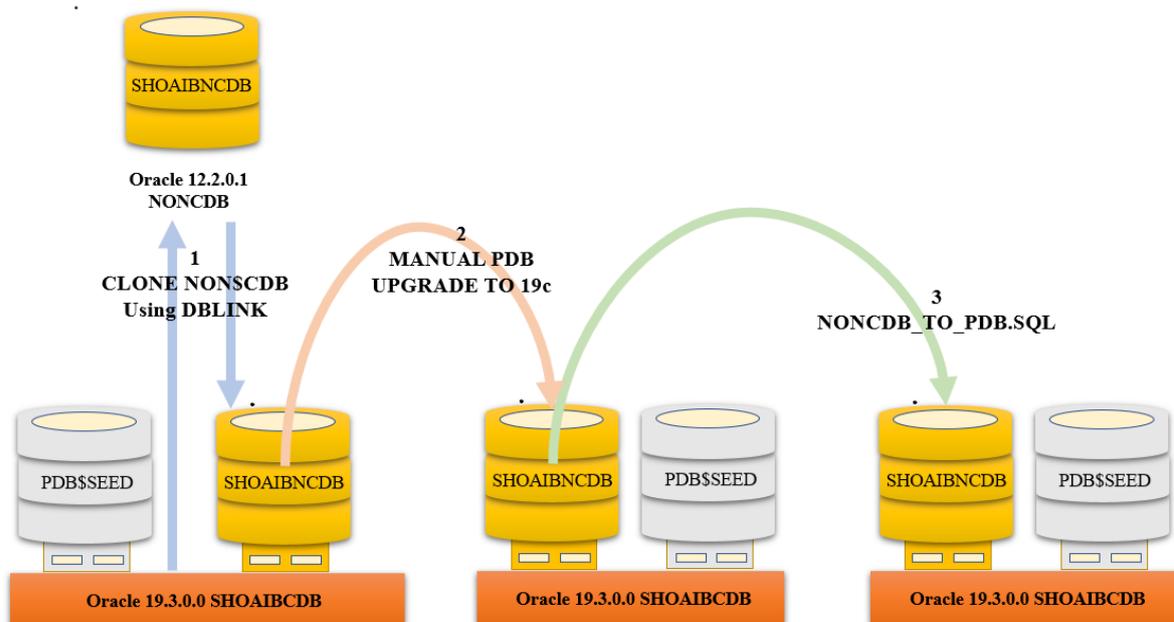
```

```

Argument list for [/u02/app/oracle/product/19.0.0/dbhome_1/rdbms/admin/catctl.pl]
For Oracle internal use only A = 0
Run in                          c = SHOAIBNCDB
Do not run in                   C = 0
Input Directory                 d = 0
Echo OFF                        e = 1

```

In my case the pdb upgrade took 30 minutes to complete.

14. CONNECT TO 19c PDB (SHOAIBNCDB) - RUN NONCDB_TO_PDB.SQL SCRIPT

```
sqlplus "/ as sysdba"
```

```
show pdbs
```

```
ALTER SESSION SET CONTAINER=SHOAIBNCDB;
```

```
[oracle@OMmac1 ~]$ sqlplus "/ as sysdba"
```

```
SQL*Plus: Release 19.0.0.0.0 - Production on Mon May 30 20:32:32 2022
Version 19.3.0.0.0
```

```
Copyright (c) 1982, 2019, Oracle. All rights reserved.
```

```
Connected to:
```

```
Oracle Database 19c Enterprise Edition Release 19.0.0.0.0 - Production
Version 19.3.0.0.0
```

```
SQL> show pdbs
```

CON_ID	CON_NAME	OPEN MODE	RESTRICTED
2	PDB\$SEED	READ ONLY	NO
3	SHOAIBNCDB	MOUNTED	

```
SQL>
```

```
SQL> alter session set container=SHOAIBNCDB;
```

```
Session altered.
```

```
@$ORACLE_HOME/rdbms/admin/noncdb_to_pdb.sql
```

```
SQL> @$ORACLE_HOME/rdbms/admin/noncdb_to_pdb.sql
```

```
SQL> SET FEEDBACK 1
```

```
SQL> SET NUMWIDTH 10
```

```
SQL> SET LINESIZE 80
```

```
SQL> SET TRIMSPOOL ON
```

```
SQL> SET TAB OFF
```

```
SQL> SET PAGESIZE 100
```

```
SQL> SET VERIFY OFF
```

```
SQL>
```

```
SQL> -- save settings
```

```
SQL> STORE SET ncdb2pdb.settings.sql REPLACE
```

```
Wrote file ncdb2pdb.settings.sql
```

```
SQL>
```

15. CHECK 19c CDB – PDB (SHOAIBNCDB) FINAL STATUS

```
SELECT NAME, OPEN_MODE, DATABASE_ROLE, CDB FROM V$DATABASE;
```

```
SHOW PDBS
```

```
ALTER PLUGGABLE DATABASE SHOAIBNCDB OPEN;
```

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

NAME	OPEN_MODE	DATABASE_ROLE	CDB
SHOAIBCD	MOUNTED	PRIMARY	YES

```
1 row selected.
```

```
SQL> show pdbs
```

CON_ID	CON_NAME	OPEN MODE	RESTRICTED
3	SHOAIBNCDB	MOUNTED	

```
SQL>
```

```
SQL> alter pluggable database SHOAIBNCDB open;
```

```
Pluggable database altered.
```

```
SQL> show pdbs
```

CON_ID	CON_NAME	OPEN MODE	RESTRICTED
3	SHOAIBNCDB	READ WRITE	NO

```
SQL> █
```

So, Finally PDB (SHOAIBNCDB) opened in READ WRITE mode.