

# CDB and PDB Management

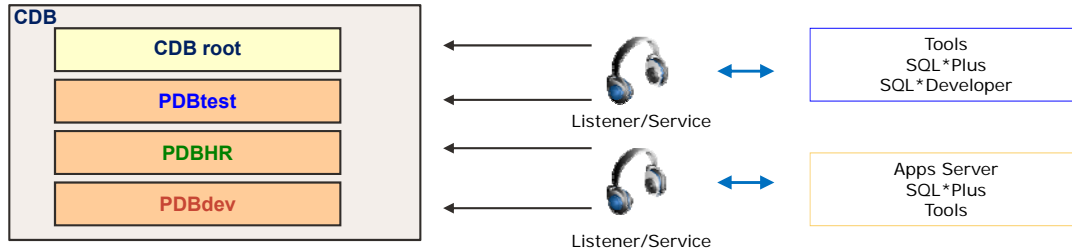
## Objectives

After completing this lesson, you should be able to:

- Establish connections to a CDB / PDB
- Avoid service name conflicts
- Start PDB service
- Start up and shut down a CDB
- Open and close PDBs
- Change the different modes and settings of PDBs
- Evaluate the impact of parameter value changes
- Configure host name and port number per PDB



# Connection



- Every PDB has a default service.

```
SQL> SELECT name, pdb FROM cdb_services;
```

- Service name has to be unique across CDBs.

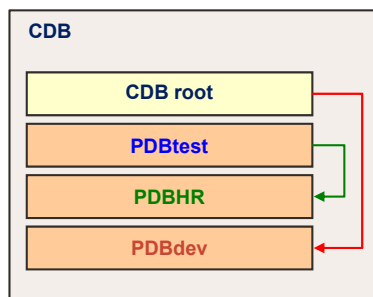
```
SQL> CONNECT / AS SYSDBA
SQL> CONNECT sys@CDB1 AS SYSDBA
SQL> CONNECT sys@PDBtest AS SYSDBA
SQL> CONNECT local_user1@hostname1:1525/PDBHR
SQL> CONNECT common_user2@PDBdev
SQL> SHOW CON_NAME
```

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# Switching Connection

Two possible ways to switch connection between containers within a CDB:



- Reconnect: Allows connection under common or local user

```
SQL> CONNECT / AS SYSDBA
SQL> CONNECT local_user1@PDBdev
```

- Use ALTER SESSION SET CONTAINER statement:

```
SQL> CONNECT sys@PDBtest AS SYSDBA
SQL> ALTER SESSION SET CONTAINER=PDBHR;
SQL> SHOW CON_NAME
SQL> ALTER SESSION SET CONTAINER=CDB$ROOT;
```

Allows connection under a common user only who is granted system privilege SET CONTAINER.

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# Creating Services

- Using the **DBMS\_SERVICE** package in an environment without Oracle Restart:

```
SQL> EXEC DBMS_SERVICE.CREATE_SERVICE('hrpdb','hrpdb')
```

```
SQL> EXEC DBMS_SERVICE.START_SERVICE('hrpdb')
```

- Using the **SRVCTL** utility in a Grid Infrastructure environment with Oracle Restart:

```
$ srvctl add service -db mycdb -service hrpdb -pdb hrpdb
```

```
$ srvctl start service -db mycdb -service hrpdb
```

- Oracle Restart configuration automatically updated:

Create operations and the Oracle Restart configuration	Automatically added to configuration?
Create a database service with SRVCTL	YES
Create a database service with DBMS_SERVICE.CREATE_SERVICE	NO

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# Renaming Services

- Renaming PDB service to avoid name conflicts

```
SQL> CREATE PLUGGABLE DATABASE pdb1 ... FROM pdb1@link_node1  
      SERVICE_NAME_CONVERT = ('pdb1_node1', 'pdb1_node2');
```

- Starting a PDB service at PDB opening

```
SQL> ALTER PLUGGABLE DATABASE pdb1 OPEN  
      SERVICES = ('pdb1_node2');
```

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# Starting Up a CDB Instance

```
SQL> CONNECT sys@CDB1 AS SYSDBA
SQL> STARTUP NOMOUNT
```

```
SQL> SELECT name, open_mode FROM v$pdb;

no rows selected
```

NOMOUNT

CDB instance started

SHUTDOWN

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# Mounting a CDB

```
SQL> CONNECT sys@CDB1 AS SYSDBA
SQL> STARTUP MOUNT
```

```
SQL> SELECT name, open_mode
FROM v$pdb;
```

NAME	OPEN_MODE
-----	
PDB\$SEED	MOUNTED
PDB1	MOUNTED
PDB2	MOUNTED

MOUNT

- CDB control files opened for the instance
- CDB root mounted
- PDBs mounted

NOMOUNT

Instance started

SHUTDOWN

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# Opening a CDB

```
SQL> STARTUP
```

```
SQL> SELECT name, open_mode  
FROM v$pdb;
```

NAME	OPEN_MODE
PDB\$SEED	READ ONLY
PDB1	MOUNTED
PDB2	MOUNTED

OPEN

- CDB root opened
- PDBs **still mounted, except CDB seed in RO**

MOUNT

- CDB control files opened for the instance
- CDB root mounted
- PDBs mounted

NOMOUNT

Instance  
started

SHUTDOWN

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# Opening a PDB

```
SQL> ALTER PLUGGABLE DATABASE pdb2 OPEN;
```

```
SQL> ALTER PLUGGABLE DATABASE ALL OPEN;
```

```
SQL> SELECT name, open_mode  
FROM v$pdb;
```

NAME	OPEN_MODE
PDB\$SEED	READ ONLY
PDB1	READ WRITE
PDB2	READ WRITE

PDB OPEN

PDBs **opened RW**,  
except CDB seed in RO

OPEN

- CDB root opened
- PDBs still mounted, **except CDB seed in RO**

MOUNT

- CDB control files opened for the instance
- CDB root mounted
- PDBs mounted

NOMOUNT

Instance  
started

SHUTDOWN

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# Automatic PDB Opening

- Automatically keep PDBs state after CDB STARTUP:

```
SQL> ALTER PLUGGABLE DATABASE pdb1 SAVE STATE;
```

Automatic PDB opening

Case 1	Case 2	Case 3
<p>PDB1 OPENED</p> <p>SHUTDOWN</p> <p>STARTUP</p> <p>PDB1 OPENED</p>	<p>PDB1 MOUNTED</p> <p>SHUTDOWN</p> <p>STARTUP</p> <p>PDB1 MOUNTED</p>	<p>PDB1 OPENED READ ONLY</p> <p>SHUTDOWN</p> <p>STARTUP</p> <p>PDB1 OPENED READ ONLY</p>

- Automatically discard PDBs state after CDB STARTUP:

```
SQL> ALTER PLUGGABLE DATABASE pdb1 DISCARD STATE;
```

Case 1	Case 2	Case 3
<p>PDB1 OPENED</p> <p>SHUTDOWN</p> <p>PDB1 MOUNTED</p>	<p>PDB1 MOUNTED</p> <p>SHUTDOWN</p> <p>PDB1 MOUNTED</p>	<p>PDB1 OPENED READ ONLY</p> <p>SHUTDOWN</p> <p>PDB1 MOUNTED</p>

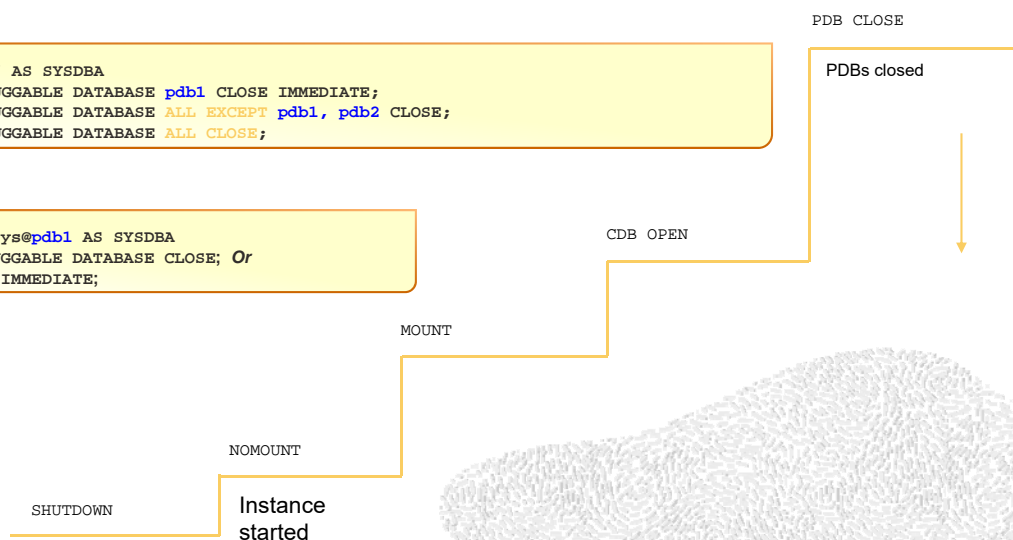
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# Closing a PDB

```
SQL> CONNECT / AS SYSDBA
SQL> ALTER PLUGGABLE DATABASE pdb1 CLOSE IMMEDIATE;
SQL> ALTER PLUGGABLE DATABASE ALL EXCEPT pdb1, pdb2 CLOSE;
SQL> ALTER PLUGGABLE DATABASE ALL CLOSE;
```

```
SQL> CONNECT sys@pdb1 AS SYSDBA
SQL> ALTER PLUGGABLE DATABASE CLOSE; Or
SQL> SHUTDOWN IMMEDIATE;
```



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## Shutting Down a CDB Instance

```
SQL> CONNECT sys@CDB1 AS SYSDBA
SQL> SHUTDOWN IMMEDIATE
```

- All PDBs closed (no new specific message)
- CDB closed
- CDB dismounted
- Instance shut down

```
SQL> CONNECT sys@PDB1 AS SYSDBA
SQL> SHUTDOWN IMMEDIATE
```

- PDB closed

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## Changing PDB Mode

After closing a PDB, open in:

- Restricted read-write

```
SQL> CONNECT sys@pdb1 AS SYSDBA
SQL> ALTER PLUGGABLE DATABASE CLOSE;
```

```
SQL> ALTER PLUGGABLE DATABASE OPEN RESTRICTED;
```

```
SQL> SELECT name, open_mode FROM v$pdb;
```

NAME	OPEN_MODE	RES
-----		
PDB1	READ WRITE	YES

- Read-only mode
- Read-write

```
SQL> CONNECT / AS SYSDBA
SQL> ALTER PLUGGABLE DATABASE ALL OPEN READ ONLY;
```

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# Modifying PDB Settings

- Bring a PDB data file online
- Change the PDB default tablespace
- Change the PDB default temporary tablespace
- Set the PDB storage limit
- Change the global name

```
SQL> CONNECT sys@pdb1 AS SYSDBA
SQL> ALTER PLUGGABLE DATABASE DATAFILE '/u03/pdb1_01.dbf' ONLINE;
```

```
SQL> ALTER PLUGGABLE DATABASE DEFAULT TABLESPACE pdb1_tbs;
```

```
SQL> ALTER PLUGGABLE DATABASE DEFAULT TEMPORARY TABLESPACE temp_tbs;
```

```
SQL> ALTER PLUGGABLE DATABASE STORAGE (MAXSIZE 2G);
```

```
SQL> ALTER PLUGGABLE DATABASE RENAME GLOBAL_NAME TO pdbAPP1;
```

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# Instance Parameter Change Impact

- A single SPFILE per CDB
- PDB values change:
  - Loaded in memory after PDB close
  - Stored in dictionary after CDB shutdown
  - Only for parameter ISPDB\_MODIFIABLE=TRUE

```
SQL> CONNECT sys@pdb1 AS SYSDBA
Connected.
SQL> ALTER SYSTEM SET ddl_lock_timeout=10;
System altered.
SQL> SHOW PARAMETER ddl_lock_timeout
```

NAME	TYPE	VALUE
ddl_lock_timeout	boolean	10

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# Instance Parameter Change Impact: Example

```
SQL> CONNECT sys@pdb2 AS SYSDBA
```

```
SQL> ALTER SYSTEM SET ddl_lock_timeout=20 SCOPE=BOTH;
```

```
SQL> ALTER PLUGGABLE DATABASE CLOSE;
```

```
SQL> ALTER PLUGGABLE DATABASE OPEN;
```

```
SQL> CONNECT / AS SYSDBA
```

```
SQL> SELECT value, ispdb_modifiable, con_id FROM v$system_parameter  
WHERE name = 'ddl_lock_timeout';
```

VALUE	ISPDB	CON_ID
0	TRUE	0
10	TRUE	3
20	TRUE	4

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## Using ALTER SYSTEM Statement on PDB

- Some statements change the way a PDB operates:

ALTER SYSTEM Affecting the PDB only	Objects Impacted
ALTER SYSTEM FLUSH SHARED_POOL	Only for objects of the PDB
ALTER SYSTEM FLUSH BUFFER_CACHE	Only for buffers of the PDB
ALTER SYSTEM ENABLE/DISABLE RESTRICTED SESSION	Only for sessions of the PDB
ALTER SYSTEM KILL SESSION	Only for sessions of the PDB
ALTER SYSTEM SET <i>parameter</i>	Only for parameter of the PDB

- Some ALTER SYSTEM statements can be executed in a PDB but affect the whole CDB:

ALTER SYSTEM CHECKPOINT	Affects all datafiles except those in read only or offline
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- All other ALTER SYSTEM statements affect the entire CDB and must be run by a common user in the CDB root.

ALTER SYSTEM SWITCH LOGFILE	Operation not allowed from within a pluggable database
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# Configuring Host Name and Port Number per PDB

```
DATABASE_PROPERTIES  
CONTAINERS_HOST=host1  
CONTAINERS_PORT=1522
```

- The host name and port number settings for a PDB are important only if proxy PDBs will reference the PDB.

```
SQL> ALTER PLUGGABLE DATABASE CONTAINERS HOST = <host_name>;  
SQL> ALTER PLUGGABLE DATABASE CONTAINERS PORT = <port_nb>;
```

- The host name and port number can be reset to their default:

```
SQL> ALTER PLUGGABLE DATABASE CONTAINERS HOST RESET;  
SQL> ALTER PLUGGABLE DATABASE CONTAINERS PORT RESET;
```

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## Summary

In this lesson, you should have learned how to:

- Establish connections to a CDB / PDB
- Avoid service name conflicts
- Start PDB service
- Start up and shut down a CDB
- Open and close PDBs
- Change the different modes and settings of PDBs
- Evaluate the impact of parameter value changes
- Configure host name and port number per PDB

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## Practice 5: Overview

- 5-1: Starting up and shutting down a CDB
- 5-2: Opening and closing PDBs
- 5-3: Renaming a PDB
- 5-4: Setting parameter values for PDBs
- 5-5: Renaming PDB services