

STEPS TO SET UP  
"TDE" TRANSPARENT  
DATA ENCRYPTION  
USING ORACLE WALLET  
FOR CDB AND PDB  
DATABASES 19C CDB

SQL\*Plus: Release 19.0.0.0.0 - Production on Sun Dec 29 17:56:39 2024  
Version 19.3.0.0.0

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Enter user-name: / as sysdba

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

SQL> select name,open\_mode from v\$database;

NAME	OPEN_MODE
ORATST	READ WRITE

SQL> select banner from v\$version;

BANNER  
-----  
-----  
Oracle Database 19c Enterprise Edition Release 19.0.0.0.0 - Production

**Set: wallet root parameter**

SQL> show parameter wallet\_root;

NAME	TYPE	VALUE
wallet_root	string	

SQL> alter system set wallet\_root='E:\ORACLE19\ewal' scope=spfile;

System altered.

SQL> show parameter wallet\_root;

NAME	TYPE	VALUE
wallet_root	string	

**Re-start database to effect the change as it is not a dynamic parameter**

SQL> shut immediate;  
Database closed.  
Database dismounted.  
ORACLE instance shut down.

SQL> startup  
ORACLE instance started.

Total System Global Area 1895824816 bytes  
Fixed Size 9268656 bytes  
Variable Size 520093696 bytes  
Database Buffers 1358954496 bytes  
Redo Buffers 7507968 bytes  
Database mounted.

Database opened.

SQL> select name,open\_mode,log\_mode from v\$database;

NAME	OPEN_MODE	LOG_MODE
ORATST	READ WRITE	NOARCHIVELOG

SQL> show parameter wallet\_root;

NAME	TYPE	VALUE
wallet_root	string	E:\ORACLE19\EWAL

SQL> show pdbs;

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

SQL> alter pluggable database ORATSTPDB open;

Pluggable database altered.

SQL> show pdbs;

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

**Set: tde configuration parameter**

SQL> show parameter tde\_configuration;

NAME	TYPE	VALUE
tde_configuration	string	

SQL> alter system set tde\_configuration='KEystore\_CONFIGURATION=FILE'  
SCOPE=SPFILE;

System altered.

**Database re-start not needed as it is a Dynamic parameter:**

SQL> show parameter tde\_configuration;

NAME	TYPE	VALUE
tde_configuration	string	

SQL> alter system set tde\_configuration='KEystore\_CONFIGURATION=FILE'  
SCOPE=both;

System altered.

SQL> show parameter tde\_configuration;

NAME	TYPE	VALUE
tde_configuration	string	
KEYSTORE_CONFIGURATION=FILE		

SQL> show pdbs;

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

SQL> show con\_name;

CON_NAME
CDB\$ROOT

**Verify for any existing configurations:**

SQL> select status from v\$encryption\_wallet;

STATUS
NOT_AVAILABLE
NOT_AVAILABLE
NOT_AVAILABLE

SQL> col wrl\_parameter for a50;

SQL> desc v\$encryption\_wallet;

Name	Null?	Type
WRL_TYPE		VARCHAR2 (20)
WRL_PARAMETER		VARCHAR2 (4000)
STATUS		VARCHAR2 (30)
WALLET_TYPE		VARCHAR2 (20)
WALLET_ORDER		VARCHAR2 (9)
KEYSTORE_MODE		VARCHAR2 (8)
FULLY_BACKED_UP		VARCHAR2 (9)
CON_ID		NUMBER

SQL> show pdbs;

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

SQL> select WRL\_TYPE,WRL\_PARAMETER,status,con\_id from v\$encryption\_wallet;

WRL_TYPE	WRL_PARAMETER	CON_ID
STATUS		
FILE	E:\ORACLE19\EWAL\tde\	
NOT_AVAILABLE		1
FILE		
NOT_AVAILABLE		2
FILE		
NOT_AVAILABLE		3

```
SQL> show con_name;
```

```
CON_NAME
```

```
-----  
CDB$ROOT
```

### Create KEY STORE:

```
SQL> ADMINISTER KEY MANAGEMENT CREATE KEYSTORE 'E:\ORACLE19\ewal\tde'  
identified by krishna123;
```

```
keystore altered.
```

```
SQL> select WRL_TYPE,WRL_PARAMETER,status,con_id from v$encryption_wallet;
```

WRL_TYPE	WRL_PARAMETER	CON_ID
FILE	E:\ORACLE19\EWAL\tde\	1
CLOSED		1
FILE		2
CLOSED		2
FILE		3
CLOSED		3

```
Directory: E:\ORACLE19\ewal\tde
```

Mode	LastWriteTime	Length	Name
-a----	29-12-2024 18:16	2555	ewallet.p12

```
PS E:\ORACLE19\ewal\tde> sqlplus
```

```
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```

```
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```

```
Enter user-name: / as sysdba
```

```
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```

```
SQL>
```

```
SQL>
```

```
SQL> show pdbs;
```

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

SQL> show pdbs;

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

SQL> col wrl\_parameter for a50;

SQL> set lines 200;

SQL> select WRL\_TYPE, WRL\_PARAMETER, status, con\_id from v\$encryption\_wallet;

WRL_TYPE	WRL_PARAMETER	CON_ID
FILE	E:\ORACLE19\EWAL\tde\	1
CLOSED		1
FILE		2
CLOSED		2
FILE		3
CLOSED		3

#### ENABLE AUTO LOGIN:

SQL> ADMINISTER KEY MANAGEMENT CREATE AUTO\_LOGIN KEYSTORE FROM KEYSTORE  
'E:\ORACLE19\ewal\tde' identified by krishna123;

keystore altered.

SQL> EXIT

PS E:\ORACLE19\ewal\tde> sqlplus

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Connected to:

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Version 19.3.0.0.0

SQL> col wrl\_parameter for a50;

SQL> set lines 200;

SQL>

SQL> show pdbs;

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

SQL> show con\_name;

CON_NAME
CDB\$ROOT

```
SQL> select WRL_TYPE,WRL_PARAMETER,status,con_id from v$encryption_wallet;
```

WRL_TYPE	WRL_PARAMETER	CON_ID
STATUS		
FILE	E:\ORACLE19\EWAL\tde\	
OPEN_NO_MASTER_KEY		1
FILE		
OPEN_NO_MASTER_KEY		2
FILE		
OPEN_NO_MASTER_KEY		3

### SET KEY STORE:

```
SQL> ADMINISTER KEY MANAGEMENT SET KEYSTORE OPEN FORCE KEYSTORE IDENTIFIED BY krishna123;
```

keystore altered.

```
SQL> select WRL_TYPE,WRL_PARAMETER,status,con_id from v$encryption_wallet;
```

WRL_TYPE	WRL_PARAMETER	CON_ID
STATUS		
FILE	E:\ORACLE19\EWAL\tde\	
OPEN_NO_MASTER_KEY		1
FILE		
OPEN_NO_MASTER_KEY		2
FILE		
OPEN_NO_MASTER_KEY		3

```
SQL> ADMINISTER KEY MANAGEMENT SET KEY FORCE KEYSTORE IDENTIFIED BY krishna123 with backup;
```

keystore altered.

```
SQL> exit
```

```
PS E:\ORACLE19\ewal\tde> sqlplus
```

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Enter user-name: / as sysdba

Connected to:

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

```
SQL> col wrl_parameter for a50;
```

```
SQL> set lines 200;
```

```
SQL> select WRL_TYPE,WRL_PARAMETER,status,con_id from v$encryption_wallet;
```

WRL_TYPE	WRL_PARAMETER	CON_ID
STATUS		

```

FILE          E:\ORACLE19\EWAL\tde\
OPEN          1
FILE
OPEN          2
FILE
OPEN_NO_MASTER_KEY 3

```

SQL> show pdbs;

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

SQL>

SQL>

SQL> select tablespace\_name from dba\_tablespaces;

TABLESPACE\_NAME

```

-----
SYSTEM
SYSAUX
UNDOTBS1
TEMP
USERS
KRISHNA

```

6 rows selected.

SQL> select file\_name from dba\_data\_files;

FILE\_NAME

```

-----
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_USERS_MP69HNQN_.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_UNDOTBS1_MP69HMDS_.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_SYSTEM_MP69D4HF_.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_SYSAUX_MP69GHYW_.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\KRISHNA.DBF

```

#### ENCRYPT A TABLESPACE NOW ON CDB LEVEL:

```

SQL> create tablespace TEST datafile
'E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\TEST.DBF' size 100M;

```

Tablespace created.

SQL> select file\_name from dba\_data\_files;

FILE\_NAME

```

-----
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_USERS_MP69HNQN_.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_UNDOTBS1_MP69HMDS_.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_SYSTEM_MP69D4HF_.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_SYSAUX_MP69GHYW_.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\KRISHNA.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\TEST.DBF

```

6 rows selected.



```
SQL> select tablespace_name from dba_tablespaces;
```

```
TABLESPACE_NAME
```

```
-----
SYSTEM
SYSAUX
UNDOTBS1
TEMP
USERS
KRISHNA
TEST
```

```
7 rows selected.
```

```
SQL> desc v$encrypted_tablespaces;
```

```
  Name
Null?   Type
```

```
-----
TS#
NUMBER
  ENCRYPTIONALG
VARCHAR2(7)
  ENCRYPTEDTS
VARCHAR2(3)
  ENCRYPTEDKEY
RAW(32)
  MASTERKEYID
RAW(16)
  BLOCKS_ENCRYPTED
NUMBER
  BLOCKS_DECRYPTED
NUMBER
  KEY_VERSION
NUMBER
  STATUS
VARCHAR2(10)
  CON_ID
NUMBER
```

```
SQL> select ENCRYPTEDKEY,STATUS,CON_ID,TS# from v$encrypted_tablespaces;
```

```
no rows selected
```

```
SQL> alter tablespace TEST encryption online using 'AES256' encrypt;
```

```
Tablespace altered.
```

```
SQL> select ENCRYPTEDKEY,STATUS,CON_ID,TS# from v$encrypted_tablespaces;
```

```
ENCRYPTEDKEY                                STATUS
CON_ID      TS#
-----
1AD8D00D2F0DD970E5AED0668F8E3C1059EB5ED7F2B08C5198331B658FEE0B65 NORMAL
1              7
```

```
SQL> select WRL_TYPE,WRL_PARAMETER,status,con_id from v$encryption_wallet;
```

WRL_TYPE	WRL_PARAMETER	CON_ID
STATUS		
FILE	E:\ORACLE19\EWAL\tde\	1
OPEN		2
FILE		3
OPEN_NO_MASTER_KEY		

**VALIDATE AUTO LOGIN: THE WALLET HAS TO BE OPEN WHEN WE RE-STAT THE DATABASE**

```
SQL> shut immediate
Database closed.
Database dismounted.
ORACLE instance shut down.
SQL> startup
ORACLE instance started.
```

```
Total System Global Area 1895824816 bytes
Fixed Size 9268656 bytes
Variable Size 520093696 bytes
Database Buffers 1358954496 bytes
Redo Buffers 7507968 bytes
Database mounted.
Database opened.
```

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

OPEN_MODE	LOG_MODE	DATABASE_ROLE
READ WRITE	NOARCHIVELOG	PRIMARY

```
SQL> show pdbs;
```

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

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

```
Pluggable database altered.
```

```
SQL> show pdbs;
```

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

```
SQL> select file_name from dba_data_files;
```

FILE_NAME
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\01_MF_SYSTEM_MP69D4HF_.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\01_MF_SYSAUX_MP69GHYW_.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\01_MF_UNDOTBS1_MP69HMDS_.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\01_MF_USERS_MP69HNQN_.DBF

```
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\KRISHNA.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_TEST_MQ3TL75D_.DBF
```

6 rows selected.

```
SQL> ALTER TABLESPACE KRISHNA ADD DATAFILE
'E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\KRISHNA01.DBF' SIZE 100M;
```

Tablespace altered.

```
SQL> select file_name from dba_data_files;
```

FILE\_NAME

```
-----
-----
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_SYSTEM_MP69D4HF_.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_SYSAUX_MP69GHYW_.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_UNDOTBS1_MP69HMDS_.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_USERS_MP69HNQN_.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\KRISHNA.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\KRISHNA01.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_TEST_MQ3TL75D_.DBF
```

7 rows selected.

```
SQL> ALTER TABLESPACE KRISHNA ADD DATAFILE
'E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\KRISHNA02.DBF' SIZE 100M;
```

Tablespace altered.

```
SQL> select file_name from dba_data_files;
```

FILE\_NAME

```
-----
-----
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_SYSTEM_MP69D4HF_.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_SYSAUX_MP69GHYW_.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_UNDOTBS1_MP69HMDS_.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_USERS_MP69HNQN_.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\KRISHNA.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\KRISHNA01.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\KRISHNA02.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_TEST_MQ3TL75D_.DBF
```

8 rows selected.

```
SQL> select WRL_TYPE,WRL_PARAMETER,status,con_id from v$encryption_wallet;
```

WRL_TYPE	WRL_PARAMETER	STATUS	CON_ID
FILE	E:\ORACLE19\EWAL\tdc\	OPEN	1
FILE		OPEN	2
FILE		OPEN	3
OPEN_NO_MASTER_KEY			

```
SQL> select ENCRYPTEDKEY,STATUS,CON_ID,TS# from v$encrypted_tablespaces;
```

ENCRYPTEDKEY	STATUS
CON_ID	TS#
1AD8D00D2F0DD970E5AED0668F8E3C1059EB5ED7F2B08C5198331B658FEE0B65	NORMAL
1	7

```
SQL> desc dba_data_files;
```

Name	Type
------	------

FILE_NAME	
VARCHAR2 (513)	
FILE_ID	
NUMBER	
TABLESPACE_NAME	
VARCHAR2 (30)	
BYTES	
NUMBER	
BLOCKS	
NUMBER	
STATUS	
VARCHAR2 (9)	
RELATIVE_FNO	
NUMBER	
AUTOEXTENSIBLE	
VARCHAR2 (3)	
MAXBYTES	
NUMBER	
MAXBLOCKS	
NUMBER	
INCREMENT_BY	
NUMBER	
USER_BYTES	
NUMBER	
USER_BLOCKS	
NUMBER	
ONLINE_STATUS	
VARCHAR2 (7)	
LOST_WRITE_PROTECT	
VARCHAR2 (7)	

```
SQL> col file_name for a70;
```

```
SQL> select file_id,file_name from dba_data_files;
```

FILE_ID	FILE_NAME
1	E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_SYSTEM_MP69D4HF_.DB
3	E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_SYSAUX_MP69GHYW_.DB

4

```
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_UNDOTBS1_MP69HMDS_
DBF
```

7

```
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_USERS_MP69HNQN_.DBF
13 E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\KRISHNA.DBF
```

```
FILE_ID FILE_NAME
-----
```

```
15 E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\KRISHNA01.DBF
16 E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\KRISHNA02.DBF
14
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_TEST_MQ3TL75D_.DBF
```

8 rows selected.

```
SQL> col file_name for a100;
```

```
SQL> select file_id,file_name from dba_data_files;
```

```
FILE_ID FILE_NAME
-----
```

```
1
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_SYSTEM_MP69D4HF_.DBF
3
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_SYSAUX_MP69GHYW_.DBF
4
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_UNDOTBS1_MP69HMDS_.DBF
7
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_USERS_MP69HNQN_.DBF
13 E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\KRISHNA.DBF
15 E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\KRISHNA01.DBF
16 E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\KRISHNA02.DBF
14
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_TEST_MQ3TL75D_.DBF
```

8 rows selected.

```
SQL> select ENCRYPTEDKEY,STATUS,CON_ID,TS# from v$encrypted_tablespaces;
```

```
ENCRYPTEDKEY                                STATUS
CON_ID      TS#
-----
```

```
1AD8D00D2F0DD970E5AED0668F8E3C1059EB5ED7F2B08C5198331B658FEE0B65 NORMAL
1              7
```

```
SQL> desc dba_data_files;
```

```
  Name
Null?   Type
-----
```

```
FILE_NAME
VARCHAR2 (513)
FILE_ID
NUMBER
TABLESPACE_NAME
VARCHAR2 (30)
```

```

BYTES
NUMBER
BLOCKS
NUMBER
STATUS
VARCHAR2(9)
RELATIVE_FNO
NUMBER
AUTOEXTENSIBLE
VARCHAR2(3)
MAXBYTES
NUMBER
MAXBLOCKS
NUMBER
INCREMENT_BY
NUMBER
USER_BYTES
NUMBER
USER_BLOCKS
NUMBER
ONLINE_STATUS
VARCHAR2(7)
LOST_WRITE_PROTECT
VARCHAR2(7)

```

```
SQL> select file_id,file_name from dba_data_files;
```

```

      FILE_ID FILE_NAME
-----
1
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_SYSTEM_MP69D4HF_.DBF
3
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_SYSAUX_MP69GHYW_.DBF
4
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_UNDOTBS1_MP69HMDS_.DBF
7
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_USERS_MP69HNQN_.DBF
13 E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\KRISHNA.DBF
15 E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\KRISHNA01.DBF
16 E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\KRISHNA02.DBF
14
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_TEST_MQ3TL75D_.DBF

```

```
8 rows selected.
```

#### ENCRYPTING A TABLESPACE ONLINE:

```
SQL> alter tablespace KRISHNA encryption online using 'AES256' encrypt;
```

```
Tablespace altered.
```

```
SQL> select file_id,file_name from dba_data_files;
```

```

      FILE_ID FILE_NAME
-----
1
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_SYSTEM_MP69D4HF_.DBF
3
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_SYSAUX_MP69GHYW_.DBF

```

```

      4
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_UNDOTBS1_MP69HMDS_.DBF
      7
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_USERS_MP69HNQN_.DBF
     15
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_KRISHNA_MQ3V7D0F_.DBF
     16
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_KRISHNA_MQ3V7H1R_.DBF
     13
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_KRISHNA_MQ3V77XN_.DBF
     14
E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\O1_MF_TEST_MQ3TL75D_.DBF

```

8 rows selected.

```
SQL> select ENCRYPTEDKEY,STATUS,CON_ID,TS# from v$encrypted_tablespaces;
```

ENCRYPTEDKEY	STATUS
CON_ID	TS#
03B27ACC1DD0650D2348486BD047E8DEA8B338FCA54A19D9318FEF8B05982D7E	NORMAL
1	6
1AD8D00D2F0DD970E5AED0668F8E3C1059EB5ED7F2B08C5198331B658FEE0B65	NORMAL
1	7

**ENABLE TDE FOR PDB NOW:**

```
SQL> show pdbs;
```

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

```
SQL> select WRL_TYPE,WRL_PARAMETER,status,con_id from v$encryption_wallet;
```

WRL_TYPE	WRL_PARAMETER	CON_ID
STATUS		
FILE	E:\ORACLE19\EWAL\tde\	
OPEN		1
FILE		
OPEN		2
FILE		
OPEN_NO_MASTER_KEY		3

```
SQL> show pdbs;
```

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

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

```
Session altered.
```

```
SQL> show pdbs;
```

CON_ID	CON_NAME	OPEN MODE	RESTRICTED
3	ORATSTPDB	READ WRITE	NO

```
SQL>
```

```
SQL>
```

```
SQL> col file_name for a60;
```

```
SQL> select file_name from dba_data_files;
```

```
FILE_NAME
```

```
-----
E:\ORACLE19\ORACLEME\ORADATA\ORATST\22610124B9B0462FADB2D29C
EF0D3BAE\DATAFILE\O1_MF_SYSTEM_MP6BG13P_.DBF
```

```
E:\ORACLE19\ORACLEME\ORADATA\ORATST\22610124B9B0462FADB2D29C
EF0D3BAE\DATAFILE\O1_MF_SYSAUX_MP6BG145_.DBF
```

```
E:\ORACLE19\ORACLEME\ORADATA\ORATST\22610124B9B0462FADB2D29C
EF0D3BAE\DATAFILE\O1_MF_UNDOTBS1_MP6BG145_.DBF
```

```
E:\ORACLE19\ORACLEME\ORADATA\ORATST\22610124B9B0462FADB2D29C
EF0D3BAE\DATAFILE\O1_MF_USERS_MP6BGG2C_.DBF
```

```
FILE_NAME
```

```
SQL> col file_name for a100;
```

```
SQL> select file_name from dba_data_files;
```

```
FILE_NAME
```

```
-----
E:\ORACLE19\ORACLEME\ORADATA\ORATST\22610124B9B0462FADB2D29CEF0D3BAE\DATAFI
LE\O1_MF_SYSTEM_MP6BG13P_.DBF
```

```
E:\ORACLE19\ORACLEME\ORADATA\ORATST\22610124B9B0462FADB2D29CEF0D3BAE\DATAFI
LE\O1_MF_SYSAUX_MP6BG145_.DBF
```

```
E:\ORACLE19\ORACLEME\ORADATA\ORATST\22610124B9B0462FADB2D29CEF0D3BAE\DATAFI
LE\O1_MF_UNDOTBS1_MP6BG145_.DBF
```

```
E:\ORACLE19\ORACLEME\ORADATA\ORATST\22610124B9B0462FADB2D29CEF0D3BAE\DATAFI
LE\O1_MF_USERS_MP6BGG2C_.DBF
```

```
FILE_NAME
```



```
SQL> col file_name for a120;
SQL> select file_name from dba_data_files;
```

```
FILE_NAME
```

```
-----
E:\ORACLE19\ORACLEME\ORADATA\ORATST\22610124B9B0462FADB2D29CEF0D3BAE\DATAFI
LE\O1_MF_SYSTEM_MP6BG13P_.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\22610124B9B0462FADB2D29CEF0D3BAE\DATAFI
LE\O1_MF_SYSAUX_MP6BG145_.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\22610124B9B0462FADB2D29CEF0D3BAE\DATAFI
LE\O1_MF_UNDOTBS1_MP6BG145_.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\22610124B9B0462FADB2D29CEF0D3BAE\DATAFI
LE\O1_MF_USERS_MP6BGG2C_.DBF
```

```
SQL> create tablespace TEST01 datafile
'E:\ORACLE19\ORACLEME\ORADATA\ORATST\DATAFILE\TEST.DBF' size 100M;
SQL>
SQL> create tablespace TEST datafile
'E:\ORACLE19\ORACLEME\ORADATA\ORATST\22610124B9B0462FADB2D29CEF0D3BAE\DATAF
ILE\TEST01.DBF' SIZE 100M;
```

Tablespace created.

```
SQL> select file_name from dba_data_files;
```

```
FILE_NAME
```

```
-----
E:\ORACLE19\ORACLEME\ORADATA\ORATST\22610124B9B0462FADB2D29CEF0D3BAE\DATAFI
LE\O1_MF_SYSTEM_MP6BG13P_.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\22610124B9B0462FADB2D29CEF0D3BAE\DATAFI
LE\O1_MF_SYSAUX_MP6BG145_.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\22610124B9B0462FADB2D29CEF0D3BAE\DATAFI
LE\O1_MF_UNDOTBS1_MP6BG145_.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\22610124B9B0462FADB2D29CEF0D3BAE\DATAFI
LE\O1_MF_USERS_MP6BGG2C_.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\22610124B9B0462FADB2D29CEF0D3BAE\DATAFI
LE\TEST01.DBF
```

NOTE: WE ARE UNABLE TO ENCRYPT AS MASTERKEY IS NOT CREATED FOR PDB:

```
SQL> alter tablespace TEST01 encryption online using 'AES256' encrypt;
alter tablespace TEST01 encryption online using 'AES256' encrypt
```

```
*
```

```
ERROR at line 1:
```

```
ORA-28361: master key not yet set
```

```
SQL> select WRL_TYPE,WRL_PARAMETER,status,con_id from v$encryption_wallet;
```

```
WRL_TYPE          WRL_PARAMETER
STATUS                                CON_ID
```

```
-----
FILE
OPEN_NO_MASTER_KEY                                3
```

```
SQL> conn sys as sysdba
Enter password:
Connected.
```

```
SQL> select WRL_TYPE,WRL_PARAMETER,status,con_id from v$encryption_wallet;
```

WRL_TYPE	WRL_PARAMETER	CON_ID
STATUS		
FILE	E:\ORACLE19\EWAL\tde\	1
OPEN		2
FILE		3
OPEN_NO_MASTER_KEY		

CONNECT TO PDB AND EXECUTE BELOW:

```
SQL> ADMINISTER KEY MANAGEMENT SET KEYSTORE OPEN FORCE KEYSTORE IDENTIFIED BY krishna123 CONTAINER=ALL;
```

keystore altered.

```
SQL> select WRL_TYPE,WRL_PARAMETER,status,con_id from v$encryption_wallet;
```

WRL_TYPE	WRL_PARAMETER	CON_ID
STATUS		
FILE	E:\ORACLE19\EWAL\tde\	1
OPEN		2
FILE		3
OPEN_NO_MASTER_KEY		

```
SQL> ADMINISTER KEY MANAGEMENT SET KEY FORCE KEYSTORE IDENTIFIED BY krishna123 with backup CONTAINER=ALL;
```

keystore altered.

```
SQL> select WRL_TYPE,WRL_PARAMETER,status,con_id from v$encryption_wallet;
```

WRL_TYPE	WRL_PARAMETER	CON_ID
STATUS		
FILE	E:\ORACLE19\EWAL\tde\	1
OPEN		2
FILE		3
OPEN		

```
SQL> show pdbs;
```

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

```
SQL> exit
```

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

```
PS E:\ORACLE19\ewal\tde> sqlplus
```

```
SQL*Plus: Release 19.0.0.0.0 - Production on Sun Dec 29 18:56:37 2024
Version 19.3.0.0.0
```

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

```
Enter user-name: / as sysdba
```

```
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	ORATSTPDB	READ WRITE	NO

```
SQL>
```

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

```
Session altered.
```

```
SQL> show pdbs;
```

CON_ID	CON_NAME	OPEN MODE	RESTRICTED
3	ORATSTPDB	READ WRITE	NO

```
SQL> select WRL_TYPE,WRL_PARAMETER,status,con_id from v$encryption_wallet;
```

```
WRL_TYPE
```

```
WRL_PARAMETER
```

```
STATUS
```

```
CON_ID
```

```
FILE
```

```
OPEN
```

```
3
```

```
SQL> col wrl_parameter for a60;
```

```
SQL> set lines 200;
```

```
SQL> /
```

```
WRL_TYPE
```

```
WRL_PARAMETER
```

```
STATUS
```

```
CON_ID
```

```
FILE
```

```
OPEN
```

```
3
```

```
SQL> col wrl_parameter for a20;
```

```
SQL> /
```

```
WRL_TYPE
```

```
WRL_PARAMETER
```

```
STATUS
```

```
CON_ID
```

FILE  
3

OPEN

SQL> select file\_name from dba\_data\_files;

FILE\_NAME

```
-----
E:\ORACLE19\ORACLEME\ORADATA\ORATST\22610124B9B0462FADB2D29CEF0D3BAE\DATAFI
LE\O1_MF_SYSTEM_MP6BG13P_.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\22610124B9B0462FADB2D29CEF0D3BAE\DATAFI
LE\O1_MF_SYSAUX_MP6BG145_.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\22610124B9B0462FADB2D29CEF0D3BAE\DATAFI
LE\O1_MF_UNDOTBS1_MP6BG145_.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\22610124B9B0462FADB2D29CEF0D3BAE\DATAFI
LE\O1_MF_USERS_MP6BGG2C_.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\22610124B9B0462FADB2D29CEF0D3BAE\DATAFI
LE\TEST01.DBF
```

SQL> show pdbs;

CON_ID	CON_NAME	OPEN MODE	RESTRICTED
3	ORATSTPDB	READ WRITE	NO

SQL> select tablespace\_name from dba\_data\_files;

TABLESPACE\_NAME

```
-----
SYSTEM
SYSAUX
UNDOTBS1
USERS
TEST
```

SQL> alter tablespace TEST encryption online using 'AES256' encrypt;

Tablespace altered.

SQL> select tablespace\_name from dba\_data\_files;

TABLESPACE\_NAME

```
-----
SYSTEM
SYSAUX
UNDOTBS1
USERS
TEST
```

SQL> select file\_name from dba\_data\_files;

FILE\_NAME

```
-----
E:\ORACLE19\ORACLEME\ORADATA\ORATST\22610124B9B0462FADB2D29CEF0D3BAE\DATAFI
LE\O1_MF_SYSTEM_MP6BG13P_.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\22610124B9B0462FADB2D29CEF0D3BAE\DATAFI
LE\O1_MF_SYSAUX_MP6BG145_.DBF
E:\ORACLE19\ORACLEME\ORADATA\ORATST\22610124B9B0462FADB2D29CEF0D3BAE\DATAFI
LE\O1_MF_UNDOTBS1_MP6BG145_.DBF
```

E:\ORACLE19\ORACLEME\ORADATA\ORATST\22610124B9B0462FADB2D29CEF0D3BAE\DATAFILE\O1\_MF\_USERS\_MP6BGG2C\_.DBF  
E:\ORACLE19\ORACLEME\ORADATA\ORATST\22610124B9B0462FADB2D29CEF0D3BAE\DATAFILE\O1\_MF\_TEST\_MQ3W45HD\_.DBF

**HAPPY LEARNING☺**

IDE