



**Advanced Product Service**

# **Oracle Database 11g Workshop I**

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**ORACLE®**

## 4. 데이터베이스 Instance 관리

- 초기화 파라미터 파일 확인

```
[orcl:~]$ . oraenv
```

```
ORACLE_SID = [orcl] ? orcl
```

```
The Oracle base for ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1 is /u01/app/oracle
```

```
[orcl:~]$ vi $ORACLE_HOME/sqlplus/admin/glogin.sql
```

```
set pagesize 100
```

```
set linesize 150
```

```
set sqlprompt "_USER'@'_CONNECT_IDENTIFIER>"
```

```
define _editor=vi
```

```
[orcl:~]$ sqlplus / as sysdba
```

```
SQL> SELECT instance_name, status
```

```
FROM v$instance ;
```

```
INSTANCE_NAME    STATUS
```

```
-----
```

orcl	OPEN
------	------

```
SQL> SELECT dbid, name, open_mode, log_mode
```

```
FROM v$database ;
```

```
DBID NAME          OPEN_MODE          LOG_MODE
```

```
-----
```

1343220851	ORCL	READ WRITE	NOARCHIVELOG
------------	------	------------	--------------

```
SQL> ! ps -ef | grep orcl
```

oracle	14864	1	0	23:30	?	00:00:00	ora_pmon_orcl
oracle	14872	1	0	23:30	?	00:00:00	ora_diag_orcl
oracle	14880	1	0	23:30	?	00:00:00	ora_mman_orcl
oracle	14882	1	0	23:30	?	00:00:00	ora_dbw0_orcl
oracle	14884	1	0	23:30	?	00:00:01	ora_lgwr_orcl
oracle	14886	1	0	23:30	?	00:00:00	ora_ckpt_orcl
oracle	14888	1	0	23:30	?	00:00:00	ora_smon_orcl
oracle	14890	1	0	23:30	?	00:00:00	ora_reco_orcl

```
...
```

```
SQL> SELECT name, value
```

```
FROM v$parameter
```

```
ORDER BY name ;
```

```
NAME
```

```
VALUE
```

```
-----
```

07_DICTIONARY_ACCESSIBILITY	FALSE
active_instance_count	
aq_tm_processes	0
archive_lag_target	0
asm_diskgroups	
asm_diskstring	
asm_power_limit	1
audit_file_dest	/u01/app/oracle/admin/orcl/adump
audit_sys_operations	FALSE
audit_syslog_level	

```
...
```

```
342 rows selected.
```

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```
SQL> SELECT name, value
        FROM v$pparameter
        WHERE value IS NOT NULL
        ORDER BY name ;
```

NAME	VALUE
audit_file_dest	/u01/app/oracle/admin/orcl/adump
audit_trail	db
compatible	11.2.0.0.0
control_files	+DATA/orcl/controlfile/current.261.815440115
control_files	+DATA/orcl/controlfile/current.260.815440115
db_block_size	8192
db_create_file_dest	+DATA
db_domain	example.com
db_name	orcl
db_recovery_file_dest	+FRA
db_recovery_file_dest_size	4039114752
diagnostic_dest	/u01/app/oracle
dispatchers	(PROTOCOL=TCP) (SERVICE=orclXDB)
memory_target	576716800
open_cursors	300
processes	150
remote_login_passwordfile	EXCLUSIVE
undo_tablespace	UNDOTBS1
18 rows selected.	

※ 전체의 parameter 중 실제 설정 값을 갖는 parameter 는 일부이며 Parameter File 에 기록 되어 있다.

- PFILE 과 SPFILE 확인

```
SQL> show parameter spfile
```

NAME	TYPE	VALUE
spfile	string	+DATA/orcl/spfileorcl.ora

```
SQL> ! ls -l $ORACLE_HOME/dbs
```

```
total 24
-rw-r----- 1 oracle oinstall 35 May 16 00:14 initorcl.ora
-rw-r----- 1 oracle oinstall 1536 May 14 23:16 orapworcl
...
```

```
SQL> ! cat $ORACLE_HOME/dbs/initorcl.ora
```

```
SPFILE='+DATA/orcl/spfileorcl.ora'
```

```
SQL> CREATE PFILE FROM SPFILE ;
```

File created.

```
SQL> CREATE SPFILE FROM PFILE ;
```

ERROR at line 1:

ORA-32002: cannot create SPFILE already being used by the instance

```
SQL> SHUTDOWN IMMEDIATE
```

Database closed.

Database dismounted.

ORACLE instance shut down.

```
SQL> CREATE SPFILE FROM PFILE ;
```

File created.

SQL> STARTUP

ORACLE instance started.  
Total System Global Area 577511424 bytes  
Fixed Size 1338000 bytes  
Variable Size 339740016 bytes  
Database Buffers 230686720 bytes  
Redo Buffers 5746688 bytes  
Database mounted.  
Database opened.

SQL> show parameter spfile

NAME	TYPE	VALUE
spfile	string	/u01/app/oracle/product/11.2.0/dbhome_1/dbs/spfileorcl.ora

SQL> ! ls -l \$ORACLE\_HOME/dbs

```
total 28
-rw-r----- 1 oracle oinstall 906 May 16 00:20 initorcl.ora
-rw-r----- 1 oracle oinstall 1536 May 14 23:16 orapworcl
-rw-r----- 1 oracle dba 2560 May 16 00:20 spfileorcl.ora
...
```

SQL> ! cat \$ORACLE\_HOME/dbs/initorcl.ora

```
*.audit_file_dest='/u01/app/oracle/admin/orcl/adump'
*.audit_trail='db'
*.compatible='11.2.0.0.0'
*.control_files='+DATA/orcl/controlfile/current.261.815440115','+DATA/orcl/controlfile/current.260.815440115'
*.db_block_size=8192
*.db_create_file_dest='+DATA'
*.db_domain='example.com'
*.db_name='orcl'
*.db_recovery_file_dest_size=4039114752
*.db_recovery_file_dest='+FRA'
*.diagnostic_dest='/u01/app/oracle'
*.dispatchers='(PROTOCOL=TCP) (SERVICE=orclXDB)'
*.memory_target=576716800
*.open_cursors=300
*.processes=150
*.remote_login_passwordfile='EXCLUSIVE'
*.undo_tablespace='UNDOTBS1'
```

SQL> ! cat \$ORACLE\_HOME/dbs/spfileorcl.ora

```
*.audit_file_dest='/u01/app/oracle/admin/orcl/adump'
*.audit_trail='db'
*.compatible='11.2.0.0.0'
*.control_files='+DATA/orcl/controlfile/current.261.815440115','+DATA/orcl/controlfile/current.260.815440115'
*.db_block_size=8192
*.db_create_file_dest='+DATA'
*.db_domain='example.com'
*.db_name='orcl'
*.db_recovery_file_dest_size=4039114752
*.db_recovery_file_dest='+FRA'
*.diagnostic_dest='/u01/app/oracle'
*.dispatchers='(PROTOCOL=TCP) (SERVICE=orclXDB)'
*.memory_target=576716800
*.open_cursors=300
*.processes=150
*.remote_login_passwordfile='EXCLUSIVE'
*.undo_tablespace='UNDOTBS1'
```

SQL> ALTER SYSTEM SET db\_recovery\_file\_dest\_size = 3G ;

System altered.

```
SQL> ! cat $ORACLE_HOME/dbs/initiorcl.ora
```

```
*.db_recovery_file_dest_size=4039114752
*.db_recovery_file_dest='+FRA'
...
```

```
SQL> ! cat $ORACLE_HOME/dbs/spfileorcl.ora
```

```
*.db_recovery_file_dest_size=3221225472
*.db_recovery_file_dest='+FRA'
...
```

- Parameter 확인

```
SQL> show parameter recovery
```

NAME	TYPE	VALUE
db_recovery_file_dest	string	+FRA
db_recovery_file_dest_size	big integer	3G
recovery_parallelism	integer	0

```
SQL> SELECT name, display_value
```

```
FROM v$parameter
```

```
WHERE name LIKE '%recovery%';
```

NAME	DISPLAY_VALUE
db_recovery_file_dest	+FRA
db_recovery_file_dest_size	3G
recovery_parallelism	0

```
SQL> SELECT name, display_value
```

```
FROM v$sppparameter
```

```
WHERE name LIKE '%recovery%';
```

NAME	DISPLAY_VALUE
db_recovery_file_dest	+FRA
db_recovery_file_dest_size	3G
recovery_parallelism	

```
SQL> SELECT name, display_value
```

```
FROM v$parameter
```

```
where name = 'control_files';
```

NAME	DISPLAY_VALUE
control_files	+DATA/orcl/controlfile/current .261.815440115, +DATA/orcl/con trolfile/current.260.815440115

```
SQL> SELECT name, display_value
```

```
FROM v$parameter2
```

```
where name = 'control_files';
```

NAME	DISPLAY_VALUE
control_files	+DATA/orcl/controlfile/current.261.815440115
control_files	+DATA/orcl/controlfile/current.260.815440115

- Parameter 변경

```
SQL> SELECT name, display_value, isdefault, isses_modifiable, issys_modifiable
        FROM v$parameter ;
```

NAME	DISPLAY_VALUE	ISDEFAULT	ISSES	ISSYS_MOD
lock_name_space		TRUE	FALSE	FALSE
processes	150	FALSE	FALSE	FALSE
sessions	248	TRUE	FALSE	FALSE
timed_statistics	TRUE	TRUE	TRUE	IMMEDIATE
timed_os_statistics	0	TRUE	TRUE	IMMEDIATE
statistics_level	TYPICAL	TRUE	TRUE	IMMEDIATE
resource_limit	FALSE	TRUE	FALSE	IMMEDIATE
license_max_sessions	0	TRUE	FALSE	IMMEDIATE
license_sessions_warning	0	TRUE	FALSE	IMMEDIATE
cpu_count	2	TRUE	FALSE	IMMEDIATE
shared_pool_size	0	TRUE	FALSE	IMMEDIATE
large_pool_size	0	TRUE	FALSE	IMMEDIATE
java_pool_size	0	TRUE	FALSE	IMMEDIATE
streams_pool_size	0	TRUE	FALSE	IMMEDIATE
...				

342 rows selected.

```
SQL> ALTER SESSION SET statistics_level = ALL ;
Session altered.
```

```
SQL> SELECT name, display_value
        FROM v$parameter
        where name = 'statistics_level' ;
```

NAME	DISPLAY_VALUE
statistics_level	ALL

```
SQL> SELECT name, display_value
        FROM v$system_parameter
        where name = 'statistics_level' ;
```

NAME	DISPLAY_VALUE
statistics_level	TYPICAL

```
SQL> ALTER SESSION SET large_pool_size = 20M ;
ERROR at line 1:
ORA-02096: specified initialization parameter is not modifiable with this option
```

```
SQL> ALTER SYSTEM SET large_pool_size = 20M ;
System altered.
```

```
SQL> show parameter large_pool_size
```

NAME	TYPE	VALUE
large_pool_size	big integer	20M

```
SQL> ALTER SYSTEM SET processes = 200 ;
ERROR at line 1:
ORA-02095: specified initialization parameter cannot be modified
SQL> ALTER SYSTEM SET processes = 200 SCOPE = SPFILE ;
System altered.
```

SQL> show parameter processes

NAME	TYPE	VALUE
aq_tm_processes	integer	0
db_writer_processes	integer	1
gcs_server_processes	integer	0
global_txn_processes	integer	1
job_queue_processes	integer	1000
log_archive_max_processes	integer	4
processes	integer	150

SQL> SELECT name, display\_value

FROM v\$pparameter

WHERE name = 'processes' ;

NAME	DISPLAY_VALUE
processes	200

SQL> STARTUP FORCE

ORACLE instance started.

Total System Global Area 577511424 bytes

Fixed Size 1338000 bytes

Variable Size 364905840 bytes

Database Buffers 205520896 bytes

Redo Buffers 5746688 bytes

Database mounted.

Database opened.

SQL> show parameter processes

NAME	TYPE	VALUE
aq_tm_processes	integer	0
db_writer_processes	integer	1
gcs_server_processes	integer	0
global_txn_processes	integer	1
job_queue_processes	integer	1000
log_archive_max_processes	integer	4
processes	integer	200

• Alert Log 확인

SQL> SELECT name, value

FROM v\$diag\_info ;

NAME	VALUE
Diag Enabled	TRUE
ADR Base	/u01/app/oracle
ADR Home	/u01/app/oracle/diag/rdbms/orcl/orcl
Diag Trace	/u01/app/oracle/diag/rdbms/orcl/orcl/trace
Diag Alert	/u01/app/oracle/diag/rdbms/orcl/orcl/alert
Diag Incident	/u01/app/oracle/diag/rdbms/orcl/orcl/incident
Diag Cdump	/u01/app/oracle/diag/rdbms/orcl/orcl/cdump
Health Monitor	/u01/app/oracle/diag/rdbms/orcl/orcl/hm
Default Trace File	/u01/app/oracle/diag/rdbms/orcl/orcl/trace/orcl_ora_29606.trc
Active Problem Count	0
Active Incident Count	0

```
SQL> ! tail /u01/app/oracle/diag/rdbms/orcl/orcl/trace/alert_orcl.log
Thu May 16 01:10:07 2013
SMCO started with pid=23, OS id=28249
Thu May 16 22:32:36 2013
Clearing Resource Manager plan via parameter
Thu May 16 22:32:39 2013
Setting Resource Manager plan SCHEDULER[0x3006]:DEFAULT_MAINTENANCE_PLAN via scheduler window
Setting Resource Manager plan DEFAULT_MAINTENANCE_PLAN via parameter
Starting background process VKRM
Thu May 16 22:32:39 2013
VKRM started with pid=40, OS id=28609
```

```
SQL> ALTER SYSTEM SET processes = 150 SCOPE = SPFILE ;
```

System altered.

```
SQL> ! tail /u01/app/oracle/diag/rdbms/orcl/orcl/trace/alert_orcl.log
```

```
Thu May 16 22:32:36 2013
Clearing Resource Manager plan via parameter
Thu May 16 22:32:39 2013
Setting Resource Manager plan SCHEDULER[0x3006]:DEFAULT_MAINTENANCE_PLAN via scheduler window
Setting Resource Manager plan DEFAULT_MAINTENANCE_PLAN via parameter
Starting background process VKRM
Thu May 16 22:32:39 2013
VKRM started with pid=40, OS id=28609
Thu May 16 22:44:25 2013
ALTER SYSTEM SET processes=150 SCOPE=SPFILE;
```

※ 별도의 터미널을 실행하여 Alert Log 파일은 모니터링 가능하도록 구성

```
[orcl:~]$ tail -F /u01/app/oracle/diag/rdbms/orcl/orcl/trace/alert_orcl.log
```

```
Thu May 16 22:32:39 2013
VKRM started with pid=40, OS id=28609
Thu May 16 22:44:25 2013
ALTER SYSTEM SET processes=150 SCOPE=SPFILE;
...
```

• *Data Dictionary & Dynamic Performance View* 종류 확인

```
SQL> SELECT *
```

```
FROM dictionary ;
```

TABLE_NAME	COMMENTS
DBA_ALERT_ARGUMENTS	Message Id and arguments of outstanding alerts
DBA_ALERT_HISTORY	Description on alert history
DBA_ALL_TABLES	Description of all object and relational tables in the database
DBA_APPLY	Details about the apply process
DBA_APPLY_CHANGE_HANDLERS	Details about apply change handler
DBA_APPLY_CONFLICT_COLUMNS	Details about conflict resolution
DBA_APPLY_DML_HANDLERS	Details about the dml handler
...	
V\$ACCESS	Synonym for V_\$ACCESS
V\$ACTIVE_INSTANCES	Synonym for V_\$ACTIVE_INSTANCES
V\$ACTIVE_SERVICES	Synonym for V_\$ACTIVE_SERVICES
V\$ACTIVE_SESSION_HISTORY	Synonym for V_\$ACTIVE_SESSION_HISTORY
V\$ACTIVE_SESS_POOL_MTH	Synonym for V_\$ACTIVE_SESS_POOL_MTH
V\$ADVISOR_PROGRESS	Synonym for V_\$ADVISOR_PROGRESS

2553 rows selected.

```
SQL> exit
```



## 5. ASM Instance 관리

### • ASM Instance 확인

```
[orcl:~]$ . oraenv
```

```
ORACLE_SID = [orcl] ? +ASM
```

```
The Oracle base for ORACLE_HOME=/u01/app/oracle/product/11.2.0/grid is /u01/app/oracle
```

```
[+ASM:~]$ vi $ORACLE_HOME/sqlplus/admin/glogin.sql
```

```
set pagesize 100
```

```
set linesize 150
```

```
set sqlprompt "_USER'@'_CONNECT_IDENTIFIER>"
```

```
define _editor=vi
```

```
[+ASM:~]$ sqlplus / as sysasm
```

```
SQL> SELECT instance_name, status
```

```
FROM v$instance ;
```

INSTANCE_NAME	STATUS
---------------	--------

+ASM	STARTED
------	---------

```
SQL> ! ps -ef | grep +ASM
```

oracle	9770	1	0	20:28	?	00:00:00	asm_pmon_+ASM
oracle	9782	1	0	20:28	?	00:00:01	asm_dia0_+ASM
oracle	9786	1	0	20:28	?	00:00:00	asm_dbw0_+ASM
oracle	9788	1	0	20:28	?	00:00:00	asm_lgwr_+ASM
oracle	9790	1	0	20:28	?	00:00:00	asm_ckpt_+ASM
oracle	9792	1	0	20:28	?	00:00:00	asm_smon_+ASM
oracle	9794	1	0	20:28	?	00:00:00	asm_rbal_+ASM
oracle	9796	1	0	20:28	?	00:00:00	asm_gmon_+ASM
oracle	9798	1	0	20:28	?	00:00:00	asm_mmon_+ASM
oracle	9800	1	0	20:28	?	00:00:01	asm_mml_+ASM
oracle	14822	1	0	20:47	?	00:00:00	asm_asmb_+ASM

```
...
```

```
SQL> SELECT name, value
```

```
FROM v$parameter
```

```
ORDER BY name ;
```

NAME	VALUE
asm_diskgroups	FRA
asm_diskstring	
asm_power_limit	1
db_unique_name	+ASM
diagnostic_dest	/u01/app/oracle
file_mapping	FALSE
filesystemio_options	none
ifile	
instance_name	+ASM
instance_type	asm
large_pool_size	12582912

```
...
```

```
74 rows selected.
```

```
SQL> show parameter spfile
```

NAME	TYPE	VALUE
spfile	string	+DATA/asm/asmparameterfile/registry.253.815439359

Chong Ha, Ryu

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<http://oukr.tistory.com>

```
SQL> SELECT name, value
        FROM v$pparameter
        WHERE value IS NOT NULL
        ORDER BY name ;
```

NAME	VALUE
asm_diskgroups	FRA
asm_power_limit	1
diagnostic_dest	/u01/app/oracle
instance_type	asm
large_pool_size	12582912
remote_login_passwordfile	EXCLUSIVE

6 rows selected.

```
SQL> SELECT name, value
        FROM v$diag_info ;
```

NAME	VALUE
Diag Enabled	TRUE
ADR Base	/u01/app/oracle
ADR Home	/u01/app/oracle/diag/asm/+asm/+ASM
Diag Trace	/u01/app/oracle/diag/asm/+asm/+ASM/trace
Diag Alert	/u01/app/oracle/diag/asm/+asm/+ASM/alert
Diag Incident	/u01/app/oracle/diag/asm/+asm/+ASM/incident
Diag Cdump	/u01/app/oracle/diag/asm/+asm/+ASM/cdump
Health Monitor	/u01/app/oracle/diag/asm/+asm/+ASM/hm
Default Trace File	/u01/app/oracle/diag/asm/+asm/+ASM/trace/+ASM_ora_31495.trc
Active Problem Count	0
Active Incident Count	0

11 rows selected.

※ 별도의 터미널을 실행하여 Alert Log 파일은 모니터링 가능하도록 구성

```
[+ASM:~]$ tail -F /u01/app/oracle/diag/asm/+asm/+ASM/trace/alert_+ASM.log
NOTE: check client alert log.
NOTE: Process state recorded in trace file /u01/app/oracle/diag/asm/+asm/+ASM/trace/+ASM_ora_14899.trc
Thu May 16 00:14:26 2013
NOTE: ASM client orcl:orcl disconnected unexpectedly.
NOTE: check client alert log.
NOTE: Process state recorded in trace file /u01/app/oracle/diag/asm/+asm/+ASM/trace/+ASM_ora_23238.trc
Thu May 16 01:04:58 2013
NOTE: ASM client orcl:orcl disconnected unexpectedly.
NOTE: check client alert log.
NOTE: Process state recorded in trace file /u01/app/oracle/diag/asm/+asm/+ASM/trace/+ASM_ora_24820.trc
...
```

• Data Dictionary & Dynamic Performance View 종류 확인

```
SQL> SELECT * FROM dictionary ;
```

```
ERROR at line 1:
ORA-01219: database not open: queries allowed on fixed tables/views only
```

※ ASM Instance 는 Dictionary Table 이 존재하지 않으므로 Dictionary View 의 접근은 불가능하다. Dynamic Performance View 는 이용 가능하며 ASM Instance 와 관련된 뷰는 다음과 같다.

V\$ASM_ACFSSNAPSHOTS	V\$ASM_DISK_STAT
V\$ASM_ACFSVOLUMES	V\$ASM_FILE
V\$ASM_ACFSENCRYPTION_INFO	V\$ASM_FILESYSTEM

V\$ASM_ACFS_SECURITY_INFO	V\$ASM_OPERATION
V\$ASM_ALIAS	V\$ASM_TEMPLATE
V\$ASM_ATTRIBUTE	V\$ASM_USER
V\$ASM_CLIENT	V\$ASM_USERGROUP
V\$ASM_DISK	V\$ASM_USERGROUP_MEMBER
V\$ASM_DISKGROUP	V\$ASM_VOLUME
V\$ASM_DISKGROUP_STAT	V\$ASM_VOLUME_STAT
V\$ASM_DISK_IOSTAT	

※ 필요한 view 의 접근은 RDBMS Instance 를 통해서도 접근 가능

참고 : [http://www.oracle.com/pls/db112/catalog\\_views#index-V\\$A](http://www.oracle.com/pls/db112/catalog_views#index-V$A)

SQL> SELECT name, state, type, total\_mb

FROM v\$asm\_diskgroup ;

NAME	STATE	TYPE	TOTAL_MB
DATA	MOUNTED	NORMAL	9216
FRA	MOUNTED	EXTERN	9216

• ASM Instance 시작 및 종료 수행

SQL> ! ps -ef | grep orcl

```
oracle 2933 1 0 23:42 ? 00:00:00 ora_pmon_orcl
oracle 2941 1 0 23:42 ? 00:00:00 ora_diag_orcl
oracle 2952 1 0 23:42 ? 00:00:00 ora_dbw0_orcl
oracle 2954 1 0 23:42 ? 00:00:00 ora_lgwr_orcl
oracle 2956 1 0 23:42 ? 00:00:00 ora_ckpt_orcl
oracle 2958 1 0 23:42 ? 00:00:00 ora_smon_orcl
oracle 2960 1 0 23:42 ? 00:00:00 ora_reco_orcl
...
```

※ 현재 ASM Instance 와 연결 된 Database 가 존재 함

SQL> SHUTDOWN NORMAL

ORA-15097: cannot SHUTDOWN ASM instance with connected client

SQL> SHUTDOWN TRANSACTIONAL

ORA-15097: cannot SHUTDOWN ASM instance with connected client

SQL> SHUTDOWN IMMEDIATE

ORA-15097: cannot SHUTDOWN ASM instance with connected client

SQL> SHUTDOWN ABORT

ASM instance shutdown

SQL> ! ps -ef | grep orcl

...

※ RDBMS Instance 도 함께 종료 됨 (비정상 종료)

SQL> STARTUP

ASM instance started

Total System Global Area 284565504 bytes

Fixed Size 1336036 bytes

Variable Size 258063644 bytes

ASM Cache 25165824 bytes

ASM diskgroups mounted

ASM diskgroups volume enabled

```
SQL> SELECT name, state, type, total_mb
```

```
FROM v$asm_diskgroup ;
```

NAME	STATE	TYPE	TOTAL_MB
DATA	MOUNTED	NORMAL	9216
FRA	MOUNTED	EXTERN	9216

```
SQL> exit
```

```
[+ASM:~]$ . oraenv
```

```
ORACLE_SID = [+ASM] ? orcl
```

```
The Oracle base for ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1 is /u01/app/oracle
```

```
[orcl:~]$ sqlplus / as sysdba
```

※ Oracle Restart 가 활성화 되어 있다면 RDBMS Instance 는 자동으로 재 시작 되어 있을 수 있으며 아직 DB 가  
오픈되어 있지 않다면 수동으로 STARTUP 수행

```
SQL> STARTUP
```

```
...
```

```
SQL> SELECT instance_name, status
```

```
FROM v$instance ;
```

INSTANCE_NAME	STATUS
orcl	OPEN

```
SQL> SELECT dbid, name, open_mode, log_mode
```

```
FROM v$database ;
```

DBID	NAME	OPEN_MODE	LOG_MODE
1343220851	ORCL	READ WRITE	NOARCHIVELOG

```
SQL> exit
```

※ 실습을 위해 터미널을 두 개 열어 각각 ORACLE\_SID 를 orcl, +ASM 으로 설정한 후 인스턴스에 연결한다.

- terminal 1

```
[orcl:~]$ . oraenv
```

```
ORACLE_SID = [orcl] ? orcl
```

```
The Oracle base for ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1 is /u01/app/oracle
```

```
[orcl:~]$ sqlplus / as sysdba
```

```
SYS@orcl>
```

- terminal 2

```
[orcl:~]$ . oraenv
```

```
ORACLE_SID = [orcl] ? +ASM
```

```
The Oracle base for ORACLE_HOME=/u01/app/oracle/product/11.2.0/grid is /u01/app/oracle
```

```
[+ASM:~]$ sqlplus / as sysasm
```

```
SYS@+ASM>
```

• ASM Disk Group 정보 확인

SYS@orcl> SELECT group\_number, instance\_name, db\_name, status

FROM v\$asm\_client ;

GROUP_NUMBER	INSTANCE_NAME	DB_NAME	STATUS
1	+ASM	orcl	CONNECTED

SYS@orcl> SELECT group\_number, name, state, type, total\_mb, free\_mb

FROM v\$asm\_diskgroup ;

GROUP_NUMBER	NAME	STATE	TYPE	TOTAL_MB	FREE_MB
1	DATA	CONNECTED	NORMAL	9216	5341
2	FRA	MOUNTED	EXTERN	9216	9158

SYS@orcl> SELECT group\_number, disk\_number, name, failgroup, total\_mb, free\_mb, mode\_status

FROM v\$asm\_disk ;

GROUP_NUMBER	DISK_NUMBER	NAME	FAILGROUP	TOTAL_MB	FREE_MB	MODE_ST
1	0	ASMDISK01	ASMDISK01	2304	1340	ONLINE
1	1	ASMDISK02	ASMDISK02	2304	1332	ONLINE
1	2	ASMDISK03	ASMDISK03	2304	1334	ONLINE
1	3	ASMDISK04	ASMDISK04	2304	1335	ONLINE
2	0	ASMDISK05	ASMDISK05	2304	2288	ONLINE
2	1	ASMDISK06	ASMDISK06	2304	2291	ONLINE
2	2	ASMDISK07	ASMDISK07	2304	2289	ONLINE
2	3	ASMDISK08	ASMDISK08	2304	2290	ONLINE
0	12			0	0	ONLINE
0	11			0	0	ONLINE
0	10			0	0	ONLINE
0	9			0	0	ONLINE
0	8			0	0	ONLINE

13 rows selected.

SYS@orcl> SELECT file\_id, file\_name, ROUND(bytes/1024/1024) AS MB, tablespace\_name

FROM dba\_data\_files ;

FILE_ID	FILE_NAME	MB	TABLESPACE_NAME
1	+DATA/orcl/datafile/system.256.815439969	690	SYSTEM
2	+DATA/orcl/datafile/sysaux.257.815439971	520	SYSAUX
3	+DATA/orcl/datafile/undotbs1.258.815439971	110	UNDOTBS1
4	+DATA/orcl/datafile/users.259.815439971	5	USERS
5	+DATA/orcl/datafile/example.269.815440195	100	EXAMPLE

SYS@orcl> CREATE TABLESPACE TBS1

DATAFILE '+DATA' SIZE 50M ;

Tablespace created.

SYS@orcl> SELECT file\_id, file\_name, bytes/1024/1024 AS MB, tablespace\_name

FROM dba\_data\_files ;

FILE_ID	FILE_NAME	MB	TABLESPACE_NAME
1	+DATA/orcl/datafile/system.256.815439969	690	SYSTEM
2	+DATA/orcl/datafile/sysaux.257.815439971	520	SYSAUX
3	+DATA/orcl/datafile/undotbs1.258.815439971	110	UNDOTBS1
4	+DATA/orcl/datafile/users.259.815439971	5	USERS
5	+DATA/orcl/datafile/example.269.815440195	100	EXAMPLE
6	+DATA/orcl/datafile/tbs1.271.815617803	50	TBS1

SYS@orcl> SELECT group\_number, name, state, type, total\_mb, free\_mb

FROM v\$asm\_diskgroup ;

GROUP_NUMBER	NAME	STATE	TYPE	TOTAL_MB	FREE_MB
1	DATA	CONNECTED	NORMAL	9216	5236
2	FRA	MOUNTED	EXTERN	9216	9158

SYS@orcl> SELECT group\_number, disk\_number, name, failgroup, total\_mb, free\_mb, mode\_status

FROM v\$asm\_disk

WHERE group\_number = 1 ;

GROUP_NUMBER	DISK_NUMBER	NAME	FAILGROUP	TOTAL_MB	FREE_MB	MODE_ST
1	0	ASMDISK01	ASMDISK01	2304	1314	ONLINE
1	1	ASMDISK02	ASMDISK02	2304	1306	ONLINE
1	2	ASMDISK03	ASMDISK03	2304	1307	ONLINE
1	3	ASMDISK04	ASMDISK04	2304	1309	ONLINE

# • ASM Fast Mirror Resync 확인

SYS@orcl> CREATE TABLE t1

TABLESPACE tbs1

AS SELECT \* FROM sh.sales ;

Table created.

SYS@orcl> ALTER DISKGROUP DATA OFFLINE DISK ASMDISK02 DROP AFTER 0.0 h ;

ALTER DISKGROUP DATA OFFLINE DISK ASMDISK02 DROP AFTER 0.0 h

\*

ERROR at line 1:

ORA-15000: command disallowed by current instance type

SYS@+ASM> ALTER DISKGROUP DATA OFFLINE DISK ASMDISK02 DROP AFTER 0.0 h ;

ALTER DISKGROUP DATA OFFLINE DISK ASMDISK02 DROP AFTER 0.0 h

\*

ERROR at line 1:

ORA-15032: not all alterations performed

ORA-15283: ASM operation requires compatible.rdbms of 11.1.0.0.0 or higher

SYS@+ASM> SELECT name, compatibility, database\_compatibility

FROM v\$asm\_diskgroup ;

NAME	COMPATIBILITY	DATABASE_COMPATIBILI
DATA	11.2.0.0.0	10.1.0.0.0
FRA	11.2.0.0.0	10.1.0.0.0

SYS@+ASM> ALTER DISKGROUP DATA SET ATTRIBUTE 'compatible.rdbms' = '11.2.0.0.0' ;

Diskgroup altered.

SYS@+ASM> SELECT name, compatibility, database\_compatibility

FROM v\$asm\_diskgroup ;

NAME	COMPATIBILITY	DATABASE_COMPATIBILI
DATA	11.2.0.0.0	11.2.0.0.0
FRA	11.2.0.0.0	10.1.0.0.0

※ ASMDISK 의 오프라인을 수행한다. 단, 지정 시간이 지나면 디스크 삭제를 진행 (리밸런싱 수행 됨)

SYS@+ASM> ALTER DISKGROUP DATA OFFLINE DISK ASMDISK02 DROP AFTER 0.0 h ;

Diskgroup altered.

SYS@+ASM> SELECT group\_number, name, mount\_status, mode\_status, free\_mb

FROM v\$asm\_disk

WHERE group\_number = 1 ;

GROUP_NUMBER	NAME	MOUNT_S	MODE_ST	FREE_MB
1	ASMDISK01	CACHED	ONLINE	1312
1	ASMDISK02	MISSING	OFFLINE	1305
1	ASMDISK03	CACHED	ONLINE	1305
1	ASMDISK04	CACHED	ONLINE	1308

SYS@+ASM> /

GROUP_NUMBER	NAME	MOUNT_S	MODE_ST	FREE_MB
1	ASMDISK01	CACHED	ONLINE	1036
1	ASMDISK03	CACHED	ONLINE	1038
1	ASMDISK04	CACHED	ONLINE	1038
1	_DROPPED_0001_DATA	MISSING	OFFLINE	2117

SYS@+ASM> /

GROUP_NUMBER	NAME	MOUNT_S	MODE_ST	FREE_MB
1	ASMDISK01	CACHED	ONLINE	975
1	ASMDISK03	CACHED	ONLINE	979
1	ASMDISK04	CACHED	ONLINE	974

SYS@+ASM> SELECT group\_number, name, state, type, total\_mb, free\_mb

FROM v\$asm\_diskgroup ;

GROUP_NUMBER	NAME	STATE	TYPE	TOTAL_MB	FREE_MB
1	DATA	MOUNTED	NORMAL	6912	2928
2	FRA	MOUNTED	EXTERN	9216	9158

※ DATA Disk Group 의 ASMDISK 가 삭제 되었으나 미리링이 되고 있다면 테이블의 작업은 진행 가능

SYS@orcl> DELETE t1 WHERE rownum <= 100000 ;

100000 rows deleted.

SYS@orcl> COMMIT ;

Commit complete.

- 삭제된 ASMDISK 를 다시 추가 할 수 있도록 재 생성 진행

[orcl:~]\$ su -

Password: oracle

[root@edydr1p0 ~]# oracleasm listdisks

ASMDISK01  
ASMDISK02  
ASMDISK03  
ASMDISK04  
ASMDISK05  
ASMDISK06  
ASMDISK07  
ASMDISK08  
ASMDISK09  
ASMDISK10  
ASMDISK11  
ASMDISK12  
ASMDISK13

```
[root@edydr1p0 ~]# oracleasm deletedisk ASMDISK02
Clearing disk header: done
Dropping disk: done
[root@edydr1p0 ~]# oracleasm createdisk ASMDISK02 /dev/xvdc
Writing disk header: done
Instantiating disk: done
[root@edydr1p0 ~]# exit
```

```
SYS@+ASM> ALTER DISKGROUP DATA ADD DISK 'ORCL:ASMDISK02' SIZE 2304 M REBALANCE POWER 11 ;
Diskgroup altered.
```

```
SYS@+ASM> SELECT group_number, name, mount_status, mode_status, free_mb
FROM v$asm_disk
WHERE group_number = 1 ;
```

GROUP_NUMBER	NAME	MOUNT_S	MODE_ST	FREE_MB
1	ASMDISK01	CACHED	ONLINE	1306
1	ASMDISK03	CACHED	ONLINE	1306
1	ASMDISK04	CACHED	ONLINE	1306
1	ASMDISK02	CACHED	ONLINE	1312

※ Alert Log 파일 안의 내용이며 리밸런싱의 수행 과정 확인 가능

```
Fri May 17 01:15:40 2013
...
SUCCESS: ALTER DISKGROUP DATA ADD DISK 'ORCL:ASMDISK02' SIZE 2304 M REBALANCE POWER 11
Starting background process ARB0
Starting background process ARB1
Fri May 17 01:15:48 2013
ARB0 started with pid=20, OS id=11089
Starting background process ARB2
Fri May 17 01:15:48 2013
ARB1 started with pid=21, OS id=11091
Starting background process ARB3
...
NOTE: assigning ARB0 to group 1/0x6d4c46c0 (DATA)
NOTE: assigning ARB1 to group 1/0x6d4c46c0 (DATA)
...
Fri May 17 01:19:21 2013
NOTE: stopping process ARB2
NOTE: stopping process ARB0
SUCCESS: rebalance completed for group 1/0x6d4c46c0 (DATA)
...
SUCCESS: refreshed membership for 1/0x6d4c46c0 (DATA)
```

※ 다음의 명령을 이용하여 위의 실습을 반복 테스트 한다.

```
SYS@+ASM> ALTER DISKGROUP DATA OFFLINE DISK ASMDISK02 DROP AFTER 3.6 h ;
SYS@+ASM> ALTER DISKGROUP DATA ONLINE DISK ASMDISK02 ;
```

ASMDISK02 디스크를 오프라인 시켜도 지정된 시간이 되기 전에는 리밸런싱은 수행되지 않으며 디스크의 상태는 오프라인으로 변경 된다. 삭제된 디스크는 아니므로 다시 온라인 상태로만 바꾸어 주면 필요한 최소한의 영역만 리밸런싱이 수행 된다.



• ASM Disk Group 생성 및 삭제

```
SYS@+ASM> CREATE DISKGROUP dgroupA NORMAL REDUNDANCY
          FAILGROUP ctrl1
          DISK 'ORCL:ASMDISK09' NAME DISK09 SIZE 2304 M ,
          'ORCL:ASMDISK10' NAME DISK10 SIZE 2304 M
          FAILGROUP ctrl2
          DISK 'ORCL:ASMDISK11' NAME DISK11 SIZE 2304 M ,
          'ORCL:ASMDISK12' NAME DISK12 SIZE 2304 M ;
```

Diskgroup created.

```
SYS@+ASM> SELECT group_number, name, state, type, total_mb, free_mb
          FROM v$asm_diskgroup ;
```

GROUP_NUMBER	NAME	STATE	TYPE	TOTAL_MB	FREE_MB
1	DATA	MOUNTED	NORMAL	9216	5230
2	FRA	MOUNTED	EXTERN	9216	9158
3	DGROUPA	MOUNTED	NORMAL	9216	9110

```
SYS@+ASM> DROP DISKGROUP dgroupA INCLUDING CONTENTS ;
```

Diskgroup dropped.

• ASM Cluster File System 구성

```
[orcl:~]$ su -
```

Password: **oracle**

```
[root@edydr1p0 ~]# lsmod | grep oracle
```

```
oracleacfs      787460  0
oracleadvn      177792  0
oracleoks       226656  2 oracleacfs,oracleadvn
oracleasm       46100   1
```

※ ASM 드라이버가 로드 되지 않았을 경우

```
[root@edydr1p0 ~]# lsmod | grep oracle
```

```
oracleasm       46100   1
```

```
[root@edydr1p0 ~]# /u01/app/oracle/product/11.2.0/grid/bin/acfsload start -s
```

```
[root@edydr1p0 ~]# lsmod | grep oracle
```

```
oracleacfs      787460  0
oracleadvn      177792  0
oracleoks       226656  2 oracleacfs,oracleadvn
oracleasm       46100   1
```

```
[root@edydr1p0 ~]# vi /etc/init.d/acfsload
```

```
#!/bin/sh
```

```
# chkconfig: 2345 30 21
```

```
# description: Load Oracle ACFS drivers at system boot
```

```
/u01/app/oracle/product/11.2.0/grid/bin/acfsload start -s
```

※ 위의 내용 추가

```
[root@edydr1p0 ~]# chmod u+x /etc/init.d/acfsload
[root@edydr1p0 ~]# chkconfig --add acfsload
[root@edydr1p0 ~]# chkconfig --list acfsload
acfsload      0:off   1:off   2:on    3:on    4:on    5:on    6:off
[root@edydr1p0 ~]# exit
```

```
[orcl:~]$ . oraenv
ORACLE_SID = [orcl] ? +ASM
The Oracle base for ORACLE_HOME=/u01/app/oracle/product/11.2.0/grid is /u01/app/oracle
[+ASM:~]$ sqlplus / as sysasm
```

```
SYS@+ASM> CREATE DISKGROUP acfs EXTERNAL REDUNDANCY
```

```
DISK 'ORCL:ASMDISK09'
```

```
DISK 'ORCL:ASMDISK10'
```

```
DISK 'ORCL:ASMDISK11'
```

```
ATTRIBUTE
```

```
'compatible.rdbms' = '11.2.0.0.0',
```

```
'compatible.asm' = '11.2.0.0.0',
```

```
'compatible.advm' = '11.2.0.0.0' ;
```

```
Diskgroup created.
```

```
SYS@+ASM> exit
```

```
[+ASM:~]$ asmcmd
```

```
ASMCMD> lsdg
```

State	Type	Rebal	Sector	Block	AU	Total_MB	Free_MB	Req_mir_free_MB	Usable_file_MB	Offline_disks	Voting_files	Name
MOUNTED	EXTERN	N	512	4096	1048576	6912	6856	0	6856	0	N	ACFS/
MOUNTED	NORMAL	N	512	4096	1048576	9216	5230	998	2116	0	N	DATA/
MOUNTED	EXTERN	N	512	4096	1048576	9216	9158	0	9158	0	N	FRA/

```
ASMCMD> volinfo -a
```

```
no volumes found
```

```
ASMCMD> volcreate -G ACFS -s 4G volume1
```

```
ASMCMD> volinfo -a
```

```
Diskgroup Name: ACFS
Volume Name: VOLUME1
Volume Device: /dev/asm/volume1-90
State: ENABLED
Size (MB): 4096
Resize Unit (MB): 256
Redundancy: UNPROT
Stripe Columns: 4
Stripe Width (K): 128
Usage:
Mountpath:
```

```
ASMCMD> exit
```

```
[+ASM:~]$ su -
```

```
Password: oracle
```

```
[root@edydr1p0 ~]# mkdir -p /u02/acfsmounts
```

```

[root@edydr1p0 ~]# mkfs -t acfs -b 4k /dev/asm/volume1-90
mkfs.acfs: version                = 11.2.0.1.0.0
mkfs.acfs: on-disk version        = 39.0
mkfs.acfs: volume                 = /dev/asm/volume1-90
mkfs.acfs: volume size            = 4294967296
mkfs.acfs: Format complete.

[root@edydr1p0 ~]# mount -t acfs /dev/asm/volume1-90 /u02/acfsmounts

[root@edydr1p0 ~]# df -h
Filesystem                Size      Used Avail Use% Mounted on
/dev/mapper/VolGroup00-LogVol100
    190G    44G   137G   25% /
/dev/sda1                  99M     18M    76M   20% /boot
tmpfs                     1014M    506M   508M   50% /dev/shm
/dev/asm/volume1-90       4.0G     45M    4.0G    2% /u02/acfsmounts

[root@edydr1p0 ~]# acfsutil registry -a /dev/asm/volume1-90 /u02/acfsmounts
acfsutil registry: mount point /u02/acfsmounts successfully added to Oracle Registry

[root@edydr1p0 ~]# acfsutil info fs
/u02/acfsmounts
  ACFS Version: 11.2.0.1.0.0
  flags:        MountPoint,Available
  mount time:   Fri May 17 03:20:59 2013
  volumes:      1
  total size:   4294967296
  total free:   4248444928
  primary volume: /dev/asm/volume1-90
    label:
    flags:      Primary,Available,ADVM
    on-disk version: 39.0
    allocation unit: 4096
    major, minor: 252, 46081
    size:        4294967296
    free:        4248444928
    ADVM diskgroup ACFS
    ADVM resize increment: 268435456
    ADVM redundancy: unprotected
    ADVM stripe columns: 4
    ADVM stripe width: 131072
  number of snapshots: 0
  snapshot space usage: 0

[root@edydr1p0 ~]# chown oracle:oinstall /u02/acfsmounts

[root@edydr1p0 ~]# ls -al /u02/acfsmounts
total 76
drwxr-xr-x 4 oracle oinstall 4096 May 17 02:44 .
drwxrwxr-x 3 oracle oinstall 4096 May 17 02:42 ..
drwxr-xr-x 5 root  root      4096 May 17 02:44 .ACFS
drwx----- 2 root  root      65536 May 17 02:44 lost+found

[root@edydr1p0 ~]# exit

[+ASM:~]$ cd /u02/acfsmounts

[+ASM:acfsmounts]$ cp $ORACLE_HOME/dbs/init* .

[+ASM:acfsmounts]$ ls -al
total 80
drwxr-xr-x 4 oracle oinstall 4096 May 17 03:02 .
drwxrwxr-x 3 oracle oinstall 4096 May 17 02:42 ..
drwxr-xr-x 5 root  root      4096 May 17 02:44 .ACFS
-rw-r--r-- 1 oracle oinstall 2851 May 17 03:02 init.ora
drwx----- 2 root  root      65536 May 17 02:44 lost+found

```

• ASMCMD 사용

[+ASM:~]\$ asmcmd

ASMCMD> help

...

commands:

-----  
md\_backup, md\_restore  
lsattr, setattr  
cd, cp, du, find, help, ls, lsct, lsdg, lsof, mkalias  
mkdir, pwd, rm, ralias  
chdg, chkdg, dropdg, iostat, lsdsd, lsod, mkdg, mount  
offline, online, rebal, remap, umount  
dsget, dsset, lsop, shutdown, spbackup, spcopy, spget  
spmove, spset, startup  
chtmpl, lstmpl, mktmpl, rmtmpl  
chgrp, chmod, chown, groups, grpmod, lsgrp, lspwusr, lsusr  
mkgrp, mkusr, orapwusr, passwd, rmgrp, rmusr  
volcreate, voldelete, voldisable, volenable, volinfo  
volresize, volset, volstat

ASMCMD> ls

ACFS/  
DATA/  
FRA/

ASMCMD> cd +DATA/ORCL/DATAFILE

ASMCMD> ls -l

Type	Redund	Striped	Time	Sys	Name
DATAFILE	MIRROR	COARSE	MAY 16 23:00:00	Y	EXAMPLE.269.815440195
DATAFILE	MIRROR	COARSE	MAY 17 00:00:00	Y	SYS_AUX.257.815439971
DATAFILE	MIRROR	COARSE	MAY 16 23:00:00	Y	SYSTEM.256.815439969
DATAFILE	MIRROR	COARSE	MAY 17 00:00:00	Y	TBS1.271.815617803
DATAFILE	MIRROR	COARSE	MAY 16 23:00:00	Y	UNDOTBS1.258.815439971
DATAFILE	MIRROR	COARSE	MAY 16 23:00:00	Y	USERS.259.815439971

ASMCMD> cd +DATA/ORCL/CONTROLFILE

ASMCMD> ls -l

Type	Redund	Striped	Time	Sys	Name
CONTROLFILE	HIGH	FINE	MAY 16 23:00:00	Y	Current.260.815440115
CONTROLFILE	HIGH	FINE	MAY 16 23:00:00	Y	Current.261.815440115

ASMCMD> cp Current.260.815440115 /tmp

copying +DATA/ORCL/CONTROLFILE/Current.260.815440115 -> /tmp/Current.260.815440115

ASMCMD> rm Current.260.815440115

ORA-15032: not all alterations performed

ORA-15028: ASM file '+DATA/ORCL/CONTROLFILE/Current.260.815440115' not dropped; currently being accessed (DBD ERROR: OCISstmtExecute)

ASMCMD> lsdg

State	Type	Rebal	Sector	Block	AU	Total_MB	Free_MB	Req_mir_free_MB	Usable_file_MB	Offline_disks	Voting_files	Name
MOUNTED	EXTERN	N	512	4096	1048576	6912	2757	0	2757	0	N	ACFS/
MOUNTED	NORMAL	N	512	4096	1048576	9216	5230	998	2116	0	N	DATA/
MOUNTED	EXTERN	N	512	4096	1048576	9216	9158	0	9158	0	N	FRA/

ASMCMD> mkdg <dg name="DATA2" redundancy="external"> <disk string="ORCL:ASMDISK12" /> <disk string="ORCL:ASMDISK13" /> </dg>

ASMCMD> lsdg

State	Type	Rebal	Sector	Block	AU	Total_MB	Free_MB	Req_mir_free_MB	Usable_file_MB	Offline_disks	Voting_files	Name
MOUNTED	EXTERN	N	512	4096	1048576	6912	2757	0	2757	0	N	ACFS/
MOUNTED	NORMAL	N	512	4096	1048576	9216	5230	998	2116	0	N	DATA/
MOUNTED	EXTERN	N	512	4096	1048576	4608	4556	0	4556	0	N	DATA2/
MOUNTED	EXTERN	N	512	4096	1048576	9216	9158	0	9158	0	N	FRA/

```
ASMCMD> dropdg DATA2
```

```
ASMCMD> exit
```

• Oracle Restart 재//여

```
[+ASM:~]$ cat /etc/inittab
```

```
...
# Run xdm in runlevel 5
x:5:respawn:/etc/X11/prefdm -nodaemon
h1:35:respawn:/etc/init.d/init.ohasd run >/dev/null 2>&1 </dev/null
```

```
[+ASM:~]$ crsctl stat resource -t
```

NAME	TARGET	STATE	SERVER	STATE_DETAILS
Local Resources				
ora.ACFS.dg	ONLINE	ONLINE	edydr 1p0	
ora.DATA.dg	ONLINE	ONLINE	edydr 1p0	
ora.FRA.dg	ONLINE	ONLINE	edydr 1p0	
ora.LISTENER.lsnr	ONLINE	ONLINE	edydr 1p0	
ora.asm	ONLINE	ONLINE	edydr 1p0	Started
Cluster Resources				
ora.cssd	1	ONLINE	ONLINE	edydr 1p0
ora.diskmon	1	ONLINE	ONLINE	edydr 1p0
ora.orcl.db	1	ONLINE	ONLINE	edydr 1p0
				Open

```
[+ASM:~]$ crsctl config has
```

```
CRS-4622: Oracle High Availability Services autostart is enabled.
```

```
[+ASM:~]$ ps -ef | grep smon
```

```
oracle 5167 1 0 03:53 ? 00:00:00 asm_smon_+ASM
oracle 5295 1 0 03:53 ? 00:00:00 ora_smon_orcl
oracle 5460 5406 0 03:55 pts/1 00:00:00 grep smon
```

```
[+ASM:~]$ kill -9 5295
```

```
[+ASM:~]$ ps -ef | grep smon
```

```
oracle 5167 1 0 03:53 ? 00:00:00 asm_smon_+ASM
oracle 5477 5406 0 03:56 pts/1 00:00:00 grep smon
```

※ 일정 시간이 흐른 후 다시 확인하면 자동으로 RDBMS Instance 가 재 시작 되어 있음.

```
[+ASM:~]$ ps -ef | grep smon
```

```
oracle 5167 1 0 03:53 ? 00:00:00 asm_smon_+ASM
oracle 5572 1 0 03:56 ? 00:00:00 ora_smon_orcl
oracle 5647 5406 0 03:56 pts/1 00:00:00 grep smon
```

```
[+ASM:~]$ cat /etc/oracle/scls_scr/edydr1p0/oracle/ohasdstr
enable
```

```
[+ASM:~]$ crsctl disable has
```

```
CRS-4621: Oracle High Availability Services autostart is disabled.
```

```
[+ASM:~]$ cat /etc/oracle/scls_scr/edydr1p0/oracle/ohasdstr
disable
```

※ enable 과 disable 의 차이는 현재 실행중인 리소스와는 상관 없이 Oracle Restart 기능을 다음 시스템 시작 시 자동 시작 여부를 결정 한다.

```
[+ASM:~]$ crsctl stat resource -t
```

NAME	TARGET	STATE	SERVER	STATE_DETAILS
Local Resources				
ora.ACFS.dg	ONLINE	ONLINE	edydr 1p0	
ora.DATA.dg	ONLINE	ONLINE	edydr 1p0	
ora.FRA.dg	ONLINE	ONLINE	edydr 1p0	
ora.LISTENER.lsnr	ONLINE	ONLINE	edydr 1p0	
ora.asm	ONLINE	ONLINE	edydr 1p0	Started
Cluster Resources				
ora.cssd	1	ONLINE	ONLINE	edydr 1p0
ora.diskmon	1	ONLINE	ONLINE	edydr 1p0
ora.orcl.db	1	ONLINE	ONLINE	edydr 1p0
				Open

```
[+ASM:~]$ su -
```

```
Password: oracle
```

```
[root@edydr1p0 ~]# reboot
```

...

```
[+ASM:~]$ ps -ef | grep smon
```

```
oracle 5063 4922 0 04:06 pts/1 00:00:00 grep smon
```

```
[+ASM:~]$ crsctl stat resource -t
```

```
CRS-4639: Could not contact Oracle High Availability Services
CRS-4000: Command Status failed, or completed with errors.
```

※ 시스템 재 시작 후 Oracle Restart 가 시작되지 않았기에 오라클 리소스 역시 자동 시작은 되지 않았다.

```
[+ASM:~]$ crsctl start has
```

```
CRS-4123: Oracle High Availability Services has been started.
```

```
[+ASM:~]$ crsctl stat resource -t
```

NAME	TARGET	STATE	SERVER	STATE_DETAILS
Local Resources				
ora.ACFS.dg	ONLINE	ONLINE	edydr 1p0	
ora.DATA.dg	ONLINE	ONLINE	edydr 1p0	
ora.FRA.dg	ONLINE	ONLINE	edydr 1p0	
ora.LISTENER.lsnr	ONLINE	ONLINE	edydr 1p0	
ora.asm	ONLINE	ONLINE	edydr 1p0	Started
Cluster Resources				
ora.cssd	1	ONLINE	ONLINE	edydr 1p0
ora.diskmon	1	ONLINE	ONLINE	edydr 1p0
ora.orcl.db	1	ONLINE	ONLINE	edydr 1p0
				Open

※ 일정 시간이 흐른 뒤 리소스의 상태를 확인하면 등록된 모든 리소스가 자동으로 시작 되어 있는 것을 확인 할 수 있다.

```
[+ASM:~]$ crsctl status resource
```

```
NAME=ora.ACFS.dg
TYPE=ora.diskgroup.type
TARGET=ONLINE
STATE=ONLINE on edydr1p0
```

```
NAME=ora.DATA.dg
TYPE=ora.diskgroup.type
TARGET=ONLINE
STATE=ONLINE on edydr1p0
```

```
NAME=ora.FRA.dg
TYPE=ora.diskgroup.type
TARGET=ONLINE
STATE=ONLINE on edydr1p0
```

```
NAME=ora.LISTENER.lsnr
TYPE=ora.listener.type
TARGET=ONLINE
STATE=ONLINE on edydr1p0
```

```
...
```

```
[+ASM:~]$ crsctl status resource ora.LISTENER.lsnr
```

```
NAME=ora.LISTENER.lsnr
TYPE=ora.listener.type
TARGET=ONLINE
STATE=ONLINE on edydr1p0
```

- *crsctl* 이용하여 리소스 시작 및 종료

```
[+ASM:~]$ lsnrctl status
```

```
...
```

```
Services Summary...
```

```
Service "+ASM" has 1 instance(s).
```

```
Instance "+ASM", status READY, has 1 handler(s) for this service...
```

```
Service "orcl.example.com" has 1 instance(s).
```

```
Instance "orcl", status READY, has 1 handler(s) for this service...
```

```
Service "orclXDB.example.com" has 1 instance(s).
```

```
Instance "orcl", status READY, has 1 handler(s) for this service...
```

```
The command completed successfully
```

```
[+ASM:~]$ crsctl stop resource ora.LISTENER.lsnr
```

```
CRS-2673: Attempting to stop 'ora.LISTENER.lsnr' on 'edydr1p0'
```

```
CRS-2677: Stop of 'ora.LISTENER.lsnr' on 'edydr1p0' succeeded
```

```
[+ASM:~]$ crsctl status resource ora.LISTENER.lsnr
```

```
NAME=ora.LISTENER.lsnr
TYPE=ora.listener.type
TARGET=OFFLINE
STATE=OFFLINE
```

```
[+ASM:~]$ lsnrctl status
```

```
...
```

```
Connecting to (DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=edydr1p0.us.oracle.com)(PORT=1521)))
```

```
TNS-12541: TNS:no listener
```

```
TNS-12560: TNS:protocol adapter error
```

```
TNS-00511: No listener
```

```
Linux Error: 111: Connection refused
```

```
[+ASM:~]$ crsctl start resource ora.LISTENER.lsnr
```

```
CRS-2672: Attempting to start 'ora.LISTENER.lsnr' on 'edydr1p0'
```

```
CRS-2676: Start of 'ora.LISTENER.lsnr' on 'edydr1p0' succeeded
```

```
[+ASM:~]$ crsctl status resource ora.LISTENER.lsnr
NAME=ora.LISTENER.lsnr
TYPE=ora.listener.type
TARGET=ONLINE
STATE=ONLINE on edydr1p0

[+ASM:~]$ lsnrctl status
...
Services Summary...
Service "+ASM" has 1 instance(s).
  Instance "+ASM", status READY, has 1 handler(s) for this service...
Service "orcl.example.com" has 1 instance(s).
  Instance "orcl", status READY, has 1 handler(s) for this service...
Service "orclXDB.example.com" has 1 instance(s).
  Instance "orcl", status READY, has 1 handler(s) for this service...
The command completed successfully
```

#### • SRVCTL 유틸리티 사용

```
[+ASM:~]$ . oraenv
ORACLE_SID = [+ASM] ? +ASM
The Oracle base for ORACLE_HOME=/u01/app/oracle/product/11.2.0/grid is /u01/app/oracle

[+ASM:~]$ srvctl config listener -l listener
Name: LISTENER
Home: /u01/app/oracle/product/11.2.0/grid
End points: TCP:1521

[+ASM:~]$ srvctl status listener
Listener LISTENER is enabled
Listener LISTENER is running on node(s): edydr1p0

[+ASM:~]$ srvctl stop listener -l listener

[+ASM:~]$ srvctl status listener
Listener LISTENER is enabled
Listener LISTENER is not running

[+ASM:~]$ srvctl start listener -l listener

[+ASM:~]$ srvctl status listener
Listener LISTENER is enabled
Listener LISTENER is running on node(s): edydr1p0
```

```
[+ASM:~]$ srvctl config database -d orcl
Database unique name: orcl
Database name: orcl
Oracle home: /u01/app/oracle/product/11.2.0/dbhome_1
Oracle user: oracle
Spfile: +DATA/orcl/spfileorcl.ora
Domain: example.com
Start options: open
Stop options: immediate
Database role: PRIMARY
Management policy: AUTOMATIC
Disk Groups: DATA
Services:

[+ASM:~]$ srvctl modify database -d orcl -p /u01/app/oracle/product/11.2.0/dbhome_1/dbs/spfileorcl.ora
```



```
[+ASM:~]$ srvctl config database -d orcl
Database unique name: orcl
Database name: orcl
Oracle home: /u01/app/oracle/product/11.2.0/dbhome_1
Oracle user: oracle
Spfile: /u01/app/oracle/product/11.2.0/dbhome_1/dbs/spfileorcl.ora
Domain: example.com
Start options: open
Stop options: immediate
Database role: PRIMARY
Management policy: AUTOMATIC
Disk Groups: DATA
Services:
```

```
[+ASM:~]$ srvctl stop database -d orcl -o immediate
```

```
[+ASM:~]$ srvctl start database -d orcl -o open
```

```
[+ASM:~]$ srvctl status database -d orcl
```

Database is running.

```
[+ASM:~]$ srvctl stop asm
```

PRCR-1065 : Failed to stop resource ora.asm

CRS-2529: Unable to act on 'ora.asm' because that would require stopping or relocating 'ora.ACFS.dg', but the force option was not specified

```
[+ASM:~]$ srvctl stop diskgroup -g DATA
```

PRCR-1065 : Failed to stop resource ora.DATA.dg

CRS-2675: Stop of 'ora.DATA.dg' on 'edydr1p0' failed

```
[+ASM:~]$ srvctl stop asm -o abort -f
```

```
[+ASM:~]$ crsctl status resource -t
```

NAME	TARGET	STATE	SERVER	STATE_DETAILS
Local Resources				
ora.ACFS.dg	OFFLINE	OFFLINE	edydr1p0	
ora.DATA.dg	OFFLINE	OFFLINE	edydr1p0	
ora.FRA.dg	OFFLINE	OFFLINE	edydr1p0	
ora.LISTENER.lsnr	ONLINE	ONLINE	edydr1p0	
ora.asm	OFFLINE	OFFLINE	edydr1p0	Instance Shutdown
Cluster Resources				
ora.cssd	1	ONLINE	ONLINE	edydr1p0
ora.diskmon	1	ONLINE	ONLINE	edydr1p0
ora.orcl.db	1	ONLINE	OFFLINE	Instance Shutdown

```
[+ASM:~]$ srvctl start database -d orcl
```

```
[+ASM:~]$ crsctl status resource -t
```

NAME	TARGET	STATE	SERVER	STATE_DETAILS
Local Resources				
ora.ACFS.dg	OFFLINE	OFFLINE	edydr1p0	
ora.DATA.dg	ONLINE	ONLINE	edydr1p0	
ora.FRA.dg	OFFLINE	OFFLINE	edydr1p0	
ora.LISTENER.lsnr	ONLINE	ONLINE	edydr1p0	
ora.asm	ONLINE	ONLINE	edydr1p0	Started

---

## Cluster Resources

---

ora.cssd	1	ONLINE	ONLINE	edydr1p0	
ora.diskmon	1	ONLINE	ONLINE	edydr1p0	
ora.orcl.db	1	ONLINE	ONLINE	edydr1p0	Open

```
[+ASM:~]$ srvctl start diskgroup -g ACFS
```

```
[+ASM:~]$ srvctl start diskgroup -g FRA
```

```
[+ASM:~]$ vi $ORACLE_HOME/network/admin/listener.ora
```

```
LSNR2 =  
(DESCRIPTION =  
  (ADDRESS = (PROTOCOL = TCP)(HOST = edydr1p0.us.oracle.com)(PORT = 1522))  
)
```

※ 기존의 내용 아래에 위의 내용 추가

- 새로운 리소스 추가

```
[+ASM:~]$ srvctl add listener -l LSNR2 -p TCP:1522 -s -o /u01/app/oracle/product/11.2.0/grid
```

```
[+ASM:~]$ srvctl start listener -l LSNR2
```

```
[+ASM:~]$ crsctl status resource ora.LSNR2.lsnr
```

```
NAME=ora.LSNR2.lsnr
```

```
TYPE=ora.listener.type
```

```
TARGET=ONLINE
```

```
STATE=ONLINE on edydr1p0
```

```
[+ASM:~]$ lsnrctl service lsnr2
```

```
...
```

```
Connecting to (DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=edydr1p0.us.oracle.com)(PORT=1522)))
```

```
The listener supports no services
```

```
The command completed successfully
```

```
[+ASM:~]$ srvctl stop listener -l LSNR2
```

```
[+ASM:~]$ srvctl remove listener -l LSNR2
```

• ASM Cluster File System 확인

```
[+ASM:~]$ cd /u02/acfsmounts/
```

```
[+ASM:acfsmounts]$ ls -al
```

```
total 8
drwxr-xr-x 2 oracle oinstall 4096 May 17 02:42 .
drwxrwxr-x 3 oracle oinstall 4096 May 17 02:42 ..
```

```
[+ASM:acfsmounts]$ asmcmd
```

```
ASMCMD> volinfo -a
```

```
Diskgroup Name: ACFS
Volume Name: VOLUME1
Volume Device: /dev/asm/volume1-90
State: DISABLED
Size (MB): 4096
Resize Unit (MB): 256
Redundancy: UNPROT
Stripe Columns: 4
Stripe Width (K): 128
Usage: ACFS
Mountpath: /u02/acfsmounts
```

```
ASMCMD> volenable -G ACFS VOLUME1
```

또는 ASMCMD> volenable -a

```
ASMCMD> exit
```

```
[+ASM:acfsmounts]$ su -
```

```
Password: oracle
```

```
[root@edydr1p0 ~]# mount -t acfs /dev/asm/volume1-90 /u02/acfsmounts
```

```
[root@edydr1p0 ~]# acfsutil info fs
```

```
/u02/acfsmounts
ACFS Version: 11.2.0.1.0.0
flags:      MountPoint,Available
mount time:  Fri May 17 16:05:55 2013
volumes:    1
total size:  4294967296
total free:  4189892608
primary volume: /dev/asm/volume1-90
label:
flags:      Primary,Available,ADVM
on-disk version: 39.0
allocation unit: 4096
major, minor: 252, 46081
size:      4294967296
free:      4189892608
ADVM diskgroup ACFS
ADVM resize increment: 268435456
ADVM redundancy: unprotected
ADVM stripe columns: 4
ADVM stripe width: 131072
number of snapshots: 0
snapshot space usage: 0
```

```
[root@edydr1p0 ~]# ls -al /u02/acfsmounts
```

```
total 80
drwxr-xr-x 4 oracle oinstall 4096 May 17 03:22 .
drwxrwxr-x 3 oracle oinstall 4096 May 17 02:42 ..
drwxr-xr-x 5 root root 4096 May 17 03:20 .ACFS
-rw-r--r-- 1 oracle oinstall 2851 May 17 03:22 init.ora
drwx----- 2 root root 65536 May 17 03:20 lost+found
```

```
[root@edydr1p0 ~]# exit
```

Chong Ha, Ryu

## 6. Oracle 네트워크 환경 구성

### • Shared Server 구성

```
[orcl:~]$ . oraenv
```

```
ORACLE_SID = [orcl] ? orcl
```

```
The Oracle base for ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1 is /u01/app/oracle
```

```
[orcl:~]$ sqlplus / as sysdba
```

```
SQL> show parameter shared
```

NAME	TYPE	VALUE
max_shared_servers	integer	
shared_server_sessions	integer	
shared_servers	integer	1
...		

```
SQL> SELECT name, paddr, status
```

```
FROM v$shared_server ;
```

NAME	PADDR	STATUS
------	-------	--------

```
S000 427C6D24 WAIT(COMMON)
```

```
SQL> ALTER SYSTEM SET shared_servers = 3 ;
```

```
System altered.
```

```
SQL> ALTER SYSTEM set max_shared_servers = 10 ;
```

```
System altered.
```

```
SQL> SELECT name, paddr, status
```

```
FROM v$shared_server ;
```

NAME	PADDR	STATUS
------	-------	--------

```
S000 427C6D24 WAIT(COMMON)
```

```
S001 427CB90C WAIT(COMMON)
```

```
S002 427CE46C WAIT(COMMON)
```

```
SQL> show parameter dispatchers
```

NAME	TYPE	VALUE
dispatchers	string	(PROTOCOL=TCP) (SERVICE=orclXDB)
max_dispatchers	integer	

```
SQL> SELECT name, paddr, status
```

```
FROM v$dispatcher ;
```

NAME	PADDR	STATUS
------	-------	--------

```
D000 427C5774 WAIT
```

```
SQL> ALTER SYSTEM SET dispatchers = '(PROTOCOL=TCP)(DISPATCHERS=2)' ;
```

```
System altered.
```

```
SQL> SELECT name, paddr, status
```

```
FROM v$dispatcher ;
```

NAME	PADDR	STATUS
------	-------	--------

```
D000 427C5774 WAIT
```

```
D001 427D04F4 WAIT
```

```
SQL> exit
```

### • Listener 구성

```
[orcl:~]$ . oraenv
```

```
ORACLE_SID = [orcl] ? +ASM
```

```
The Oracle base for ORACLE_HOME=/u01/app/oracle/product/11.2.0/grid is /u01/app/oracle
```

```
[+ASM:~]$ cd $ORACLE_HOME/network/admin
```

```
[+ASM:admin]$ lsnrctl stop
```

```
...
```

```
[+ASM:admin]$ vi listener.ora
```

```
# listener.ora Network Configuration File: /u01/app/oracle/product/11.2.0/grid/network/admin/listener.ora
```

```
# Generated by Oracle configuration tools.
```

```
LISTENER =
```

```
(DESCRIPTION =
```

```
(ADDRESS = (PROTOCOL = TCP)(HOST = edydr1p0.us.oracle.com)(PORT = 1521))
```

```
)
```

```
LSNR2 =
```

```
(DESCRIPTION =
```

```
(ADDRESS = (PROTOCOL = TCP)(HOST = edydr1p0.us.oracle.com)(PORT = 1522))
```

```
)
```

```
SID_LIST_LSNR2 =
```

```
(SID_LIST =
```

```
(SID_DESC =
```

```
(GLOBAL_DBNAME = orcl.example.com)
```

```
(ORACLE_HOME = /u01/app/oracle/product/11.2.0/dbhome_1)
```

```
(SID_NAME = orcl)
```

```
)
```

```
)
```

```
LSNR3 =
```

```
(DESCRIPTION =
```

```
(ADDRESS = (PROTOCOL = TCP)(HOST = edydr1p0.us.oracle.com)(PORT = 1523))
```

```
)
```

```
ADR_BASE_LISTENER = /u01/app/oracle
```

```
ADR_BASE_LSNR2 = /u01/app/oracle
```

```
ADR_BASE_LSNR3 = /u01/app/oracle
```

※ 위의 내용과 같이 수정 (netmgr 이용 가능)

```
[+ASM:admin]$ lsnrctl start
```

```
Listening Endpoints Summary...
```

```
(DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=edydr1p0.us.oracle.com)(PORT=1521)))
```

```
The listener supports no services
```

```
The command completed successfully
```

```
[+ASM:admin]$ lsnrctl start lsnr2
```

```
Listening Endpoints Summary...
```

```
(DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=edydr1p0.us.oracle.com)(PORT=1522)))
```

```
Services Summary...
```

```
Service "orcl.example.com" has 1 instance(s).
```

```
Instance "orcl", status UNKNOWN, has 1 handler(s) for this service...
```

```
The command completed successfully
```

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<http://oukr.tistory.com>

```
[+ASM:admin]$ lsnrctl start lsnr3
```

```
Listening Endpoints Summary...
```

```
(DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=edydr1p0.us.oracle.com)(PORT=1523)))
```

```
The listener supports no services
```

```
The command completed successfully
```

```
[+ASM:admin]$ lsnrctl services
```

```
...
```

```
Services Summary...
```

```
Service "+ASM" has 1 instance(s).
```

```
Instance "+ASM", status READY, has 1 handler(s) for this service...
```

```
Handler(s):
```

```
"DEDICATED" established:0 refused:0 state:ready
```

```
LOCAL SERVER
```

```
Service "orcl.example.com" has 1 instance(s).
```

```
Instance "orcl", status READY, has 3 handler(s) for this service...
```

```
Handler(s):
```

```
"D001" established:0 refused:0 current:0 max:1022 state:ready
```

```
DISPATCHER <machine: edydr1p0.us.oracle.com, pid: 12436>
```

```
(ADDRESS=(PROTOCOL=tcp)(HOST=edydr1p0.us.oracle.com)(PORT=53225))
```

```
"D000" established:0 refused:0 current:0 max:1022 state:ready
```

```
DISPATCHER <machine: edydr1p0.us.oracle.com, pid: 10874>
```

```
(ADDRESS=(PROTOCOL=tcp)(HOST=edydr1p0.us.oracle.com)(PORT=42449))
```

```
"DEDICATED" established:0 refused:0 state:ready
```

```
LOCAL SERVER
```

```
Service "orclXDB.example.com" has 1 instance(s).
```

```
Instance "orcl", status READY, has 0 handler(s) for this service...
```

```
The command completed successfully
```

```
[+ASM:admin]$ lsnrctl services lsnr2
```

```
...
```

```
Services Summary...
```

```
Service "orcl.example.com" has 1 instance(s).
```

```
Instance "orcl", status UNKNOWN, has 1 handler(s) for this service...
```

```
Handler(s):
```

```
"DEDICATED" established:0 refused:0
```

```
LOCAL SERVER
```

```
The command completed successfully
```

```
[+ASM:admin]$ lsnrctl services lsnr3
```

```
...
```

```
The listener supports no services
```

```
The command completed successfully
```

※ *LISTENER* 는 필요에 따라 여러 개가 동시에 구성 되고 실행 될 수 있으며 각 리스너는 서비스 목록을 동적 또는 수동으로 등록할 수 있다. 기본 포트(1521)를 사용하는 리스너는 *PMON* 으로부터 현재 실행 중인 디스패처의 정보도 함께 등록하고 있음을 확인 할 수 있다. 하지만 기본 포트를 사용하지 않는 *LSNR3* 는 동적으로 서비스의 정보를 등록 받을 수 없다.

```
[+ASM:admin]$ . oraenv
ORACLE_SID = [+ASM] ? orcl
The Oracle base for ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1 is /u01/app/oracle
[orcl:admin]$ cd $ORACLE_HOME/network/admin
[orcl:admin]$ vi tnsnames.ora
```

```
LSNR3 =
(DESCRIPTION =
  (ADDRESS = (PROTOCOL= TCP)(HOST = edydr1p0.us.oracle.com)(PORT = 1523))
)
```

※ 기존 설정 아래에 위의 내용 추가

```
[orcl:admin]$ sqlplus / as sysdba
SQL> ALTER SYSTEM SET local_listener = lsnr3 ;
System altered.
SQL> ALTER SYSTEM REGISTER ;
System altered.
SQL> exit
[orcl:admin]$ lsnrctl services lsnr3
...
Services Summary...
Service "orcl.example.com" has 1 instance(s).
  Instance "orcl", status READY, has 3 handler(s) for this service...
    Handler(s):
      "D001" established:0 refused:0 current:0 max:1022 state:ready
        DISPATCHER <machine: edydr1p0.us.oracle.com, pid: 12436>
        (ADDRESS=(PROTOCOL=tcp)(HOST=edydr1p0.us.oracle.com)(PORT=53225))
      "D000" established:0 refused:0 current:0 max:1022 state:ready
        DISPATCHER <machine: edydr1p0.us.oracle.com, pid: 10874>
        (ADDRESS=(PROTOCOL=tcp)(HOST=edydr1p0.us.oracle.com)(PORT=42449))
      "DEDICATED" established:0 refused:0 state:ready
        LOCAL SERVER
The command completed successfully
```

```
[orcl:admin]$ lsnrctl services
...
Services Summary...
Service "+ASM" has 1 instance(s).
  Instance "+ASM", status READY, has 1 handler(s) for this service...
    Handler(s):
      "DEDICATED" established:0 refused:0 state:ready
        LOCAL SERVER
The command completed successfully
```

※ LOCAL\_LISTENER 설정을 LSNR3 로 변경 하였기 때문에 1521 포트의 기본 리스너는 동적으로 서비스를 등록 할 수 없다.

```
[orcl:admin]$ sqlplus / as sysdba
SQL> ALTER SYSTEM RESET local_listener ;
SQL> STARTUP FORCE
...
SQL> exit
[orcl:admin]$ lsnrctl stop lsnr3
...
```

- 이름 지정 방식 확인

```
[orcl:admin]$ cd $ORACLE_HOME/network/admin
```

```
[orcl:admin]$ vi tnsnames.ora
```

```
ORCL =
  (DESCRIPTION =
    (ADDRESS_LIST =
      (ADDRESS = (PROTOCOL = TCP)(HOST = edydr1p0.us.oracle.com)(PORT = 1521))
    )
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SERVICE_NAME = orcl.example.com)
    )
  )
DB1 =
  (DESCRIPTION =
    (ADDRESS_LIST =
      (ADDRESS = (PROTOCOL = TCP)(HOST = edydr1p0.us.oracle.com)(PORT = 1521))
    )
    (CONNECT_DATA =
      (SERVER = SHARED)
      (SERVICE_NAME = orcl.example.com)
    )
  )
DB2 =
  (DESCRIPTION =
    (ADDRESS_LIST =
      (ADDRESS = (PROTOCOL = TCP)(HOST = edydr1p0.us.oracle.com)(PORT = 1522))
    )
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SERVICE_NAME = orcl.example.com)
    )
  )
MYDB =
  (DESCRIPTION =
    (ADDRESS_LIST =
      (ADDRESS = (PROTOCOL = TCP)(HOST = edydr1p0.us.oracle.com)(PORT = 1521))
      (ADDRESS = (PROTOCOL = TCP)(HOST = edydr1p0.us.oracle.com)(PORT = 1522))
      (LOAD_BALANCE = yes)
    )
    (CONNECT_DATA =
      (SERVICE_NAME = orcl.example.com)
    )
  )
```

※ 기존의 내용을 위와 같이 수정 (netmgr 사용 가능)



```
[orcl:admin]$ sqlplus system/oracle_4U@ORCL
SQL> SELECT server, service_name FROM v$session
        WHERE sid = USERENV('SID') ;
```

SERVER	SERVICE_NAME
--------	--------------

---

DEDICATED orcl.example.com

```
SQL> save 1 replace
```

```
Wrote file 1.sql
```

```
SQL> CONN system/oracle_4U@DB1
```

```
Connected.
```

```
SQL> @1
```

SERVER	SERVICE_NAME
--------	--------------

---

SHARED orcl.example.com

```
SQL> CONN system/oracle_4U@DB2
```

```
Connected.
```

```
SQL> @1
```

SERVER	SERVICE_NAME
--------	--------------

---

DEDICATED orcl.example.com

```
SQL> CONN system/oracle_4U@MYDB
```

```
Connected.
```

```
SQL> @1
```

SERVER	SERVICE_NAME
--------	--------------

---

DEDICATED orcl.example.com

- *Easy Connect* 확인

```
SQL> CONN system/oracle_4U@edydr1p0.us.oracle.com:1521/orcl.example.com
```

```
Connected.
```

```
SQL> @1
```

SERVER	SERVICE_NAME
--------	--------------

---

SHARED orcl.example.com

```
SQL> exit
```

## 7. 데이터베이스 저장 영역 구조 관리

- 테이블에 데이터가 저장되는 방법

```
[orcl:~]$ . oraenv
```

```
ORACLE_SID = [orcl] ? orcl
```

```
The Oracle base for ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1 is /u01/app/oracle
```

```
[orcl:~]$ sqlplus / as sysdba
```

```
SQL> CREATE TABLESPACE tbs2
```

```
DATAFILE '/home/oracle/tbs2.dbf' SIZE 10M ;
```

```
Tablespace created.
```

```
SQL> CREATE TABLE t2
```

```
( id          NUMBER,  
  name        CHAR(1000))
```

```
SEGMENT CREATION IMMEDIATE
```

```
TABLESPACE tbs2 ;
```

```
Table created.
```

```
SQL> SELECT tablespace_name, status, contents, logging, segment_space_management, bigfile  
FROM dba_tablespaces ;
```

TABLESPACE_NAME	STATUS	BLOCK_SIZE	CONTENTS	LOGGING	SEGMENT SPACE MANAGEMENT	BIGFILE
SYSTEM	ONLINE	8192	PERMANENT	LOGGING	MANUAL	NO
SYSAUX	ONLINE	8192	PERMANENT	LOGGING	AUTO	NO
UNDOTBS1	ONLINE	8192	UNDO	LOGGING	MANUAL	NO
TEMP	ONLINE	8192	TEMPORARY	NOLOGGING	MANUAL	NO
USERS	ONLINE	8192	PERMANENT	LOGGING	AUTO	NO
EXAMPLE	ONLINE	8192	PERMANENT	NOLOGGING	AUTO	NO
TBS1	ONLINE	8192	PERMANENT	LOGGING	AUTO	NO
TBS2	ONLINE	8192	PERMANENT	LOGGING	AUTO	NO

```
SQL> SELECT file_id, file_name, tablespace_name, bytes/1024/1024 AS MB,  
blocks, autoextensible, increment_by, TRUNC(maxbytes/1024/1024/1024) AS MAX_GB
```

```
FROM dba_data_files ;
```

FILE_ID	FILE_NAME	TABLESPACE	MB	BLOCKS	AUT	INCREMENT_BY	MAX_GB
1	+DATA/orcl/datafile/system.256.815439969	SYSTEM	690	88320	YES	1280	31
2	+DATA/orcl/datafile/sysaux.257.815439971	SYSAUX	530	67840	YES	1280	31
3	+DATA/orcl/datafile/undotbs1.258.815439971	UNDOTBS1	110	14080	YES	640	31
4	+DATA/orcl/datafile/users.259.815439971	USERS	5	640	YES	160	31
5	+DATA/orcl/datafile/example.269.815440195	EXAMPLE	100	12800	YES	80	31
6	+DATA/orcl/datafile/tbs1.271.815617803	TBS1	50	6400	NO	0	0
7	/home/oracle/tbs2.dbf	TBS2	10	1280	NO	0	0

```
SQL> SELECT segment_name, segment_type, tablespace_name, header_file, header_block, bytes, blocks, extents  
FROM dba_segments
```

```
WHERE segment_name = 'T2' ;
```

SEGMENT_NAME	SEGMENT_TYPE	TABLESPACE_NAME	HEADER_FILE	HEADER_BLOCK	BYTES	BLOCKS	EXTENTS
T2	TABLE	TBS2	7	130	65536	8	1

SQL> SELECT segment\_name, extent\_id, file\_id, block\_id, bytes, blocks

FROM dba\_extents

WHERE segment\_name = 'T2' ;

SEGMENT_NAME	EXTENT_ID	FILE_ID	BLOCK_ID	BYTES	BLOCKS
T2	0	7	128	65536	8

SQL> INSERT INTO t2

SELECT object\_id, object\_name FROM dba\_objects

WHERE rownum <= 100 ;

100 rows created.

SQL> COMMIT ;

Commit complete.

SQL> SELECT segment\_name, segment\_type, tablespace\_name, header\_file, header\_block, bytes, blocks, extents

FROM dba\_segments

WHERE segment\_name = 'T2' ;

SEGMENT_NAME	SEGMENT_TYPE	TABLESPACE_NAME	HEADER_FILE	HEADER_BLOCK	BYTES	BLOCKS	EXTENTS
T2	TABLE	TBS2	7	130	196608	24	3

SQL> SELECT segment\_name, extent\_id, file\_id, block\_id, bytes, blocks

FROM dba\_extents

WHERE segment\_name = 'T2' ;

SEGMENT_NAME	EXTENT_ID	FILE_ID	BLOCK_ID	BYTES	BLOCKS
T2	0	7	128	65536	8
T2	1	7	136	65536	8
T2	2	7	144	65536	8

SQL> SELECT id, rowid, DBMS\_ROWID.ROWID\_RELATIVE\_FNO(rowid) AS FILE\_NO,  
DBMS\_ROWID.ROWID\_BLOCK\_NUMBER(rowid) AS BLOCK\_NO,  
DBMS\_ROWID.ROWID\_ROW\_NUMBER(rowid) AS ROW\_NO

FROM t2 ;

ID	ROWID	FILE_NO	BLOCK_NO	ROW_NO
6	AAASNjAAHAAAACDAAA	7	131	0
44	AAASNjAAHAAAACDAAB	7	131	1
21	AAASNjAAHAAAACDAAC	7	131	2
45	AAASNjAAHAAAACDAAD	7	131	3
35	AAASNjAAHAAAACDAAE	7	131	4
5	AAASNjAAHAAAACDAAF	7	131	5
23	AAASNjAAHAAAACDAAG	7	131	6
47	AAASNjAAHAAAACEAAA	7	132	0
24	AAASNjAAHAAAACEAAB	7	132	1
36	AAASNjAAHAAAACEAAC	7	132	2
49	AAASNjAAHAAAACEAAD	7	132	3

...

100 rows selected.

• *Tablespace 생성 및 삭제*

SQL> show parameter db\_create\_file\_dest

NAME	TYPE	VALUE
db_create_file_dest	string	+/DATA

SQL> CREATE SMALLFILE TABLESPACE tbs3

DATAFILE SIZE 10M AUTOEXTEND ON NEXT 10M MAXSIZE 100M

EXTENT MANAGEMENT LOCAL UNIFORM SIZE 1M

SEGMENT SPACE MANAGEMENT AUTO

LOGGING ;

Tablespace created.

※ OMF 를 사용하고 있는 경우라면 DATAFILE, TEMPFILE 절을 직접 정의하지 않고 Tablespace 를 생성 가능

SQL> CREATE BIGFILE TABLESPACE tbs4

DATAFILE '+DATA' SIZE 10M AUTOEXTEND ON NEXT 10M MAXSIZE 5T ;

Tablespace created.

※ smallfile tablespace 는 400 백만개의 block 을 포함할 수 있으며 그 이상은 40 억개까지 가능한 bigfile tablespace 를 사용 한다.

SQL> SELECT \* FROM v\$sga\_dynamic\_free\_memory ;

CURRENT\_SIZE

-----  
209715200

SQL> ALTER SYSTEM SET db\_16k\_cache\_size = 16M ;

System altered.

※ Free Memory 가 부족 시 강사의 지시에 따라 공간을 확보한 후 진행

SQL> CREATE TABLESPACE tbs5

DATAFILE '+DATA' SIZE 10M BLOCKSIZE 16K ;

Tablespace created.

SQL> CREATE UNDO TABLESPACE undotbs2

DATAFILE '+DATA' SIZE 100M AUTOEXTEND ON ;

Tablespace created.

SQL> CREATE TEMPORARY TABLESPACE temp1

TEMPFILE '+DATA' SIZE 10M AUTOEXTEND ON

TABLESPACE GROUP temp\_grp ;

Tablespace created.

SQL> CREATE TEMPORARY TABLESPACE temp2

TEMPFILE '+DATA' SIZE 10M AUTOEXTEND ON

TABLESPACE GROUP temp\_grp ;

※ Temporary Tablespace 여러 개를 묶어서 하나의 그룹으로 사용하면 I/O 가 분산되며 임시 데이터에 의한 공간 부족 및 경합을 줄일 수 있다.

SQL> SELECT tablespace\_name, status, contents, logging, segment\_space\_management, bigfile

FROM dba\_tablespaces ;

TABLESPACE_NAME	STATUS	CONTENTS	LOGGING	SEGMENT SPACE MANAGEMENT	BIGFILE
SYSTEM	ONLINE	PERMANENT	LOGGING	MANUAL	NO
SYSAUX	ONLINE	PERMANENT	LOGGING	AUTO	NO
UNDOTBS1	ONLINE	UNDO	LOGGING	MANUAL	NO
TEMP	ONLINE	TEMPORARY	NOLOGGING	MANUAL	NO
USERS	ONLINE	PERMANENT	LOGGING	AUTO	NO
UNDOTBS2	ONLINE	UNDO	LOGGING	MANUAL	NO
EXAMPLE	ONLINE	PERMANENT	NOLOGGING	AUTO	NO
TBS1	ONLINE	PERMANENT	LOGGING	AUTO	NO
TBS2	ONLINE	PERMANENT	LOGGING	AUTO	NO
TBS3	ONLINE	PERMANENT	LOGGING	AUTO	NO
TBS4	ONLINE	PERMANENT	LOGGING	AUTO	YES
TEMP1	ONLINE	TEMPORARY	NOLOGGING	MANUAL	NO
TEMP2	ONLINE	TEMPORARY	NOLOGGING	MANUAL	NO
TBS5	ONLINE	PERMANENT	LOGGING	AUTO	NO

SQL> SELECT file\_id, file\_name, tablespace\_name, bytes/1024/1024 AS MB,

blocks, autoextensible, increment\_by, TRUNC(maxbytes/1024/1024/1024) AS MAX\_GB

FROM dba\_data\_files ;

FILE_ID	FILE_NAME	TABLESPACE	MB	BLOCKS	AUT	INCREMENT_BY	MAX_GB
1	+DATA/orcl/datafile/system.256.815439969	SYSTEM	690	88320	YES	1280	31
2	+DATA/orcl/datafile/sysaux.257.815439971	SYSAUX	530	67840	YES	1280	31
3	+DATA/orcl/datafile/undotbs1.258.815439971	UNDOTBS1	110	14080	YES	640	31
4	+DATA/orcl/datafile/users.259.815439971	USERS	5	640	YES	160	31
5	+DATA/orcl/datafile/example.269.815440195	EXAMPLE	100	12800	YES	80	31
6	+DATA/orcl/datafile/tbs1.271.815617803	TBS1	50	6400	NO	0	0
7	/home/oracle/tbs2.dbf	TBS2	10	1280	NO	0	0
8	+DATA/orcl/datafile/tbs3.273.815709325	TBS3	10	1280	YES	1280	0
9	+DATA/orcl/datafile/tbs4.272.815709333	TBS4	10	1280	YES	1280	5120
10	+DATA/orcl/datafile/undotbs2.274.815709483	UNDOTBS2	100	12800	YES	12800	31
11	+DATA/orcl/datafile/tbs5.277.815709825	TBS5	10	640	NO	0	0

SQL> SELECT file\_id, file\_name, tablespace\_name, bytes/1024/1024 AS MB,

blocks, autoextensible, increment\_by, TRUNC(maxbytes/1024/1024/1024) AS MAX\_GB

FROM dba\_temp\_files ;

FILE_ID	FILE_NAME	TABLESPACE	MB	BLOCKS	AUT	INCREMENT_BY	MAX_GB
1	+DATA/orcl/tempfile/temp.268.815440181	TEMP	43	5504	YES	80	31
2	+DATA/orcl/tempfile/temp1.275.815709557	TEMP1	10	1280	YES	1280	31
3	+DATA/orcl/tempfile/temp2.276.815709575	TEMP2	10	1280	YES	1280	31

SQL> DROP TABLESPACE tbs1 INCLUDING CONTENTS AND DATAFILES ;

Tablespace dropped.

SQL> DROP TABLESPACE tbs3 INCLUDING CONTENTS AND DATAFILES ;

Tablespace dropped.

SQL> DROP TABLESPACE tbs4 INCLUDING CONTENTS AND DATAFILES ;

Tablespace dropped.

SQL> DROP TABLESPACE tbs5 INCLUDING CONTENTS AND DATAFILES ;

Tablespace dropped.

SQL> DROP TABLESPACE undotbs2 INCLUDING CONTENTS AND DATAFILES ;

Tablespace dropped.

```
SQL> DROP TABLESPACE temp1 INCLUDING CONTENTS AND DATAFILES ;
Tablespace dropped.
SQL> DROP TABLESPACE temp2 INCLUDING CONTENTS AND DATAFILES ;
Tablespace dropped.
```

• *Tablespace 의 공간 부족 시 해결 방법*

```
SQL> INSERT INTO t2 SELECT * FROM t2 ;
100 rows created.
```

..

```
SYS@orcl> /
```

```
3200 rows created.
```

```
SYS@orcl> /
```

```
INSERT INTO t2 SELECT * FROM t2
```

\*

```
ERROR at line 1:
```

```
ORA-01653: unable to extend table SYS.T2 by 128 in tablespace TBS2
```

```
SQL> SELECT tablespace_name, file_id, bytes/1024/1024 AS MB, blocks
        FROM dba_free_space
        WHERE tablespace_name = 'TBS2' ;
no rows selected
```

```
SQL> ALTER TABLESPACE tbs2
        ADD DATAFILE '/home/oracle/tbs2_1.dbf' SIZE 10M ;
Tablespace altered.
```

```
SQL> ALTER DATABASE DATAFILE '/home/oracle/tbs2.dbf' RESIZE 20M ;
Database altered.
```

```
SQL> ALTER DATABASE DATAFILE '/home/oracle/tbs2.dbf' AUTOEXTEND ON NEXT 10M MAXSIZE 100M ;
Database altered.
```

```
SQL> SELECT tablespace_name, file_id, bytes/1024/1024 AS MB, blocks
        FROM dba_free_space
        WHERE tablespace_name = 'TBS2' ;
```

TABSPACE	FILE_ID	MB	BLOCKS
TBS2	7	10	1280
TBS2	6	9	1152

• *Tablespace 의 작업*

```
SQL> ALTER TABLESPACE tbs2 READ ONLY ;
Tablespace altered.
```

```
SQL> DELETE t2 ;
```

```
DELETE t2
```

\*

```
ERROR at line 1:
```

```
ORA-00372: file 7 cannot be modified at this time
```

```
ORA-01110: data file 7: '/home/oracle/tbs2.dbf'
```

```
SQL> ALTER TABLESPACE tbs2 READ WRITE ;
```

```
Tablespace altered.
```

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<http://oukr.tistory.com>

```
SQL> ALTER TABLESPACE tbs2 OFFLINE ;
Tablespace altered.
SQL> SELECT * FROM t2 ;
SELECT * FROM t2
      *
ERROR at line 1:
ORA-00376: file 7 cannot be read at this time
ORA-01110: data file 7: '/home/oracle/tbs2.dbf'
```

```
SQL> ALTER TABLESPACE tbs2 ONLINE ;
Tablespace altered.
```

```
SQL> DROP TABLESPACE tbs2 ;
DROP TABLESPACE tbs2
*
ERROR at line 1:
ORA-01549: tablespace not empty, use INCLUDING CONTENTS option
SQL> DROP TABLESPACE tbs2 INCLUDING CONTENTS ;
Tablespace dropped.
SQL> exit
```

```
[orcl:~]$ ls -l /home/oracle/tbs2*
-rw-r----- 1 oracle dba 20979712 May 18 02:23 /home/oracle/tbs2.dbf
-rw-r----- 1 oracle dba 10493952 May 18 02:23 /home/oracle/tbs2_1.dbf
[orcl:~]$ rm /home/oracle/tbs2*
```

※ OMF 를 사용하는 경우가 아니라면 테이블스페이스 삭제 시 OS 상의 파일은 함께 삭제 되지 않는다.  
수동으로 OS 상의 파일을 삭제 하거나 INCLUDING CONTENTS AND DATAFILES 절을 함께 사용한다.

## 8. 유저 보안 관리

### • 유저 생성 (Password 인증)

```
[orcl:~]$ . oraenv
ORACLE_SID = [orcl] ? orcl
The Oracle base for ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1 is /u01/app/oracle
[orcl:~]$ sqlplus / as sysdba

SYS@orcl> CREATE TABLESPACE inventory
            DATAFILE '+DATA' SIZE 100M AUTOEXTEND ON NEXT 10M MAXSIZE 1G ;
Tablespace created.

SYS@orcl> CREATE USER inventory
            IDENTIFIED BY oracle_4U
            PROFILE default
            DEFAULT TABLESPACE inventory
            TEMPORARY TABLESPACE temp
            ACCOUNT UNLOCK
            PASSWORD EXPIRE ;
User created.

SYS@orcl> GRANT connect, resource TO inventory ;
Grant succeeded.

SYS@orcl> CONN inventory/oracle_4U
ERROR:
ORA-28001: the password has expired
Changing password for inventory
New password: oracle_4U
Retype new password: oracle_4U
Password changed
Connected.

INVENTORY@orcl> SHOW USER
USER is "INVENTORY"
```

### • 유저 생성 (External 인증)

```
INVENTORY@orcl> CONN / as sysdba
Connected.

SYS@orcl> show parameter os_authent_prefix
NAME                                TYPE                                VALUE
-----                                -
os_authent_prefix                    string                              ops$

SYS@orcl> CREATE USER OPS$ORACLE
            IDENTIFIED EXTERNALLY ;
User created.

SYS@orcl> GRANT CREATE SESSION TO OPS$ORACLE ;
Grant succeeded.

SYS@orcl> CONN /
Connected.

OPS$ORACLE@orcl> SHOW USER
USER is "OPS$ORACLE"
```



- OS 인증을 통한 SYSDBA 권한 확인

```
OPS$ORACLE@orcl> CONN / as sysdba
```

```
Connected.
```

```
SYS@orcl> SHOW USER
```

```
USER is "SYS"
```

※ 기본적으로 SYS 유저의 인증은 OS 인증을 통해 획득 가능하다. 때문에 SYS 의 Password 를 알지 못해도 DB 의 최고 권한으로 접속이 가능하다.

```
SYS@orcl> exit
```

```
[orcl:~]$ vi $ORACLE_HOME/network/admin/sqlnet.ora
```

```
SQLNET.AUTHENTICATION_SERVICES=(NONE)
```

※ 기존 내용에 추가

```
[orcl:~]$ sqlplus / as sysdba
```

```
SQL*Plus: Release 11.2.0.1.0 Production on Sat May 18 00:51:59 2013
```

```
Copyright (c) 1982, 2009, Oracle. All rights reserved.
```

```
ERROR:
```

```
ORA-01031: insufficient privileges
```

※ OS 인증을 이용하여 접속 불가능하다. Password File 의 인증을 이용해야 한다.

```
[orcl:~]$ sqlplus sys/oracle_4U as sysdba
```

```
SYS@orcl> SHOW USER
```

```
USER is "SYS"
```

```
SYS@orcl> exit
```

```
[orcl:~]$ vi $ORACLE_HOME/network/admin/sqlnet.ora
```

```
# SQLNET.AUTHENTICATION_SERVICES=(NONE)
```

※ 주석 처리를 하거나 삭제 한다.

- 권한 관리

```
[orcl:~]$ sqlplus inventory/oracle_4U
```

```
INVENTORY@orcl> SELECT * FROM session_privs ;
```

```
PRIVILEGE
```

```
-----  
CREATE SESSION
```

```
UNLIMITED TABLESPACE
```

```
CREATE TABLE
```

```
CREATE CLUSTER
```

```
CREATE SEQUENCE
```

```
CREATE PROCEDURE
```

```
CREATE TRIGGER
```

```
CREATE TYPE
```

```
CREATE OPERATOR
```

```
CREATE INDEXTYPE
```

```
10 rows selected.
```

```
INVENTORY@orcl> SELECT * FROM session_roles ;
```

```
ROLE
```

```
-----  
CONNECT
```

```
RESOURCE
```

```

INVENTORY@orcl> CREATE TABLE t1 (id number, name varchar2(10)) ;
Table created.
INVENTORY@orcl> INSERT INTO t1 VALUES (1111,'ABC') ;
1 row created.
INVENTORY@orcl> COMMIT ;
Commit complete.
INVENTORY@orcl> CONN /
Connected.
OPS$ORACLE@orcl> CREATE TABLE t1 (id number, name varchar2(10)) ;
CREATE TABLE t1 (id number, name varchar2(10))
*
ERROR at line 1:
ORA-01031: insufficient privileges
OPS$ORACLE@orcl> SELECT * FROM inventory.t1 ;
SELECT * FROM inventory.t1
*
ERROR at line 1:
ORA-00942: table or view does not exist
OPS$ORACLE@orcl> SELECT * FROM session_privs;
PRIVILEGE
-----
CREATE SESSION

OPS$ORACLE@orcl> CONN / as sysdba
Connected.
SYS@orcl> GRANT create table TO ops$oracle ;
Grant succeeded.
SYS@orcl> ALTER USER ops$oracle QUOTA 10M ON users ;
User altered.
SYS@orcl> CONN /
Connected.
OPS$ORACLE@orcl> CREATE TABLE t1 (id number, name varchar2(10))
                SEGMENT CREATION IMMEDIATE
                TABLESPACE users ;

Table created.
OPS$ORACLE@orcl> CREATE TABLE t2 (id number, name varchar2(10))
                SEGMENT CREATION IMMEDIATE
                TABLESPACE example ;
CREATE TABLE t2 (id number, name varchar2(10))
*
ERROR at line 1:
ORA-01950: no privileges on tablespace 'EXAMPLE'
OPS$ORACLE@orcl> SELECT * FROM session_privs ;
PRIVILEGE
-----
CREATE SESSION
CREATE TABLE

```

- *DEFAULT ROLE 의 활용*

```
OPS$ORACLE@orcl> CONN / as sysdba
Connected.
SYS@orcl> REVOKE create session, create table FROM ops$oracle ;
Revoke succeeded.
SYS@orcl> CREATE ROLE APP_A ;
Role created.
SYS@orcl> CREATE ROLE APP_B ;
Role created.
SYS@orcl> GRANT create session TO APP_A, APP_B ;
Grant succeeded.
SYS@orcl> GRANT create table, unlimited tablespace TO APP_B ;
Grant succeeded.
SYS@orcl> GRANT APP_A, APP_B TO ops$oracle ;
Grant succeeded.
SYS@orcl> ALTER USER ops$oracle DEFAULT ROLE app_a ;
User altered.
SYS@orcl> CONN /
Connected.
OPS$ORACLE@orcl> SELECT * FROM session_privs ;
PRIVILEGE
-----
CREATE SESSION
OPS$ORACLE@orcl> SET ROLE app_b ;
Role set.
OPS$ORACLE@orcl> SELECT * FROM session_privs ;
PRIVILEGE
-----
CREATE SESSION
UNLIMITED TABLESPACE
CREATE TABLE
```

- *권한의 Passing*

```
OPS$ORACLE@orcl> CONN / as sysdba
Connected.
SYS@orcl> GRANT create table TO inventory WITH ADMIN OPTION ;
Grant succeeded.
SYS@orcl> CONN inventory/oracle_4U
Connected.
INVENTORY@orcl> GRANT create view TO ops$oracle ;
GRANT create view TO ops$oracle
*
ERROR at line 1:
ORA-01031: insufficient privileges
INVENTORY@orcl> GRANT create table TO ops$oracle ;
Grant succeeded.
INVENTORY@orcl> GRANT select,update ON t1 TO ops$oracle ;
Grant succeeded.
INVENTORY@orcl> GRANT delete ON t1 TO ops$oracle WITH GRANT OPTION ;
Grant succeeded.
```

```
INVENTORY@orcl> CONN /
```

Connected.

```
OPS$ORACLE@orcl> SELECT owner, table_name, grantor, privilege
```

```
FROM user_tab_privs_recd ;
```

OWNER	TABLE_NAME	GRANTOR	PRIVILEGE
INVENTORY	T1	INVENTORY	UPDATE
INVENTORY	T1	INVENTORY	SELECT
INVENTORY	T1	INVENTORY	DELETE

#### • 프로파일 생성 및 사용

```
OPS$ORACLE@orcl> CONN / as sysdba
```

Connected.

```
SYS@orcl> SELECT profile, resource_name, resource_type, limit
```

```
FROM dba_profiles
```

```
WHERE profile = 'DEFAULT' ;
```

PROFILE	RESOURCE_NAME	RESOURCE	LIMIT
DEFAULT	COMPOSITE_LIMIT	KERNEL	UNLIMITED
DEFAULT	SESSIONS_PER_USER	KERNEL	UNLIMITED
DEFAULT	PRIVATE_SGA	KERNEL	UNLIMITED
DEFAULT	CONNECT_TIME	KERNEL	UNLIMITED
DEFAULT	IDLE_TIME	KERNEL	UNLIMITED
DEFAULT	LOGICAL_READS_PER_CALL	KERNEL	UNLIMITED
DEFAULT	LOGICAL_READS_PER_SESSION	KERNEL	UNLIMITED
DEFAULT	CPU_PER_CALL	KERNEL	UNLIMITED
DEFAULT	CPU_PER_SESSION	KERNEL	UNLIMITED
DEFAULT	PASSWORD_VERIFY_FUNCTION	PASSWORD	NULL
DEFAULT	PASSWORD_REUSE_MAX	PASSWORD	UNLIMITED
DEFAULT	PASSWORD_REUSE_TIME	PASSWORD	UNLIMITED
DEFAULT	PASSWORD_LIFE_TIME	PASSWORD	180
DEFAULT	FAILED_LOGIN_ATTEMPTS	PASSWORD	10
DEFAULT	PASSWORD_LOCK_TIME	PASSWORD	1
DEFAULT	PASSWORD_GRACE_TIME	PASSWORD	7

16 rows selected.

```
SYS@orcl> @$ORACLE_HOME/rdbms/admin/utlpwdmg.sql
```

Function created.

Profile altered.

Function created.

```
SYS@orcl> SELECT profile, resource_name, resource_type, limit
```

```
FROM dba_profiles
```

```
WHERE profile = 'DEFAULT' ;
```

PROFILE	RESOURCE_NAME	RESOURCE	LIMIT
...			
DEFAULT	PASSWORD_VERIFY_FUNCTION	PASSWORD	VERIFY_FUNCTION_11G
...			
DEFAULT	PASSWORD_LIFE_TIME	PASSWORD	180
DEFAULT	FAILED_LOGIN_ATTEMPTS	PASSWORD	10
DEFAULT	PASSWORD_LOCK_TIME	PASSWORD	1
DEFAULT	PASSWORD_GRACE_TIME	PASSWORD	7

16 rows selected.

SYS@orcl> ALTER PROFILE default LIMIT

composite_limit	UNLIMITED
sessions_per_user	UNLIMITED
private_sga	UNLIMITED
connect_time	UNLIMITED
idle_time	UNLIMITED
logical_reads_per_call	UNLIMITED
logical_reads_per_session	UNLIMITED
cpu_per_call	UNLIMITED
cpu_per_session	UNLIMITED
password_verify_function	NULL
password_reuse_max	UNLIMITED
password_reuse_time	UNLIMITED
password_life_time	UNLIMITED
failed_login_attempts	UNLIMITED
password_lock_time	UNLIMITED
password_grace_time	UNLIMITED ;

Profile altered.

SYS@orcl> CREATE PROFILE hrprofile LIMIT

sessions_per_user	1
idle_time	15
cpu_per_call	50
password_verify_function	VERIFY_FUNCTION_11G
password_reuse_max	2
password_life_time	30
failed_login_attempts	5
password_lock_time	1 ;

Profile created.

SYS@orcl> show parameter resource\_limit

NAME	TYPE	VALUE
resource_limit	boolean	FALSE

SYS@orcl> ALTER SYSTEM SET resource\_limit = TRUE ;

System altered.

SYS@orcl> ALTER USER inventory PROFILE hrprofile ;

User altered.

SYS@orcl> ALTER USER inventory IDENTIFIED BY oracle ;

ALTER USER inventory IDENTIFIED BY oracle

\*

ERROR at line 1:

ORA-28003: password verification for the specified password failed  
ORA-20001: Password length less than 8

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```

SYS@orcl> ALTER USER inventory IDENTIFIED BY inventory ;
ALTER USER inventory IDENTIFIED BY inventory
*
ERROR at line 1:
ORA-28003: password verification for the specified password failed
ORA-20002: Password same as or similar to user

```

```

SYS@orcl> ALTER USER inventory IDENTIFIED BY oracle_4U ;
User altered.

```

```

SYS@orcl> ALTER USER inventory IDENTIFIED BY oracle_4U ;
ALTER USER inventory IDENTIFIED BY oracle_4U

```

```

*
ERROR at line 1:
ORA-28007: the password cannot be reused

```

```

SYS@orcl> CONN inventory/oracle_4U
Connected.

```

```

INVENTORY@orcl> SELECT * FROM all_objects a, all_objects b, all_objects c
ORDER BY 1,2,3,4,5,6,7 ;

```

```

SELECT * FROM all_objects a, all_objects b, all_objects c
*
ERROR at line 1:
ORA-02393: exceeded call limit on CPU usage

```

```

INVENTORY@orcl> CONN / as sysdba
Connected.

```

```

SYS@orcl> ALTER SYSTEM SET resource_limit = FALSE ;
System altered.

```

```

SYS@orcl> ALTER USER inventory PROFILE DEFAULT ;
User altered.

```

```

SYS@orcl> DROP PROFILE hrprofile ;
Profile dropped.

```

#### • 11g New Features **확인**

```

SYS@orcl> show parameter sec_case_sensitive_logon

```

NAME	TYPE	VALUE
sec_case_sensitive_logon	boolean	TRUE

```

SYS@orcl> show parameter sec_max_failed_login_attempts

```

NAME	TYPE	VALUE
sec_max_failed_login_attempts	integer	10

```

SYS@orcl> exit

```

## 9. 데이터 동시성 관리

- Lock 충돌 해결 (터미널 창을 3개 실행하여 진행)

# Terminal 2	# Terminal 3
<pre>[orcl:~]\$ sqlplus system/oracle_4U SQL&gt; SELECT empno, ename, sal       FROM scott.emp       WHERE deptno = 10 ; EMPNO  ENAME      SAL ----- 7782 CLARK      2450 7839 KING      5000 7934 MILLER     1300 SQL&gt; UPDATE scott.emp       SET sal = sal * 1.1       WHERE deptno = 10 ; 3 row updated.</pre>	<pre>[orcl:~]\$ sqlplus system/oracle_4U SQL&gt; SELECT empno, ename, sal       FROM scott.emp       WHERE deptno = 10 ; EMPNO  ENAME      SAL ----- 7782 CLARK      2450 7839 KING      5000 7934 MILLER     1300 SQL&gt; UPDATE scott.emp       SET sal = 6000       WHERE empno = 7839 ; ...  &lt;= Waiting</pre>

### # Terminal 1

```
[orcl:~]$ sqlplus / as sysdba
```

```
SYS@orcl> SELECT session_id, object_id, oracle_username, locked_mode
```

```
      FROM v$locked_object ;
```

SESSION_ID	OBJECT_ID	ORACLE_USERNAME	LOCKED_MODE
139	73181	SYSTEM	3
142	73181	SYSTEM	3

```
SYS@orcl> SELECT session_id, owner, name, mode_held
```

```
      FROM dba_dml_locks ;
```

SESSION_ID	OWNER	NAME	MODE_HELD
139	SCOTT	EMP	Row-X (SX)
142	SCOTT	EMP	Row-X (SX)

```
SYS@orcl> SELECT sid, serial#, username, blocking_session, event, seconds_in_wait
```

```
      FROM v$session
```

```
      WHERE username = 'SYSTEM' ;
```

SID	SERIAL#	USERNAME	BLOCKING_SESSION	EVENT	SECONDS_IN_WAIT
139	34	SYSTEM		SQL*Net message from client	298
142	60	SYSTEM	139	enq: TX - row lock contention	63

```

SYS@orcl> SELECT username, row_wait_obj#, row_wait_file#, row_wait_block#, row_wait_row#, prev_sql_id
           FROM v$session
           WHERE blocking_session IS NOT NULL ;

```

USERNAME	ROW_WAIT_OBJ#	ROW_WAIT_FILE#	ROW_WAIT_BLOCK#	ROW_WAIT_ROW#	PREV_SQL_ID
SYSTEM	73181	4	151	8	fzfv0f2pdmnym

```

SYS@orcl> SELECT owner, object_name
           FROM dba_objects
           WHERE object_id = 73181 ;

```

OWNER	OBJECT_NAME
SCOTT	EMP

```

SYS@orcl> SELECT empno, ename, sal
           FROM scott.emp
           WHERE rowid = DBMS_ROWID.ROWID_CREATE(1,73181,4,151,8) ;

```

EMPNO	ENAME	SAL
7839	KING	5000

```

SYS@orcl> SELECT sql_text
           FROM v$sql
           WHERE sql_id = 'fzfv0f2pdmnym' ;

```

```

SQL_TEXT
-----
UPDATE scott.emp SET sal = 6000 WHERE empno = 7839
SYS@orcl> ALTER SYSTEM KILL SESSION '139,34' IMMEDIATE ;
System altered.

```

# Terminal 2	# Terminal 3
<pre> SQL&gt; SELECT empno, ename, sal       FROM scott.emp       WHERE deptno = 10 ; SELECT empno, ename, sal * ERROR at line 1: ORA-03135: connection lost contact Process ID: 16800 Session ID: 139 Serial number: 34 </pre>	<pre> SQL&gt; UPDATE scott.emp       SET sal = 6000       WHERE empno = 7839 ; ...   &lt;= Waiting 1 row updated.  SQL&gt; ROLLBACK ; Rollback complete. </pre>



• "ddl\_lock\_timeout" Parameter 확인

# Terminal 2	# Terminal 3
<pre>SQL&gt; CONN system/oracle_4U SQL&gt; UPDATE scott.emp       SET sal = sal * 1.1       WHERE empno = 7788 ; 1 row updated.</pre>	<pre>SQL&gt; CONN system/oracle_4U  SQL&gt; ALTER TABLE scott.emp       MODIFY ( ename  VARCHAR2(11) ) ; ALTER TABLE scott.emp       * ERROR at line 1: ORA-00054: resource busy and acquire with NOWAIT specified or timeout expired  SQL&gt; show parameter ddl_lock_timeout NAME                                TYPE                                VALUE -----                                -                                - ddl_lock_timeout                    integer                            0 SQL&gt; ALTER SESSION SET ddl_lock_timeout = 5 ; Session altered. SQL&gt; ALTER TABLE scott.emp       MODIFY ( ename  VARCHAR2(11) ) ; ... =&gt; 5 초의 waiting 후 ALTER TABLE scott.emp       * ERROR at line 1: ORA-00054: resource busy and acquire with NOWAIT specified or timeout expired  SQL&gt; exit</pre>
<pre>SQL&gt; ROLLBACK ; Rollback complete. SQL&gt; exit</pre>	

## 10. 언두 데이터 관리

• Automatic Undo Management *오/해*

[orcl:~]\$ sqlplus / as sysdba

SYS@orcl> show parameter undo

NAME	TYPE	VALUE
undo_management	string	AUTO
undo_retention	integer	900
undo_tablespace	string	UNDOTBS1

SYS@orcl> SELECT tablespace\_name, contents, retention

FROM dba\_tablespaces

WHERE contents = 'UNDO' ;

TABSPACE_NAME	CONTENTS	RETENTION
UNDOTBS1	UNDO	NOGUARANTEE

SYS@orcl> SELECT file\_name, bytes/1024/1024 AS MB, autoextensible

FROM dba\_data\_files

WHERE tablespace\_name = 'UNDOTBS1' ;

FILE_NAME	MB	AUT
+DATA/orcl/datafile/undotbs1.258.815439971	110	YES

SYS@orcl> SELECT \*

FROM v\$rollname ;

USN NAME

```
0 SYSTEM
1 _SYSSMU1_592353410$
2 _SYSSMU2_967517682$
3 _SYSSMU3_1204390606$
4 _SYSSMU4_1003442803$
5 _SYSSMU5_538557934$
6 _SYSSMU6_2897970769$
7 _SYSSMU7_3517345427$
8 _SYSSMU8_3901294357$
9 _SYSSMU9_1735643689$
10 _SYSSMU10_4131489474$
```

11 rows selected.

SYS@orcl> SELECT segment\_name, owner, tablespace\_name, segment\_id, status

FROM dba\_rollback\_segs ;

SEGMENT_NAME	OWNER	TABSPACE_NAME	SEGMENT_ID	STATUS
SYSTEM	SYS	SYSTEM	0	ONLINE
_SYSSMU1_592353410\$	PUBLIC	UNDOTBS1	1	ONLINE
_SYSSMU2_967517682\$	PUBLIC	UNDOTBS1	2	ONLINE
_SYSSMU3_1204390606\$	PUBLIC	UNDOTBS1	3	ONLINE
_SYSSMU4_1003442803\$	PUBLIC	UNDOTBS1	4	ONLINE
_SYSSMU5_538557934\$	PUBLIC	UNDOTBS1	5	ONLINE
_SYSSMU6_2897970769\$	PUBLIC	UNDOTBS1	6	ONLINE
_SYSSMU7_3517345427\$	PUBLIC	UNDOTBS1	7	ONLINE
_SYSSMU8_3901294357\$	PUBLIC	UNDOTBS1	8	ONLINE
_SYSSMU9_1735643689\$	PUBLIC	UNDOTBS1	9	ONLINE
_SYSSMU10_4131489474\$	PUBLIC	UNDOTBS1	10	ONLINE

11 rows selected.

- Undo Segment 할당 확인

SYS@orcl> CONN system/oracle\_4U

Connected.

SYSTEM@orcl> CREATE TABLE t1

AS SELECT rownum AS ID, object\_name, created  
FROM dba\_objects ;

Table created.

SYSTEM@orcl> UPDATE t1

SET created = created + 1  
WHERE id = 1 ;

1 row updated.

SYSTEM@orcl> SELECT xid, xidusn, xidslot, xidsqn, ubafil, ubablk  
FROM v\$transaction ;

XID	XIDUSN	XIDSLLOT	XIDSQN	UBAFIL	UBABLK
0400070031020000	4	7	561	3	11361

SYSTEM@orcl> save 1 replace

Wrote file 1.sql

SYSTEM@orcl> SELECT segment\_name, extent\_id, file\_id, block\_id, bytes, blocks, status  
FROM dba\_undo\_extents  
WHERE status = 'ACTIVE' ;

SEGMENT_NAME	EXTENT_ID	FILE_ID	BLOCK_ID	BYTES	BLOCKS	STATUS
_SYSSMU4_1003442803\$	2	3	11264	1048576	128	ACTIVE

SYSTEM@orcl> save 2 replace

Wrote file 2.sql

SYSTEM@orcl> ! sqlplus system/oracle\_4U

SYSTEM@orcl> UPDATE t1

SET created = created + 1  
WHERE id = 2 ;

1 row updated.

SYSTEM@orcl> @1

XID	XIDUSN	XIDSLLOT	XIDSQN	UBAFIL	UBABLK
0400070031020000	4	7	561	3	11361
0100060009020000	1	6	521	3	11089

SYSTEM@orcl> @2

SEGMENT_NAME	EXTENT_ID	FILE_ID	BLOCK_ID	BYTES	BLOCKS	STATUS
_SYSSMU4_1003442803\$	2	3	11264	1048576	128	ACTIVE
_SYSSMU1_592353410\$	4	3	11008	1048576	128	ACTIVE

SYSTEM@orcl> ! sqlplus system/oracle\_4U

SYSTEM@orcl> UPDATE t1

SET created = created + 1  
WHERE id = 3 ;

1 row updated.

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SYSTEM@orcl> @1

XID	XIDUSN	XIDSLT	XIDSQN	UBAFILE	UBABLK
0400070031020000	4	7	561	3	11361
0100060009020000	1	6	521	3	11089
0A000B0033020000	10	11	563	3	1490

SYSTEM@orcl> @2

SEGMENT_NAME	EXTENT_ID	FILE_ID	BLOCK_ID	BYTES	BLOCKS	STATUS
_SYSSMU10_4131489474\$	2	3	1408	1048576	128	ACTIVE
_SYSSMU4_1003442803\$	2	3	11264	1048576	128	ACTIVE
_SYSSMU1_592353410\$	4	3	11008	1048576	128	ACTIVE

# 동일한 방법을 이용하여 기존의 세션을 종료하지 않은 상태로 SYSTEM 유저로 로그인하여 T1 테이블의 서로 다른 행을 수정하여 각각의 Undo Segment 할당 방식을 확인 한다.

...

SYSTEM@orcl> ! sqlplus system/oracle\_4U

SYSTEM@orcl> UPDATE t1

SET created = created + 1

WHERE id = 10 ;

1 row updated.

SYSTEM@orcl> @1

XID	XIDUSN	XIDSLT	XIDSQN	UBAFILE	UBABLK
03001600F8020000	3	22	760	3	10360
0700030043020000	7	3	579	3	10987
0400070031020000	4	7	561	3	11361
08001800BC030000	8	24	956	3	11833
0100060009020000	1	6	521	3	11089
05001E002C030000	5	30	812	3	13800
09000700DC020000	9	7	732	3	406
06000C00E6020000	6	12	742	3	11695
02001000D2020000	2	16	722	3	1703
0A000B0033020000	10	11	563	3	1490

10 rows selected.

SYSTEM@orcl> @2

SEGMENT_NAME	EXTENT_ID	FILE_ID	BLOCK_ID	BYTES	BLOCKS	STATUS
_SYSSMU10_4131489474\$	2	3	1408	1048576	128	ACTIVE
_SYSSMU9_1735643689\$	15	3	400	65536	8	ACTIVE
_SYSSMU8_3901294357\$	3	3	11776	1048576	128	ACTIVE
_SYSSMU7_3517345427\$	3	3	10880	1048576	128	ACTIVE
_SYSSMU6_2897970769\$	5	3	11648	1048576	128	ACTIVE
_SYSSMU5_538557934\$	97	3	12800	8388608	1024	ACTIVE
_SYSSMU4_1003442803\$	2	3	11264	1048576	128	ACTIVE
_SYSSMU3_1204390606\$	3	3	10240	1048576	128	ACTIVE
_SYSSMU2_967517682\$	4	3	1664	1048576	128	ACTIVE
_SYSSMU1_592353410\$	4	3	11008	1048576	128	ACTIVE

10 rows selected.

# 10 개의 세션이 각각 서로 다른 Undo Segment 를 할당 받아 DML 을 진행하고 있는 모습을 확인할 수 있다.  
만약 새로운 세션에서 Transaction 이 진행 된다면 Undo Segment 는 어떻게 사용되는지 확인한다.

SYSTEM@orcl> ! sqlplus system/oracle\_4U

SYSTEM@orcl> UPDATE t1

SET created = created + 1

WHERE id = 11 ;

1 row updated.

SYSTEM@orcl> @1

XID	XIDUSN	XIDSLOT	XIDSQN	UBAFILE	UBABLK
03001600F8020000	3	22	760	3	10360
0C00050004000000	12	5	4	3	518
0700030043020000	7	3	579	3	10987
0400070031020000	4	7	561	3	11361
08001800BC030000	8	24	956	3	11833
0100060009020000	1	6	521	3	11089
05001E002C030000	5	30	812	3	13800
09000700DC020000	9	7	732	3	406
06000C00E6020000	6	12	742	3	11695
02001000D2020000	2	16	722	3	1703
0A000B0033020000	10	11	563	3	1490

11 rows selected.

SYSTEM@orcl> @2

SEGMENT_NAME	EXTENT_ID	FILE_ID	BLOCK_ID	BYTES	BLOCKS	STATUS
_SYSSMU12_3926715923\$	0	3	512	65536	8	ACTIVE
_SYSSMU10_4131489474\$	2	3	1408	1048576	128	ACTIVE
_SYSSMU9_1735643689\$	15	3	400	65536	8	ACTIVE
_SYSSMU8_3901294357\$	3	3	11776	1048576	128	ACTIVE
_SYSSMU7_3517345427\$	3	3	10880	1048576	128	ACTIVE
_SYSSMU6_2897970769\$	5	3	11648	1048576	128	ACTIVE
_SYSSMU5_538557934\$	97	3	12800	8388608	1024	ACTIVE
_SYSSMU4_1003442803\$	2	3	11264	1048576	128	ACTIVE
_SYSSMU3_1204390606\$	3	3	10240	1048576	128	ACTIVE
_SYSSMU2_967517682\$	4	3	1664	1048576	128	ACTIVE
_SYSSMU1_592353410\$	4	3	11008	1048576	128	ACTIVE

11 rows selected.

SYSTEM@orcl> SELECT \*

FROM v\$rollname ;

USN NAME

0	SYSTEM
1	_SYSSMU1_592353410\$
2	_SYSSMU2_967517682\$
3	_SYSSMU3_1204390606\$
4	_SYSSMU4_1003442803\$
5	_SYSSMU5_538557934\$
6	_SYSSMU6_2897970769\$
7	_SYSSMU7_3517345427\$
8	_SYSSMU8_3901294357\$
9	_SYSSMU9_1735643689\$
10	_SYSSMU10_4131489474\$
11	_SYSSMU11_312975126\$
12	_SYSSMU12_3926715923\$
13	_SYSSMU13_2911742133\$

14 rows selected.

※ Automatic Undo Management 는 Transaction 당 하나의 Undo Segment 할당을 최대한 보장해 줌으로써  
경합을 최소화 할 수 있으며 UNDO\_RETENTION 의 값을 최대한 보장할 수 있는 환경을 구성할 수 있다.

단, Undo Segment 가 생성될 수 있는 저장 공간이 존재할 때 가능하며 저장 공간이 부족할 때는 하나의 Undo Segment 에 여러 개의 Transaction 정보가 함께 공유될 수도 있다.

※ 현재 열려진 터미널은 강제 종료 후 새로운 터미널을 열고 실습 진행

- 읽기 일관성 및 Undo Retention 확인

[orcl:~]\$ sqlplus / as sysdba

SYS@orcl> show parameter undo

NAME	TYPE	VALUE
undo_management	string	AUTO
undo_retention	integer	900
undo_tablespace	string	UNDOTBS1

SYS@orcl> SELECT ksppinm AS NAME,  
ksppstvl AS VALUE,  
decode(bitand(ksppiflg/256,1),1,'true','false') AS SES\_MODIF,  
decode(bitand(ksppiflg/65536,3),1,'immediate',2,'deferred',3,'immediate','false') AS SYS\_MODIF,  
ksppdesc AS DESCRIPTION

FROM sys.x\$ksppi i, sys.x\$ksppcv v

WHERE i.indx = v.indx

AND i.ksppinm = '\_undo\_autotune' ;

NAME	VALUE	SES_MODIF	SYS_MODIF	DESCRIPTION
_undo_autotune	TRUE	false	immediate	enable auto tuning of undo_retention

SYS@orcl> SELECT \*

FROM ( SELECT TO\_CHAR(begin\_time,'MM/DD HH24:MI:SS') AS BEGIN\_TIME ,  
TO\_CHAR(end\_time,'MM/DD HH24:MI:SS') AS END\_TIME,  
maxquerylen,  
maxqueryid,  
tuned\_undoretention,  
b.sql\_text  
FROM v\$undostat a, v\$sql b  
WHERE a.maxqueryid = b.sql\_id(+)  
ORDER BY begin\_time DESC )

WHERE rownum <= 3 ;

BEGIN_TIME	END_TIME	MAXQUERYLEN	MAXQUERYID	TUNED_UNDORETENTION	SQL_TEXT
05/21 13:35:01	05/21 13:39:38	588	0rc4km05kgzb9	796	select 1 f
05/21 13:25:01	05/21 13:35:01	279	0rc4km05kgzb9	569	select 1 f
05/21 13:15:01	05/21 13:25:01	864	0rc4km05kgzb9	1785	select 1 f

SYS@orcl> SELECT tablespace\_name, contents, retention

FROM dba\_tablespaces

WHERE contents = 'UNDO' ;

TABLESPACE_NAME	CONTENTS	RETENTION
UNDOTBS1	UNDO	NOGUARANTEE

```

SYS@orcl> CREATE UNDO TABLESPACE undotbs2
            DATAFILE '+DATA' SIZE 1M AUTOEXTEND OFF ;
Tablespace created.
SYS@orcl> ALTER SYSTEM SET undo_tablespace = undotbs2 ;
System altered.
SYS@orcl> ALTER SYSTEM SET undo_retention = 60 ;
System altered.
SYS@orcl> ALTER SYSTEM SET "_undo_autotune" = false ;
System altered.
SYS@orcl> shutdown immediate
SYS@orcl> startup
...
SYS@orcl> SELECT *
            FROM ( SELECT TO_CHAR(begin_time,'MM/DD HH24:MI:SS') AS BEGIN_TIME ,
                        TO_CHAR(end_time,'MM/DD HH24:MI:SS') AS END_TIME,
                        maxquerylen,
                        maxqueryid,
                        tuned_undoretention,
                        b.sql_text
                    FROM v$undostat a, v$sql b
                    WHERE a.maxqueryid = b.sql_id(+)
                    ORDER BY begin_time DESC )
            WHERE rownum <= 3 ;

```

BEGIN_TIME	END_TIME	MAXQUERYLEN	MAXQUERYID	TUNED_UNDORETENTION	SQL_TEXT
05/21 15:41:04	05/21 15:44:28	0		0	

```

SYS@orcl> show parameter undo

```

NAME	TYPE	VALUE
_undo_autotune	boolean	FALSE
undo_management	string	AUTO
undo_retention	integer	60
undo_tablespace	string	UNDOTBS2

```

SYS@orcl> SELECT *
            FROM v$rollname ;

```

USN	NAME
0	SYSTEM
14	_SYSSMU14_1542060853\$
15	_SYSSMU15_1584200815\$
16	_SYSSMU16_2708161455\$
17	_SYSSMU17_2314065922\$
18	_SYSSMU18_3842416161\$
19	_SYSSMU19_810267679\$
20	_SYSSMU20_296494783\$

8 rows selected.

# 새로운 터미널을 2개 실행하여 SYSTEM 유저로 로그인

# Terminal 1

[orcl:~]\$ sqlplus system/oracle\_4U

```
SQL> SELECT created
      FROM t1
      WHERE id = 1 ;
```

```
CREATED
-----
14-AUG-09
```

```
SQL> SELECT created
      FROM t1
      WHERE id = 1 ;
```

```
CREATED
-----
14-AUG-09
```

```
SQL> SELECT created
      FROM t1
      WHERE id = 1 ;
```

```
CREATED
-----
15-AUG-09
```

```
SQL> SELECT created
      FROM t1
      AS OF TIMESTAMP (SYSDATE - 10/1440)
      WHERE id = 1 ;
```

```
CREATED
-----
14-AUG-09
```

# Terminal 2

[orcl:~]\$ sqlplus system/oracle\_4U

```
SQL> SELECT created
      FROM t1
      WHERE id = 1 ;
```

```
CREATED
-----
14-AUG-09
```

```
SQL> UPDATE t1
      SET created = created + 1
      WHERE id = 1 ;
```

1 row updated.

```
SQL> SELECT created
      FROM t1
      WHERE id = 1 ;
```

```
CREATED
-----
15-AUG-09
```

```
SQL> SELECT segment_name, extent_id, status
      FROM dba_undo_extents
      WHERE status = 'ACTIVE' ;
```

SEGMENT_NAME	EXTENT_ID	STATUS
_____	_____	_____
_SYSSMU20_296494783\$	0	ACTIVE

```
SQL> COMMIT ;
Commit complete.
```

```
SQL> SELECT created
      FROM t1
      WHERE id = 1 ;
```

```
CREATED
-----
15-AUG-09
```

```
SQL> SELECT segment_name, extent_id, status
      FROM dba_undo_extents
      WHERE segment_name = '_SYSSMU20_296494783$'
      AND extent_id = 0 ;
```

SEGMENT_NAME	EXTENT_ID	STATUS
_____	_____	_____
_SYSSMU20_296494783\$	0	UNEXPIRED



※ *SELECT* 명령의 결과는 다른 세션에서 현재 DML 수행중인 결과를 반영하지 않는다. *SELECT* 명령이 실행 될 때 다른 세션의 DML 명령에 의해 값이 수정 되었다면 Undo Data 를 이용하여 이전의 데이터를 확보할 수 있다. DML 명령을 수행하는 세션에서 COMMIT 이 수행 되면 보관 중인 Undo Data 를 UNDO\_RETENTION 의 기간동안 지우지 않고 보관 한다. 때문에 Flashback Query 등을 이용하여 일정 기간 동안은 Undo Data 의 접근이 가능하다.

읽기 일관성은 *SELECT* 명령문 실행 단위로 구현되나 필요 시 TRANSACTION 단위로 작업 가능하다.

<pre>SQL&gt; SET TRANSACTION       ISOLATION LEVEL SERIALIZABLE ; Transaction set.  SQL&gt; SELECT created       FROM t1       WHERE id = 1 ;  CREATED ----- 15-AUG-09  SQL&gt; SELECT created       FROM t1       WHERE id = 1 ;  CREATED ----- 15-AUG-09</pre>	<pre>SQL&gt; UPDATE t1       SET created = created + 1       WHERE id = 1 ;  1 row updated. SQL&gt; SELECT created       FROM t1       WHERE id = 1 ;  CREATED ----- 16-AUG-09  SQL&gt; SELECT segment_name, extent_id, status       FROM dba_undo_extents       WHERE status = 'ACTIVE' ;  SEGMENT_NAME          EXTENT_ID STATUS ----- _SYSSMU14_154206085\$          0 ACTIVE  SQL&gt; COMMIT ; Commit complete. SQL&gt; SELECT created       FROM t1       WHERE id = 1 ;  CREATED ----- 16-AUG-09  SQL&gt; SELECT segment_name, extent_id, status       FROM dba_undo_extents       WHERE segment_name = '_SYSSMU14_154206085\$'       AND extent_id = 0 ;  SEGMENT_NAME          EXTENT_ID STATUS ----- _SYSSMU14_154206085\$          0 UNEXPIRED</pre>
--	--

※ 터미널 2 에서 COMMIT 을 수행 했으나 터미널 1 에서는 그 결과를 확인 할 수 없다. SET TRANSACTION 명령을 이용하여 해당 시점에 COMMIT 이 되어 있는 결과만을 보장하게 한다. 터미널 1 에서 확인 가능한 '15-AUG-09' 의 값은 Undo Data 를 이용하는 것이나 해당 Undo Data 는 ACTIVE 상태가 아니므로 일정 시간 (UNDO\_RETENTION) 이 지나면 EXPIRED 상태로 바뀌며 다른 트랜잭션에서 해당 Undo Data 영역은 재 사용이 될 수 있다.

<pre> SQL&gt; / SELECT created * ERROR at line 1: ORA-01555: snapshot too old: rollback segment number 19 with name "_SYSSMU19_810267679\$" too small SQL&gt; ROLLBACK ; Rollback complete. SQL&gt; SELECT created       FROM t1       WHERE id = 1 ; CREATED ----- 01-NOV-09 SQL&gt; exit </pre>	<pre> SQL&gt; BEGIN       FOR i IN 1..100 LOOP         UPDATE t1         SET created = created + 1         WHERE rownum &lt;= 400 ;         COMMIT ;       END LOOP ; END ; / ... ※ 실행 도중 에러 발생 될 수도 있음 ERROR at line 1: ORA-30036: unable to extend segment by 8 in undo tablespace 'UNDOTBS2' ORA-06512: at line 3 </pre> <pre> SQL&gt; exit </pre>
---	--

※ 터미널 2 에서 많은 트랜잭션을 수행하며 Undo Tablespace 공간을 재사용 하게 하였으므로 터미널 1 에서는 필요한 Undo Data 에 접근이 불가능하여 ORA-01555 : snapshot too old 에러를 보게 된다.

현재의 실습은 임의적인 설정으로 에러를 만들었지만 실제 업무에서는 Long Query 를 수행하는 도중 필요한 Undo Data 를 접근하지 못해 동일한 에러를 경험할 수 있다.

```

SYS@orcl> ALTER SYSTEM SET undo_tablespace = undotbs1 ;
System altered.
SYS@orcl> ALTER SYSTEM SET undo_retention = 900 ;
System altered.
SYS@orcl> ALTER SYSTEM RESET "_undo_autotune" ;
System altered.
SYS@orcl> ALTER TABLESPACE undotbs1 RETENTION GUARANTEE ;
Tablespace altered.

```

```
SYS@orcl> SELECT file_name, bytes/1024/1024 AS MB, autoextensible
FROM dba_data_files
WHERE tablespace_name = 'UNDOTBS1' ;
```

FILE_NAME	MB	AUT
+DATA/orcl/datafile/undotbs1.258.815439971	110	YES

```
SYS@orcl> STARTUP FORCE
```

...

```
SYS@orcl> show parameter undo
```

NAME	TYPE	VALUE
undo_management	string	AUTO
undo_retention	integer	900
undo_tablespace	string	UNDOTBS1

```
SYS@orcl> SELECT tablespace_name, contents, retention
FROM dba_tablespaces
WHERE contents = 'UNDO' ;
```

TABLESPACE_NAME	CONTENTS	RETENTION
UNDOTBS1	UNDO	GUARANTEE

```
SYS@orcl> SELECT *
```

```
FROM ( SELECT TO_CHAR(begin_time,'MM/DD HH24:MI:SS') AS BEGIN_TIME ,
TO_CHAR(end_time,'MM/DD HH24:MI:SS') AS END_TIME,
maxquerylen,
maxqueryid,
tuned_undoretention,
b.sql_text
FROM v$undostat a, v$sql b
WHERE a.maxqueryid = b.sql_id(+)
ORDER BY begin_time DESC )
```

```
WHERE rownum <= 3 ;
```

BEGIN_TIME	END_TIME	MAXQUERYLEN	MAXQUERYID	TUNED_UNDORETENTION	SQL_TEXT
05/21 21:35:52	05/21 21:36:15	0		900	

```
SYS@orcl> DROP TABLESPACE undotbs2 ;
```

Tablespace dropped.

```
SYS@orcl> ALTER TABLESPACE undotbs1 RETENTION NOGUARANTEE ;
```

Tablespace altered.

※ 일정 시간이 흐른 후 마지막 v\$undostat 뷰를 다시 쿼리하여 자동으로 튜닝 된 RETENTION 의 값 확인

## 11. 오라클 데이터베이스 감사(audit) 구현

- 필수 감사 확인 (Alert Log file)

[orcl:~]\$ sqlplus / as sysdba

SYS@orcl> show parameter diagnostic\_dest

NAME	TYPE	VALUE
diagnostic_dest	string	/u01/app/oracle

SYS@orcl> SELECT name, value FROM v\$diag\_info ;

NAME	VALUE
Diag Enabled	TRUE
ADR Base	/u01/app/oracle
ADR Home	/u01/app/oracle/diag/rdbms/orcl/orcl
Diag Trace	/u01/app/oracle/diag/rdbms/orcl/orcl/trace
Diag Alert	/u01/app/oracle/diag/rdbms/orcl/orcl/alert
Diag Incident	/u01/app/oracle/diag/rdbms/orcl/orcl/incident
Diag Cdump	/u01/app/oracle/diag/rdbms/orcl/orcl/cdump
Health Monitor	/u01/app/oracle/diag/rdbms/orcl/orcl/hm
Default Trace File	/u01/app/oracle/diag/rdbms/orcl/orcl/trace/orcl_ora_15748.trc
Active Problem Count	0
Active Incident Count	0

SYS@orcl> CREATE TABLESPACE tbs2 DATAFILE '+DATA' SIZE 10M ;

Tablespace created.

SYS@orcl> DROP TABLESPACE tbs2 ;

Tablespace dropped.

SYS@orcl> ! tail -9 /u01/app/oracle/diag/rdbms/orcl/orcl/trace/alert\_orcl.log

```
Tue May 21 23:26:23 2013
CREATE TABLESPACE tbs1 DATAFILE '+DATA' SIZE 10M
ORA-1543 signalled during: CREATE TABLESPACE tbs1 DATAFILE '+DATA' SIZE 10M ...
CREATE TABLESPACE tbs2 DATAFILE '+DATA' SIZE 10M
Completed: CREATE TABLESPACE tbs2 DATAFILE '+DATA' SIZE 10M
Tue May 21 23:26:52 2013
DROP TABLESPACE tbs2
Deleted Oracle managed file +DATA/orcl/datafile/tbs2.273.816045991
Completed: DROP TABLESPACE tbs2
```

SYS@orcl> SELECT \*

```
FROM ( SELECT indx,
              TO_CHAR(originating_timestamp,'RR/MM/DD HH24:MI:SS') AS org_time ,
              message_text
        FROM x$dbgaalertext
        ORDER BY indx DESC )
WHERE rownum <= 7
ORDER BY indx ;
```

INDX	ORG_TIME	MESSAGE_TEXT
3665	13/05/21 23:26:23	CREATE TABLESPACE tbs1 DATAFILE '+DATA' SIZE 10M
3666	13/05/21 23:26:23	ORA-1543 signalled during: CREATE TABLESPACE tbs1 DATAFILE '+DATA' SIZE 10M ...
3667	13/05/21 23:26:30	CREATE TABLESPACE tbs2 DATAFILE '+DATA' SIZE 10M
3668	13/05/21 23:26:31	Completed: CREATE TABLESPACE tbs2 DATAFILE '+DATA' SIZE 10M
3669	13/05/21 23:26:52	DROP TABLESPACE tbs2
3670	13/05/21 23:26:53	Deleted Oracle managed file +DATA/orcl/datafile/tbs2.273.816045991
3671	13/05/21 23:26:53	Completed: DROP TABLESPACE tbs2

- 값 기준 감사 (Trigger 활용)

```
SYS@orcl> CREATE TABLE system.audit_emp
      ( os_user      VARCHAR2(10),
        dml_date     DATE,
        addr         VARCHAR2(15),
        description   VARCHAR2(1000) );
```

Table created.

```
SYS@orcl> CREATE OR REPLACE TRIGGER system.sal_audit
      AFTER UPDATE OF sal ON scott.emp
      FOR EACH ROW
      BEGIN
        IF :old.sal != :new.sal THEN
          INSERT INTO system.audit_emp
            VALUES (sys_context('userenv','os_user'), sysdate, sys_context('userenv','ip_address'),
                    :new.empno || ' salary changed from ' || :old.sal || ' to ' || :new.sal);
        END IF;
      END;
```

/

Trigger created.

```
SYS@orcl> CONN system/oracle_4U@ORCL
```

Connected.

```
SYSTEM@ORCL> UPDATE scott.emp
      SET sal = sal * 1.1
      WHERE empno = 7788 ;
```

1 row updated.

```
SYSTEM@ORCL> SELECT * FROM audit_emp ;
```

OS_USER	DML_DATE	ADDR	DESCRIPTION
oracle	22-MAY-13	127.0.0.1	7788 salary changed from 3000 to 3300

```
SYSTEM@ORCL> ROLLBACK ;
```

Rollback complete.

```
SYSTEM@ORCL> DROP TABLE audit_emp PURGE ;
```

Table dropped.

```
SYSTEM@ORCL> DROP TRIGGER sal_audit ;
```

Trigger dropped.

```
SYSTEM@ORCL> exit
```

• 표준 데이터베이스 감사 (Audit)

[orcl:~]\$ sqlplus / as sysdba

SYS@orcl> show parameter audit\_trail

NAME	TYPE	VALUE
audit_trail	string	DB

SYS@orcl> SELECT privilege, success, failure

FROM dba\_priv\_audit\_opts

ORDER BY 1 ;

PRIVILEGE	SUCCESS	FAILURE
ALTER ANY PROCEDURE	BY ACCESS	BY ACCESS
ALTER ANY TABLE	BY ACCESS	BY ACCESS
ALTER DATABASE	BY ACCESS	BY ACCESS
ALTER PROFILE	BY ACCESS	BY ACCESS
ALTER SYSTEM	BY ACCESS	BY ACCESS
ALTER USER	BY ACCESS	BY ACCESS
AUDIT SYSTEM	BY ACCESS	BY ACCESS
CREATE ANY JOB	BY ACCESS	BY ACCESS
CREATE ANY LIBRARY	BY ACCESS	BY ACCESS
CREATE ANY PROCEDURE	BY ACCESS	BY ACCESS
CREATE ANY TABLE	BY ACCESS	BY ACCESS
CREATE EXTERNAL JOB	BY ACCESS	BY ACCESS
CREATE PUBLIC DATABASE LINK	BY ACCESS	BY ACCESS
CREATE SESSION	BY ACCESS	BY ACCESS
CREATE USER	BY ACCESS	BY ACCESS
DROP ANY PROCEDURE	BY ACCESS	BY ACCESS
DROP ANY TABLE	BY ACCESS	BY ACCESS
DROP PROFILE	BY ACCESS	BY ACCESS
DROP USER	BY ACCESS	BY ACCESS
EXEMPT ACCESS POLICY	BY ACCESS	BY ACCESS
GRANT ANY OBJECT PRIVILEGE	BY ACCESS	BY ACCESS
GRANT ANY PRIVILEGE	BY ACCESS	BY ACCESS
GRANT ANY ROLE	BY ACCESS	BY ACCESS

23 rows selected.

SYS@orcl> SELECT audit\_option, success, failure

FROM dba\_stmt\_audit\_opts

ORDER BY 1 ;

AUDIT_OPTION	SUCCESS	FAILURE
ALTER ANY PROCEDURE	BY ACCESS	BY ACCESS
ALTER ANY TABLE	BY ACCESS	BY ACCESS
ALTER DATABASE	BY ACCESS	BY ACCESS
ALTER PROFILE	BY ACCESS	BY ACCESS
ALTER SYSTEM	BY ACCESS	BY ACCESS
ALTER USER	BY ACCESS	BY ACCESS
CREATE ANY JOB	BY ACCESS	BY ACCESS
CREATE ANY LIBRARY	BY ACCESS	BY ACCESS
CREATE ANY PROCEDURE	BY ACCESS	BY ACCESS
CREATE ANY TABLE	BY ACCESS	BY ACCESS
CREATE EXTERNAL JOB	BY ACCESS	BY ACCESS
CREATE PUBLIC DATABASE LINK	BY ACCESS	BY ACCESS
CREATE SESSION	BY ACCESS	BY ACCESS
CREATE USER	BY ACCESS	BY ACCESS
DATABASE LINK	BY ACCESS	BY ACCESS

Chong Ha, Ryu

DROP ANY PROCEDURE	BY ACCESS	BY ACCESS
DROP ANY TABLE	BY ACCESS	BY ACCESS
DROP PROFILE	BY ACCESS	BY ACCESS
DROP USER	BY ACCESS	BY ACCESS
EXEMPT ACCESS POLICY	BY ACCESS	BY ACCESS
GRANT ANY OBJECT PRIVILEGE	BY ACCESS	BY ACCESS
GRANT ANY PRIVILEGE	BY ACCESS	BY ACCESS
GRANT ANY ROLE	BY ACCESS	BY ACCESS
PROFILE	BY ACCESS	BY ACCESS
PUBLIC SYNONYM	BY ACCESS	BY ACCESS
ROLE	BY ACCESS	BY ACCESS
SYSTEM AUDIT	BY ACCESS	BY ACCESS
SYSTEM GRANT	BY ACCESS	BY ACCESS

28 rows selected.

SYS@orcl> SELECT owner, object\_name, sel, ins, upd, del

FROM dba\_obj\_audit\_opts ;

no rows selected

SYS@orcl> SELECT username, timestamp, owner, obj\_name, action\_name, sql\_text

FROM dba\_audit\_trail ;

USERNAME	TIMESTAMP	OWNER	OBJ_NAME	ACTION_NAME	SQL_TEXT
DBSNMP	14-MAY-13			LOGOFF	
SYSMAN	14-MAY-13			LOGON	
SYSMAN	14-MAY-13			LOGON	
SYSMAN	14-MAY-13			LOGON	
SYSMAN	14-MAY-13			LOGON...	
...					

SYS@orcl> AUDIT select on scott.emp ;

Audit succeeded.

SYS@orcl> AUDIT CREATE TABLE ;

Audit succeeded.

SYS@orcl> AUDIT TABLE ;

Audit succeeded.

SYS@orcl> NOAUDIT CREATE SESSION ;

Noaudit succeeded.

SYS@orcl> SELECT privilege, success, failure

FROM dba\_priv\_audit\_opts

ORDER BY 1 ;

PRIVILEGE	SUCCESS	FAILURE
ALTER ANY PROCEDURE	BY ACCESS	BY ACCESS
ALTER ANY TABLE	BY ACCESS	BY ACCESS
ALTER DATABASE	BY ACCESS	BY ACCESS
ALTER PROFILE	BY ACCESS	BY ACCESS
ALTER SYSTEM	BY ACCESS	BY ACCESS
ALTER USER	BY ACCESS	BY ACCESS
AUDIT SYSTEM	BY ACCESS	BY ACCESS
CREATE ANY JOB	BY ACCESS	BY ACCESS
CREATE ANY LIBRARY	BY ACCESS	BY ACCESS
CREATE ANY PROCEDURE	BY ACCESS	BY ACCESS
CREATE ANY TABLE	BY ACCESS	BY ACCESS
CREATE EXTERNAL JOB	BY ACCESS	BY ACCESS

```

CREATE PUBLIC DATABASE LINK      BY ACCESS BY ACCESS
CREATE TABLE                   BY ACCESS BY ACCESS
CREATE USER                     BY ACCESS BY ACCESS
DROP ANY PROCEDURE              BY ACCESS BY ACCESS
DROP ANY TABLE                 BY ACCESS BY ACCESS
DROP PROFILE                    BY ACCESS BY ACCESS
DROP USER                      BY ACCESS BY ACCESS
EXEMPT ACCESS POLICY            BY ACCESS BY ACCESS
GRANT ANY OBJECT PRIVILEGE      BY ACCESS BY ACCESS
GRANT ANY PRIVILEGE             BY ACCESS BY ACCESS
GRANT ANY ROLE                  BY ACCESS BY ACCESS

```

23 rows selected.

```

SYS@orcl> SELECT audit_option, success, failure
           FROM dba_stmt_audit_opts
           ORDER BY 1 ;

```

AUDIT_OPTION	SUCCESS	FAILURE
ALTER ANY PROCEDURE	BY ACCESS	BY ACCESS
ALTER ANY TABLE	BY ACCESS	BY ACCESS
ALTER DATABASE	BY ACCESS	BY ACCESS
ALTER PROFILE	BY ACCESS	BY ACCESS
ALTER SYSTEM	BY ACCESS	BY ACCESS
ALTER USER	BY ACCESS	BY ACCESS
CREATE ANY JOB	BY ACCESS	BY ACCESS
CREATE ANY LIBRARY	BY ACCESS	BY ACCESS
CREATE ANY PROCEDURE	BY ACCESS	BY ACCESS
CREATE ANY TABLE	BY ACCESS	BY ACCESS
CREATE EXTERNAL JOB	BY ACCESS	BY ACCESS
CREATE PUBLIC DATABASE LINK	BY ACCESS	BY ACCESS
CREATE TABLE	BY ACCESS	BY ACCESS
CREATE USER	BY ACCESS	BY ACCESS
DATABASE LINK	BY ACCESS	BY ACCESS
DROP ANY PROCEDURE	BY ACCESS	BY ACCESS
DROP ANY TABLE	BY ACCESS	BY ACCESS
DROP PROFILE	BY ACCESS	BY ACCESS
DROP USER	BY ACCESS	BY ACCESS
EXEMPT ACCESS POLICY	BY ACCESS	BY ACCESS
GRANT ANY OBJECT PRIVILEGE	BY ACCESS	BY ACCESS
GRANT ANY PRIVILEGE	BY ACCESS	BY ACCESS
GRANT ANY ROLE	BY ACCESS	BY ACCESS
PROFILE	BY ACCESS	BY ACCESS
PUBLIC SYNONYM	BY ACCESS	BY ACCESS
ROLE	BY ACCESS	BY ACCESS
SYSTEM AUDIT	BY ACCESS	BY ACCESS
SYSTEM GRANT	BY ACCESS	BY ACCESS
TABLE	BY ACCESS	BY ACCESS

29 rows selected.

```

SYS@orcl> SELECT owner, object_name, sel, ins, upd, del
           FROM dba_obj_audit_opts ;

```

OWNER	OBJECT_NAME	SEL	INS	UPD	DEL
SCOTT	EMP	S/S	-/-	-/-	-/-

[http://docs.oracle.com/cd/E11882\\_01/server.112/e25513/statviews\\_4152.htm#REFRN23141](http://docs.oracle.com/cd/E11882_01/server.112/e25513/statviews_4152.htm#REFRN23141)

```

SYS@orcl> TRUNCATE TABLE aud$ ;

```

Table truncated.



```
SYS@orcl> SELECT username, timestamp, owner, obj_name, action_name, sql_text
        FROM dba_audit_trail ;
```

no rows selected

```
SYS@orcl> show user
```

USER is "SYS"

```
SYS@orcl> CREATE TABLE t (id NUMBER) ;
```

Table created.

```
SYS@orcl> DROP TABLE t PURGE ;
```

Table dropped.

```
SYS@orcl> SELECT empno, sal
```

```
        FROM scott.emp
```

```
        WHERE empno = 7788 ;
```

EMPNO	SAL
7788	3000

```
SYS@orcl> CONN system/oracle_4U
```

Connected.

```
SYSTEM@orcl> CREATE TABLE t (id NUMBER) ;
```

Table created.

```
SYSTEM@orcl> DROP TABLE t PURGE ;
```

Table dropped.

```
SYSTEM@orcl> SELECT empno, sal
```

```
        FROM scott.emp
```

```
        WHERE empno = 7788 ;
```

EMPNO	SAL
7788	3000

```
SYSTEM@orcl> CONN / as sysdba
```

Connected.

```
SYS@orcl> SELECT username, timestamp, owner, obj_name, action_name, sql_text, sql_bind
```

```
        FROM dba_audit_trail ;
```

USERNAME	TIMESTAMP	OWNER	OBJ_NAME	ACTION_NAME	SQL_TEXT	SQL_B
SYSTEM	22-MAY-13	SYSTEM	T	CREATE TABLE		
SYSTEM	22-MAY-13	SYSTEM	T	DROP TABLE		
SYSTEM	22-MAY-13	SCOTT	EMP	SESSION REC		

```
SYS@orcl> ALTER SYSTEM SET audit_trail = db,extended SCOPE=SPFILE ;
```

System altered.

```
SYS@orcl> STARTUP FORCE
```

ORACLE instance started.

Total System Global Area 577511424 bytes

Fixed Size 1338000 bytes

Variable Size 427820400 bytes

Database Buffers 142606336 bytes

Redo Buffers 5746688 bytes

Database mounted.

Database opened.

Chong Ha, Ryu

[chongharyu@naver.com](mailto:chongharyu@naver.com)  
<http://oukr.tistory.com>

SYS@orcl> TRUNCATE TABLE aud\$ ;

Table truncated.

SYS@orcl> CONN system/oracle\_4U

Connected.

SYSTEM@orcl> CREATE TABLE t (id NUMBER) ;

Table created.

SYSTEM@orcl> DROP TABLE t PURGE ;

Table dropped.

SYSTEM@orcl> SELECT empno, sal  
FROM scott.emp  
WHERE empno = 7788 ;

EMPNO	SAL
7788	3000

SYSTEM@orcl> CONN / as sysdba

Connected.

SYS@orcl> SELECT username, timestamp, owner, obj\_name, action\_name, sql\_text

FROM dba\_audit\_trail ;

USERNAME	TIMESTAMP	OWNER	OBJ_NAME	ACTION_NAME	SQL_TEXT
SYSTEM	22-MAY-13	SYSTEM	T	CREATE TABLE	CREATE TABLE t (id NUMBER)
SYSTEM	22-MAY-13	SYSTEM	T	DROP TABLE	DROP TABLE t PURGE
SYSTEM	22-MAY-13	SCOTT	EMP	SESSION REC	SELECT empno, sal FROM scott.emp WHERE empno = 7788

SYS@orcl> ALTER SYSTEM SET audit\_trail = none SCOPE=SPFILE ;

System altered.

SYS@orcl> STARTUP FORCE

ORACLE instance started.

Total System Global Area 577511424 bytes

Fixed Size 1338000 bytes

Variable Size 427820400 bytes

Database Buffers 142606336 bytes

Redo Buffers 5746688 bytes

Database mounted.

Database opened.

SYS@orcl> TRUNCATE TABLE aud\$ ;

Table truncated.

- FGA (Fine-grained auditing)

```

SYS@orcl> BEGIN
  DBMS_FGA.ADD_POLICY(
    object_schema      => 'SCOTT',
    object_name        => 'EMP',
    policy_name        => 'CHK_SCOTT_EMP',
    enable             => TRUE,
    statement_types    => 'INSERT, UPDATE, SELECT, DELETE' ,
    audit_condition    => 'DEPTNO = 10',
    audit_column       => 'SAL,COMM',
    audit_column_opts  => DBMS_FGA.ALL_COLUMNS,
    audit_trail        => DBMS_FGA.DB + DBMS_FGA.EXTENDED);
END;
/
PL/SQL procedure successfully completed.

```

```

SYS@orcl> SELECT object_schema, object_name, policy_owner, policy_name, policy_text, policy_column_options
           FROM dba_audit_policies ;

```

OBJECT_SCHEMA	OBJECT_NAME	POLICY_OWNER	POLICY_NAME	POLICY_TEXT	POLICY_COLU
SCOTT	EMP	SYS	CHK_SCOTT_EMP	DEPTNO = 10	ALL_COLUMNS

```

SYS@orcl> SELECT policy_name, policy_column
           FROM dba_audit_policy_columns ;

```

POLICY_NAME	POLICY_COLUMN
CHK_SCOTT_EMP	SAL
CHK_SCOTT_EMP	COMM

```

SYS@orcl> CONN system/oracle_4U
Connected.

```

```

SYSTEM@orcl> SELECT empno, sal FROM scott.emp
              WHERE deptno = 10 ;

```

...

```

SYSTEM@orcl> SELECT empno, sal FROM scott.emp
              WHERE deptno = 20 ;

```

...

```

SYSTEM@orcl> SELECT empno, sal,comm FROM scott.emp
              WHERE deptno = 10 ;

```

...

```

SYSTEM@orcl> SELECT empno, sal,comm FROM scott.emp
              WHERE deptno = 20 ;

```

...

SYSTEM@orcl> CONN / as sysdba

Connected.

SYS@orcl> SELECT timestamp, username, owner, obj\_name, action\_name, sql\_text  
FROM dba\_audit\_trail ;

no rows selected

SYS@orcl> SELECT timestamp, db\_user, object\_name, policy\_name, statement\_type, sql\_text  
FROM dba\_fga\_audit\_trail ;

TIMESTAMP	DB_USER	OBJECT_NAME	POLICY_NAME	STATEMENT	SQL_TEXT
22-MAY-13	SYSTEM	EMP	CHK_SCOTT_EMP	SELECT	SELECT empno, sal,comm FROM scott.emp WHERE deptno = 10

SYS@orcl> SELECT audit\_type, db\_user, policy\_name, statement\_type, action, audit\_option, sql\_text  
FROM dba\_common\_audit\_trail ;

AUDIT_TYPE	DB_USER	POLICY_NAME	STATEMENT	ACTION	AUDIT_OPTION	SQL_TEXT
Fine Grained Audit	SYSTEM	CHK_SCOTT_EMP	SELECT			SELECT empno, sal,comm FROM scott.emp WHERE deptno = 10

SYS@orcl> BEGIN

```
DBMS_FGA.DROP_POLICY (  
  object_schema => 'SCOTT',  
  object_name   => 'EMP',  
  policy_name    => 'CHK_SCOTT_EMP');
```

END ;

/

PL/SQL procedure successfully completed.

SYS@orcl> TRUNCATE TABLE fga\_log\$ ;

Table truncated.

#### • SYSDBA 감사 (Audit)

SYS@orcl> show parameter audit

NAME	TYPE	VALUE
audit_file_dest	string	/u01/app/oracle/admin/orcl/adump
audit_sys_operations	boolean	FALSE
audit_syslog_level	string	
audit_trail	string	NONE

SYS@orcl> ! ls -l /u01/app/oracle/admin/orcl/adump

```
total 1072  
-rw-r----- 1 oracle dba 999 May 17 15:37 orcl_ora_10046_1.aud  
-rw-r----- 1 oracle dba 763 May 17 15:40 orcl_ora_10195_1.aud  
-rw-r----- 1 oracle dba 761 May 17 15:40 orcl_ora_10195_2.aud  
-rw-r----- 1 oracle dba 762 May 17 15:40 orcl_ora_10293_1.aud  
-rw-r----- 1 oracle dba 796 May 17 15:40 orcl_ora_10368_1.aud  
...
```

SYS@orcl> ALTER SYSTEM SET audit\_sys\_operations = TRUE SCOPE= SPFILE ;

System altered.

SYS@orcl> STARTUP FORCE

...

Chong Ha, Ryu

```
SYS@orcl> ! rm /u01/app/oracle/admin/orcl/adump/*
```

```
SYS@orcl> CONN / as sysdba
```

Connected.

```
SYS@orcl> CREATE TABLE t (id number) ;
```

Table created.

```
SYS@orcl> DROP TABLE t PURGE ;
```

Table dropped.

```
SYS@orcl> SELECT empno, sal FROM scott.emp
```

WHERE deptno = 10 ;

EMPNO	SAL
7782	2450
7839	5000
7934	1300

```
SYS@orcl> ! ls -l /u01/app/oracle/admin/orcl/adump
```

total 4

```
-rw-r----- 1 oracle dba 1913 May 23 00:07 orcl_ora_18583_1.aud
```

```
SYS@orcl> ! cat /u01/app/oracle/admin/orcl/adump/orcl_ora_18583_1.aud
```

```
Audit file /u01/app/oracle/admin/orcl/adump/orcl_ora_18583_1.aud
Oracle Database 11g Enterprise Edition Release 11.2.0.1.0 - Production
With the Partitioning, Automatic Storage Management, OLAP, Data Mining
and Real Application Testing options
ORACLE_HOME = /u01/app/oracle/product/11.2.0/dbhome_1
System name:      Linux
Node name:        edydr1p0.us.oracle.com
Release:          2.6.18-164.el5
Version:          #1 SMP Thu Sep 3 02:16:47 EDT 2009
Machine:          i686
Instance name:    orcl
Redo thread mounted by this instance: 1
Oracle process number: 23
Unix process pid: 18583, image: oracle@edydr1p0.us.oracle.com (TNS V1-V3)
```

```
Thu May 23 00:07:01 2013 +09:00
```

```
LENGTH : '160'
```

```
ACTION :[7] 'CONNECT'
```

```
DATABASE USER:[1] '/'
```

```
PRIVILEGE :[6] 'SYSDBA'
```

```
CLIENT USER:[6] 'oracle'
```

```
CLIENT TERMINAL:[5] 'pts/1'
```

```
STATUS:[1] '0'
```

```
DBID:[10] '1343220851'
```

```
...
```

```
Thu May 23 00:07:16 2013 +09:00
```

```
LENGTH : '205'
```

```
ACTION :[51] 'SELECT empno, sal FROM scott.emp
```

```
WHERE deptno = 10 '
```

```
DATABASE USER:[1] '/'
```

```
PRIVILEGE :[6] 'SYSDBA'
```

```
CLIENT USER:[6] 'oracle'
```

```
CLIENT TERMINAL:[5] 'pts/1'
```

```
STATUS:[1] '0'
```

```
DBID:[10] '1343220851'
```

```
SYS@orcl> ALTER SYSTEM SET audit_sys_operations = FALSE SCOPE= SPFILE ;
```

System altered.

```
SYS@orcl> STARTUP FORCE
```

...

```
SYS@orcl> exit
```

## 12. 데이터베이스 유지 관리

### • Oracle 옵티마이저 통계 확인

[orcl:~]\$ sqlplus / as sysdba

SQL> CREATE USER user01

IDENTIFIED BY oracle ;

User created.

SQL> GRANT DBA TO user01 ;

Grant succeeded.

SQL> CONN user01/oracle

Connected.

SQL> CREATE TABLE emp

AS SELECT \* FROM scott.emp ;

Table created.

SQL> CREATE INDEX deptno\_ix ON emp(deptno) ;

Index created.

SQL> SELECT empno, ename, sal, deptno

FROM emp ;

EMPNO	ENAME	SAL	DEPTNO
7369	SMITH	800	20
7499	ALLEN	1600	30
7521	WARD	1250	30
7566	JONES	2975	20
7654	MARTIN	1250	30
7698	BLAKE	2850	30
7782	CLARK	2450	10
7788	SCOTT	3000	20
7839	KING	5000	10
7844	TURNER	1500	30
7876	ADAMS	1100	20
7900	JAMES	950	30
7902	FORD	3000	20
7934	MILLER	1300	10

14 rows selected.

SQL> SELECT table\_name, num\_rows, blocks, avg\_row\_len

FROM user\_tables ;

TABLE_NAME	NUM_ROWS	BLOCKS	AVG_ROW_LEN
EMP			

SQL> SELECT table\_name, column\_name, num\_distinct, density, num\_buckets, histogram

FROM user\_tab\_col\_statistics ;

no rows selected

SQL> SET AUTOTRACE ON EXPLAIN

SQL> SELECT empno, ename, sal  
FROM emp  
WHERE deptno = 10 ;

EMPNO	ENAME	SAL
7782	CLARK	2450
7839	KING	5000
7934	MILLER	1300

Execution Plan

Plan hash value: 870210623

Id	Operation	Name	Rows	Bytes	Cost (%CPU)	Time
0	SELECT STATEMENT		3	138	2 (0)	00:00:01
1	TABLE ACCESS BY INDEX ROWID	EMP	3	138	2 (0)	00:00:01
* 2	INDEX RANGE SCAN	DEPTNO_IX	3		1 (0)	00:00:01

Predicate Information (identified by operation id):

2 - access("DEPTNO"=10)

Note

- dynamic sampling used for this statement (level=2)

SQL> SET AUTOTRACE OFF

SQL> show parameter dynamic

NAME	TYPE	VALUE
optimizer_dynamic_sampling	integer	2

SQL> EXEC DBMS\_STATS.GATHER\_TABLE\_STATS('USER01','EMP',CASCADE=>TRUE) ;

PL/SQL procedure successfully completed.

SQL> SELECT table\_name, num\_rows, blocks, avg\_row\_len

FROM user\_tables ;

TABLE_NAME	NUM_ROWS	BLOCKS	AVG_ROW_LEN
EMP	14	4	38

SQL> SELECT table\_name, column\_name, num\_distinct, density, num\_buckets, histogram

FROM user\_tab\_col\_statistics ;

TABLE_NAME	COLUMN_NAME	NUM_DISTINCT	DENSITY	NUM_BUCKETS	HISTOGRAM
EMP	EMPNO	14	.071428571	1	NONE
EMP	ENAME	14	.071428571	1	NONE
EMP	JOB	5	.2	1	NONE
EMP	MGR	6	.166666667	1	NONE
EMP	HIREDATE	13	.076923077	1	NONE
EMP	SAL	12	.083333333	1	NONE
EMP	COMM	4	.25	1	NONE
EMP	DEPTNO	3	.035714286	3	FREQUENCY

8 rows selected.

```
SQL> INSERT INTO emp
      SELECT e.*
      FROM emp e, (SELECT level
                   FROM dual
                   CONNECT BY level <= 100000) ;
```

1400000 rows created.

```
SQL> COMMIT ;
```

Commit complete.

```
SQL> EXEC DBMS_STATS.GATHER_TABLE_STATS('USER01','EMP',CASCADE=>TRUE) ;
```

PL/SQL procedure successfully completed.

```
SQL> SELECT table_name, num_rows, blocks, avg_row_len
```

```
      FROM user_tables ;
```

TABLE_NAME	NUM_ROWS	BLOCKS	AVG_ROW_LEN
EMP	1400014	9080	38

```
SQL> SELECT table_name, column_name, num_distinct, density, num_buckets, histogram
```

```
      FROM user_tab_col_statistics ;
```

TABLE_NAME	COLUMN_NAME	NUM_DISTINCT	DENSITY	NUM_BUCKETS	HISTOGRAM
EMP	EMPNO	14	.071428571	1	NONE
EMP	ENAME	14	.071428571	1	NONE
EMP	JOB	5	.2	1	NONE
EMP	MGR	6	.166666667	1	NONE
EMP	HIREDATE	13	.076923077	1	NONE
EMP	SAL	12	.083333333	1	NONE
EMP	COMM	4	.25	1	NONE
EMP	DEPTNO	3	3.5617E-07	3	FREQUENCY

8 rows selected.

```
SQL> SET AUTOTRACE TRACEONLY EXPLAIN
```

```
SQL> SELECT empno, ename, sal
```

```
      FROM emp
```

```
      WHERE deptno = 10 ;
```

Id	Operation	Name	Rows	Bytes	Cost (%CPU)	Time
0	SELECT STATEMENT		301K	5010K	2478 (1)	00:00:30
* 1	TABLE ACCESS FULL	EMP	301K	5010K	2478 (1)	00:00:30

Predicate Information (identified by operation id):

```
1 - filter("DEPTNO"=10)
```

```
SQL> SET AUTOTRACE OFF
```

```
SQL> TRUNCATE TABLE emp ;
```

Table truncated.



SQL> SELECT table\_name, num\_rows, blocks, avg\_row\_len

FROM user\_tables ;

TABLE_NAME	NUM_ROWS	BLOCKS	AVG_ROW_LEN
EMP	1400014	9080	38

SQL> SET AUTOTRACE ON EXPLAIN

SQL> SELECT empno, ename, sal

FROM emp

WHERE deptno = 10 ;

no rows selected

Id	Operation	Name	Rows	Bytes	Cost (%CPU)	Time
0	SELECT STATEMENT		301K	5010K	2478 (1)	00:00:30
* 1	TABLE ACCESS FULL	EMP	301K	5010K	2478 (1)	00:00:30

Predicate Information (identified by operation id):

1 - filter("DEPTNO">=10)

SQL> EXEC DBMS\_STATS.GATHER\_TABLE\_STATS('USER01','EMP',CASCADE=>TRUE) ;

PL/SQL procedure successfully completed.

SQL> SELECT empno, ename, sal

FROM emp

WHERE deptno = 10 ;

no rows selected

Id	Operation	Name	Rows	Bytes	Cost (%CPU)	Time
0	SELECT STATEMENT		1	46	1 (0)	00:00:01
1	TABLE ACCESS BY INDEX ROWID	EMP	1	46	1 (0)	00:00:01
* 2	INDEX RANGE SCAN	DEPTNO_IX	1		1 (0)	00:00:01

Predicate Information (identified by operation id):

2 - access("DEPTNO">=10)

SQL> SET AUTOTRACE OFF

SQL> CONN / as sysdba

Connected.

SQL> DROP USER user01 CASCADE ;

User dropped.

## 17. 데이터 이동

### • *export,import* 와 *DATA PUMP* 의 비교

```
[orcl:~]$ mkdir -p /home/oracle/data
```

```
[orcl:~]$ cd /home/oracle/data
```

```
[orcl:data]$ sqlplus system/oracle_4U
```

```
SQL> CREATE OR REPLACE DIRECTORY data_dir AS '/home/oracle/data' ;
Directory created.
```

```
SQL> GRANT READ, WRITE ON DIRECTORY data_dir TO sh ;
Grant succeeded.
```

```
SQL> ALTER USER sh IDENTIFIED BY sh ACCOUNT UNLOCK ;
User altered.
```

```
SQL> exit
```

```
[orcl:data]$ export NLS_LANG=AMERICAN_AMERICA.AL32UTF8
```

```
[orcl:data]$ exp -help
```

```
...
```

You can let Export prompt you for parameters by entering the EXP command followed by your username/password:

Example: EXP SCOTT/TIGER

Or, you can control how Export runs by entering the EXP command followed by various arguments. To specify parameters, you use keywords:

Format: EXP KEYWORD=value or KEYWORD=(value1,value2,...,valueN)

Example: EXP SCOTT/TIGER GRANTS=Y TABLES=(EMP,DEPT,MGR)

or TABLES=(T1:P1,T1:P2), if T1 is partitioned table

USERID must be the first parameter on the command line.

Keyword	Description (Default)	Keyword	Description (Default)
---------	-----------------------	---------	-----------------------

USERID	username/password	FULL	export entire file (N)
BUFFER	size of data buffer	OWNER	list of owner usernames
FILE	output files (EXPDAT.DMP)	TABLES	list of table names

```
...
```

```
[orcl:data]$ time exp sh/sh file=exp_sh.dmp log=exp_sh.log
```

```
...
```

Export: Release 11.2.0.1.0 – Production on Mon May 27 23:51:23 2013

Copyright (c) 1982, 2009, Oracle and/or its affiliates. All rights reserved.

Connected to: Oracle Database 11g Enterprise Edition Release 11.2.0.1.0 – Production

With the Partitioning, Automatic Storage Management, OLAP, Data Mining  
and Real Application Testing options

Export done in AL32UTF8 character set and AL16UTF16 NCHAR character set

- . exporting pre-schema procedural objects and actions
- . exporting foreign function library names for user SH
- . exporting PUBLIC type synonyms
- . exporting private type synonyms
- . exporting object type definitions for user SH

About to export SH's objects ...

- . exporting database links
- . exporting sequence numbers
- . exporting cluster definitions
- . about to export SH's tables via Conventional Path ...

. . exporting table	CAL_MONTH_SALES_MV	48 rows exported
. . exporting table	CHANNELS	5 rows exported

```
...
```

Export terminated successfully without warnings.

real 0m20.299s

user 0m1.684s

sys 0m1.170s

Chong Ha, Ryu

```
[orcl:data]$ expdp -help
```

```
...
```

The Data Pump export utility provides a mechanism for transferring data objects between Oracle databases. The utility is invoked with the following command:

Example: expdp scott/tiger DIRECTORY=dmpdir DUMPFILE=scott.dmp

You can control how Export runs by entering the 'expdp' command followed by various parameters. To specify parameters, you use keywords:

Format: expdp KEYWORD=value or KEYWORD=(value1,value2,...,valueN)

Example: expdp scott/tiger DUMPFILE=scott.dmp DIRECTORY=dmpdir SCHEMAS=scott  
or TABLES=(T1:P1,T1:P2), if T1 is partitioned table

USERID must be the first parameter on the command line.

---

The available keywords and their descriptions follow. Default values are listed within square brackets.

ATTACH

Attach to an existing job.

For example, ATTACH=job\_name.

```
...
```

```
[orcl:data]$ time expdp sh/sh directory=data_dir dumpfile=expdp_sh.dmp logfile=expdp_sh.log
```

Export: Release 11.2.0.1.0 - Production on Mon May 27 23:53:29 2013

Copyright (c) 1982, 2009, Oracle and/or its affiliates. All rights reserved.

Connected to: Oracle Database 11g Enterprise Edition Release 11.2.0.1.0 - Production

With the Partitioning, Automatic Storage Management, OLAP, Data Mining

and Real Application Testing options

Starting "SH"."SYS\_EXPORT\_SCHEMA\_01": sh/\*\*\*\*\* directory=data\_dir dumpfile=expdp\_sh.dmp logfile=expdp\_sh.log

Estimate in progress using BLOCKS method...

Processing object type SCHEMA\_EXPORT/TABLE/TABLE\_DATA

Total estimation using BLOCKS method: 35.31 MB

Processing object type SCHEMA\_EXPORT/PRE\_SCHEMA/PROCACT\_SCHEMA

Processing object type SCHEMA\_EXPORT/TABLE/TABLE

Processing object type SCHEMA\_EXPORT/TABLE/GRANT/OWNER\_GRANT/OBJECT\_GRANT

Processing object type SCHEMA\_EXPORT/TABLE/INDEX/INDEX

```
...
```

Dump file set for SH.SYS\_EXPORT\_SCHEMA\_01 is:

/home/oracle/data/expdp\_sh.dmp

Job "SH"."SYS\_EXPORT\_SCHEMA\_01" successfully completed at 23:54:30

real 0m39.939s

user 0m0.008s

sys 0m0.017s

```
[orcl:data]$ ls -lh
```

total 95M

-rw-r--r-- 1 oracle oinstall 50M May 27 23:51 exp\_sh.dmp

-rw-r--r-- 1 oracle oinstall 6.4K May 27 23:51 exp\_sh.log

-rw-r----- 1 oracle dba 45M May 27 23:54 expdp\_sh.dmp

-rw-r--r-- 1 oracle dba 7.0K May 27 23:54 expdp\_sh.log

```
[orcl:data]$ rm *
```

## • Datapump 사용

```
[orcl:data]$ expdp userid=system/oracle_4U directory=data_dir dumpfile=emp.dmp tables=scott.emp
```

```
...
```

```
[orcl:data]$ expdp userid=system/oracle_4U directory=data_dir dumpfile=users_tbs.dmp tablespaces=users
```

```
...
```

Starting "SYSTEM"."SYS\_EXPORT\_TABLESPACE\_01": userid=system/\*\*\*\*\* directory=data\_dir dumpfile=users\_tbs.dmp  
tablespaces=users

Estimate in progress using BLOCKS method...

Processing object type TABLE\_EXPORT/TABLE/TABLE\_DATA

Total estimation using BLOCKS method: 1024 KB

Processing object type TABLE\_EXPORT/TABLE/TABLE

```
^C
```

Chong Ha, Ryu

[chongharyu@naver.com](mailto:chongharyu@naver.com)  
<http://oukr.tistory.com>

Export> continue\_client

...

[orcl:data]\$ cat >> expdp\_sh.par << EOF

> userid=system/oracle\_4U

> directory=data\_dir

> job\_name=expdp\_sh

> logfile=expdp\_sh.log

> dumpfile=expdp\_sh%U.dmp

> filesize=10m

> SCHEMAS=SH

> EXCLUDE=TABLE:"LIKE 'C%'"

> EOF

※ 터미널 창을 두 개 열고 Export 도중에 작업을 제어 한다.

[orcl:data]\$ expdp parfile=expdp\_sh.par

...

Starting "SYSTEM"."EXPDP\_SH": system/\*\*\*\*\* parfile=exp\_sh.par

Estimate in progress using BLOCKS method...

Processing object type SCHEMA\_EXPORT/TABLE/TABLE\_DATA

Total estimation using BLOCKS method: 20.75 MB

Processing object type SCHEMA\_EXPORT/USER

Processing object type SCHEMA\_EXPORT/SYSTEM\_GRANT

Processing object type SCHEMA\_EXPORT/ROLE\_GRANT

Processing object type SCHEMA\_EXPORT/DEFAULT\_ROLE

Processing object type SCHEMA\_EXPORT/PRE\_SCHEMA/PROCACT\_SCHEMA

...

# 새로운 터미널에서 수행

[orcl:~]\$ expdp system/oracle\_4U attach=expdp\_sh

Job: EXPDP\_SH

Owner: SYSTEM

Operation: EXPORT

Creator Privs: TRUE

GUID: DE3BEF536659C240E040007F01006402

Start Time: Monday, 03 June, 2013 17:41:47

Mode: SCHEMA

Instance: orcl

Max Parallelism: 1

EXPORT Job Parameters:

Parameter Name Parameter Value:

CLIENT\_COMMAND system/\*\*\*\*\* parfile=exp\_sh.par

State: EXECUTING

Bytes Processed: 0

Current Parallelism: 1

Job Error Count: 0

Dump File: /home/oracle/data/expdp\_sh01.dmp

size: 10,485,760

bytes written: 4,096

Dump File: /home/oracle/data/expdp\_sh%u.dmp

size: 10,485,760

Worker 1 Status:

Process Name: DW00

State: EXECUTING

Object Schema: SH

Object Type: SCHEMA\_EXPORT/DEFAULT\_ROLE

Completed Objects: 1

Total Objects: 1

Worker Parallelism: 1

Export> stop\_job

Are you sure you wish to stop this job ([yes]/no): yes

```
[orcl:~]$ expdp system/oracle_4U attach=expdp_sh
```

```
...  
Worker 1 Status:  
  Process Name: DW00  
  State: UNDEFINED
```

```
Export> start_job          <= 명령 실행 시 background 로 작업 시작
```

OR

```
Export> continue_client    <= foreground 로 작업 시작
```

```
...
```

*# 첫번째 터미널에서 확인*

```
[orcl:data]$ ls -lh *sh*
```

```
-rw-r--r-- 1 oracle oinstall 156 Jun  3 17:36 expdp_sh.par  
-rw-r--r-- 1 oracle dba      5.0K Jun  3 17:50 expdp_sh.log  
-rw-r----- 1 oracle dba     10M Jun  3 17:50 expdp_sh01.dmp  
-rw-r----- 1 oracle dba     10M Jun  3 17:50 expdp_sh02.dmp  
-rw-r----- 1 oracle dba     10M Jun  3 17:50 expdp_sh03.dmp  
-rw-r----- 1 oracle dba     2.1M Jun  3 17:50 expdp_sh04.dmp
```

```
[orcl:data]$ rm *
```

*※ 장시간 동안 진행 될 작업 수행 시 아래의 뷰 확인 가능*

```
SELECT * FROM dba_datapump_jobs ;  
SELECT * FROM dba_datapump_sessions ;  
SELECT * FROM v$datapump_job ;  
SELECT * FROM v$datapump_session ;
```

#### • **Datapump** 기존 모드 사용

```
[orcl:data]$ exp sh/sh file=exp_custs.dmp log=exp_sh.log tables=sh.customers
```

```
...  
About to export specified tables via Conventional Path ...  
.. exporting table          CUSTOMERS          55500 rows exported  
Export terminated successfully without warnings.
```

```
[orcl:data]$ expdp sh/sh file=exp_custs.dmp log=exp_sh.log tables=sh.customers
```

```
...  
Legacy Mode Active due to the following parameters:  
Legacy Mode Parameter: "file=exp_custs.dmp" Location: Command Line, Replaced with: "dumpfile=DATA_DIR:exp_custs.dmp"  
Database Directory Object "DATA_DIR" has been added to file specification: "exp_custs.dmp".  
Legacy Mode Parameter: "log=exp_sh.log" Location: Command Line, Replaced with: "logfile=DATA_DIR:exp_sh.log"  
Database Directory Object "DATA_DIR" has been added to file specification: "exp_sh.log".  
Legacy Mode has set reuse_dumpfiles=true parameter.  
Starting "SH"."SYS_EXPORT_TABLE_01":  sh/***** dumpfile=DATA_DIR:exp_custs.dmp logfile=DATA_DIR:exp_sh.log  
tables=sh.customers reuse_dumpfiles=true  
...  
Dump file set for SH.SYS_EXPORT_TABLE_01 is:  
  /home/oracle/data/exp_custs.dmp  
Job "SH"."SYS_EXPORT_TABLE_01" successfully completed at 18:16:53
```

```
[orcl:data]$ rm *
```

## • SQL\*Loader 사용

[orcl:data]\$ sqlplus system/oracle\_4U

```
SQL> CREATE TABLE copy_emp
      AS SELECT * FROM scott.emp
      WHERE 1= 0 ;
```

Table created.

```
SQL> set colsep ',' linesize 150 pagesize 0 feedback off
```

```
SQL> spool emp.dat
```

```
SQL> SELECT * FROM scott.emp ;
```

7369,SMITH	,CLERK	,7902,17-DEC-80	,	800,	,	20
7499,ALLEN	,SALESMAN	,7698,20-FEB-81	,	1600,	300,	30
7521,WARD	,SALESMAN	,7698,22-FEB-81	,	1250,	500,	30

...

```
SQL> spool off
```

```
SQL> exit
```

[orcl:data]\$ vi emp.dat

7369,SMITH	,CLERK	,7902,17-DEC-80	,	800,	,	20
7499,ALLEN	,SALESMAN	,7698,20-FEB-81	,	1600,	300,	30
7521,WARD	,SALESMAN	,7698,22-FEB-81	,	1250,	500,	30
7566,JONES	,MANAGER	,7839,02-APR-81	,	2975,	,	20
7654,MARTIN	,SALESMAN	,7698,28-SEP-81	,	1250,	1400,	30
7698,BLAKE	,MANAGER	,7839,01-MAY-81	,	2850,	,	30
7782,CLARK	,MANAGER	,7839,09-JUN-81	,	2450,	,	10
7788,SCOTT	,ANALYST	,7566,19-APR-87	,	3000,	,	20
7839,KING	,PRESIDENT	,17-NOV-81	,	5000,	,	10
7844,TURNER	,SALESMAN	,7698,08-SEP-81	,	1500,	0,	30
7876,ADAMS	,CLERK	,7788,23-MAY-87	,	1100,	,	20
7900,JAMES	,CLERK	,7698,03-DEC-81	,	950,	,	30
7902,FORD	,ANALYST	,7566,03-DEC-81	,	3000,	,	20
7934,MILLER	,CLERK	,7782,23-JAN-82	,	1300,	,	10

# 위의 내용과 같이 수정

[orcl:data]\$ vi emp.ctl

```
LOAD DATA
APPEND
INTO TABLE SYSTEM.COPY_EMP
FIELDS TERMINATED BY ',' OPTIONALLY ENCLOSED BY '"'
( EMPNO INTEGER EXTERNAL,
  ENAME CHAR,
  JOB CHAR,
  MGR INTEGER EXTERNAL,
  HIREDATE DATE,
  SAL INTEGER EXTERNAL,
  COMM INTEGER EXTERNAL,
  DEPTNO INTEGER EXTERNAL )
```

# Control File 생성

[orcl:data]\$ sqlldr userid=system/oracle\_4U control=emp.ctl log=emp.log data=emp.dat

SQL\*Loader: Release 11.2.0.1.0 - Production on Mon Jun 3 18:46:39 2013

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Commit point reached - logical record count 14

[orcl:data]\$ sqlplus system/oracle\_4U

SQL> SELECT \* FROM copy\_emp ;

EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO
7369	SMITH	CLERK	7902	17-DEC-80	800		20
7499	ALLEN	SALESMAN	7698	20-FEB-81	1600	300	30

...

14 rows selected.

SQL> DROP TABLE copy\_emp PURGE ;

Table dropped.

### • External Table 사용

SQL> CREATE TABLE emp\_ext

(EMPNO            NUMBER(4),  
  ENAME           VARCHAR2(10),  
  JOB             VARCHAR2(9),  
  MGR             NUMBER(4),  
  HIREDATE        DATE,  
  SAL             NUMBER(7,2),  
  COMM            NUMBER(7,2),  
  DEPTNO          NUMBER(2))

ORGANIZATION external

( TYPE oracle\_loader

  DEFAULT DIRECTORY DATA\_DIR

  ACCESS PARAMETERS

  ( RECORDS DELIMITED BY NEWLINE CHARACTERSET AL32UTF8

    BADFILE 'DATA\_DIR':emp.bad'

    LOGFILE 'emp.log'

  FIELDS TERMINATED BY "," OPTIONALLY ENCLOSED BY '"' LDRTRIM

  REJECT ROWS WITH ALL NULL FIELDS

  ( EMPNO        CHAR(255),  
    ENAME        CHAR(255),  
    JOB          CHAR(255),  
    MGR          CHAR(255),  
    HIREDATE     CHAR(255)      DATE\_FORMAT DATE MASK "DD-MON-RR",  
    SAL          CHAR(255),  
    COMM         CHAR(255),  
    DEPTNO       CHAR(255)))

  location ( 'emp.dat' )

)REJECT LIMIT UNLIMITED ;

Table created.

```
SQL> SELECT * FROM emp_ext ;
```

EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO
7369	SMITH	CLERK	7902	17-DEC-80	800		20
7499	ALLEN	SALESMAN	7698	20-FEB-81	1600	300	30

...

14 rows selected.

```
SQL> DROP TABLE emp_ext ;
```

Table dropped.

```
SQL> CREATE TABLE emp_ext ( empno, ename, job, mgr, hiredate, sal, comm, deptno)
```

ORGANIZATION EXTERNAL

( TYPE ORACLE\_DATAPUMP

DEFAULT DIRECTORY data\_dir

LOCATION ('emp.exp') )

AS SELECT \* FROM scott.emp ;

Table created.

```
SQL> SELECT * FROM emp_ext ;
```

EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO
7369	SMITH	CLERK	7902	17-DEC-80	800		20
7499	ALLEN	SALESMAN	7698	20-FEB-81	1600	300	30

...

14 rows selected.

```
SQL> ! ls -l /home/oracle/data
```

total 32

```
-rw-r--r-- 1 oracle dba      82 Jun  3 19:02 EMP_EXT_31832.log
-rw-r--r-- 1 oracle oinstall 268 Jun  3 18:45 emp.ctl
-rw-r--r-- 1 oracle oinstall 2114 Jun  3 18:28 emp.dat
-rw-r--r-- 1 oracle dba    12288 Jun  3 19:01 emp.exp
-rw-r--r-- 1 oracle oinstall 8007 Jun  3 18:58 emp.log
```

```
SQL> DROP TABLE emp_ext ;
```

Table dropped.