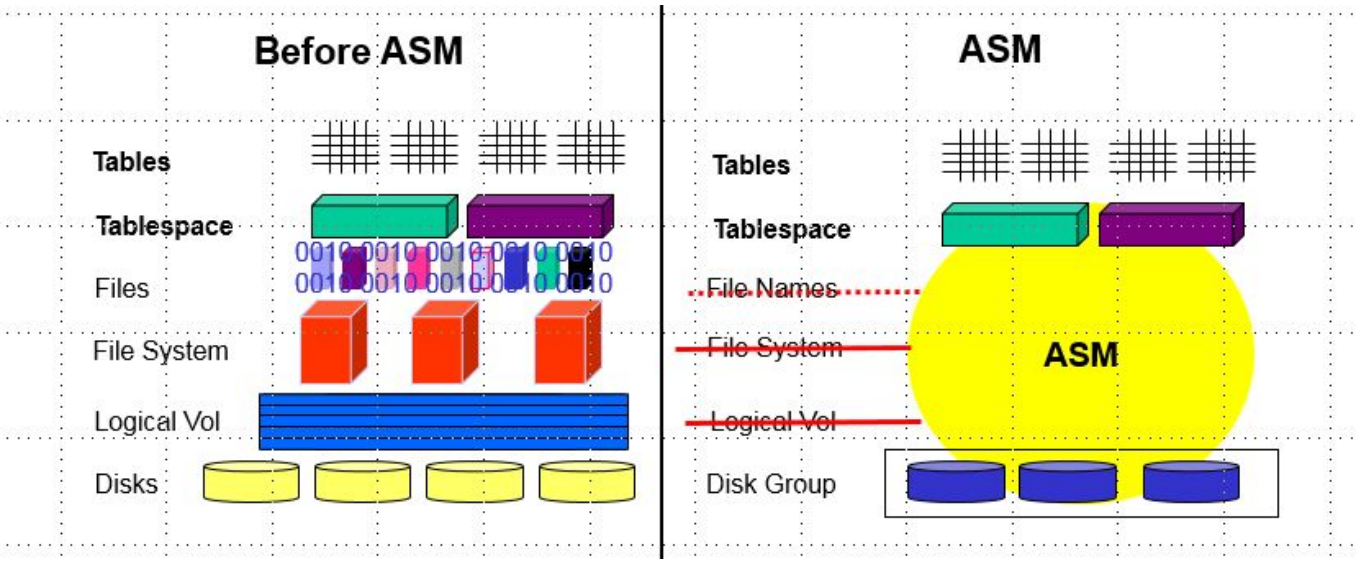
Oracle 11g R2에서 ASM 사용하기

ASM(Automatic Storage Management)이란 클러스터를 지원하는 논리 볼륨 관리자(LVM)이며, 오라클에서 파일들이 저장되는 Storage를 직접 관리하는 방식이다. 오라클의 물리적 데이터베이스 구조를 저장하기 위해 사용된다. File System 과 Raw Device의 장점만을 결합한 방식으로, 데이터를 저장하거나 불러오는 원리는 File system과 비슷하지만, OS가 아닌 ASM에게 요청하는 부분에서 차이가 난다.

File System	OS를 통하여 데이터를 저장하고 관리하는 방식으로 사용자가 관리하기는 쉽지만, OS 성능에 따라 오라클 성능에 영향을 받는다
Raw Device	오라클에서 직접 storage에 데이터를 저장하는 방식이다. OS를 거치지 않고 Application이 직접 디스크에 I/O를 발생한다. 성능은 File System보다 좋으나 관리하기가 어렵고 불편하다.



ASM Architecture : Logical volume / 파일시스템 / 그리고 오라클 데이터파일에 대한 개념이 ASM에 의해 제거되었다.

* 특징

1) 효율적 디스크 관리
   - 디스크추가/삭제 보다 쉽게할수 있다.(정확히는 디스크 추가후 파일 재배치작업)
   - 관리자가 ASM 디스크 그룹에 새로운 디스크를 추가하거나 제거하기만 하면
   - ASM에서 자동으로 Rebalancing 작업을 해준다.

2) 디스크 I/O의 효과적 분산
   - 기존 방식은 디스크가 교체되거나 추가되면 데이터가 균등하게 분산되지 못하고 한족으로 쏠리는 현상이 발생
   - ASM은 AU(Allocation Unit) 이란 단위로 나누어서 서로 다른 디스크에 균등하게 분산시켜 저장함.

1) ASM 사전 세팅

ASM과 클러스터를 사용하기 위해 grid 디렉토리 path를 환경변수에 추가해준다.

```
[root@host1 ~]# vi /home/oracle/.bash_profile

# .bash_profile

# Get the aliases and functions
if [ -f ~/.bashrc ]; then
    . ~/.bashrc
fi

# User specific environment and startup programs

PATH=$PATH:$HOME/bin

export PATH

# Oracle Settings
export ORACLE_BASE=/u01/app/oracle
export ORACLE_HOME=/u01/app/oracle/product/11.2.0.3/dbhome_1
export GRID_HOME=/u01/app/oracle/product/11.2.0.3/grid
export PATH=$ORACLE_HOME/bin:$GRID_HOME/bin:$PATH
export ORACLE_SID=PROD
export PS1="[\'echo \$ORACLE_SID\ '@\h \W]$ "
unset LANG

[root@host01 ~]# mkdir -p /u01/app/oracle
[root@host01 ~]# chown -R oracle:oinstall /u01
[root@host01 ~]# chmod -R 775 /u01
```

ASM을 설정한다.

```
[root@host1 ~]# rpm -qa oracleasm*
oracleasm-2.6.18-164.el5-2.0.5-1.el5
oracleasmlib-2.0.4-1.el5
oracleasm-support-2.1.8-1.el5
```

※ 만약 없다면 설치한다.

```
[root@host1 ~]# cd /mnt/hgfs/share

[root@host1 share]# ls
enterprise-r5-u4-server-x86_64-dvd.iso  p10404530_112030_linux-x86-64_1of7.zip
linuxamd64_12102_database_1of2.zip      p10404530_112030_linux-x86-64_2of7.zip
linuxamd64_12102_database_2of2.zip      p10404530_112030_linux-x86-64_3of7.zip
linuxamd64_12102_grid_1of2.zip          rpm.tar.gz
linuxamd64_12102_grid_2of2.zip

[root@host1 share]# tar xvzf rpm.tar.gz

[root@host1 share]# cd rpm
[root@host1 rpm]# rpm -Uvh oracleasm*
[root@host1 rpm]# rpm -Uvh cvuqdisk*
[root@host1 rpm]# rpm -Uvh flash-player-npapi*
```

커널 설정값 확인

```
[root@host1 ~]# cat /etc/sysctl.conf
# for Oracle Database 11gR2
fs.suid_dumpable = 1
fs.aio-max-nr = 1048576
fs.file-max = 6815744
kernel.shmall = 2097152
kernel.shmmax = 4294967295
kernel.shmmni = 4096
kernel.sem = 250 32000 100 128
net.ipv4.ip_local_port_range = 9000 65500
net.core.rmem_default = 262144
net.core.rmem_max = 4194304
net.core.wmem_default = 262144
net.core.wmem_max = 1048576

[root@host1 ~]# cat /etc/security/limits.conf
# End of file
oracle soft nproc 2047
oracle hard nproc 16384
oracle soft nofile 4096
oracle hard nofile 65536
oracle soft stack 10240

[root@host1 ~]# cat /etc/hosts
# Do not remove the following line, or various programs
# that require network functionality will fail.
127.0.0.1               host1 localhost.localdomain localhost
::1             localhost6.localdomain6 localhost6
192.168.100.111 host01
```

ASM을 사용하기 위한 디렉토리를 생성하고, 폴더 소유권과 권한을 변경한다.

```
[root@host1 ~]# mkdir -p /u02/asmdisks
[root@host1 ~]# chown -R oracle:oinstall /u02/asmdisks
[root@host1 ~]# chmod 666 /u02/asmdisks
[root@host1 ~]# cd /u02/asmdisks
```

블록단위로 파일을 복사한 후 권한을 주고 환경변수를 수정한다.

```
[root@host01 asmdisks]# dd if=/dev/zero of=_file_disk_01 bs=1024k count=2304
[root@host01 asmdisks]# dd if=/dev/zero of=_file_disk_02 bs=1024k count=2304
[root@host01 asmdisks]# dd if=/dev/zero of=_file_disk_03 bs=1024k count=2304
[root@host01 asmdisks]# dd if=/dev/zero of=_file_disk_04 bs=1024k count=2304
[root@host01 asmdisks]# dd if=/dev/zero of=_file_disk_05 bs=1024k count=2304
[root@host01 asmdisks]# dd if=/dev/zero of=_file_disk_06 bs=1024k count=2304
[root@host01 asmdisks]# dd if=/dev/zero of=_file_disk_07 bs=1024k count=2304
[root@host01 asmdisks]# dd if=/dev/zero of=_file_disk_08 bs=1024k count=2304
[root@host01 asmdisks]# dd if=/dev/zero of=_file_disk_09 bs=1024k count=2304
[root@host01 asmdisks]# dd if=/dev/zero of=_file_disk_10 bs=1024k count=2304
[root@host01 asmdisks]# dd if=/dev/zero of=_file_disk_11 bs=1024k count=2304
[root@host01 asmdisks]# dd if=/dev/zero of=_file_disk_12 bs=1024k count=2304
[root@host01 asmdisks]# dd if=/dev/zero of=_file_disk_13 bs=1024k count=2304

[root@host1 ~]# chmod 666 _file_disk*
```

```
[root@host01 asmdisks]# vi /etc/modprobe.conf

alias eth0 e1000
alias scsi_hostadapter mptbase
alias scsi_hostadapter1 mptspi
alias scsi_hostadapter2 ata_piix
alias snd-card-0 snd-ens1371
options snd-card-0 index=0
options snd-ens1371 index=0
remove snd-ens1371 { /usr/sbin/alsactl store 0 >/dev/null 2>&1 || : ; }; /sbin/modprobe -r --ignore-remove
snd-ens1371
options loop max_loop=32
```

데몬 설정

```
[root@host1 ~]# cat >> /etc/rc5.d/S91ora_start <<EOF
> !/bin/bash
>
> description: Start Oracle ASM Disk after reboots
su - root -c '/sbin/modprobe loop'
su - root -c 'losetup /dev/loop1 /u02/asmdisks/_file_disk_01'
su - root -c 'losetup /dev/loop2 /u02/asmdisks/_file_disk_02'
su - root -c 'losetup /dev/loop3 /u02/asmdisks/_file_disk_03'
su - root -c 'losetup /dev/loop4 /u02/asmdisks/_file_disk_04'
su - root -c 'losetup /dev/loop5 /u02/asmdisks/_file_disk_05'
su - root -c 'losetup /dev/loop6 /u02/asmdisks/_file_disk_06'
su - root -c 'losetup /dev/loop7 /u02/asmdisks/_file_disk_07'
su - root -c 'losetup /dev/loop8 /u02/asmdisks/_file_disk_08'
su - root -c 'losetup /dev/loop9 /u02/asmdisks/_file_disk_09'
su - root -c 'losetup /dev/loop10 /u02/asmdisks/_file_disk_10'
su - root -c 'losetup /dev/loop11 /u02/asmdisks/_file_disk_11'
su - root -c 'losetup /dev/loop12 /u02/asmdisks/_file_disk_12'
su - root -c 'losetup /dev/loop13 /u02/asmdisks/_file_disk_13'
su - root -c 'ln -s /dev/loop1 /dev/xvdb'
su - root -c 'ln -s /dev/loop2 /dev/xvdc'
su - root -c 'ln -s /dev/loop3 /dev/xvdd'
su - root -c 'ln -s /dev/loop4 /dev/xvde'
su - root -c 'ln -s /dev/loop5 /dev/xvdf'
su - root -c 'ln -s /dev/loop6 /dev/xvdg'
su - root -c 'ln -s /dev/loop7 /dev/xvdh'
su - root -c 'ln -s /dev/loop8 /dev/xvdi'
su - root -c 'ln -s /dev/loop9 /dev/xvdj'
su - root -c 'ln -s /dev/loop10 /dev/xvdk'
su - root -c 'ln -s /dev/loop11 /dev/xvdl'
su - root -c 'ln -s /dev/loop12 /dev/xvdm'
su - root -c 'ln -s /dev/loop13 /dev/xvdn'
su - root -c 'chmod 666 /dev/loop1'
su - root -c 'chmod 666 /dev/loop2'
su - root -c 'chmod 666 /dev/loop3'
su - root -c 'chmod 666 /dev/loop4'
su - root -c 'chmod 666 /dev/loop5'
su - root -c 'chmod 666 /dev/loop6'
su - root -c 'chmod 666 /dev/loop7'
su - root -c 'chmod 666 /dev/loop8'
su - root -c 'chmod 666 /dev/loop9'
su - root -c 'chmod 666 /dev/loop10'
```

```
su - root -c 'chmod 666 /dev/loop11'
su - root -c 'chmod 666 /dev/loop12'
su - root -c 'chmod 666 /dev/loop13'
su - root -c 'chown oracle:oinstall /dev/loop1'
su - root -c 'chown oracle:oinstall /dev/loop2'
su - root -c 'chown oracle:oinstall /dev/loop3'
su - root -c 'chown oracle:oinstall /dev/loop4'
su - root -c 'chown oracle:oinstall /dev/loop5'
su - root -c 'chown oracle:oinstall /dev/loop6'
su - root -c 'chown oracle:oinstall /dev/loop7'
su - root -c 'chown oracle:oinstall /dev/loop8'
su - root -c 'chown oracle:oinstall /dev/loop9'
su - root -c 'chown oracle:oinstall /dev/loop10'
su - root -c 'chown oracle:oinstall /dev/loop11'
su - root -c 'chown oracle:oinstall /dev/loop12'
su - root -c 'chown oracle:oinstall /dev/loop13'
su - root -c 'oracleasm scandisks'
> EOF

[root@host01 asmdisks]# chmod 777 /etc/rc5.d/S91ora_start
[root@host01 asmdisks]# reboot
```

위치 정보 확인

```
[root@host1 ~]# ls -l /dev/xv*
lrwxrwxrwx 1 root root 10 Jul 17 13:26 /dev/xvdb -> /dev/loop1
lrwxrwxrwx 1 root root 10 Jul 17 13:26 /dev/xvdc -> /dev/loop2
lrwxrwxrwx 1 root root 10 Jul 17 13:26 /dev/xvdd -> /dev/loop3
lrwxrwxrwx 1 root root 10 Jul 17 13:26 /dev/xvde -> /dev/loop4
lrwxrwxrwx 1 root root 10 Jul 17 13:26 /dev/xvdf -> /dev/loop5
lrwxrwxrwx 1 root root 10 Jul 17 13:26 /dev/xvdg -> /dev/loop6
lrwxrwxrwx 1 root root 10 Jul 17 13:26 /dev/xvdh -> /dev/loop7
lrwxrwxrwx 1 root root 10 Jul 17 13:26 /dev/xvdi -> /dev/loop8
lrwxrwxrwx 1 root root 10 Jul 17 13:26 /dev/xvdj -> /dev/loop9
lrwxrwxrwx 1 root root 11 Jul 17 13:26 /dev/xvdk -> /dev/loop10
lrwxrwxrwx 1 root root 11 Jul 17 13:26 /dev/xvdl -> /dev/loop11
lrwxrwxrwx 1 root root 11 Jul 17 13:26 /dev/xvdm -> /dev/loop12
lrwxrwxrwx 1 root root 11 Jul 17 13:26 /dev/xvdn -> /dev/loop13
```

oracleasm 설정하기

```
[root@host1 ~]# oracleasm configure -i
Configuring the Oracle ASM library driver.

This will configure the on-boot properties of the Oracle ASM library
driver.  The following questions will determine whether the driver is
loaded on boot and what permissions it will have.  The current values
will be shown in brackets ('[]').  Hitting <ENTER> without typing an
answer will keep that current value.  Ctrl-C will abort.

Default user to own the driver interface []: oracle
Default group to own the driver interface []: asmadmin
Start Oracle ASM library driver on boot (y/n) [n]: y
Scan for Oracle ASM disks on boot (y/n) [y]: y
Writing Oracle ASM library driver configuration: done
```

※ oracleasm 드라이버 끄기

```
[root@host1 ~]# oracleasm exit
```

※ oracleasm 구성한대로 초기설정

```
[root@host1 ~]# oracleasm init
Creating /dev/oracleasm mount point: /dev/oracleasm
Loading module "oracleasm": oracleasm
Mounting ASMlib driver filesystem: /dev/oracleasm
```

※ oracleasm 상태보기

```
[root@host1 ~]# oracleasm status
Checking if ASM is loaded: yes
Checking if /dev/oracleasm is mounted: yes
```

※ ASM에서 사용할 디스크 생성

```
[root@host1 ~]# oracleasm createdisk ASMDISK01 /dev/xvdb
[root@host1 ~]# oracleasm createdisk ASMDISK02 /dev/xvdc
[root@host1 ~]# oracleasm createdisk ASMDISK03 /dev/xvdd
[root@host1 ~]# oracleasm createdisk ASMDISK04 /dev/xvde
[root@host1 ~]# oracleasm createdisk ASMDISK05 /dev/xvdf
[root@host1 ~]# oracleasm createdisk ASMDISK06 /dev/xvdg
[root@host1 ~]# oracleasm createdisk ASMDISK07 /dev/xvdh
[root@host1 ~]# oracleasm createdisk ASMDISK08 /dev/xvdi
[root@host1 ~]# oracleasm createdisk ASMDISK09 /dev/xvdj
[root@host1 ~]# oracleasm createdisk ASMDISK10 /dev/xvdk
[root@host1 ~]# oracleasm createdisk ASMDISK11 /dev/xvdl
[root@host1 ~]# oracleasm createdisk ASMDISK12 /dev/xvdm
[root@host1 ~]# oracleasm createdisk ASMDISK13 /dev/xvdn
Writing disk header: done
Instantiating disk: done
```

※ 디스크 목록 스캔

```
[root@host1 ~]# oracleasm scandisks
Reloading disk partitions: done
Cleaning any stale ASM disks...
Scanning system for ASM disks…
```

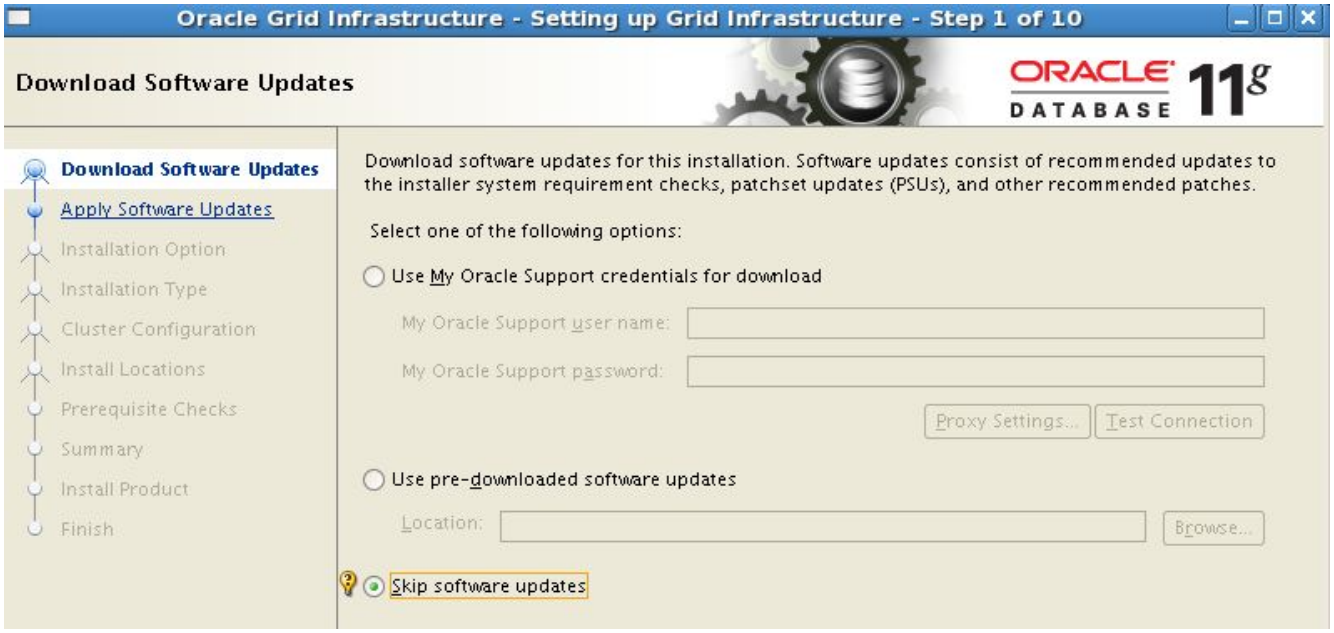
※ 디스크 목록 조회

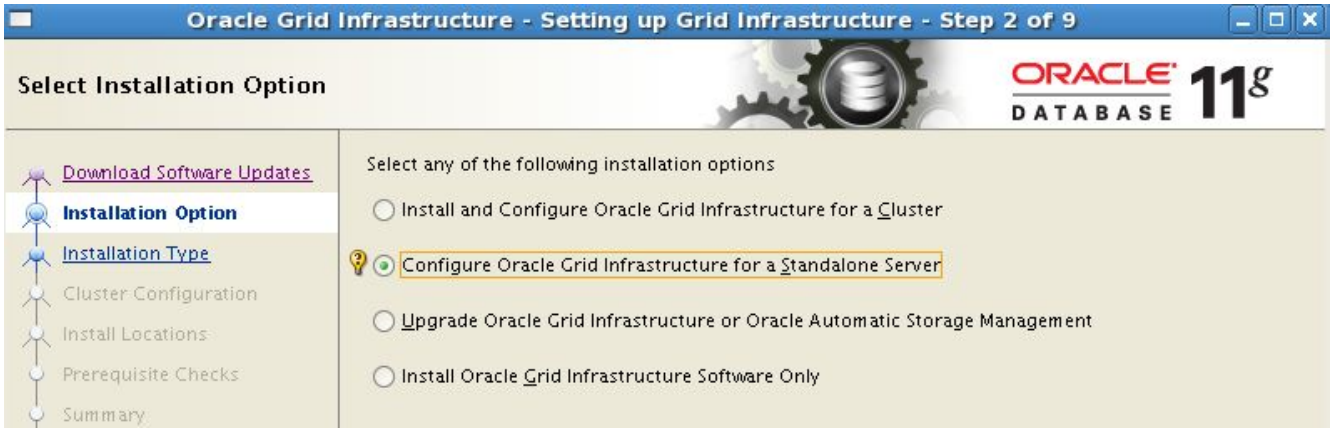
```
[root@host1 ~]# oracleasm listdisks
ASMDISK01
ASMDISK02
ASMDISK03
ASMDISK04
ASMDISK05
ASMDISK06
ASMDISK07
ASMDISK08
ASMDISK09
ASMDISK10
ASMDISK11
ASMDISK12
ASMDISK13

[root@host1 ~]# shutdown -h now
```

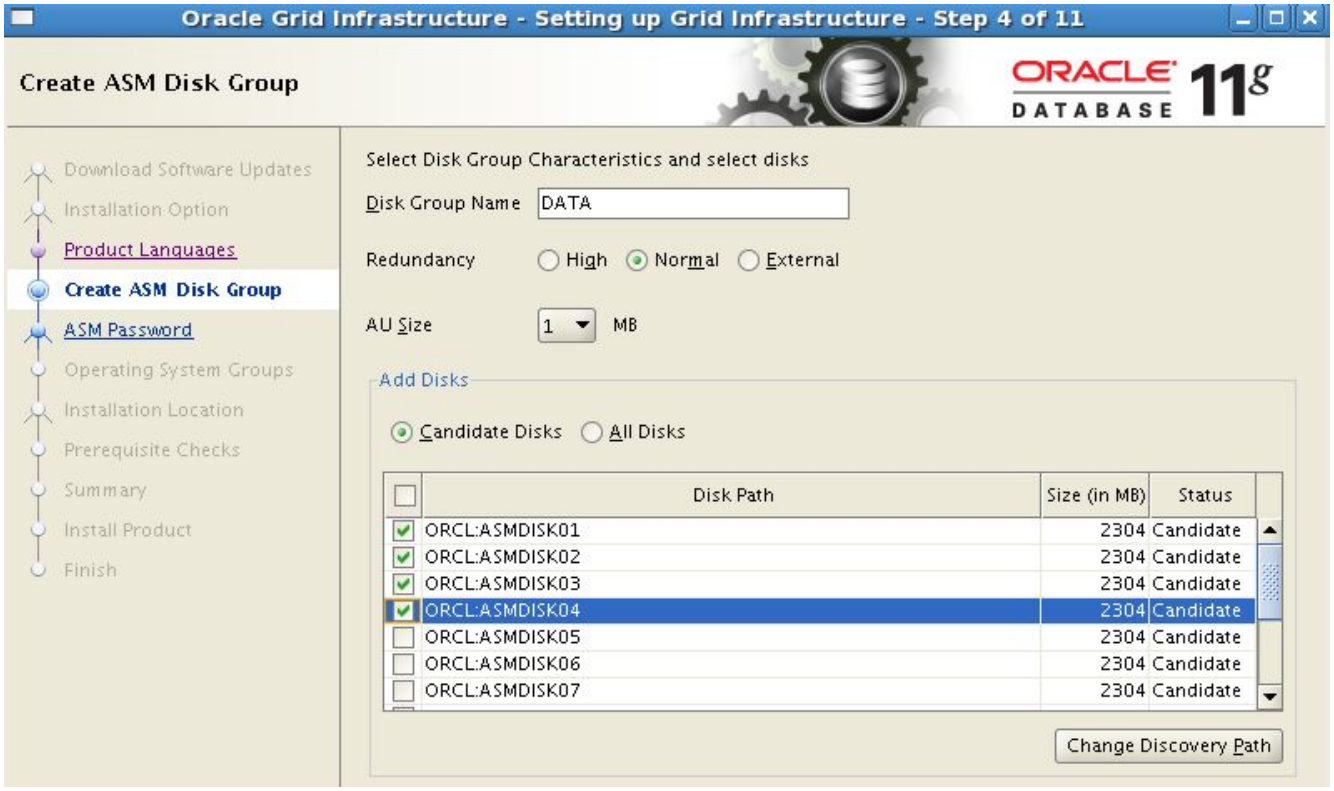
2) ASM 생성

오라클로 재접속

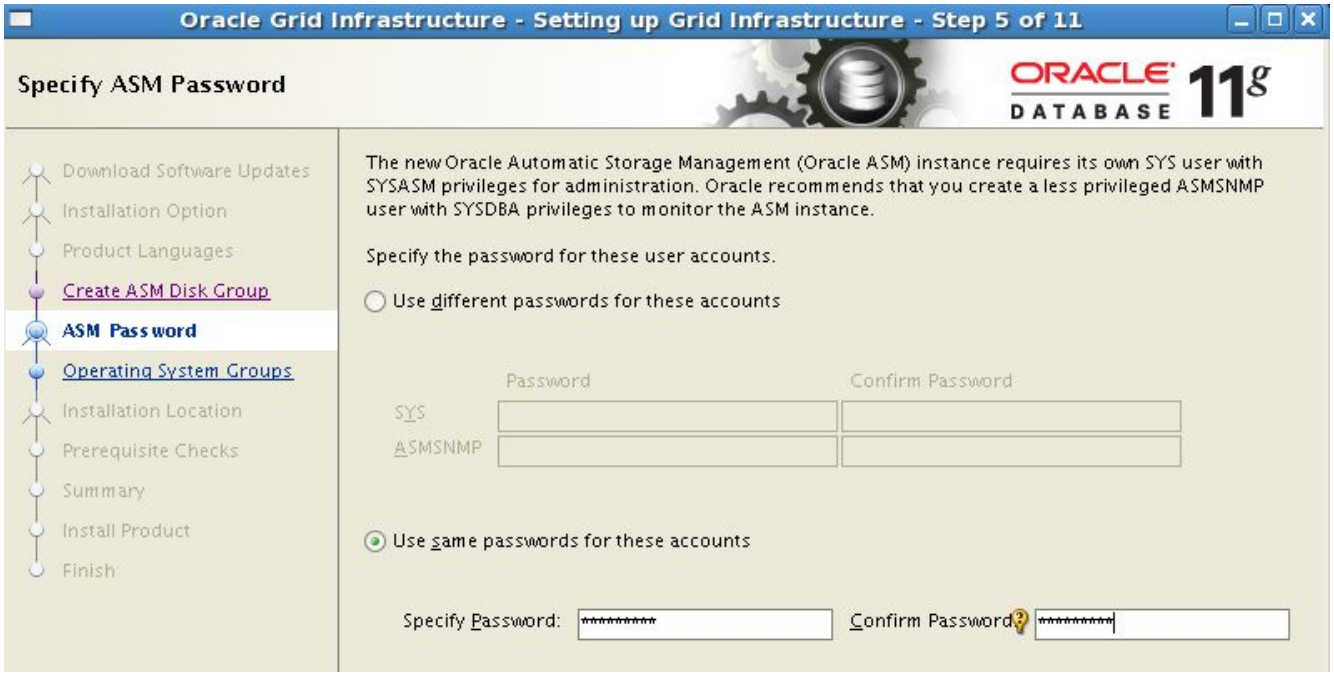
```
[oracle@host1 ~]$ cd /stage/grid
[oracle@host1 grid]$ ./runInstaller
```



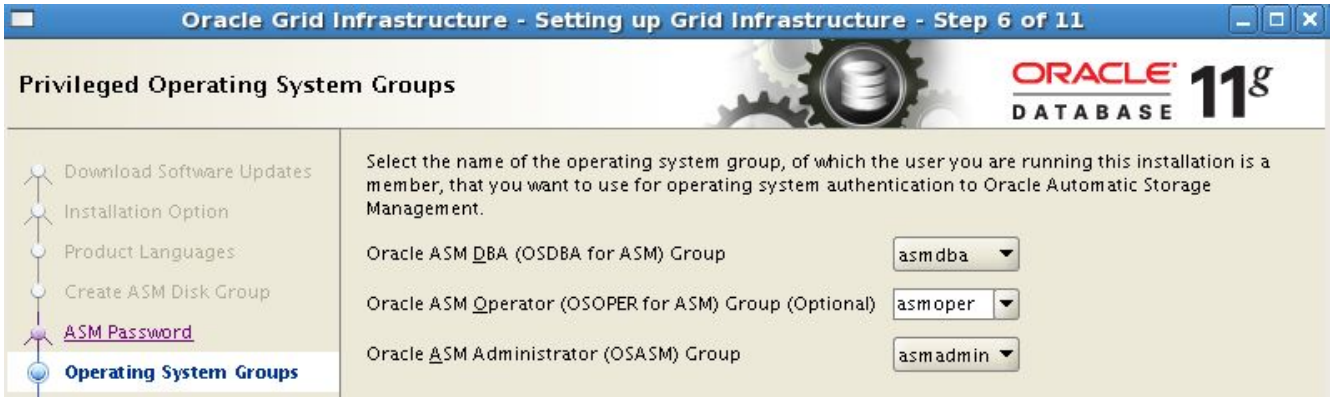


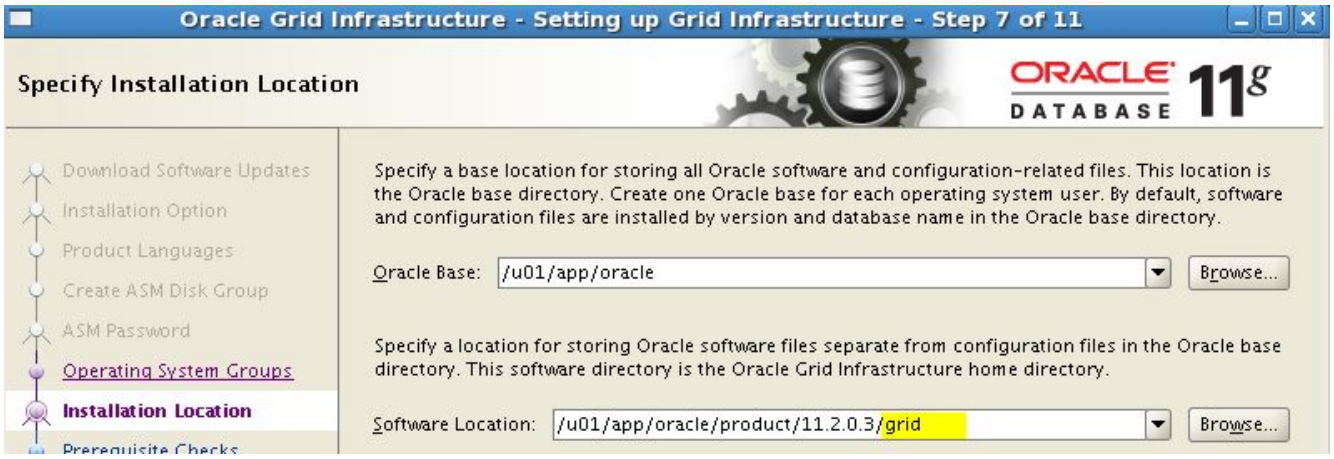


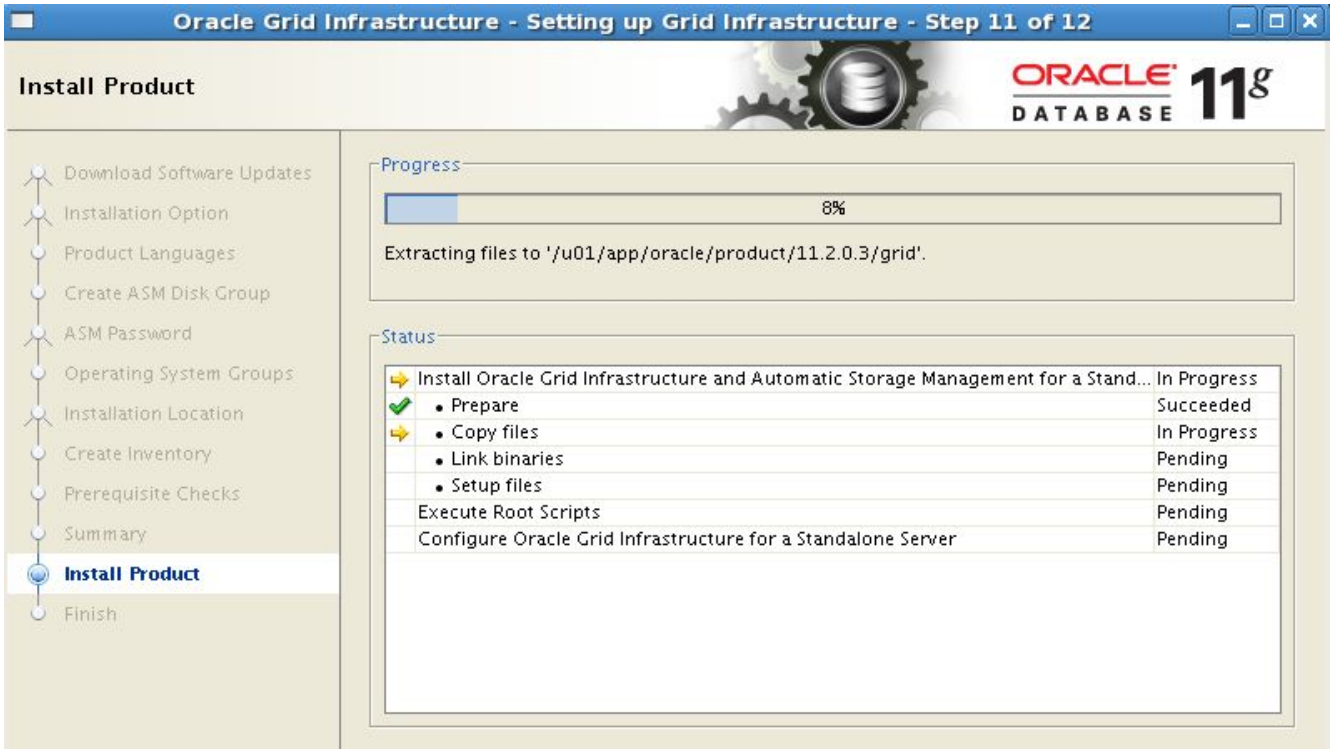
High (3중화), Normal (2중화), External (다중화안함)

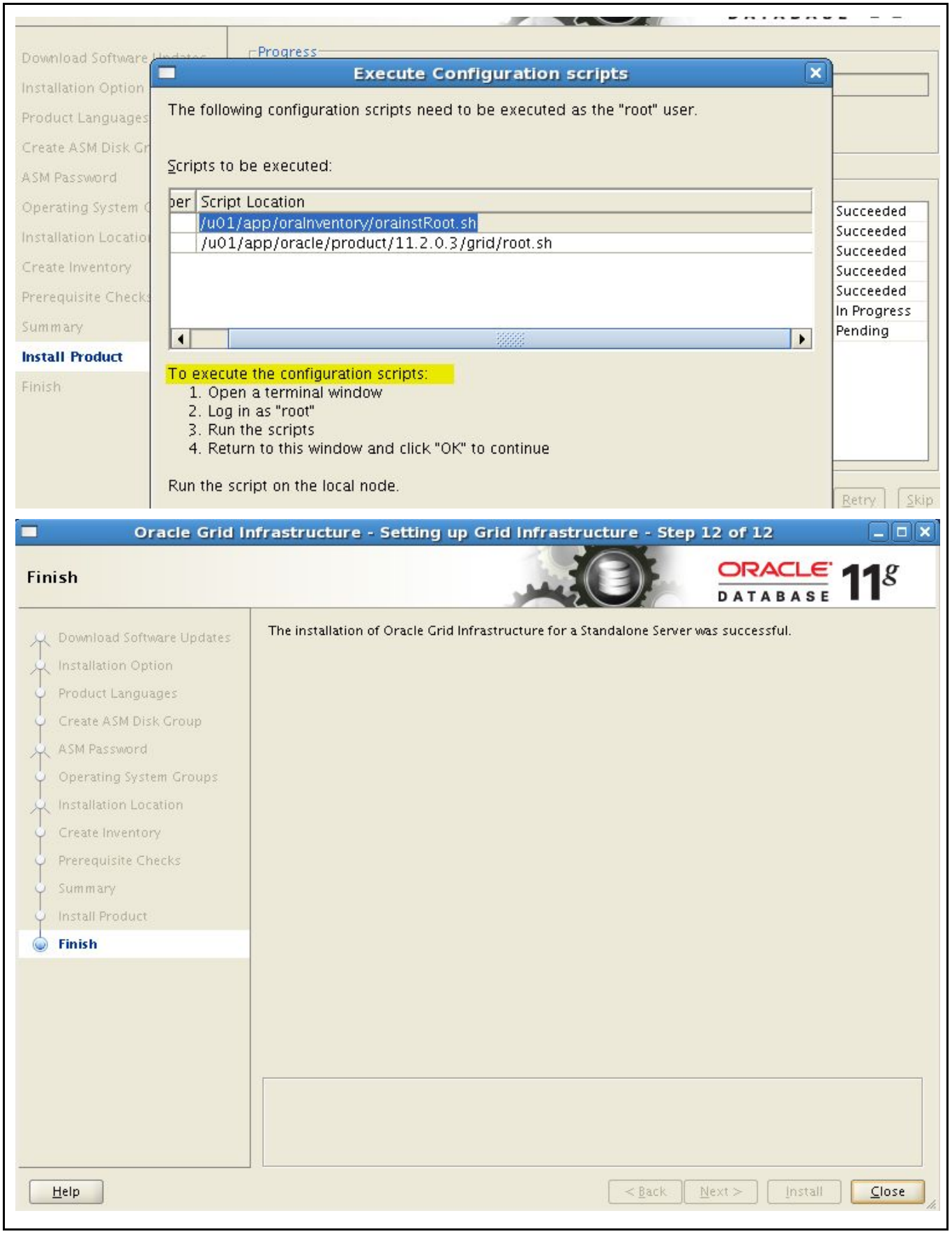


oracle_4U 로 비밀번호 설정







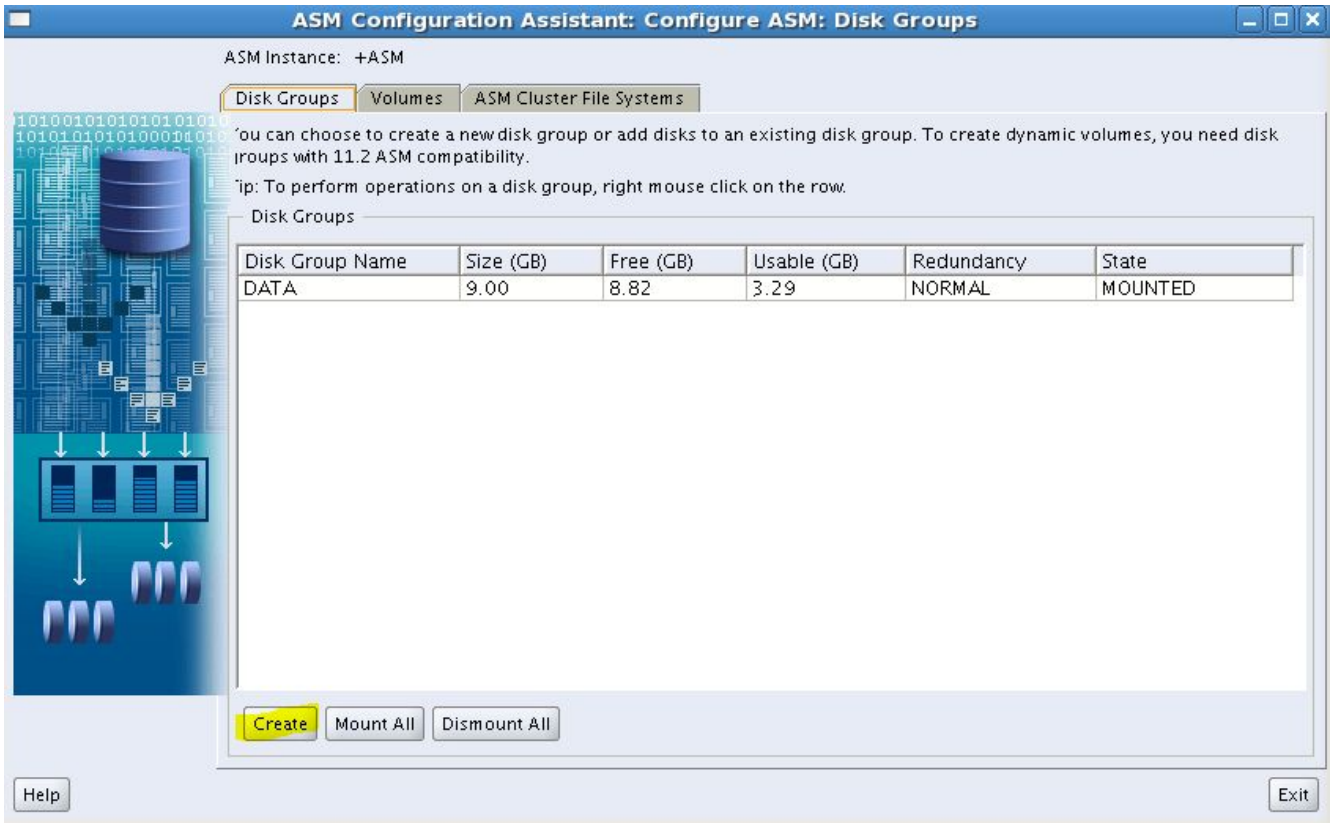


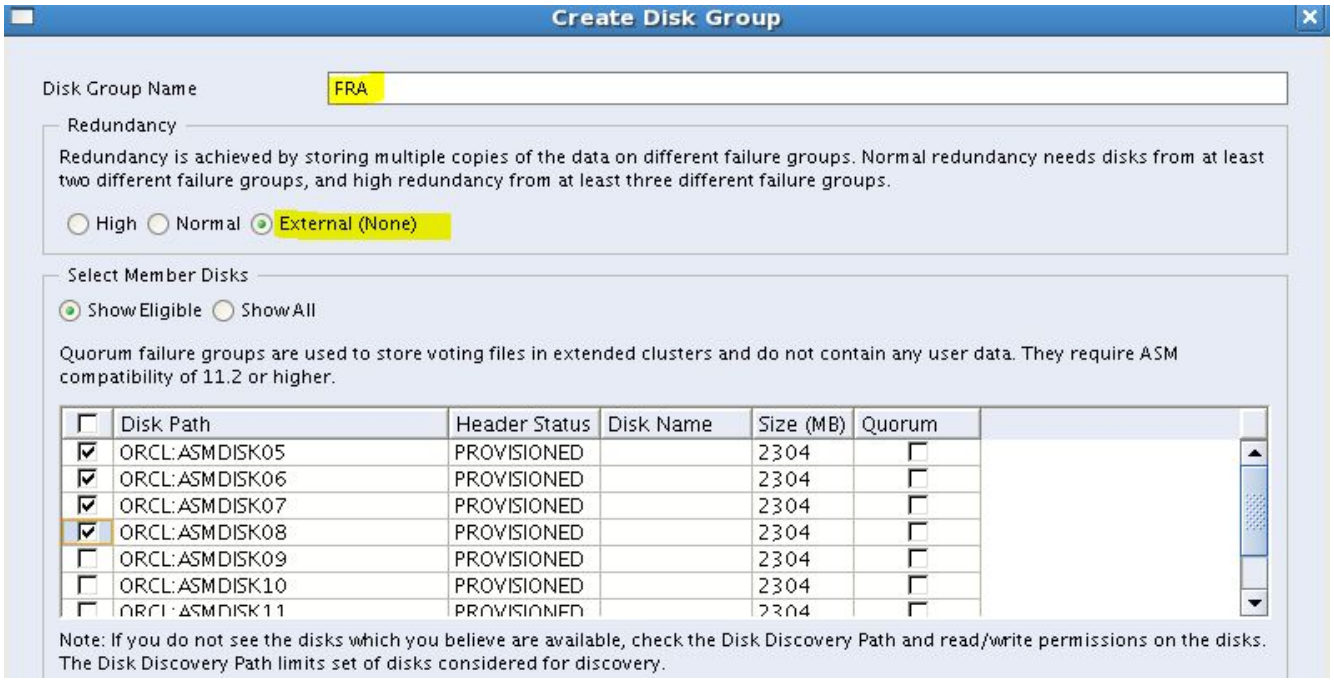
DB에 ASM 붙이기

```
[oracle@host1 ~]$ . oraenv
ORACLE_SID = [PROD] ? +ASM
The Oracle base remains unchanged with value /u01/app/oracle
```

ASM 구성하기

[oracle@host1 ~]$ asmca

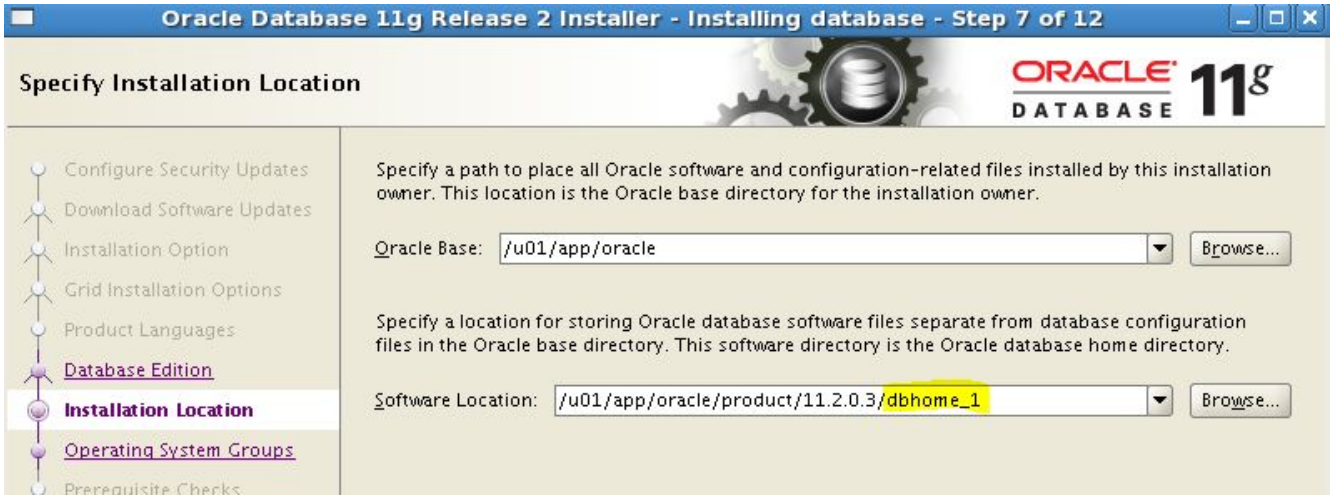




oracle 계정으로 로그인하여 오라클 소프트웨어를 설치한다.

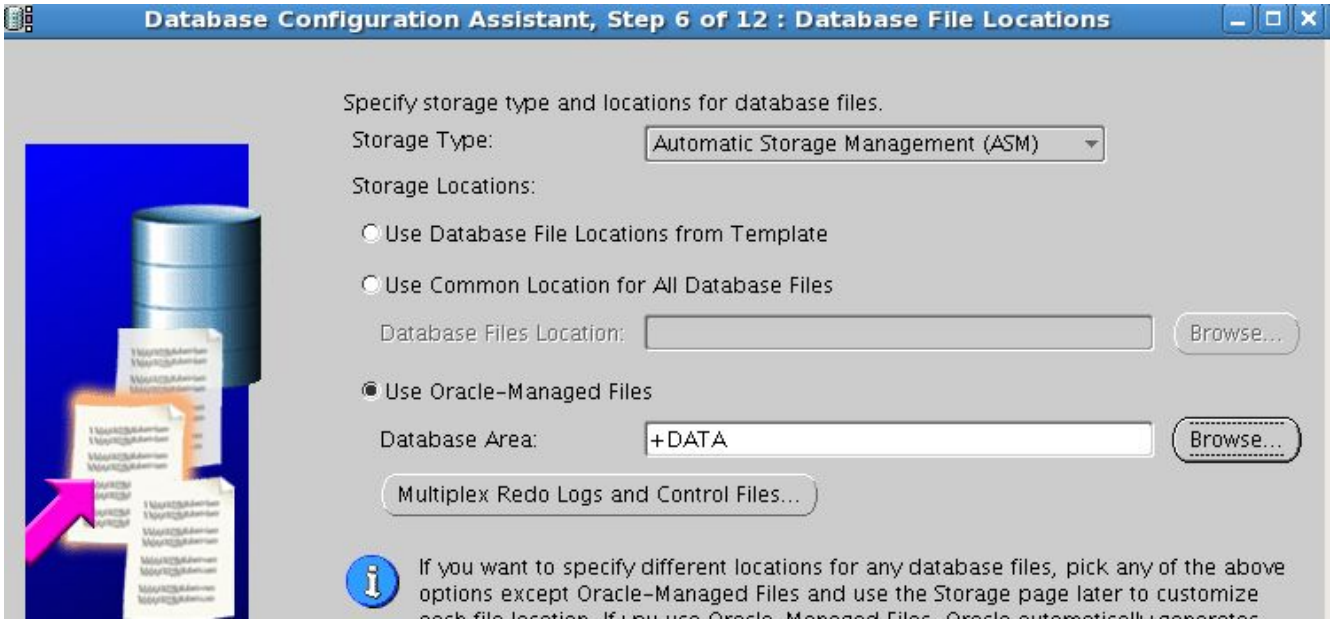
```
[oracle@host1 ~]$ cd /stage/database/

[oracle@host1 database]$ ls
doc       readme.html  rpm           sshsetup  welcome.html
install   response     runInstaller  stage

[oracle@host1 database]$ ./runInstaller
```

※ 경로주의



재시작 후 DB를 설치한다.

```
[oracle@host1 ~ ]$ dbca
```




```
[oracle@host1 ~]$ sqlplus / as sysdba

SQL*Plus: Release 11.2.0.3.0 Production on Fri Jul 17 17:07:36 2020

Copyright (c) 1982, 2011, Oracle.  All rights reserved.


Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.3.0 - 64bit Production
With the Partitioning, Automatic Storage Management, OLAP, Data Mining
and Real Application Testing options

SQL> select status from v$instance;

STATUS
------------
OPEN
```

3) ASM 을 사용할 때 오라클 버전 업그레이드 하기

ASM을 사용하기 위해 ASM 인스턴스를 킨다.

```
[oracle@host1 ~]$ srvctl start asm
PRCC-1014 : asm was already running
PRCR-1004 : Resource ora.asm is already running
PRCR-1079 : Failed to start resource ora.asm
CRS-5702: Resource 'ora.asm' is already running on 'host1'

SQL> select file_name
  2  from dba_data_files;

FILE_NAME
-----------------------------------------------
+DATA/prod/datafile/users.259.1046019577
+DATA/prod/datafile/undotbs1.258.1046019577
+DATA/prod/datafile/sysaux.257.1046019577
+DATA/prod/datafile/system.256.1046019577
+DATA/prod/datafile/example.265.1046019727
```

초기설정) 11.2.0.4 버전 압축을 해제한다.

```
[oracle@host1 ~]$ mkdir /stage/11.2.0.4

[oracle@host1 ~]$ cd /mnt/hgfs/share/11.2.0.4

[oracle@host1 11.2.0.4]$ unzip -d /stage/11.2.0.4 p13390677_112040_linux-x86-64_1of7.zip
[oracle@host1 11.2.0.4]$ unzip -d /stage/11.2.0.4 p13390677_112040_linux-x86-64_2of7.zip
[oracle@host1 11.2.0.4]$ unzip -d /stage/11.2.0.4 p13390677_112040_linux-x86-64_3of7.zip
```

초기설정) 환경변수 해제

```
[oracle@host1 ~]$ cd /stage/11.2.0.4/grid
[oracle@host1 grid]$ unset ORACLE_HOME
[oracle@host1 grid]$ unset ORACLE_BASE
[oracle@host1 grid]$ unset ORACLE_SID
```

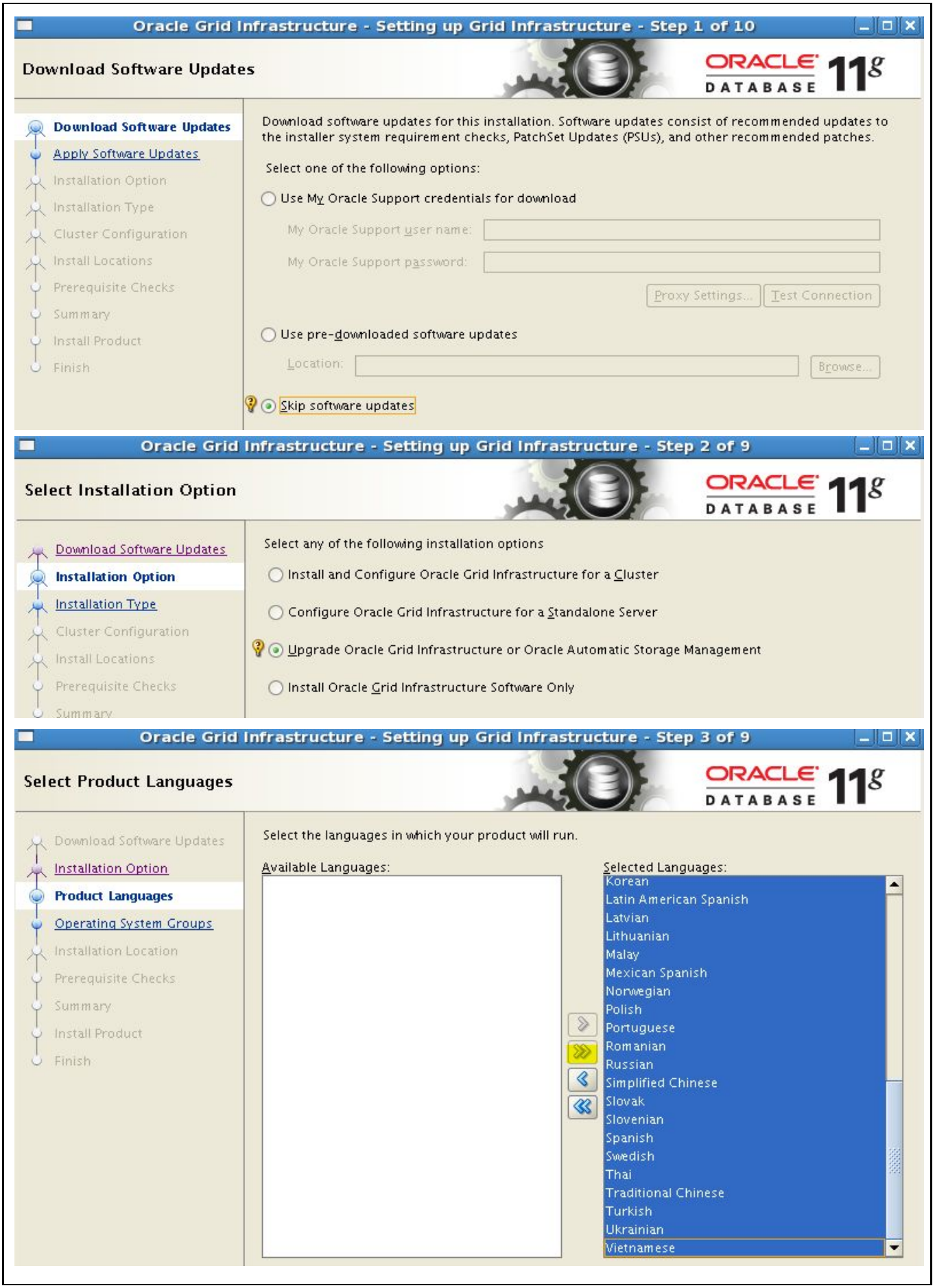
Grid를 업그레이드한다.

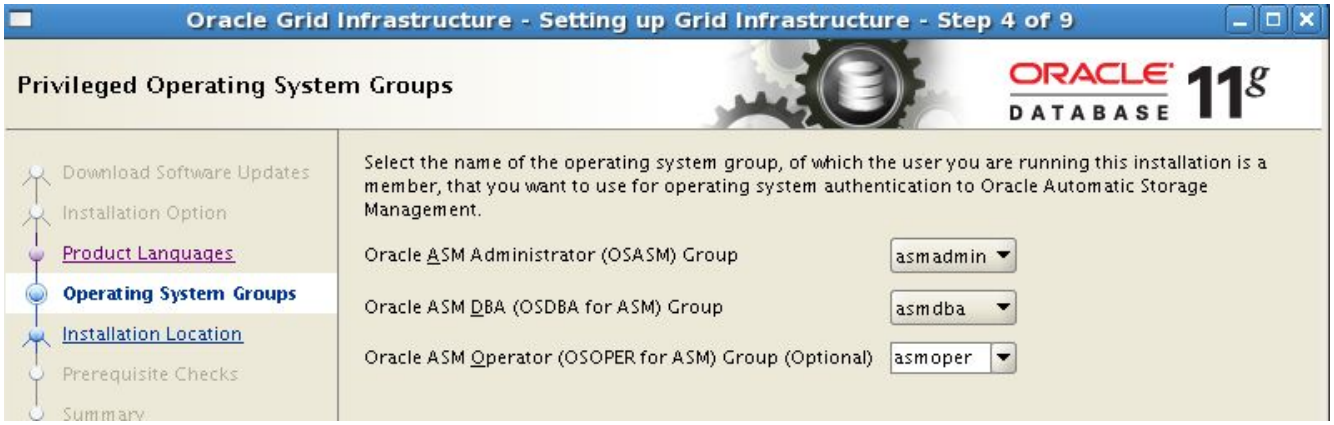
※ 업그레이드를 위한 디렉토리 생성

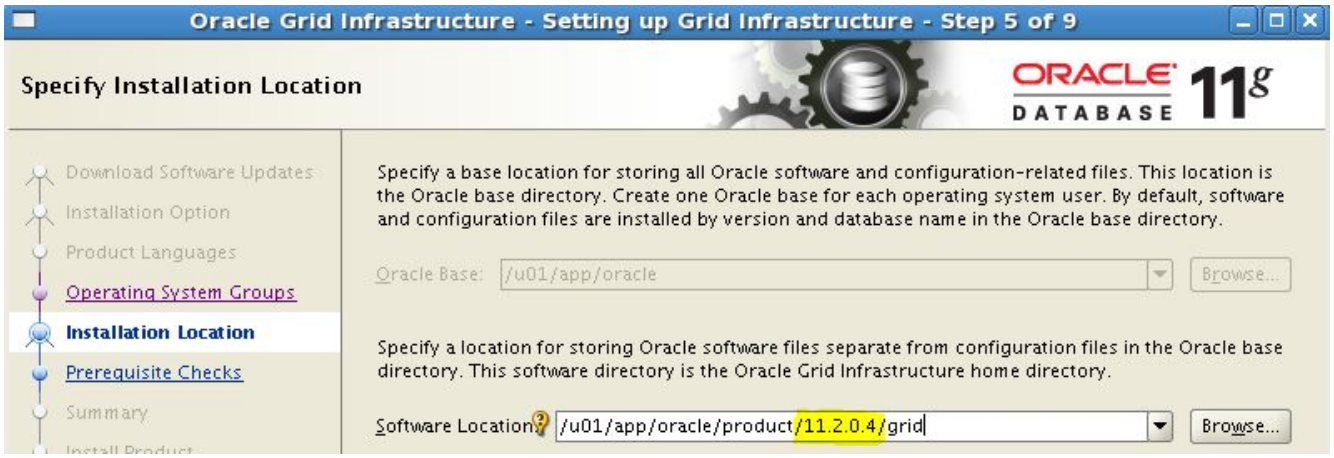
```
[oracle@host1 ~]$ mkdir -p /u01/app/oracle/product/11.2.0.4/grid
[oracle@host1 ~]$ mkdir -p /u01/app/oracle/product/11.2.0.4/dbhome_1
```

※ 인스톨러 실행

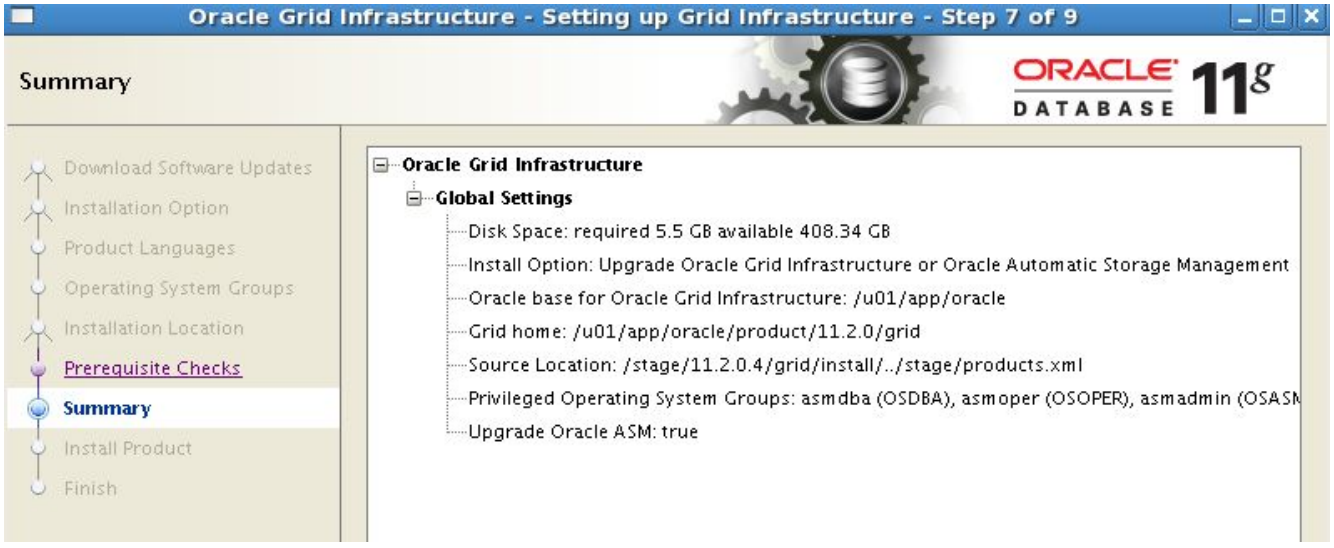
```
[oracle@host1 ~]$ cd /stage/11.2.0.4/grid
[oracle@host1 grid]$ ./runInstaller
```

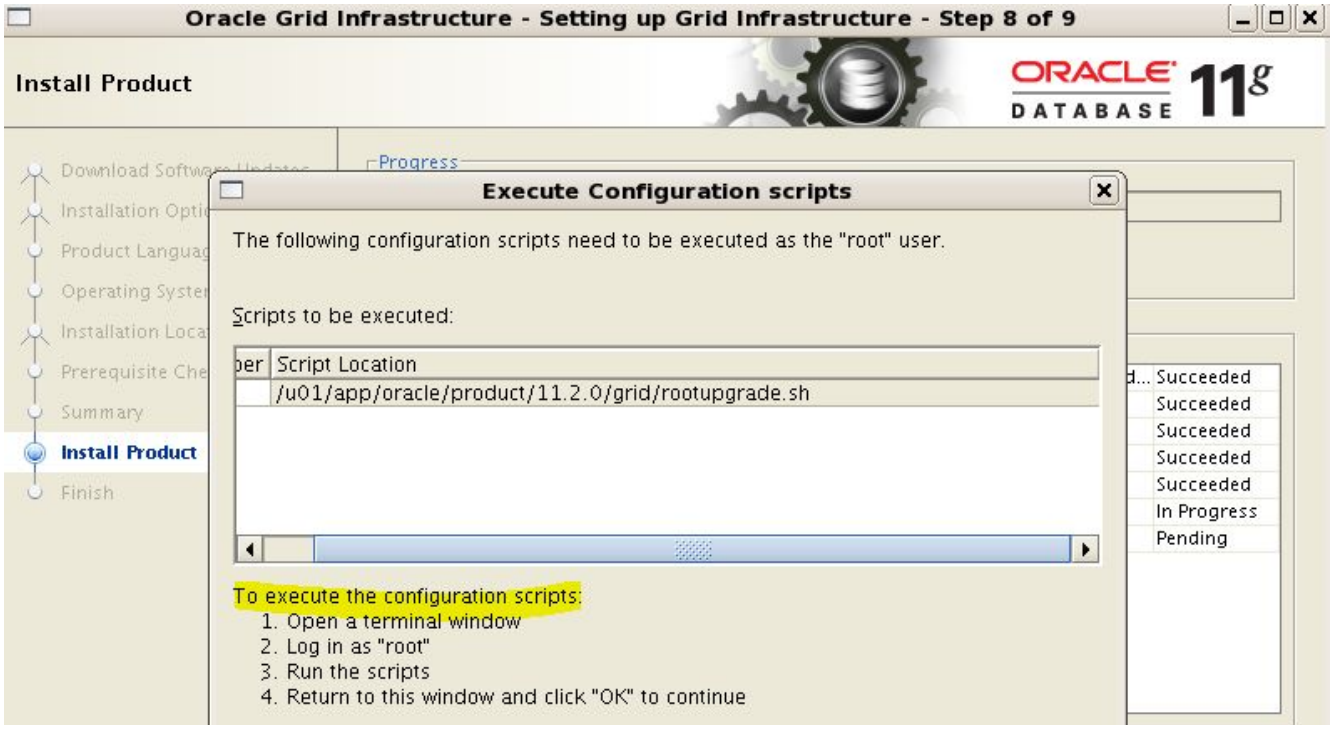






※ 경로주의 (11.2.0.4)






```
[root@host1 ~]# /u01/app/oracle/product/11.2.0.4/grid/rootupgrade.sh
Performing root user operation for Oracle 11g

The following environment variables are set as:
    ORACLE_OWNER= oracle
    ORACLE_HOME=  /u01/app/oracle/product/11.2.0.4/grid

Enter the full pathname of the local bin directory: [/usr/local/bin]: Enter
The contents of "dbhome" have not changed. No need to overwrite.
The contents of "oraenv" have not changed. No need to overwrite.
The contents of "coraenv" have not changed. No need to overwrite.

Entries will be added to the /etc/oratab file as needed by
Database Configuration Assistant when a database is created
Finished running generic part of root script.
Now product-specific root actions will be performed.
Using configuration parameter file:
/u01/app/oracle/product/11.2.0.4/grid/crs/install/crsconfig_params
Creating trace directory

ASM Configuration upgraded successfully.

Creating OCR keys for user 'oracle', privgrp 'oinstall'..
Operation successful.
LOCAL ONLY MODE
Successfully accumulated necessary OCR keys.
Creating OCR keys for user 'root', privgrp 'root'..
Operation successful.
CRS-4664: Node host1 successfully pinned.
Replacing Clusterware entries in inittab
Replacing Clusterware entries in inittab
host1     2020/07/21 13:35:45
/u01/app/oracle/product/11.2.0.4/grid/cdata/host1/backup_20200721_133545.olr

host1     2020/07/20 16:32:06
/u01/app/oracle/product/11.2.0.3/grid/cdata/host1/backup_20200720_163206.olr
Successfully configured Oracle Grid Infrastructure for a Standalone Server
```

버전이 바뀌었는지 확인한다.

```
[oracle@host1 grid]$ crsctl query has softwareversion
Oracle High Availability Services version on the local node is [11.2.0.4.0]
```

bash_profile 환경변수 경로를 11.2.0.4로 변경해준다.

```
[root@host1 ~]# vi /home/oracle/.bash_profile
# Oracle Settings
export ORACLE_BASE=/u01/app/oracle
export ORACLE_HOME=/u01/app/oracle/product/11.2.0.4/dbhome_1
export GRID_HOME=/u01/app/oracle/product/11.2.0.4/grid
export PATH=$ORACLE_HOME/bin:$GRID_HOME/bin:$PATH
export ORACLE_SID=PROD
```

DB도 업그레이드 해준다.

```
[oracle@host1 ~]$ cd /stage/11.2.0.4/database/
[oracle@host1 database]$ ./runInstaller
```

업그레이드 가능한지 확인

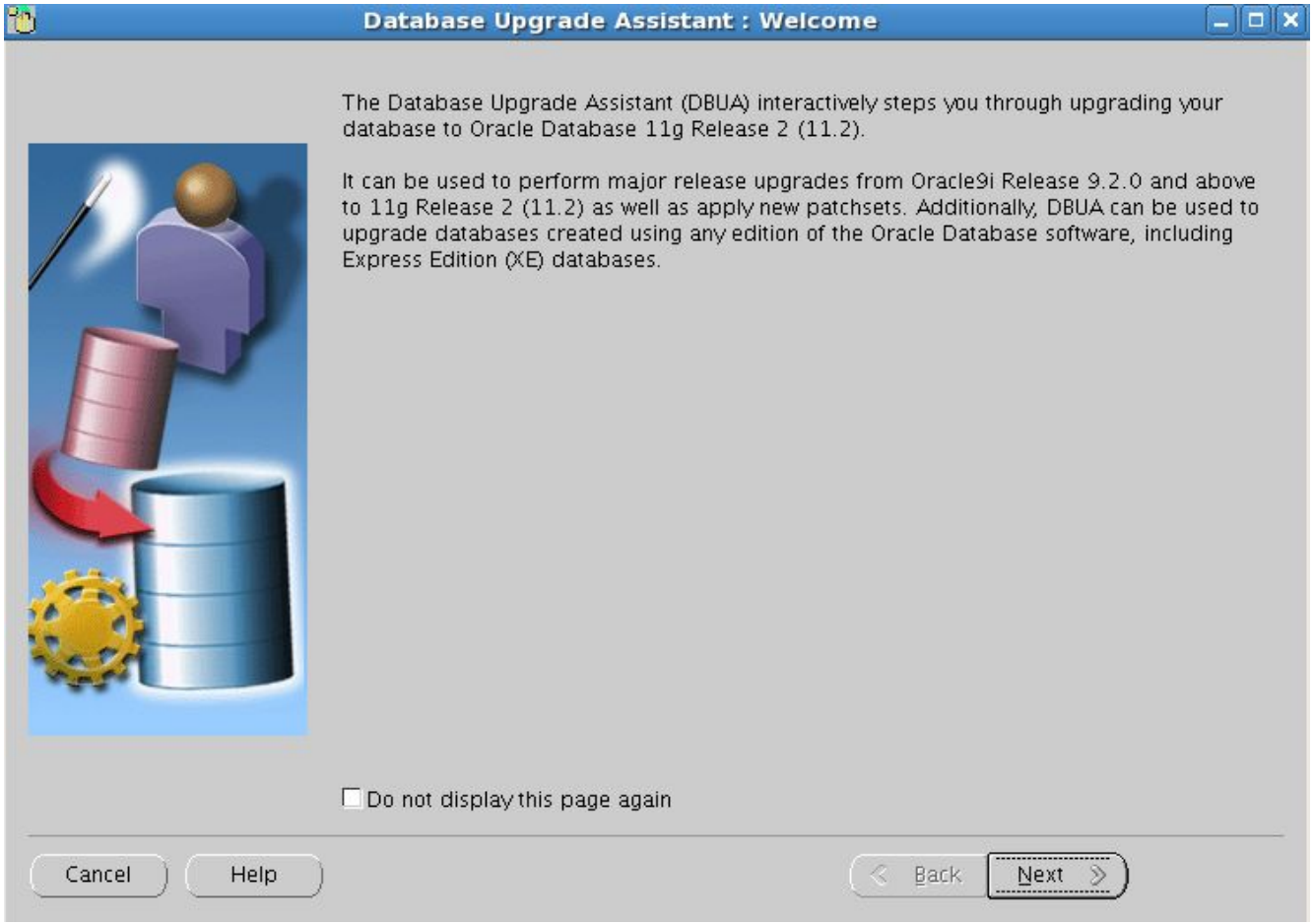
```
[oracle@host1 ~]$ export ORACLE_BASE=/u01/app/oracle
[oracle@host1 ~]$ export ORACLE_HOME=/u01/app/oracle/product/11.2.0.3/dbhome_1
[oracle@host1 ~]$ export ORACLE_SID=PROD

[oracle@host1 ~]$ sqlplus / as sysdba
SQL > @/u01/app/oracle/product/11.2.0.4/dbhome_1/rdbms/admin/utlu112i.sql

SQL*Plus: Release 11.2.0.3.0 Production on Mon Jul 20 18:08:35 2020
Copyright (c) 1982, 2011, Oracle.  All rights reserved.
......
**********************************************************************
Database:
**********************************************************************
--> name:         PROD
--> version:      11.2.0.3.0
--> compatible:   11.2.0.0.0
--> blocksize:    8192
--> platform:     Linux x86 64-bit
--> timezone file: V14
.
```

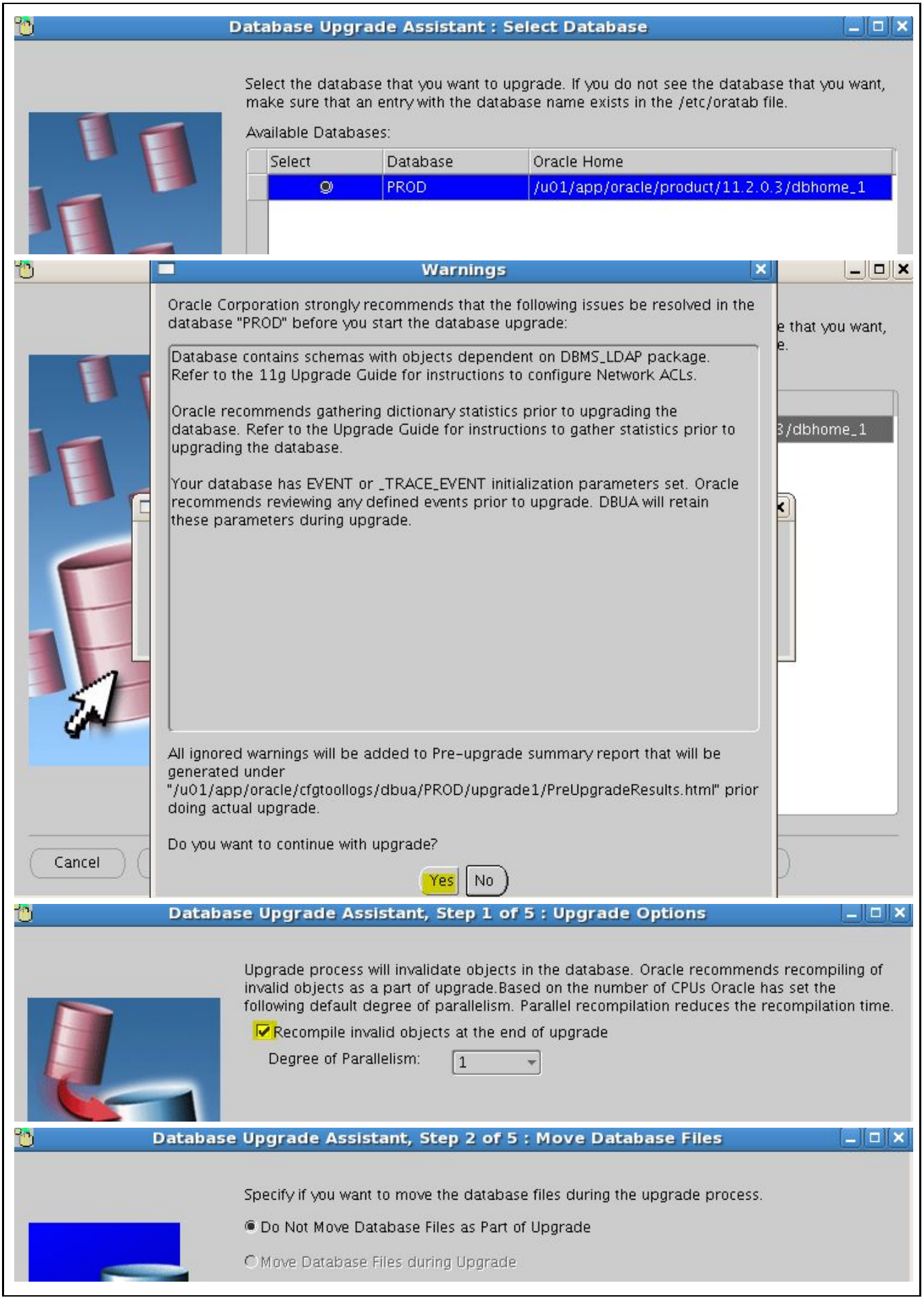
```
************************************************************************
Tablespaces: [make adjustments in the current environment]
************************************************************************
--> SYSTEM tablespace is adequate for the upgrade.
.... minimum required size: 924 MB
--> SYSAUX tablespace is adequate for the upgrade.
.... minimum required size: 643 MB
--> UNDOTBS1 tablespace is adequate for the upgrade.
.... minimum required size: 400 MB
--> TEMP tablespace is adequate for the upgrade.
.... minimum required size: 60 MB
--> EXAMPLE tablespace is adequate for the upgrade.
.... minimum required size: 310 MB
.
************************************************************************
Flashback: OFF
************************************************************************
************************************************************************
Update Parameters: [Update Oracle Database 11.2 init.ora or spfile]
Note: Pre-upgrade tool was run on a lower version 64-bit database.
************************************************************************
.
.
************************************************************************
Renamed Parameters: [Update Oracle Database 11.2 init.ora or spfile]
************************************************************************
-- No renamed parameters found. No changes are required.
.
************************************************************************
Obsolete/Deprecated Parameters: [Update Oracle Database 11.2 init.ora or spfile]
************************************************************************
-- No obsolete parameters found. No changes are required
.
************************************************************************
Components: [The following database components will be upgraded or installed]
************************************************************************
--> Oracle Catalog Views       [upgrade]  VALID
--> Oracle Packages and Types   [upgrade]  VALID
--> JServer JAVA Virtual Machine [upgrade]  VALID
--> Oracle XDK for Java        [upgrade]  VALID
--> Oracle Workspace Manager    [upgrade]  VALID
--> OLAP Analytic Workspace     [upgrade]  VALID
--> OLAP Catalog               [upgrade]  VALID
--> EM Repository              [upgrade]  VALID
--> Oracle Text                [upgrade]  VALID
--> Oracle XML Database        [upgrade]  VALID
--> Oracle Java Packages       [upgrade]  VALID
--> Oracle interMedia          [upgrade]  VALID
--> Spatial                    [upgrade]  VALID
--> Expression Filter          [upgrade]  VALID
--> Rule Manager               [upgrade]  VALID
--> Oracle Application Express  [upgrade]  VALID
... APEX will only be upgraded if the version of APEX in
... the target Oracle home is higher than the current one.
--> Oracle OLAP API            [upgrade]  VALID
.
************************************************************************
Miscellaneous Warnings
************************************************************************
.
.
```

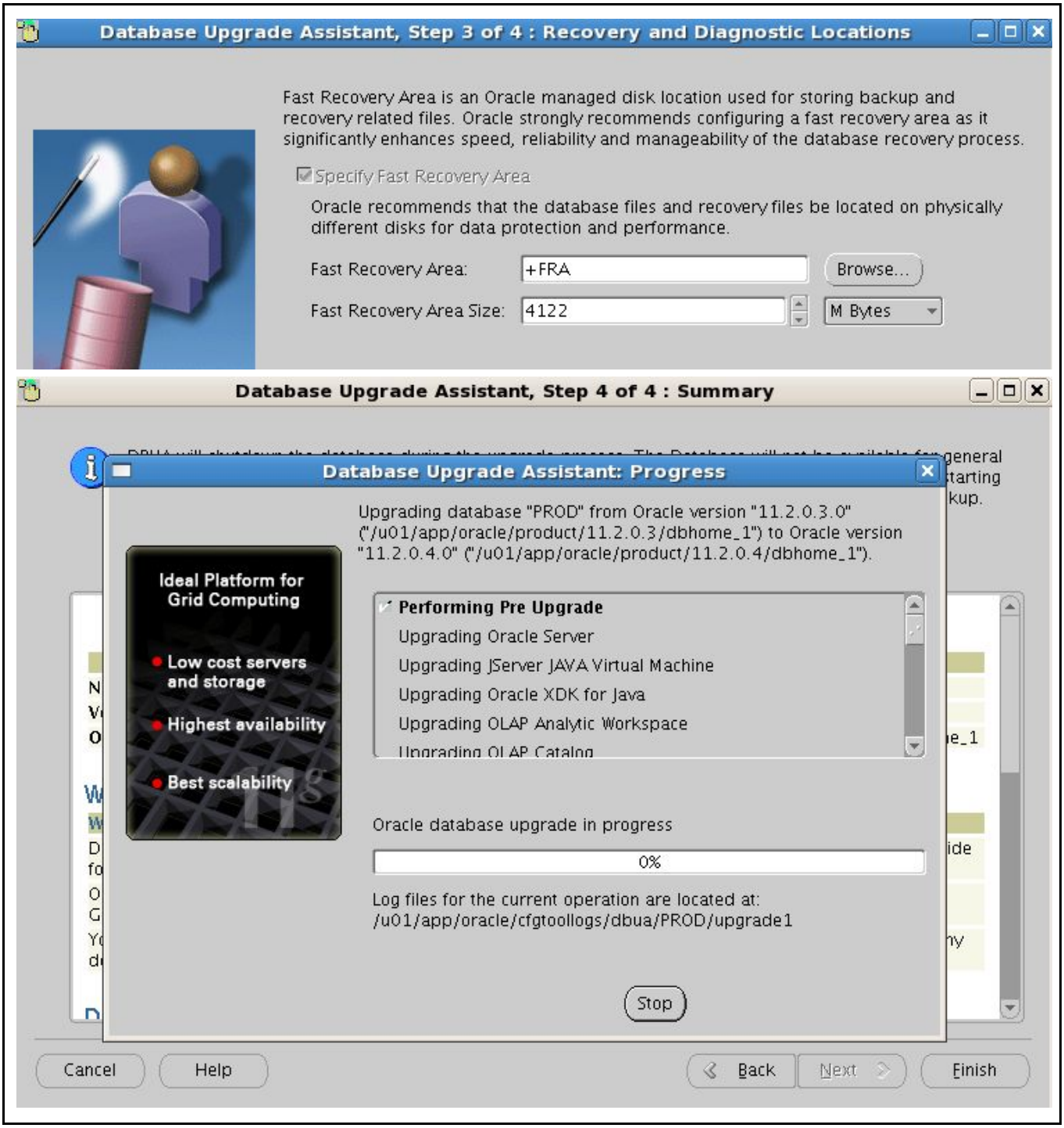
```
**********************************************************************
Recommendations
**********************************************************************
Oracle recommends gathering dictionary statistics prior to
upgrading the database.
To gather dictionary statistics execute the following command
while connected as SYSDBA:

   EXECUTE dbms_stats.gather_dictionary_stats;

**********************************************************************
Oracle recommends reviewing any defined events prior to upgrading.

To view existing non-default events execute the following commands
while connected AS SYSDBA:
  Events:
    SELECT (translate(value,chr(13)||chr(10),' ')) FROM sys.v$parameter2
      WHERE  UPPER(name) ='EVENT' AND  isdefault='FALSE'

  Trace Events:
    SELECT (translate(value,chr(13)||chr(10),' ')) from sys.v$parameter2
      WHERE UPPER(name) = '_TRACE_EVENTS' AND isdefault='FALSE'

Changes will need to be made in the init.ora or spfile.
```

dbua 실행

```
[oracle@host1 ~]$ /u01/app/oracle/product/11.2.0.4/dbhome_1/bin/dbua
```







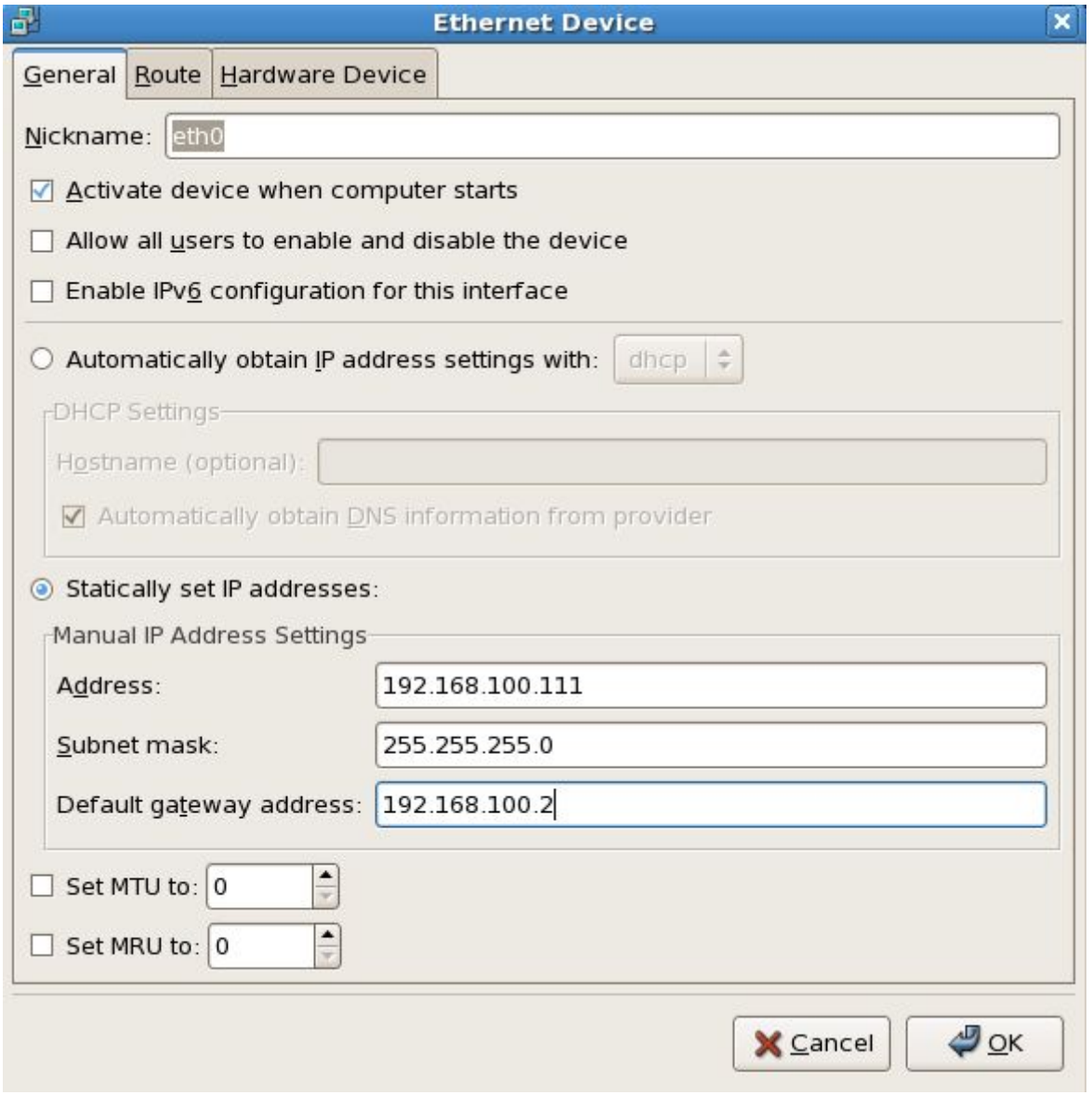
업그레이드 확인

```
[oracle@host1 ~]$ cat /etc/oratab
#Backup file is  /u01/app/oracle/product/11.2.0.4/grid/srvm/admin/oratab.bak.host1
line added by Agent
...
#
# Multiple entries with the same $ORACLE_SID are not allowed.
+ASM:/u01/app/oracle/product/11.2.0.4/grid:N
PROD:/u01/app/oracle/product/11.2.0.4/dbhome_1:N
# line added by Agent
```

```
[oracle@host1 ~]$ . oraenv
ORACLE_SID = [PROD] ? PROD
The Oracle base remains unchanged with value /u01/app/oracle

[oracle@host1 ~]$ cat >> $ORACLE_HOME/sqlplus/admin/glogin.sql <<EOF
set linesize 150
set pagesize 100
set arraysize 100
set echo off
set verify off
set timing on
--set time on
define _editor=vi
set sqlprompt "_USER'@'_CONNECT_IDENTIFIER> "
> EOF

[oracle@host1 ~]$ sqlplus / as sysdba

SQL*Plus: Release 11.2.0.4.0 Production on Tue Jul 21 14:29:22 2020

Copyright (c) 1982, 2013, Oracle.  All rights reserved.


Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.4.0 - 64bit Production
With the Partitioning, Automatic Storage Management, OLAP, Data Mining
and Real Application Testing options

SYS@PROD> select comp_name, version, status, schema from dba_registry;

COMP_NAME                                VERSION              STATUS     SCHEMA
---------------------------------------- -------------------- ---------- ------
OWB                                      11.2.0.3.0           VALID      OWBSYS
Oracle Application Express               3.2.1.00.12          VALID      APEX_030200
Oracle Enterprise Manager                11.2.0.4.0           VALID      SYSMAN
Spatial                                  11.2.0.4.0           VALID      MDSYS
OLAP Catalog                             11.2.0.4.0           VALID      OLAPSYS
Oracle OLAP API                          11.2.0.4.0           VALID      SYS
OLAP Analytic Workspace                  11.2.0.4.0           VALID      SYS
Oracle Multimedia                        11.2.0.4.0           VALID      ORDSYS
Oracle Rules Manager                     11.2.0.4.0           VALID      EXFSYS
Oracle XML Database                      11.2.0.4.0           VALID      XDB
Oracle Text                              11.2.0.4.0           VALID      CTXSYS
Oracle Expression Filter                 11.2.0.4.0           VALID      EXFSYS
Oracle Database Java Packages            11.2.0.4.0           VALID      SYS
Oracle XDK                               11.2.0.4.0           VALID      SYS
JServer JAVA Virtual Machine             11.2.0.4.0           VALID      SYS
Oracle Workspace Manager                 11.2.0.4.0           VALID      WMSYS
Oracle Database Packages and Types       11.2.0.4.0           VALID      SYS
Oracle Database Catalog Views            11.2.0.4.0           VALID      SYS

18 rows selected.
SYS@PROD> exit
SYS@PROD> SELECT owner,object_name,object_type,status FROM dba_objects WHERE status
!= 'VALID';

no rows selected

[PROD@host01 ~]$ su - root
[root@host01 ~]# rm -rf /u01/app/oracle/product/11.2.0.3
```

4) 물리적으로 디스크를 생성한 후 ASM 디스크 그룹 만들기

사전설정) stage 까지 완료된 이미지로 작업, 아이피 고정하는 방법

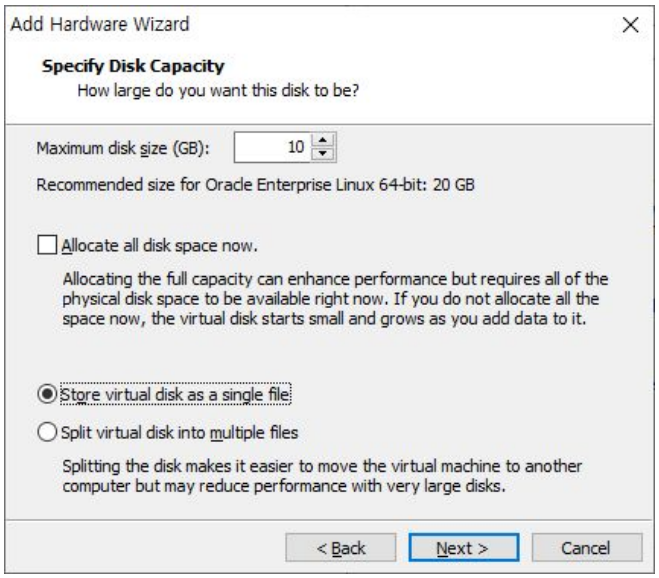


[system –administration– network – eth0 더블클릭]

ASM을 사용하기 위한 설정 (환경변수 설정, ASM 패키지 설치)

```
[root@host1 ~]# vi /home/oracle/.bash_profile

[root@host1 ~]# rpm -qa oracleasm*
oracleasm-2.6.18-164.el5-2.0.5-1.el5
oracleasmlib-2.0.4-1.el5
oracleasm-support-2.1.8-1.el5
```

disk 01 ~ disk 06 까지 추가




```
[root@host1 ~]# fdisk -l

Disk /dev/sda: 536.8 GB, 536870912000 bytes
255 heads, 63 sectors/track, 65270 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes

   Device Boot      Start         End      Blocks   Id  System
/dev/sda1   *           1          13      104391   83  Linux
/dev/sda2              14         535     4192965   82  Linux swap / Solaris
/dev/sda3             536       65270   519983887+  83  Linux

Disk /dev/sdb: 10.7 GB, 10737418240 bytes
255 heads, 63 sectors/track, 1305 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes

Disk /dev/sdb doesn't contain a valid partition table

Disk /dev/sdc: 10.7 GB, 10737418240 bytes
255 heads, 63 sectors/track, 1305 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes

Disk /dev/sdc doesn't contain a valid partition table

Disk /dev/sdd: 10.7 GB, 10737418240 bytes
255 heads, 63 sectors/track, 1305 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes

Disk /dev/sdd doesn't contain a valid partition table

Disk /dev/sde: 10.7 GB, 10737418240 bytes
255 heads, 63 sectors/track, 1305 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes

Disk /dev/sde doesn't contain a valid partition table

Disk /dev/sdf: 10.7 GB, 10737418240 bytes
255 heads, 63 sectors/track, 1305 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes

Disk /dev/sdf doesn't contain a valid partition table

Disk /dev/sdg: 10.7 GB, 10737418240 bytes
255 heads, 63 sectors/track, 1305 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes

Disk /dev/sdg doesn't contain a valid partition table
```

파티션 나누기

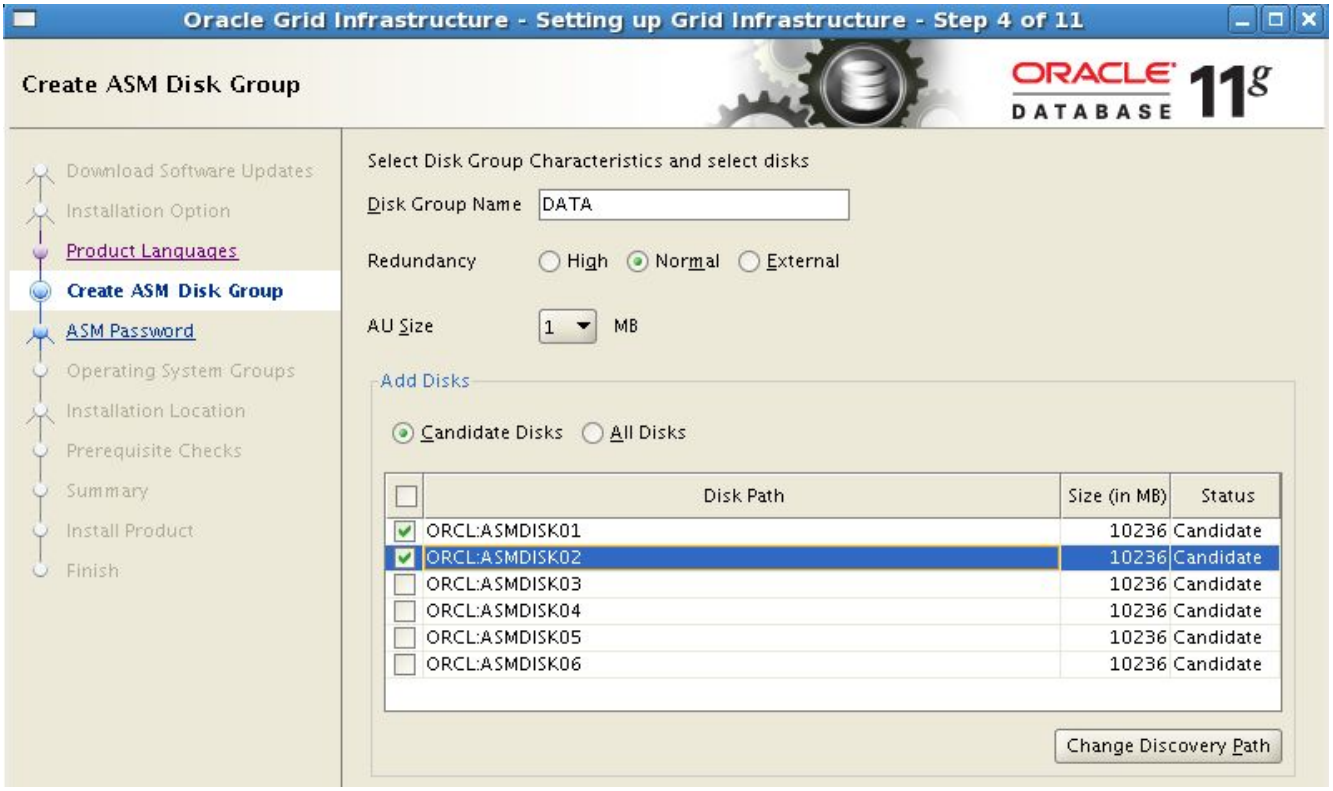
```
[root@host1 ~]# fdisk /dev/sdb
Device contains neither a valid DOS partition table, nor Sun, SGI or OSF disklabel
Building a new DOS disklabel. Changes will remain in memory only,
until you decide to write them. After that, of course, the previous
content won't be recoverable.

The number of cylinders for this disk is set to 1305.
There is nothing wrong with that, but this is larger than 1024,
and could in certain setups cause problems with:
1) software that runs at boot time (e.g., old versions of LILO)
2) booting and partitioning software from other OSs
   (e.g., DOS FDISK, OS/2 FDISK)
Warning: invalid flag 0x0000 of partition table 4 will be corrected by w(rite)

Command (m for help): n
Command action
   e   extended
   p   primary partition (1-4)
p
Partition number (1-4): 1
First cylinder (1-1305, default 1): (Enter)
Using default value 1
Last cylinder or +size or +sizeM or +sizeK (1-1305, default 1305): (Enter)
Using default value 1305

Command (m for help): w
The partition table has been altered!

Calling ioctl() to re-read partition table.
Syncing disks.
```

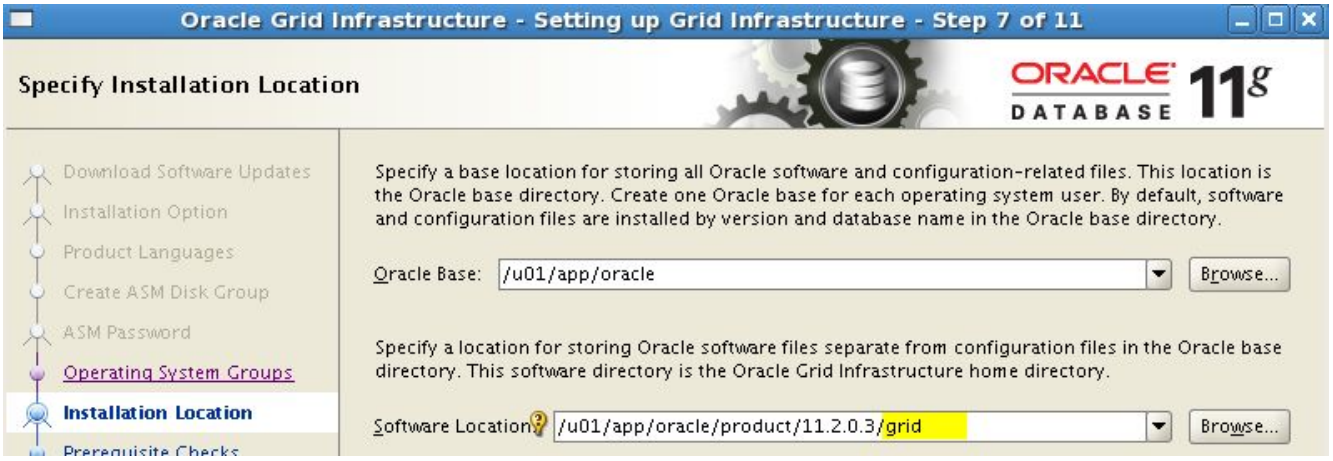
```
[root@host1 ~]# fdisk -l

Disk /dev/sda: 536.8 GB, 536870912000 bytes
255 heads, 63 sectors/track, 65270 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes

   Device Boot      Start         End      Blocks   Id  System
/dev/sda1   *           1          13      104391   83  Linux
/dev/sda2              14         535     4192965   82  Linux swap / Solaris
/dev/sda3             536       65270   519983887+  83  Linux

Disk /dev/sdb: 10.7 GB, 10737418240 bytes
255 heads, 63 sectors/track, 1305 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes

   Device Boot      Start         End      Blocks   Id  System
/dev/sdb1               1        1305    10482381   83  Linux

Disk /dev/sdc: 10.7 GB, 10737418240 bytes
255 heads, 63 sectors/track, 1305 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes

   Device Boot      Start         End      Blocks   Id  System
/dev/sdc1               1        1305    10482381   83  Linux

Disk /dev/sdd: 10.7 GB, 10737418240 bytes
255 heads, 63 sectors/track, 1305 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes

   Device Boot      Start         End      Blocks   Id  System
/dev/sdd1               1        1305    10482381   83  Linux

Disk /dev/sde: 10.7 GB, 10737418240 bytes
255 heads, 63 sectors/track, 1305 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes

   Device Boot      Start         End      Blocks   Id  System
/dev/sde1               1        1305    10482381   83  Linux

Disk /dev/sdf: 10.7 GB, 10737418240 bytes
255 heads, 63 sectors/track, 1305 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes

   Device Boot      Start         End      Blocks   Id  System
/dev/sdf1               1        1305    10482381   83  Linux

Disk /dev/sdg: 10.7 GB, 10737418240 bytes
255 heads, 63 sectors/track, 1305 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes

   Device Boot      Start         End      Blocks   Id  System
/dev/sdg1               1        1305    10482381   83  Linux
```

```
[root@host1 ~]# oracleasm configure -i
Configuring the Oracle ASM library driver.

This will configure the on-boot properties of the Oracle ASM library
driver.  The following questions will determine whether the driver is
loaded on boot and what permissions it will have.  The current values
will be shown in brackets ('[]').  Hitting <ENTER> without typing an
answer will keep that current value.  Ctrl-C will abort.

Default user to own the driver interface []: oracle
Default group to own the driver interface []: asmadmin
Start Oracle ASM library driver on boot (y/n) [n]: y
Scan for Oracle ASM disks on boot (y/n) [y]: y
Writing Oracle ASM library driver configuration: done

[root@host1 ~]# oracleasm exit
[root@host1 ~]# oracleasm init
Creating /dev/oracleasm mount point: /dev/oracleasm
Loading module "oracleasm": oracleasm
Mounting ASMlib driver filesystem: /dev/oracleasm

[root@host1 ~]# oracleasm scandisks
Reloading disk partitions: done
Cleaning any stale ASM disks...
Scanning system for ASM disks…

[root@host1 ~]# oracleasm createdisk ASMDISK01 /dev/sdb1
[root@host1 ~]# oracleasm createdisk ASMDISK02 /dev/sdc1
[root@host1 ~]# oracleasm createdisk ASMDISK03 /dev/sdd1
[root@host1 ~]# oracleasm createdisk ASMDISK04 /dev/sde1
[root@host1 ~]# oracleasm createdisk ASMDISK05 /dev/sdf1
[root@host1 ~]# oracleasm createdisk ASMDISK06 /dev/sdg1
Writing disk header: done
Instantiating disk: done

[root@host1 ~]# oracleasm listdisks
ASMDISK01
ASMDISK02
ASMDISK03
ASMDISK04
ASMDISK05
ASMDISK06

[root@host1 ~]# oracleasm status
Checking if ASM is loaded: yes
Checking if /dev/oracleasm is mounted: yes

[root@host1 ~]# reboot
```

ASMDISK01, ASMDISK02를 DATA로

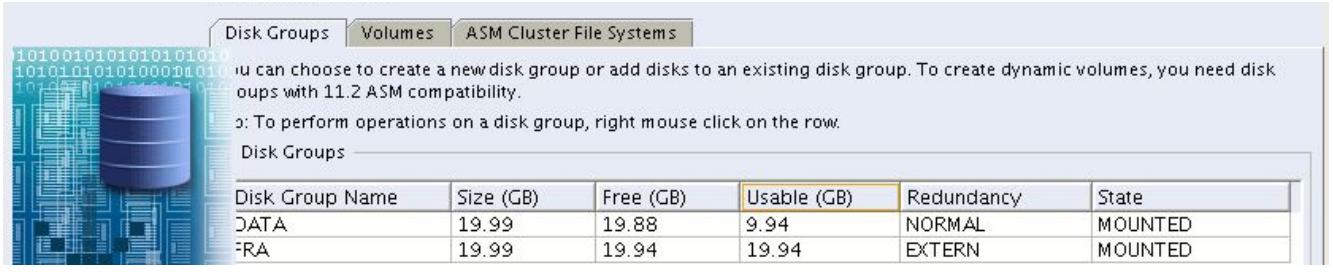
```
[oracle@host1 ~]# ./runInstaller
```





ASMDISK03, ASMDISK04를 FRA로

```
[oracle@host1 ~]$ . oraenv
ORACLE_SID = [PROD] ? +ASM
The Oracle base remains unchanged with value /u01/app/oracle
[oracle@host1 ~]$ asmca
```

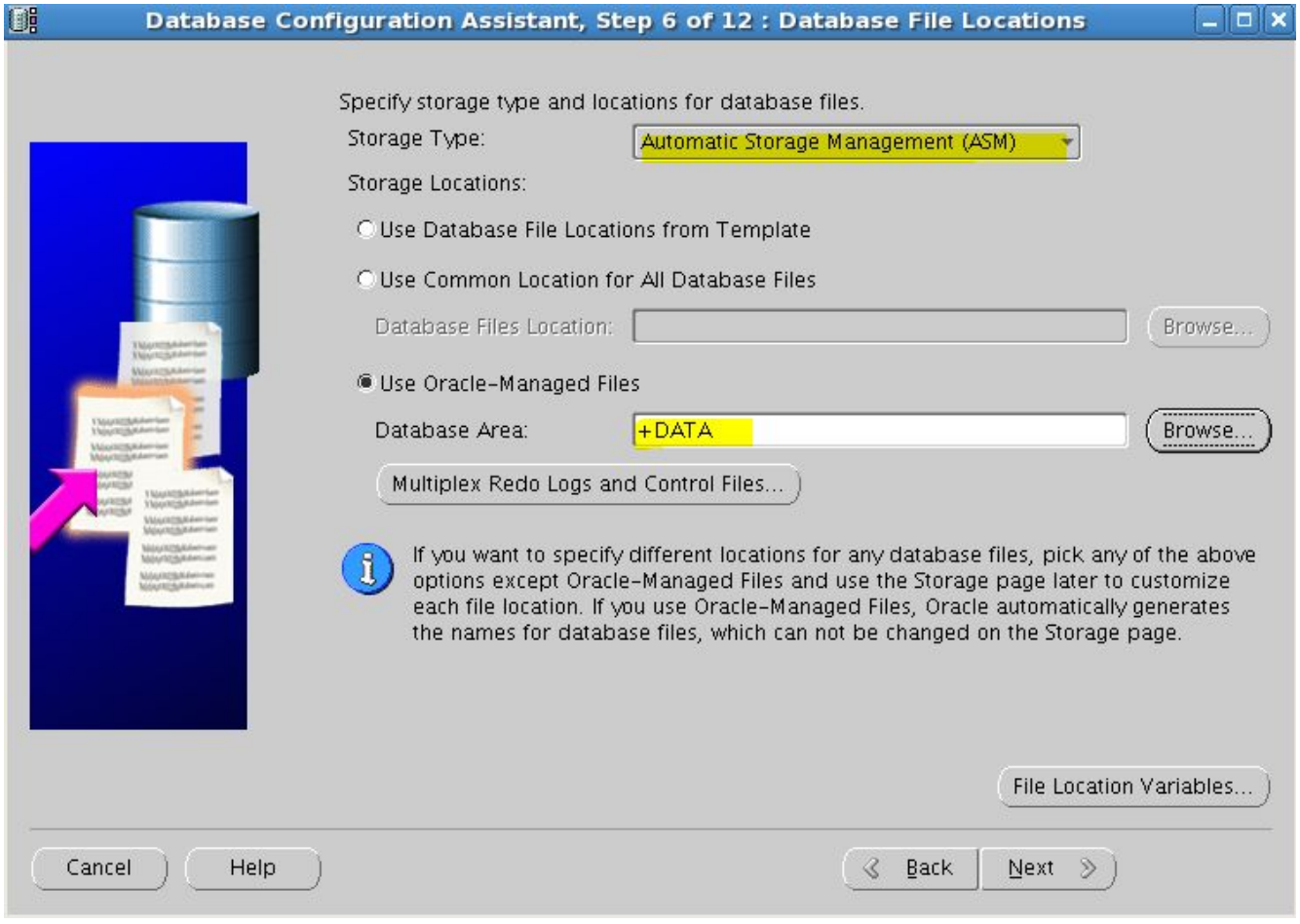


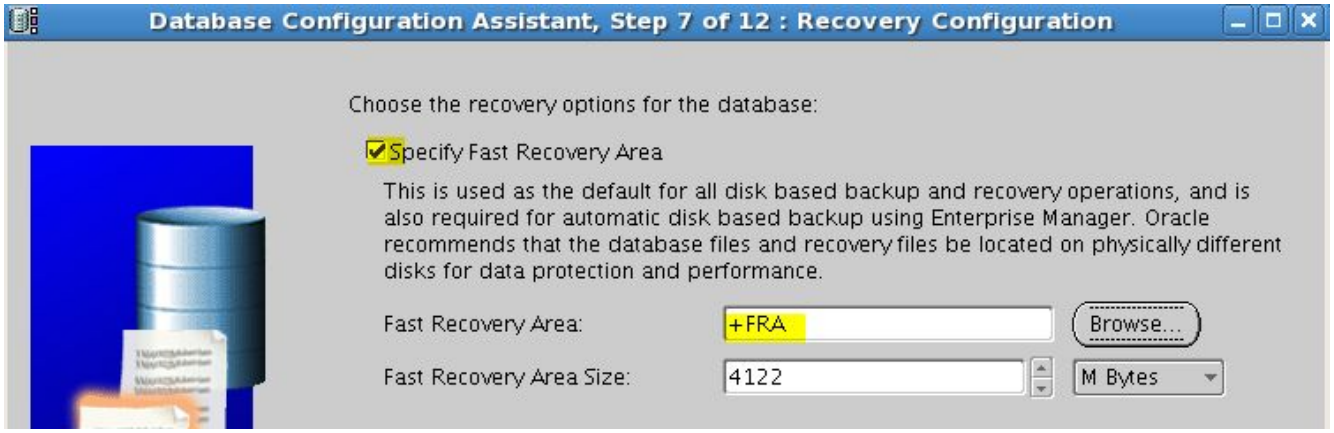
오라클 소프트웨어 설치

```
[oracle@host1 ~]$ cd /stage/database/
[oracle@host1 database]$ ./runInstaller
```

DB 설치

```
[oracle@host1 ~]$ echo $ORACLE_HOME
/u01/app/oracle/product/11.2.0.3/dbhome_1
[oracle@host1 ~]$ dbca
```





확인

```
SQL> select file_name from dba_data_files;

FILE_NAME
--------------------------------------------------------------------------------
+DATA/prod/datafile/users.259.1046434207
+DATA/prod/datafile/undotbs1.258.1046434207
+DATA/prod/datafile/sysaux.257.1046434207
+DATA/prod/datafile/system.256.1046434207
+DATA/prod/datafile/example.265.1046434295
SQL> show parameter db_recovery

NAME                                 TYPE        VALUE
------------------------------------ ----------- ------------------------------
db_recovery_file_dest                string      +FRA
db_recovery_file_dest_size           big integer 4122M
```