

Hot ASM Migration

Downtime encountered: 45 seconds

Migration host: powerededge

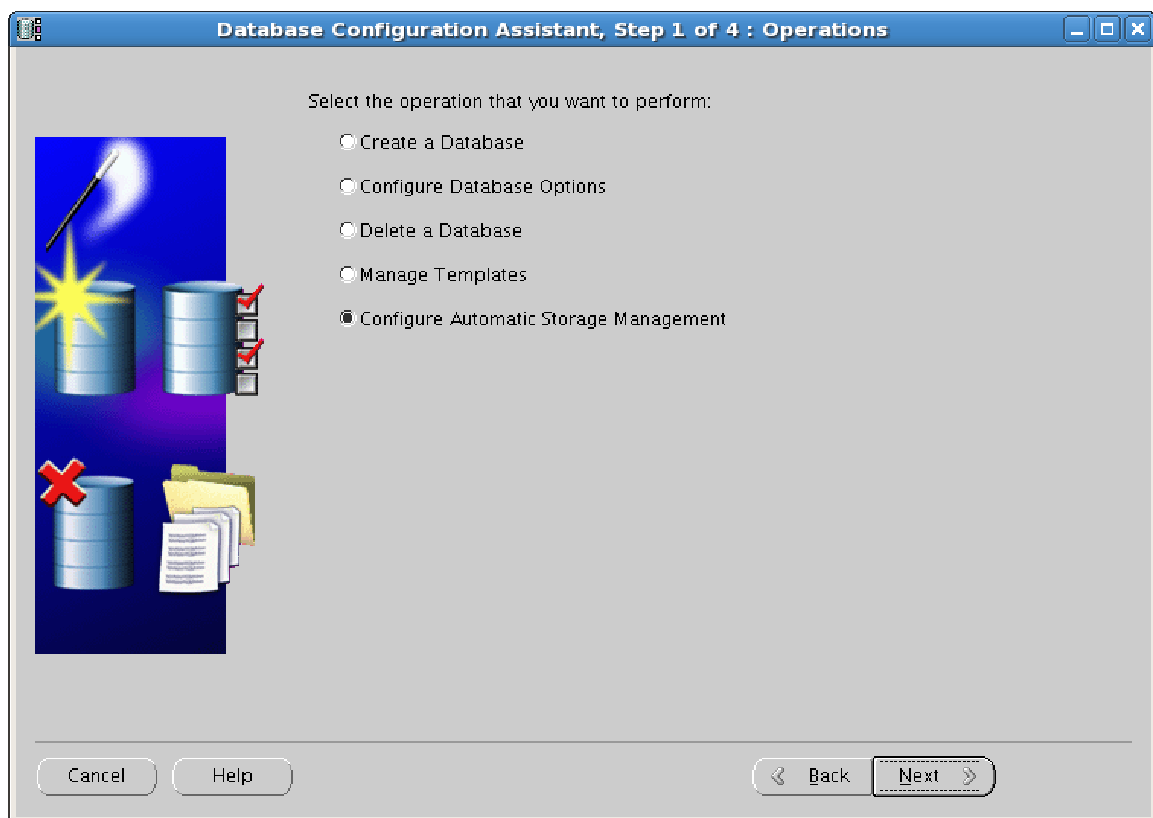
OS: RedHat LINUX AS 5

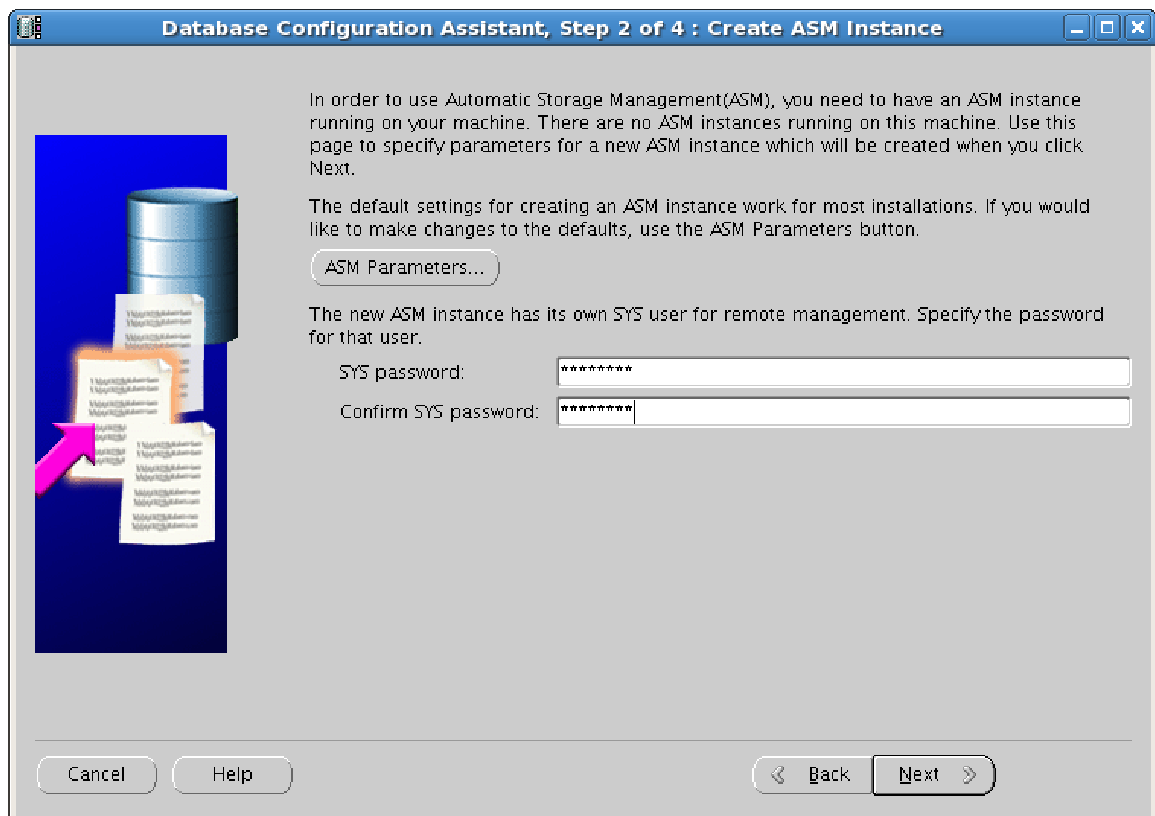
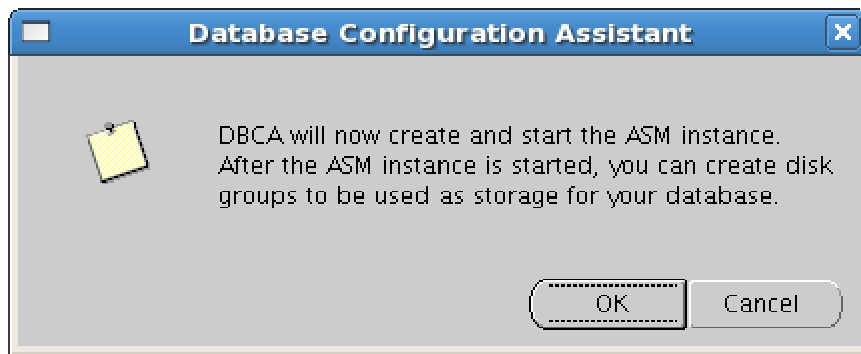
DB source: SID=orcl, 11.1.0.6, data stored on disk in /u01/app/oracle/oradata

DB destination: same db home, ASM diskgroup +DATA, recovery destination /u01/app/oracle/oradata/reco (normally this would be a separate diskgroup called +RECO or +FRA on a separate array from data files).

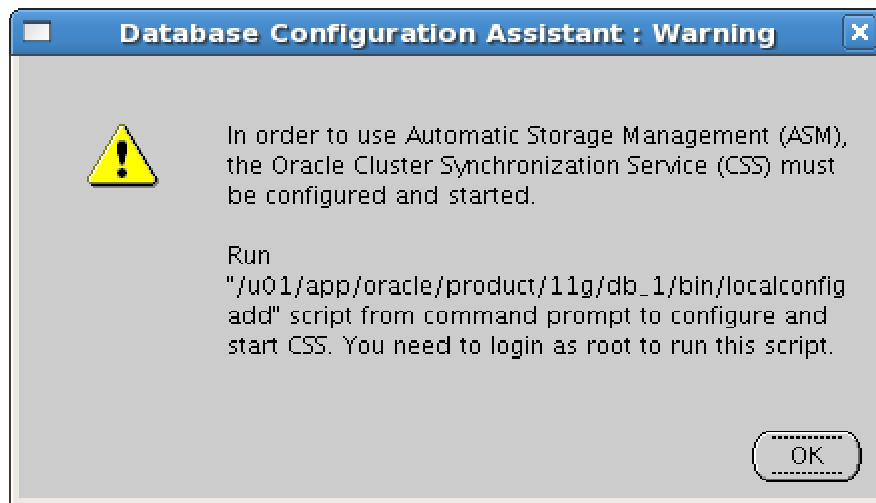
RMAN repository: same host as database, SID=test.

1. Install ASM RDBMS into a new oracle home. The slide below shows /u01/app/oracle/product/11g/db_1, but normally it will be in a different home like /u01/app/oracle/product/11g/asm_1.
2. Make sure there is no ASM installed (ps -ef | grep asm). Start ./dbca from this ASM home. Choose Configure ASM, create ASM instance.





3. Log on as root and run required localconfig add script



4. Localconfig add creates or adds CSS for ASM

```
root@poweredge:~  
File Edit View Terminal Tabs Help  
[root@poweredge ~]# /u01/app/oracle/product/11g/db_1/bin/localconfig add  
/etc/oracle does not exist. Creating it now.  
Successfully accumulated necessary OCR keys.  
Creating OCR keys for user 'root', privgrp 'root'..  
Operation successful.  
Configuration for local CSS has been initialized  
  
Cleaning up Network socket directories  
Setting up Network socket directories  
Adding to inittab  
Startup will be queued to init within 30 seconds.  
Checking the status of new Oracle init process...  
Expecting the CRS daemons to be up within 600 seconds.  
Cluster Synchronization Services is active on these nodes.  
poweredge  
Cluster Synchronization Services is active on all the nodes.  
Oracle CSS service is installed and running under init(1M)  
[root@poweredge ~]#
```

5. Next dbca will show available disks (on RedHat we configure ASMLib first, which is not shown here because this is for HP/UX platform). Normally, we would create 2 disk groups: +DATA diskgroup (for datafiles, temp/undo, redo logs, controlfiles, etc.) and +RECO diskgroup (for backups, image copies, archive log copies/backups, etc.). Optionally, the Flash Recovery Area diskgroup can be stored on disk, as in this case. This is not recommended it was done to save space on this home test system.

Create Disk Group

Disk Group Name: DATA

Redundancy

☐ High

☐ Normal

☒ External

Select Member Disks

☐ Show Candidates

☒ Show All

<input type="checkbox"/>	Disk Path	Header Status	ASM Name	Size (MB)	Force
<input checked="" type="checkbox"/>	ORCL:VOL1	Provisioned		286181	<input type="checkbox"/>

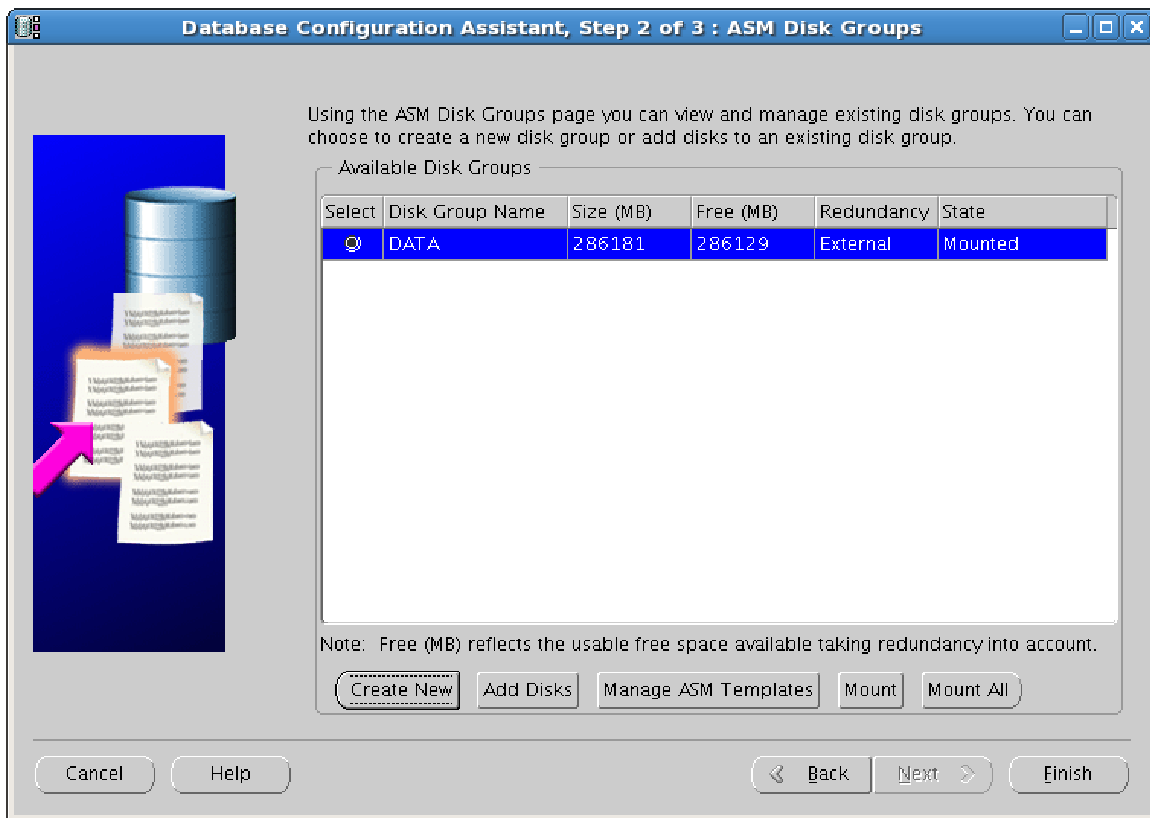
Note: If you don't see disks which you believe should be available, you may need to check disk permissions or change the disk discovery path.

Change Disk Discovery Path...

OK

Cancel

Help



7. Now, after we have created the +DATA diskgroup, we have to instruct database to store newly created/restored datafiles in ASM instead of file system. We also set recovery file destination to /u01/app/oracle/oradata/reco. This is not recommended it should be another diskgroup in a separate storage array for redundancy reasons sized 2-3 times the size of +DATA.

```

oracle@poweredge:~/product/11g/db_1/bin
File Edit View Terminal Tabs Help
SQL*Plus: Release 11.1.0.6.0 - Production on Sun Jan 25 20:14:44 2009

Copyright (c) 1982, 2007, Oracle. All rights reserved.

SQL> connect / as sysdba;
Connected.
SQL> alter system set db_create_file_dest='+DATA' scope=both;

System altered.

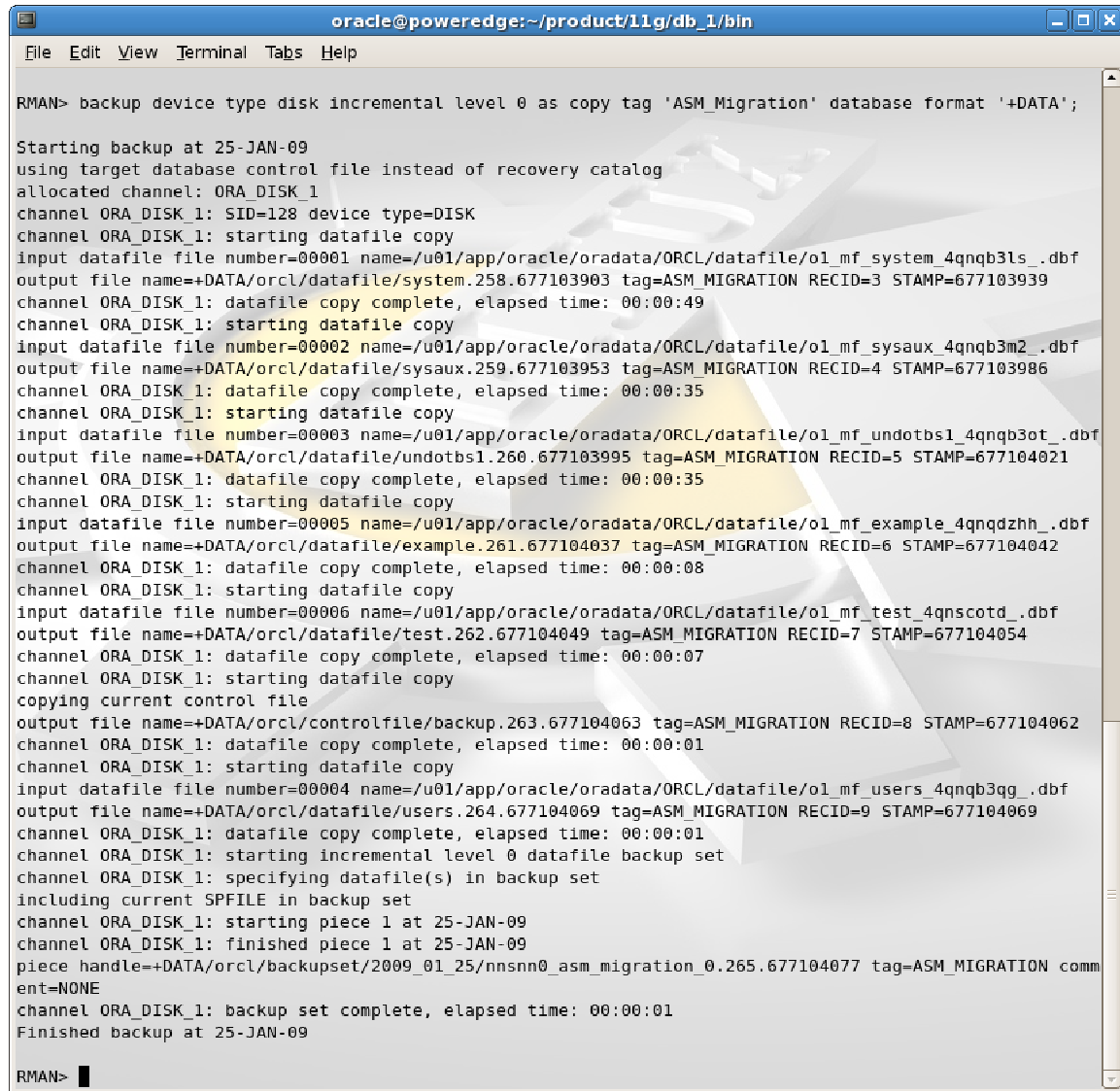
SQL> alter system set db_recovery_file_dest='/u01/app/oracle/oradata/reco' scope=both;

System altered.

SQL>

```

8. Next we connect to RMAN recovery catalog instance TEST (optional), target ORCL in RMAN command line interface and backup database.



```
oracle@poweredge:~/product/11g/db_1/bin
File Edit View Terminal Tabs Help

RMAN> backup device type disk incremental level 0 as copy tag 'ASM_Migration' database format '+DATA';

Starting backup at 25-JAN-09
using target database control file instead of recovery catalog
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=128 device type=DISK
channel ORA_DISK_1: starting datafile copy
input datafile file number=00001 name=/u01/app/oracle/oradata/ORCL/datafile/o1_mf_system_4qnb3ls_.dbf
output file name=+DATA/orcl/datafile/system.258.677103903 tag=ASM_MIGRATION RECID=3 STAMP=677103939
channel ORA_DISK_1: datafile copy complete, elapsed time: 00:00:49
channel ORA_DISK_1: starting datafile copy
input datafile file number=00002 name=/u01/app/oracle/oradata/ORCL/datafile/o1_mf_sysaux_4qnb3m2_.dbf
output file name=+DATA/orcl/datafile/sysaux.259.677103953 tag=ASM_MIGRATION RECID=4 STAMP=677103986
channel ORA_DISK_1: datafile copy complete, elapsed time: 00:00:35
channel ORA_DISK_1: starting datafile copy
input datafile file number=00003 name=/u01/app/oracle/oradata/ORCL/datafile/o1_mf_undotbs1_4qnb3ot_.dbf
output file name=+DATA/orcl/datafile/undotbs1.260.677103995 tag=ASM_MIGRATION RECID=5 STAMP=677104021
channel ORA_DISK_1: datafile copy complete, elapsed time: 00:00:35
channel ORA_DISK_1: starting datafile copy
input datafile file number=00005 name=/u01/app/oracle/oradata/ORCL/datafile/o1_mf_example_4qndqzh_.dbf
output file name=+DATA/orcl/datafile/example.261.677104037 tag=ASM_MIGRATION RECID=6 STAMP=677104042
channel ORA_DISK_1: datafile copy complete, elapsed time: 00:00:08
channel ORA_DISK_1: starting datafile copy
input datafile file number=00006 name=/u01/app/oracle/oradata/ORCL/datafile/o1_mf_test_4qnsctod_.dbf
output file name=+DATA/orcl/datafile/test.262.677104049 tag=ASM_MIGRATION RECID=7 STAMP=677104054
channel ORA_DISK_1: datafile copy complete, elapsed time: 00:00:07
channel ORA_DISK_1: starting datafile copy
copying current control file
output file name=+DATA/orcl/controlfile/backup.263.677104063 tag=ASM_MIGRATION RECID=8 STAMP=677104062
channel ORA_DISK_1: datafile copy complete, elapsed time: 00:00:01
channel ORA_DISK_1: starting datafile copy
input datafile file number=00004 name=/u01/app/oracle/oradata/ORCL/datafile/o1_mf_users_4qnb3qg_.dbf
output file name=+DATA/orcl/datafile/users.264.677104069 tag=ASM_MIGRATION RECID=9 STAMP=677104069
channel ORA_DISK_1: datafile copy complete, elapsed time: 00:00:01
channel ORA_DISK_1: starting incremental level 0 datafile backup set
channel ORA_DISK_1: specifying datafile(s) in backup set
including current SPFILE in backup set
channel ORA_DISK_1: starting piece 1 at 25-JAN-09
channel ORA_DISK_1: finished piece 1 at 25-JAN-09
piece handle=+DATA/orcl/backupset/2009_01_25/nnsnn0_asm_migration_0.265.677104077 tag=ASM_MIGRATION comm
ent=NONE
channel ORA_DISK_1: backup set complete, elapsed time: 00:00:01
Finished backup at 25-JAN-09

RMAN>
```

9. Next we query current online redo log file locations, add new redo log files stored in +DATA instead of file system, drop old ones until all redo logs are in the ASM.

```
oracle@poweredge:~/product/11g/db_1/bin
File Edit View Terminal Tabs Help
SQL> select member from v$logfile;

MEMBER
-----
/u01/app/oracle/oradata/ORCL/onlinelog/o1_mf_3_4qnqddqz_.log
/u01/app/oracle/oradata/ORCL/onlinelog/o1_mf_2_4qnqddq38_.log
/u01/app/oracle/oradata/ORCL/onlinelog/o1_mf_1_4qnqddpgm_.log

SQL> alter database add logfile member '+DATA' to group 1;

Database altered.

SQL> alter database add logfile member '+DATA' to group 2;

Database altered.

SQL> alter database add logfile member '+DATA' to group 3;

Database altered.

SQL> █
```

```
oracle@poweredge:~/product/11g/db_1/bin
File Edit View Terminal Tabs Help
SQL> alter database drop logfile member '/u01/app/oracle/oradata/ORCL/onlinelog/o1_mf_3_4qnqddqz_.log';

Database altered.

SQL> alter database drop logfile member '/u01/app/oracle/oradata/ORCL/onlinelog/o1_mf_2_4qnqddq38_.log';

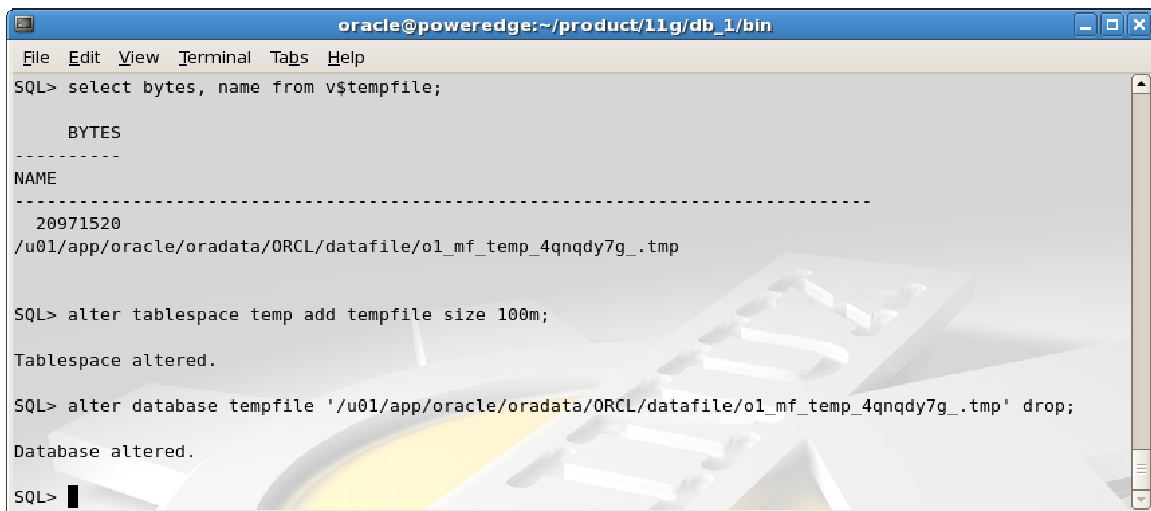
Database altered.

SQL> select member from v$logfile;

MEMBER
-----
+DATA/orcl/onlinelog/group_1.266.677106477
+DATA/orcl/onlinelog/group_2.267.677106491
+DATA/orcl/onlinelog/group_3.268.677106499

SQL> █
```

10. We do likewise with temp file



The screenshot shows a terminal window titled 'oracle@poweredge:~/product/11g/db_1/bin'. The window contains the following text:

```
File Edit View Terminal Tabs Help
SQL> select bytes, name from v$tempfile;

      BYTES
-----
NAME
-----
      20971520
/u01/app/oracle/oradata/ORCL/datafile/o1_mf_temp_4qnqdy7g_.tmp

SQL> alter tablespace temp add tempfile size 100m;
Tablespace altered.

SQL> alter database tempfile '/u01/app/oracle/oradata/ORCL/datafile/o1_mf_temp_4qnqdy7g_.tmp' drop;
Database altered.

SQL> 
```

11. We then recover copy of database we created (backed up) above, since we made some changes.


```
oracle@poweredge:~/product/11g/db_1/bin
File Edit View Terminal Tabs Help
RMAN> run {
2> backup incremental level 1 for recover of copy with tag 'ASM_Migration' database;
3> recover copy of database with tag 'ASM_Migration';
4> }

Starting backup at 25-JAN-09
using channel ORA_DISK_1
channel ORA_DISK_1: starting incremental level 1 datafile backup set
channel ORA_DISK_1: specifying datafile(s) in backup set
input datafile file number=00001 name=/u01/app/oracle/oradata/ORCL/datafile/o1_mf_system_4qnb3ls_.dbf
input datafile file number=00002 name=/u01/app/oracle/oradata/ORCL/datafile/o1_mf_sysaux_4qnb3m2_.dbf
input datafile file number=00003 name=/u01/app/oracle/oradata/ORCL/datafile/o1_mf_undotbs1_4qnb3ot_.dbf
input datafile file number=00005 name=/u01/app/oracle/oradata/ORCL/datafile/o1_mf_example_4qndzhh_.dbf
input datafile file number=00006 name=/u01/app/oracle/oradata/ORCL/datafile/o1_mf_test_4qnsctd_.dbf
input datafile file number=00004 name=/u01/app/oracle/oradata/ORCL/datafile/o1_mf_users_4qnb3qg_.dbf
channel ORA_DISK_1: starting piece 1 at 25-JAN-09
channel ORA_DISK_1: finished piece 1 at 25-JAN-09
piece handle=/u01/app/oracle/oradata/reco/ORCL/backupset/2009_01_25/o1_mf_nnnd1_TAG20090125T212058_4qt7j
jcl_.bkp tag=TAG20090125T212058 comment=NONE
channel ORA_DISK_1: backup set complete, elapsed time: 00:00:12
channel ORA_DISK_1: starting incremental level 1 datafile backup set
channel ORA_DISK_1: specifying datafile(s) in backup set
including current control file in backup set
including current SPFILE in backup set
channel ORA_DISK_1: starting piece 1 at 25-JAN-09
channel ORA_DISK_1: finished piece 1 at 25-JAN-09
piece handle=/u01/app/oracle/oradata/reco/ORCL/backupset/2009_01_25/o1_mf_ncsn1_TAG20090125T212058_4qt7k
34l_.bkp tag=TAG20090125T212058 comment=NONE
channel ORA_DISK_1: backup set complete, elapsed time: 00:00:01
Finished backup at 25-JAN-09

Starting recover at 25-JAN-09
using channel ORA_DISK_1
channel ORA_DISK_1: starting incremental datafile backup set restore
channel ORA_DISK_1: specifying datafile copies to recover
recovering datafile copy file number=00001 name=+DATA/orcl/datafile/system.258.677103903
recovering datafile copy file number=00002 name=+DATA/orcl/datafile/sysaux.259.677103953
recovering datafile copy file number=00003 name=+DATA/orcl/datafile/undotbs1.260.677103995
recovering datafile copy file number=00004 name=+DATA/orcl/datafile/users.264.677104069
recovering datafile copy file number=00005 name=+DATA/orcl/datafile/example.261.677104037
recovering datafile copy file number=00006 name=+DATA/orcl/datafile/test.262.677104049
channel ORA_DISK_1: reading from backup piece /u01/app/oracle/oradata/reco/ORCL/backupset/2009_01_25/o1_
mf_nnnd1_TAG20090125T212058_4qt7jjcl_.bkp
channel ORA_DISK_1: piece handle=/u01/app/oracle/oradata/reco/ORCL/backupset/2009_01_25/o1_mf_nnnd1_TAG2
0090125T212058_4qt7jjcl_.bkp tag=TAG20090125T212058
channel ORA_DISK_1: restored backup piece 1
channel ORA_DISK_1: restore complete, elapsed time: 00:00:03
Finished recover at 25-JAN-09

RMAN> █
```

12. Next, we backup controlfile to +DATA ASM diskgroup and set new location of controlfile to +DATA.

```
oracle@poweredge:~/product/11g/db_1/bin
File Edit View Terminal Tabs Help
SQL> alter database backup controlfile to '+DATA';

Database altered.

SQL> show parameter db_name

NAME                                TYPE                                VALUE
-----                                -                                -
db_name                              string                              orcl
SQL> show parameter db_unique_name

NAME                                TYPE                                VALUE
-----                                -                                -
db_unique_name                       string                              orcl
SQL> alter system set control_files='+DATA/orcl/CONTROLFILE/mycontrol.ctl' scope=spfile;

System altered.

SQL> select name from v$controlfile;

NAME
-----
/u01/app/oracle/oradata/ORCL/controlfile/ol_mf_4qnqdn3j_.ctl
/u01/app/oracle/flash_recovery_area/ORCL/controlfile/ol_mf_4qnqdn5w_.ctl

SQL>
```

13. This change is not immediate as database has to be down for this to occur. Up till this point all of activities were executed with the database up and running. Its time to change that. At this point we are shutting down database to point to its copy in ASM and restore controlfile to the same location.

```
oracle@poweredge:~/product/11g/db_1/bin
File Edit View Terminal Tabs Help
SQL> shutdown immediate;
Database closed.
Database dismounted.
ORACLE instance shut down.
SQL> startup nomount;
ORACLE instance started.

Total System Global Area 2058981376 bytes
Fixed Size                  1300968 bytes
Variable Size              603981336 bytes
Database Buffers          1442840576 bytes
Redo Buffers                10858496 bytes
```

```
oracle@poweredge:~/product/11g/db_1/bin
File Edit View Terminal Tabs Help
[oracle@poweredge bin]$ rman

Recovery Manager: Release 11.1.0.6.0 - Production on Sun Jan 25 21:30:59 2009

Copyright (c) 1982, 2007, Oracle. All rights reserved.

RMAN> connect target

connected to target database: ORCL (not mounted)

RMAN> restore controlfile from '/u01/app/oracle/oradata/ORCL/controlfile/o1_mf_4qnqdn3j_.ctl';

Starting restore at 25-JAN-09
using target database control file instead of recovery catalog
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=150 device type=DISK

channel ORA_DISK_1: copied control file copy
output file name=+DATA/orcl/controlfile/mycontrol.ctl
Finished restore at 25-JAN-09

RMAN> █
```

14. Now its time to switch to copy and recover database. As you can see we are switching from /u01/app/oracle/oradata after only a half a minute this database spent in downtime. This time will be longer for larger databases (this one is only 2-3GB), but should not exceed 15 mins even for a TB database.

```
oracle@poweredge:~/product/11g/db_1/bin
File Edit View Terminal Tabs Help
RMAN> switch database to copy;

datafile 1 switched to datafile copy "+DATA/orcl/datafile/system.258.677103903"
datafile 2 switched to datafile copy "+DATA/orcl/datafile/sysaux.259.677103953"
datafile 3 switched to datafile copy "+DATA/orcl/datafile/undotbs1.260.677103995"
datafile 4 switched to datafile copy "+DATA/orcl/datafile/users.264.677104069"
datafile 5 switched to datafile copy "+DATA/orcl/datafile/example.261.677104037"
datafile 6 switched to datafile copy "+DATA/orcl/datafile/test.262.677104049"

RMAN> recover database;

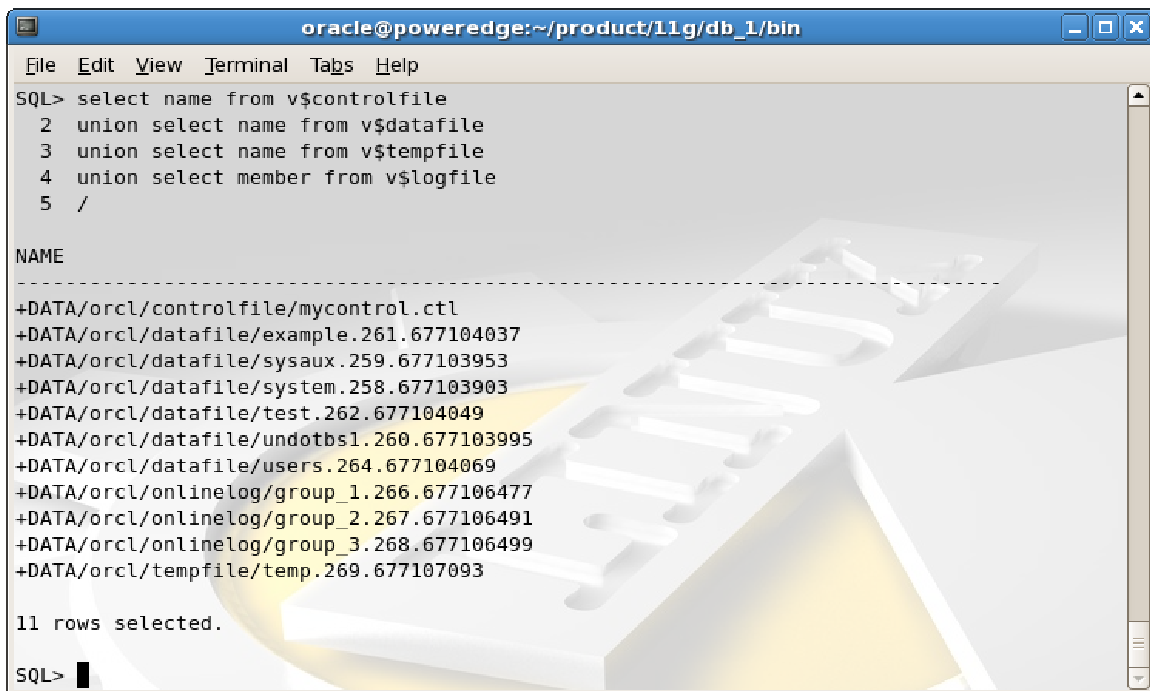
Starting recover at 25-JAN-09
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=150 device type=DISK

starting media recovery
media recovery complete, elapsed time: 00:00:03

Finished recover at 25-JAN-09

RMAN> █
```

15. Now we are completed database hot migration to ASM. To make sure everything is in ASM lets run the following query:



```
oracle@poweredge:~/product/11g/db_1/bin
File Edit View Terminal Tabs Help
SQL> select name from v$controlfile
2 union select name from v$datafile
3 union select name from v$tempfile
4 union select member from v$logfile
5 /

NAME
-----
+DATA/orcl/controlfile/mycontrol.ctl
+DATA/orcl/datafile/example.261.677104037
+DATA/orcl/datafile/sysaux.259.677103953
+DATA/orcl/datafile/system.258.677103903
+DATA/orcl/datafile/test.262.677104049
+DATA/orcl/datafile/undotbs1.260.677103995
+DATA/orcl/datafile/users.264.677104069
+DATA/orcl/onlineolog/group_1.266.677106477
+DATA/orcl/onlineolog/group_2.267.677106491
+DATA/orcl/onlineolog/group_3.268.677106499
+DATA/orcl/tempfile/temp.269.677107093

11 rows selected.

SQL>
```

16. As you can see, all data structures are in ASM. In production, however, you would also make sure that controlfiles are multiplexed (there is only one above) and existing backup sets are moved into the newly created +RECO, which we did not create in this pre-test.