Using Data Guard for hardware migration

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Motivation

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- Commodity hardware has small warranty periods
- Hardware specifications progress very fast
- Minimal downtime required
- Easy to fallback in case of error
- Can include
  - Version change
  - Migration to 64bit
  - Different hardware sizing

- Our use cases: migrate hardware (storage + servers) and
  - upgrade 10.2.0.2 to 10.2.0.3
  - upgrade 32bit to 64bit OS+RDBMS

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32-bit Linux to 64-bit migration

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- New hardware acquisitions next year
  - 60 SAN diskservers (16 disks x 400GB)
  - 35 mid-range servers (2 x Intel quad core, 16 GB RAM)
- Moving from 32-bit Linux to 64-bit Linux
  - Migration using Oracle DataGuard
    - minimum downtime required (independent of database size)
    - easy to rollback if something goes wrong

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Outline

I. Preparation steps – Standby DB
II. Preparation steps – Primary DB
III. Configuration and startup – Standby DB
IV. Final steps – Primary DB
V. Checks
VI. Database switchover / migration completion
VII. Final cleanup

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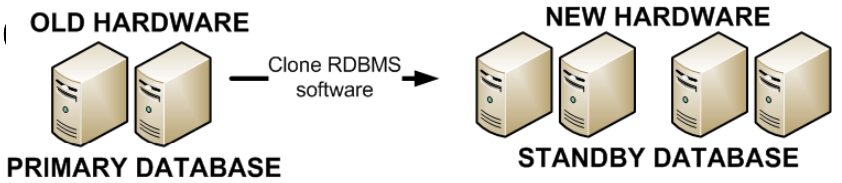
I - Preparation steps Standby DB

- Configure new hw: OS, storage, oracle account

- Install clusterware (latest version if upgrading)
- Install rdbms software (exactly same version)
  - Use cloning
    - from primary/source:

      `sudo tar cfpz rdbms_PRE_migr.tgz $ORACLE_HOME/rdbms`
    - on standby/destination untar: `tar xfp`;
    - edit/remove instance specific files: minimal set is

      `$ORACLE_HOME/dbs + $ORACLE_HOME/network/admin`
- Configure listeners (netca)
- Configure ASM instances, create diskgroups
- Don' t create databas



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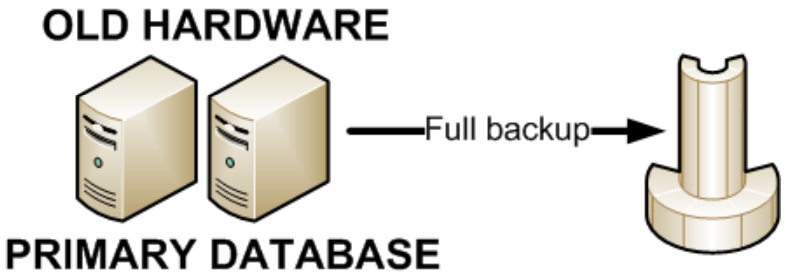
II - Preparation steps – Primary DB

- Needs to be in ARCHIVE LOG mode
- Set `force logging`
- Copy `$ORACLE_HOME/network/admin/ + spfile` to stage directory in Standby DB
- Make at least level 1 backup after setting `force logging`
- Save service definitions for later recreation



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III - Configuration and startup – Standby DB (1/3)

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- Change `tnsnames.ora` copied from primary with standby hosts
  - Add new possible nodes
  - Add entry `old_db` pointing to primary database
  - Copy on all standby nodes (also `sqlnet.ora`)
- Create password file (SYS pw needs to be the same as in primary)
- Change `pfile` copied from primary with dataguard parameters
  - `log_archive_dest_2, standby_file_management, fal_server, fal_client`
  - If diskgroup names are different, set also conversion parameters and location of FRA
  - Add new nodes (`instance_name, instance_nu,ber, thread, undo_tablespace, local_listener`)
- Create dump directories

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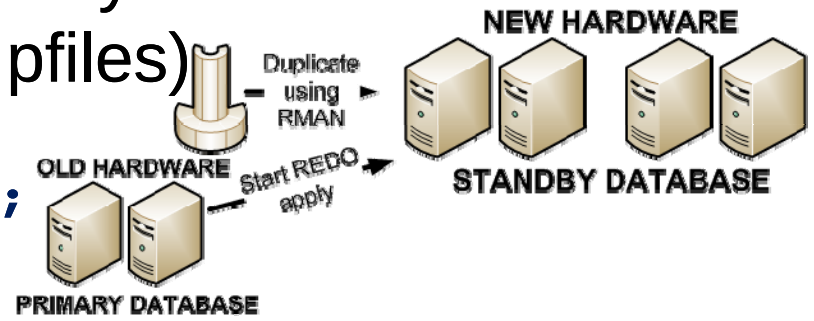
III - Configuration and startup – Standby DB (2/3)

- Create controlfile directory in ASM
- Create DB spfile (and pfiles)

```
SQL> startup nomount;
```



- Configure RMAN/backups
- Start DB duplication with RMAN:

```
$ rman target admin@old_db auxiliary / nocatalog

RUN {
   ALLOCATE AUXILIARY CHANNEL t1 DEVICE TYPE sbt_tape;
   ALLOCATE AUXILIARY CHANNEL t2 DEVICE TYPE sbt_tape;
   DUPLICATE TARGET DATABASE FOR STANDBY;
   }
```

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III - Configuration and startup – Standby DB (3/3)

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- Start redo apply:

```
SQL> ALTER DATABASE RECOVER MANAGED STANDBY
                DATABASE DISCONNECT FROM SESSION;
```

- Register with clusterware the DB, instances and services

```
srvctl add database -d {DB_NAME} -o $ORACLE_HOME
srvctl add instance -d {DB_NAME} -i
  {INSTANCE_NAME} -n {NODE_NAME}
srvctl modify instance -d {DB_NAME} -i
  {INSTANCE_NAME} -s {ASM_INSTANCE_NAME}
srvctl add service -d {DB_NAME} -s
  {SERVICE_NAME} -R {PREF_NODES} –a {AV_NODES}
```

- Add entries on `/etc/oratab` on all nodes

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IV – Final steps – Primary DB

- Add entry in `tnsnames.ora` on all nodes pointing to standby DB

- Modify Dataguard parameters

```
SQL> alter system set
  log_archive_dest_2='service=standbydb
  valid_for=(online_logfiles,primary_role)'
  scope=both sid='*';

SQL> alter system set standby_file_management=auto
  scope=both sid='*';
```

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V - Checks

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- Standby - List shipped archive redo logs

```
SQL> select sequence#, first_time, next_time, applied
   from v$archived_log order by 1;
```

- Primary – Archive current redo logs

```
SQL> alter system archive log current;
```

- Standby – Check they were shipped and are being applied

```
SQL> select thread#, sequence#, first_time, next_time,
   applied from v$archived_log order by 3;
```

- Other monitoring:

```
SQL> select * from v$dataguard_stats;
SQL> select * from v$dataguard_status;
```

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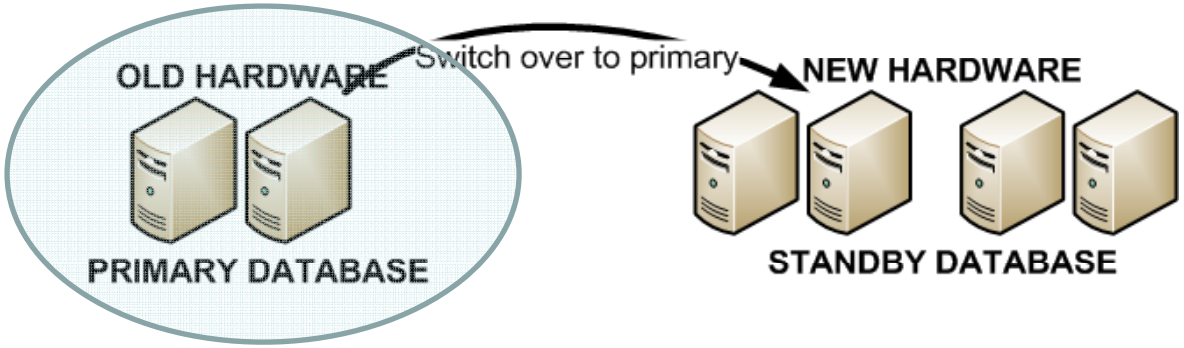
VI - Database switchover – Primary DB

- Shutdown all services on primary
- Shutdown all instances but one
- On running instance set primary to standby role

```
SQL> ALTER DATABASE COMMIT TO SWITCHOVER TO
   PHYSICAL STANDBY WITH SESSION SHUTDOWN;
SQL> SHUTDOWN IMMEDIATE
SQL> STARTUP MOUNT
```



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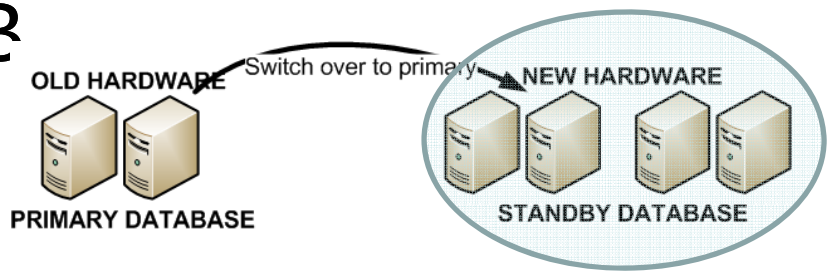
VI - Database switchover – Standby DB

- Verify `switchover_status` on `v$database` (should be `TO_PRIMARY`)
- Switch to primary role

```
SQL> ALTER DATABASE COMMIT TO SWITCHOVER TO PRIMARY;
SQL> ALTER DATABASE OPEN;
```

- Do any necessary upgrade, patchset to target system
- Start up other nodes of new primary DB



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VII – Final clean-up

- Disable `archivelog` mode and `force logging`, if applicable
- Remove DataGuard parameters from `spfile`
- Grant sysdba privileges to any specific user
- Backups:
  - Crosscheck backups, delete expired ones, do full backup
  - If no backups needed, remove ones created for migration
- Remove pointers to old db on `tnsnames.ora`
- Shutdown primary cluster
- Add RAC nodes to new setup
  - Redologs , undo tablespaces, add to CRS, public tnsnames.ora

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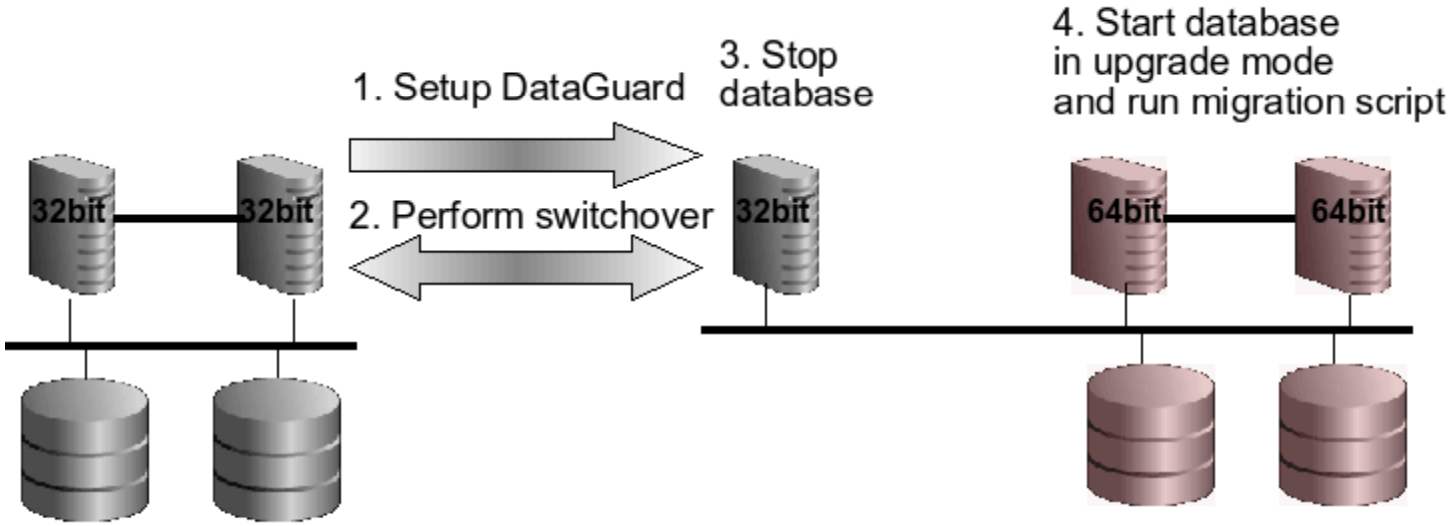
- Setup DataGuard
- Perform switchover
- Stop intermediate database
- Perform upgrade (utlirp.sql)



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Questions?

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