ORACLE 10g Data Guard on the Command Line

Uwe Hesse, Principal Instructor (ORACLE University)

The following guide is intended as a supplement to the Oracle University course `Oracle Database 10g: Data Guard Administration.` It deals with the creation and management of physical and logical standby databases without using Oracle Grid Control.

The guide has been developed on
`Red Hat Enterprise Linux AS release 4 (Nahant Update 2)`
`Kernel 2.6.9-22.EL on an i686,`
but should work almost identical on all platforms certified.

The ORACLE version used is
`Oracle Database 10g Enterprise Edition Release 10.2.0.2`

There is only one server used for the Primary Data Base, a physical and a logical standby database. For test and demonstration purposes this is well suited; a realistic implementation would require 3 computers of course.

The guide is easily adaptable for this approach, in fact, it is even a little harder to implement it all on one computer only.

Creation of the Primary Database

Customize listener.ora and tnsnames.ora (with netmgr or editor)
Important entry in listener.ora for later use of Data Guard Broker:

```
GLOBAL_DBNAME = prima_DGMGRL
GLOBAL_DBNAME = physt_DGMGRL

cd skripte
./prima.sh
```

Creation of the Physical Standby Database

Prepare Primary DB:

```
connect sys/oracle@prima as sysdba
alter database force logging;
shutdown immediate;
startup mount
alter database archivelog;
alter database open;
```

Create directories and copy datafiles:

```
exit;
cd $HOME/skripte
./physt.sh
```

Create controlfile for Physical Standby:

```
connect sys/oracle@prima as sysdba
alter database create standby controlfile as
'/home/oracle/physt/control01.ctl';
```

Standby Database:

```
connect sys/oracle@physt as sysdba
create spfile from pfile='/home/oracle/skripte/initphyst.ora';

startup nomount;
alter database mount standby database;
```

Create Standby Logs on Physical Standby

```
alter database add standby logfile
'/home/oracle/physt/sblog_g1m1.rdo' size 100m;

alter database add standby logfile
'/home/oracle/physt/sblog_g2m1.rdo' size 100m;

alter database add standby logfile
'/home/oracle/physt/sblog_g3m1.rdo' size 100m;

recover managed standby database disconnect;
```

Set LOG_ARCHIVE_DEST_2 on Primary:

```
connect sys/oracle@prima as sysdba
alter system set log_archive_dest_2='service=physt
valid_for=(online_logfiles,primary_role) db_unique_name=physt';
```

Test:

```
alter system archive log current;
```

2. Session:

```
tail –f $HOME/physt/bdump/ale*
```

Create Standby Logs on Primary also for later SWITCHOVER

```
connect sys/oracle@prima as sysdba

alter database add standby logfile
'/home/oracle/prima/sblog_g1m1.rdo' size 100m;

alter database add standby logfile
'/home/oracle/prima/sblog_g2m1.rdo' size 100m;

alter database add standby logfile
'/home/oracle/prima/sblog_g3m1.rdo' size 100m;
```

Creation of the Data Guard Broker Configuration

Start DMON background process on Primary and Standby:

```
connect sys/oracle@prima as sysdba
alter system set dg_broker_start=true;

connect sys/oracle@physt as sysdba
alter system set dg_broker_start=true;
exit
```

*Call **D**ata **G**uard **M**ana**g**e**r L**inemode and create configuration:*

```
dgmgrl
help

connect sys/oracle@prima
create configuration myconfig as
  primary database is prima
  connect identifier is prima;

add database physt as
  connect identifier is physt
  maintained as physical;

enable configuration;
show configuration verbose;
```

Change of Protection Level and Transport Method

```
dgmgrl> connect sys/oracle@prima
show configuration verbose;
show database verbose physt;
```

Maximum Protection; here 2 Standby Databases are recommended.
The changes are always done on Primary and Standby in case of a later SWITCHOVER.

```
edit database prima set property LogXptMode=SYNC;
edit database physt set property LogXptMode=SYNC;
edit configuration set protection mode as maxprotection;

show configuration verbose;
```

Maximum Availability

```
edit database prima set property LogXptMode=SYNC;
edit database physt set property LogXptMode=SYNC;
edit configuration set protection mode as maxavailability;

show configuration verbose;
```

Maximum Performance with LGWR-Transport
If there was a higher Protection Level beforehand, it must be lowered to Maximum Performance now

```
edit configuration set protection mode as maxperformance;
edit database prima set property LogXptMode=ASYNC;
edit database physt set property LogXptMode=ASYNC;

show configuration verbose;
```

Maximum Performance with ARCH-Transport (The original mode)

```
edit configuration set protection mode as maxperformance;
edit database prima set property LogXptMode=ARCH;
edit database physt set property LogXptMode=ARCH;

show configuration verbose;
```

Creation of the Logical Standby Database

Check beforehand whether Logical Standby makes sense at all

```
select distinct owner,table_name from dba_logstdby_unsupported
order by owner,table_name;
```

What tables have no Primary/Unique Constraints?

```
select owner, table_name from dba_logstdby_not_unique
where table_name not in (select table_name from
dba_logstdby_unsupported);
```

Implement Supplemental Logging on Primary

We need more information written in the Logfiles of the Primary to be able to identify the modified rows at the Standby.

```
alter database add supplemental log data (primary key, unique
index) columns;
```

Create directories and passwordfile for the Logical Standby

```
exit
./logst.sh
```

Create spfile for the Logical Standby:

```
connect sys/oracle@logst as sysdba

create spfile from pfile='/home/oracle/skripte/initlogst.ora';
startup nomount
```

*At first, we create (using **RMAN**) a Physical Standby Database.*

This is done via RMAN Online Backup; the Primary remains in an open status.

```
exit
rman cmdfile=dupli.rcv
```

Customize Parameter on Primary for new Standby Database

```
connect sys/oracle@prima as sysdba

alter system set log_archive_dest_3='service=logst
valid_for=(online_logfiles, primary_role) db_unique_name=logst';
alter system set undo_retention=3600;
```

Create Standby Dictionary

```
execute dbms_logstdby.build
```

Now we transform the Physical Standby Database into a Logical Standby Database.

```
connect sys/oracle@logst as sysdba
alter database recover to logical standby logst;
shutdown immediate
startup mount
alter database open resetlogs;
alter database start logical standby apply;
```

Add theLogical Standby to the Broker Configuration

```
connect sys/oracle@logst as sysdba
alter system set dg_broker_start=true;

dgmgrl>connect sys/oracle@prima

show configuration verbose;

add database logst as
  connect identifier is logst
  maintained as logical;

enable database logst;

show configuration verbose;
```

Maximum Protection with Logical Standby Database

The Standby Logfiles must be created beforehand, the same way it was the case with the Physical Standby Database. Afterwards:

```
edit database prima set property LogXptMode=SYNC;
edit database physt set property LogXptMode=SYNC;
edit database logst set property LogXptMode=SYNC;

edit configuration set protection mode as maxprotection;

show configuration verbose;
```

Switchover and Failover

Switchover: Primary and Standby exchange their roles

```
dgmgrl>connect sys/oracle@prima
switchover to physt;
```

Failover: Emergency, the Primary is destroyed

```
dgmgrl>connect sys/oracle@physt
failover to physt;
```

Flashback Database

Turn on Flashback for all Databases

```
connect sys/oracle@prima as sysdba

@$HOME/skripte/flashbackon;
```

Example of a Flashback of the Physical Standby

```
recover managed standby database cancel;

flashback database to timestamp
to_timestamp('2005-10-20:16:30:00','yyyy-mm-dd:hh24:mi:ss');
```

Open Physical Standby Read Only

```
alter database open read only;
select ...;
shutdown immediate
startup mount
recover managed standby database [using current logfile]
disconnect;
```

After a Failover turn old Primary into a Standby Database

```
NewPrimary > select standby_became_primary_scn from v$database;

OldPrimary > flashback database to scn <s.o.>;
OldPrimary > alter database convert to physical standby;
OldPrimary > shutdown immediate
OldPrimary > startup mount

DGMGRL> reinstate database OldPrimary;
```

Fast-Start-Failover

Modify Broker-Configuration

```
EDIT DATABASE prima SET PROPERTY FastStartFailoverTarget = physt;
EDIT DATABASE physt SET PROPERTY FastStartFailoverTarget = prima;

EDIT CONFIGURATION SET PROPERTY FastStartFailoverThreshold = 20;
ENABLE FAST_START FAILOVER;
```

Start the Observer on another computer

```
START OBSERVER;
```

Appendix

VALID_FOR – Configurations

Primary and Physical Standby

DB_UNIQUE_NAME=prima
LOG_ARCHIVE_CONFIG=
'DG_CONFIG=(prima,physt)'
LOG_ARCHIVE_DEST_1=
'LOCATION=/home/oracle/prima/archive/
VALID_FOR=(ALL_LOGFILES,ALL_ROLES)
DB_UNIQUE_NAME=prima'
LOG_ARCHIVE_DEST_2=
'SERVICE=physt
VALID_FOR=(ONLINE_LOGFILES,PRIMARY_ROLE)
DB_UNIQUE_NAME=physt'
STANDBY_ARCHIVE_DEST=/home/oracle/prima/archive/

DB_UNIQUE_NAME=physt
LOG_ARCHIVE_CONFIG=
'DG_CONFIG=(prima,physt)'
LOG_ARCHIVE_DEST_1=
'LOCATION=/home/oracle/physt/archive/
VALID_FOR=(ALL_LOGFILES,ALL_ROLES)
DB_UNIQUE_NAME=physt'
LOG_ARCHIVE_DEST_2=
'SERVICE=prima
VALID_FOR=(ONLINE_LOGFILES,PRIMARY_ROLE)
DB_UNIQUE_NAME=prima'
STANDBY_ARCHIVE_DEST=/home/oracle/physt/archive/

Primary and Logical Standby

DB_UNIQUE_NAME=prima
LOG_ARCHIVE_CONFIG=
'DG_CONFIG=(prima,logst)'
LOG_ARCHIVE_DEST_1=
'LOCATION=/home/oracle/prima/archive1/
VALID_FOR=(ONLINE_LOGFILES,ALL_ROLES)
DB_UNIQUE_NAME=prima'
LOG_ARCHIVE_DEST_2=
'LOCATION=/home/oracle/prima/archive2
VALID_FOR=(STANDBY_LOGFILES,STANDBY_ROLE)
DB_UNIQUE_NAME=prima'
LOG_ARCHIVE_DEST_3=
'SERVICE=logst
VALID_FOR=(ONLINE_LOGFILES,PRIMARY_ROLE)
DB_UNIQUE_NAME=logst'
STANDBY_ARCHIVE_DEST=/home/oracle/prima/archive2

DB_UNIQUE_NAME=logst
LOG_ARCHIVE_CONFIG=
'DG_CONFIG=(prima,logst)'
LOG_ARCHIVE_DEST_1=
'LOCATION=/home/oracle/logst/archive1/
VALID_FOR=(ONLINE_LOGFILES,ALL_ROLES)
DB_UNIQUE_NAME=logst'
LOG_ARCHIVE_DEST_2=
'LOCATION=/home/oracle/logst/archive2/
VALID_FOR=(STANDBY_LOGFILES,STANDBY_ROLE)
DB_UNIQUE_NAME=logst'
LOG_ARCHIVE_DEST_3=
'SERVICE=prima
VALID_FOR=(ONLINE_LOGFILES,PRIMARY_ROLE)
DB_UNIQUE_NAME=prima'
STANDBY_ARCHIVE_DEST=/home/oracle/logst/archive2

Primary, Physical Standby and Logical Standby

DB_UNIQUE_NAME=prima
LOG_ARCHIVE_CONFIG=
'DG_CONFIG=(prima,physt, logst)'
LOG_ARCHIVE_DEST_1=
'LOCATION=/home/oracle/prima/archive/
VALID_FOR=
(ALL_LOGFILES,ALL_ROLES)
DB_UNIQUE_NAME=prima'
LOG_ARCHIVE_DEST_2=
'SERVICE=physt
VALID_FOR=
(ONLINE_LOGFILES,PRIMARY_ROLE)
DB_UNIQUE_NAME=physt'
LOG_ARCHIVE_DEST_3=
'SERVICE=logst
VALID_FOR=
(ONLINE_LOGFILES,PRIMARY_ROLE)
DB_UNIQUE_NAME=logst'
STANDBY_ARCHIVE_DEST=
'/home/oracle/prima/archive'

DB_UNIQUE_NAME=physt
LOG_ARCHIVE_CONFIG=
'DG_CONFIG=(prima,physt, logst)'
LOG_ARCHIVE_DEST_1=
'LOCATION=/home/oracle/physt/archive/
VALID_FOR=
(ALL_LOGFILES,ALL_ROLES)
DB_UNIQUE_NAME=physt'
LOG_ARCHIVE_DEST_2=
'SERVICE=prima
VALID_FOR=
(ONLINE_LOGFILES,PRIMARY_ROLE)
DB_UNIQUE_NAME=prima'
LOG_ARCHIVE_DEST_3=
'SERVICE=logst
VALID_FOR=
(ONLINE_LOGFILES,PRIMARY_ROLE)
DB_UNIQUE_NAME=logst'
STANDBY_ARCHIVE_DEST=
'/home/oracle/physt/archive'

DB_UNIQUE_NAME=logst
LOG_ARCHIVE_CONFIG=
'DG_CONFIG=(prima,physt, logst)'
LOG_ARCHIVE_DEST_1=
'LOCATION=/home/oracle/logst/archive1/
VALID_FOR=
(ONLINE_LOGFILES,ALL_ROLES)
DB_UNIQUE_NAME=logst'
LOG_ARCHIVE_DEST_2=
'LOCATION=/home/oracle/logst/archive2/
VALID_FOR=
(STANDBY_LOGFILES,STANDBY_ROLE)
DB_UNIQUE_NAME=logst'
STANDBY_ARCHVE_DEST=
'/home/oracle/logst/archive2'

#initprima.ora

```
compatible=10.2.0
db_block_size=8192

db_name='prima'
db_unique_name='prima'
instance_name='prima'

control_files='/home/oracle/prima/control01.ctl'
sga_target=180m
pga_aggregate_target=20m

undo_management=auto
undo_tablespace=undotbs1

log_archive_config='dg_config=(prima,physt,logst)'
log_archive_dest_1='location=/home/oracle/prima/archive
valid_for=(all_logfiles,all_roles) db_unique_name=prima'
standby_archive_dest='/home/oracle/prima/archive/'
standby_file_management=auto

processes=100
db_recovery_file_dest=''
db_domain=''

background_dump_dest=/home/oracle/prima/bdump
core_dump_dest=/home/oracle/prima/cdump
user_dump_dest=/home/oracle/prima/udump
remote_login_passwordfile=exclusive
```

#initphyst.ora

```
compatible=10.2.0
db_block_size=8192

db_name='prima'
db_unique_name='physt'
instance_name='physt'

control_files='/home/oracle/physt/control01.ctl'
sga_target=180m
pga_aggregate_target=20m

undo_management=auto
undo_tablespace=undotbs1

db_file_name_convert='/home/oracle/prima','/home/oracle/physt'
log_file_name_convert='/home/oracle/prima','/home/oracle/physt'

log_archive_config='dg_config=(prima,physt,logst)'
log_archive_dest_1='location=/home/oracle/physt/archive
valid_for=(all_logfiles,all_roles) db_unique_name=physt'
standby_archive_dest='/home/oracle/physt/archive/'
standby_file_management=auto

processes=100
db_recovery_file_dest=''
db_domain=''

background_dump_dest=/home/oracle/physt/bdump
core_dump_dest=/home/oracle/physt/cdump
user_dump_dest=/home/oracle/physt/udump
remote_login_passwordfile=exclusive
```

#initlogst.ora

```
compatible=10.2.0
db_block_size=8192

db_name='prima'
db_unique_name='logst'
instance_name='logst'

control_files='/home/oracle/logst/control01.ctl'
sga_target=180m
pga_aggregate_target=20m

undo_management=auto
undo_tablespace=undotbs1
undo_retention=3600

db_file_name_convert='/home/oracle/prima','/home/oracle/logst'
log_file_name_convert='/home/oracle/prima','/home/oracle/logst'
log_archive_config='dg_config=(prima,physt,logst)'
log_archive_dest_1='location=/home/oracle/logst/archive1
valid_for=(online_logfiles,all_roles) db_unique_name=logst'
log_archive_dest_2='location=/home/oracle/logst/archive2
valid_for=(standby_logfiles,standby_role) db_unique_name=logst'
standby_archive_dest='/home/oracle/logst/archive2/'
standby_file_management=auto

processes=100
db_recovery_file_dest=''
db_domain=''

background_dump_dest=/home/oracle/logst/bdump
core_dump_dest=/home/oracle/logst/cdump
user_dump_dest=/home/oracle/logst/udump
remote_login_passwordfile=exclusive
```

#physt.sh

```
mkdir /home/oracle/physt
mkdir /home/oracle/physt/bdump
mkdir /home/oracle/physt/cdump
mkdir /home/oracle/physt/udump
mkdir /home/oracle/physt/archive
mkdir /home/oracle/physt/flashback
export ORACLE_SID=physt
rm /u01/app/oracle/product/10.2.0/db_1/dbs/orapwphyst
orapwd file=/u01/app/oracle/product/10.2.0/db_1/dbs/orapwphyst
password=oracle
sqlplus /nolog @phystcp.sql
```

--phystcp.sql

```
connect sys/oracle@prima as sysdba
startup force;
shutdown immediate;
host echo "Datendateien kopieren..."
host cp /home/oracle/prima/*.dbf /home/oracle/physt
startup
exit
```

#logst.sh

```
mkdir /home/oracle/logst
mkdir /home/oracle/logst/bdump
mkdir /home/oracle/logst/cdump
mkdir /home/oracle/logst/udump
mkdir /home/oracle/logst/archive
export ORACLE_SID=logst
rm /u01/app/oracle/product/10.2.0/db_1/dbs/orapwlogst
orapwd file=/u01/app/oracle/product/10.2.0/db_1/dbs/orapwlogst
password=oracle
```

#dupli.rcv

```
connect target sys/oracle@prima
configure channel device type disk format ’/home/oracle/backup/%U’;
backup database;
backup current controlfile for standby;
connect auxiliary sys/oracle@logst
duplicate target database for standby;
```

--flashbackon.sql

```
connect sys/oracle@prima as sysdba
alter system set db_recovery_file_dest_size=5g;
alter system set db_recovery_file_dest=’/home/oracle/prima/flashback’;
shutdown immediate
startup mount
alter database flashback on;
alter database open;
connect sys/oracle@logst as sysdba
alter system set db_recovery_file_dest_size=5g;
alter system set db_recovery_file_dest=’/home/oracle/logst/flashback’;
alter database stop logical standby apply;
shutdown immediate
startup mount
alter database flashback on;
alter database open;
alter database start logical standby apply immediate;
connect sys/oracle@physt as sysdba
alter system set db_recovery_file_dest_size=5g;
alter system set db_recovery_file_dest=’/home/oracle/physt/flashback’;
recover managed standby database cancel;
alter database flashback on;
recover managed standby database using current logfile disconnect;
```

#listener.ora

```
#Der HOST edd2r7p15 muss durch den jeweiligen Rechnernamen ersetzt werden
#GLOBAL_DBNAME=prima_DGMGRL ist erforderlich fuer den Data Guard Broker

LISTENER =
  (DESCRIPTION_LIST =
    (DESCRIPTION =
      (ADDRESS = (PROTOCOL = IPC)(KEY = EXTPROC))
    )
    (DESCRIPTION =
      (ADDRESS = (PROTOCOL = TCP)(HOST = edd2r7p15)(PORT = 1521))
    )
  )

SID_LIST_LISTENER =
  (SID_LIST =
    (SID_DESC =
      (SID_NAME = PLSExtProc)
      (ORACLE_HOME = /u01/app/oracle/product/10.2.0/db_1)
      (PROGRAM = extproc)
    )
    (SID_DESC =
      (GLOBAL_DBNAME = prima_DGMGRL)
      (ORACLE_HOME = /u01/app/oracle/product/10.2.0/db_1)
      (SID_NAME = prima)
    )
    (SID_DESC =
      (GLOBAL_DBNAME = physt_DGMGRL)
      (ORACLE_HOME = /u01/app/oracle/product/10.2.0/db_1)
      (SID_NAME = physt)
    )
    (SID_DESC =
      (GLOBAL_DBNAME = logst_DGMGRL)
      (ORACLE_HOME = /u01/app/oracle/product/10.2.0/db_1)
      (SID_NAME = logst)
    )
  )
```