

Oracle GoldenGate Disaster Recovery Switchover / Failover Automation

Author:	Vladimir Grigorian
Review Date:	March 20, 2015
Last Updated:	March 20, 2015
Version:	2.0

Table of Contents

Document Control	3
Introduction	4

Overview of Standby and GoldenGate Configuration	5
1. GoldenGate Failover scripts Functionality and Purpose.....	8
2. Implementation	10
3. Testing of GoldenGate Failover Capaility.abase for Target	11
APPENDIX	16

Document Control

Change Record

Date	Author	Version	Change Reference
March 10, 2011	Vladimir Grigorian	1.0	First Draft
March 20, 2011	Vladimir Grigorian	2.0	Changed scripts from 5 mins checks from cron to on-demand run. Added first SCN after failover check.

Reviewers

Name	Position

Distribution

Copy No.	Name	Location
1		
2		
3		

This publication may not be reproduced, stored in a retrieval system, or transmitted in whole or in part, in any form, or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior written permission of Cognizant/ Xerox Company.

Introduction

Purpose

The purpose of this document is to outline a procedure for failing over GoldenGate from a primary database to its standby in an Oracle DataGuard configuration. This is a Proof of Concept setup.

Usually, production databases with a running GoldenGate configuration, which replicates to a DSS or another environment, also utilize a standby database for disaster recovery. The challenge most DBA's are facing is that if a primary datacenter is inaccessible, the rebuilding of a new GoldenGate setup on the failedover standby instance either takes time, or becomes impossible because primary GoldenGate configuration files and trails are no longer available. If DataGuard failover takes minutes to complete, the reinstantiation of GoldenGate on the new primary could take weeks.

Therefore, the purpose of this proof of concept test is to implement and successfully test a functionality that will allow the following:

- 1) The periodic (every 5 minutes) parameter file sync up between a primary GoldenGate and standby. This will run from the primary database. It will first make backups of the files being replaced. The sync up should automatically change copied parameter files on the standby to reflect its specific parameters, such as \$TNS_ADMIN, \$ORACLE_SID, dirdat, etc. The sync up should not overwrite parameter files that do not exist on primary.
- 2) The on-demand script run which will get the first SCN after failover to ensure no data is lost after standby has been started as primary. The script will enable instance GoldenGate parameters, logon to GGSCI, enable and start processes synced up and changed to the standby's specs. The script then will pass the SCN to the obey GoldenGate script. The script should then clean up the obey script, so the first SCN after failover is deleted.

Audience

This document is intended for:

- Oracle DBAs and GoldenGate Administrators.

Assumptions

Following assumptions have been verified prior to installing and configuring Oracle GoldenGate.

1. Oracle Dataguard has been installed and is functioning properly.
2. GoldenGate is installed on the primary and standby, but functioning on primary.
3. This is a test system which is acceptable to switchover for testing purposes.

Overview of Standby and GoldenGate Configuration

The following outlines the intended setup for this configuration.

Table 1. Server Information (Due to Hardware Constraint this POC was executed on a Single Server)

	Source	Destination
Hostname	Oralinux6	Oralinux6
OS	3.8.13-55.1.2.el7uek.x86_64	3.8.13-55.1.2.el7uek.x86_64
GoldenGate Home	/u02/gg/source	/u02/gg/target
Oracle Instance	PBMP	STBMP
Oracle Version	12.1.0.2.0	12.1.0.2.0
GoldenGate version	11.2.1.0.27	11.2.1.0.27

Table 2. GoldenGate Processes Information

	Primary	Standby
Manager Port	7809	7810
DataPump	ESNDRT01	ESNDRT01
Failover Scripts in	/u02/gg/source/scripts	/u02/gg/source/scripts
Trails	/u02/gg/source/dirdat/s1	/u02/gg/source/dirdat/s1
GoldenGate Admin	GGATE	GGATE
User schemas	SENDER	SENDER

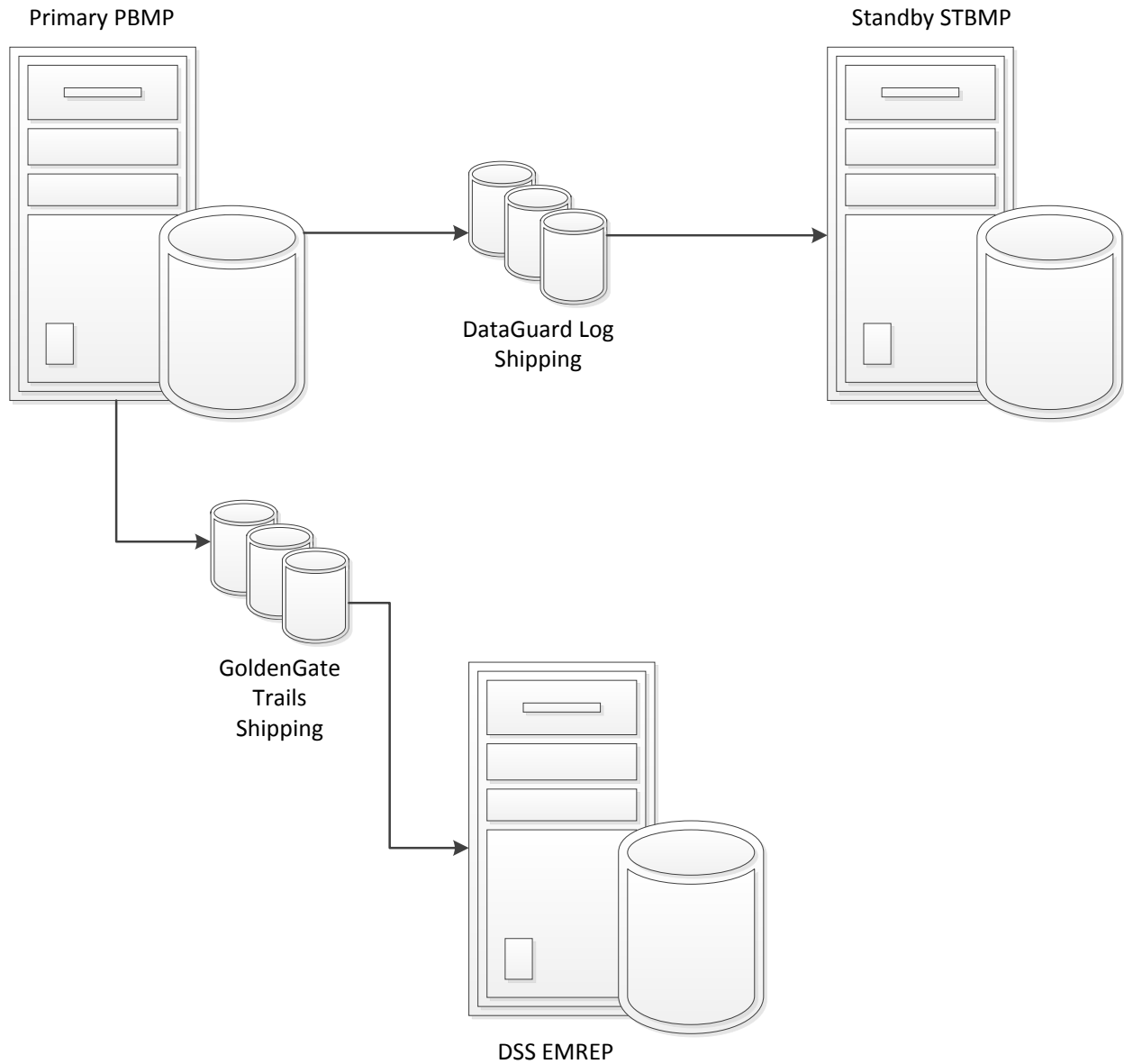


Fig 1. Regular DataGuard and GoldenGate Operation

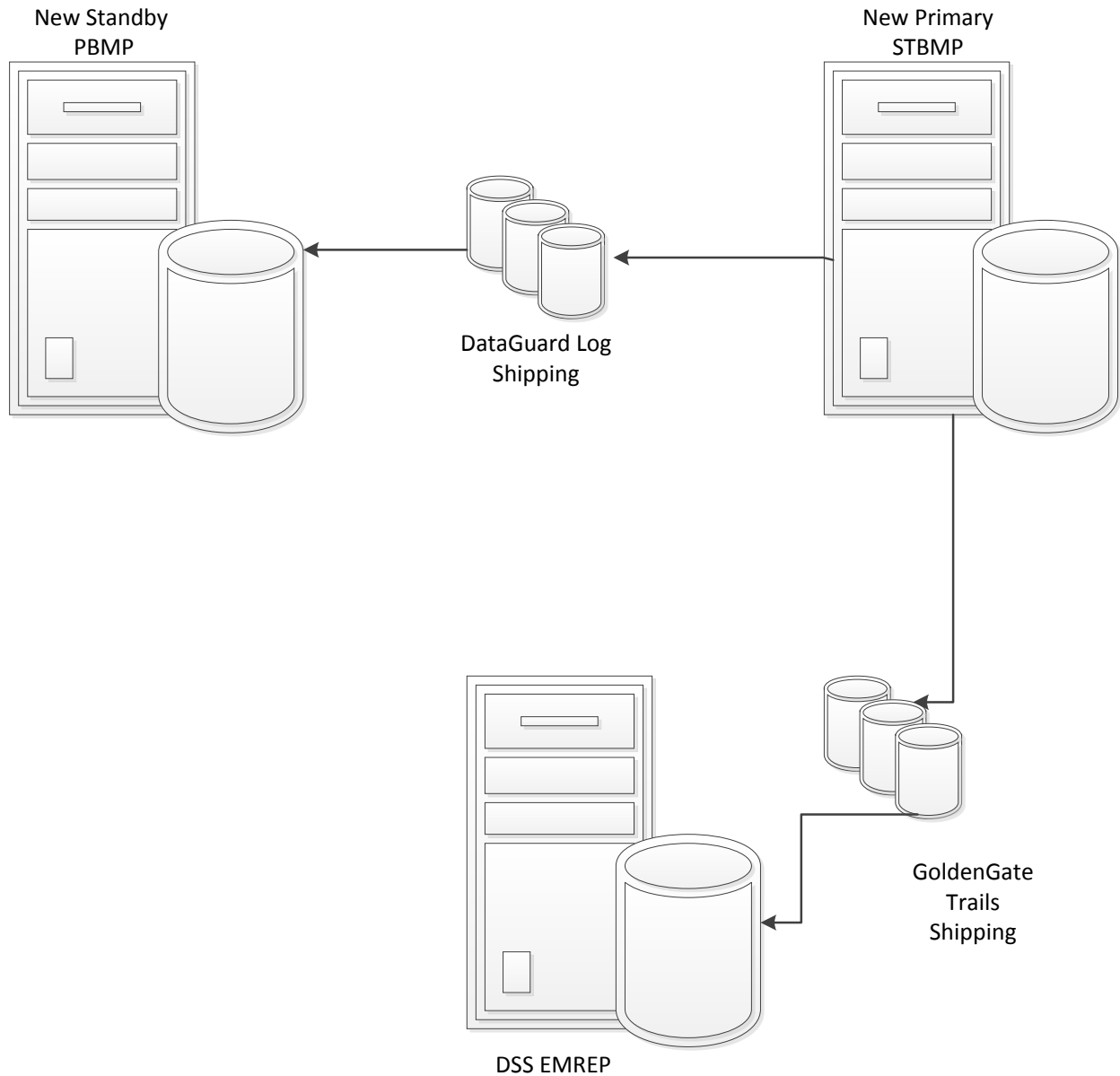


Fig 2. Switchedover DataGuard and GoldenGate Configuration

1. GoldenGate Failover Scripts Functionality and Purpose

Script Name	Purpose	Function
ggdr_sync_01_rsync.ksh	Sync up	Backup parameter files, syncup files, but exclude MGR
ggdr_sync_02_rename_SID.ksh	Sync up	Rename SID to the standby's or other STBY specific parameters
ggdr_01_if_switchedover_enable_GG.ksh	GG Failover	Check STANDBY_BECAME_PRIMARY_SCN in V\$DATABASE. Insert it into obey script (script #4)
ggdr_02_SQL_Eable_GG_param.ksh	GG Failover	Login as SYSDBA and issue "ALTER SYSTEM SET enable_goldengate_replication=TRUE SCOPE=BOTH; then kick off the next script
ggdr_03_failover_GoldenGate.ksh	GG Failover	This is a GG wrapper script that takes input from GGSCI script <code>obey_switchover.ksh</code>
ggdr_04_obey_switchover.ksh (identical to ggdr_04_obey_switchover_VANILLA.ksh when idle, except at run time when SCN is inserted into it)	GG Failover	This is the actual GG script that logs into db in GGSCI, starts manager, forcestops processes, adds new processes, adds exttrails, starts processes from STANDBY_BECAME_PRIMARY_SCN (from script #1).
ggdr_05_rename_obey_afterGG_switchover.ksh	GG Failover	Deletes the obey script <code>ggdr_04_obey_switchover.ksh</code> with a STANDBY_BECAME_PRIMARY_SCN so it cannot run again. Copies <code>ggdr_04_obey_switchover_VANILLA.ksh</code> (which doesn't have the SCN) to <code>ggdr_04_obey_switchover.ksh</code> so it can be used for future switchover.

Table 3. Script Names and their Purpose

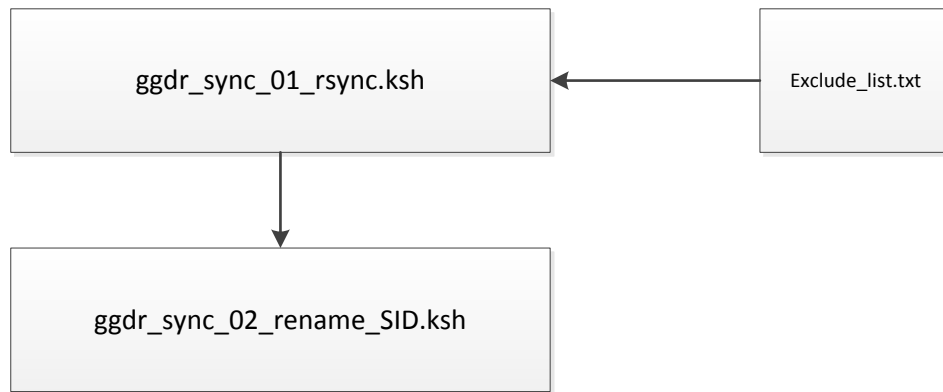


Fig 3. Sync Up Functionality

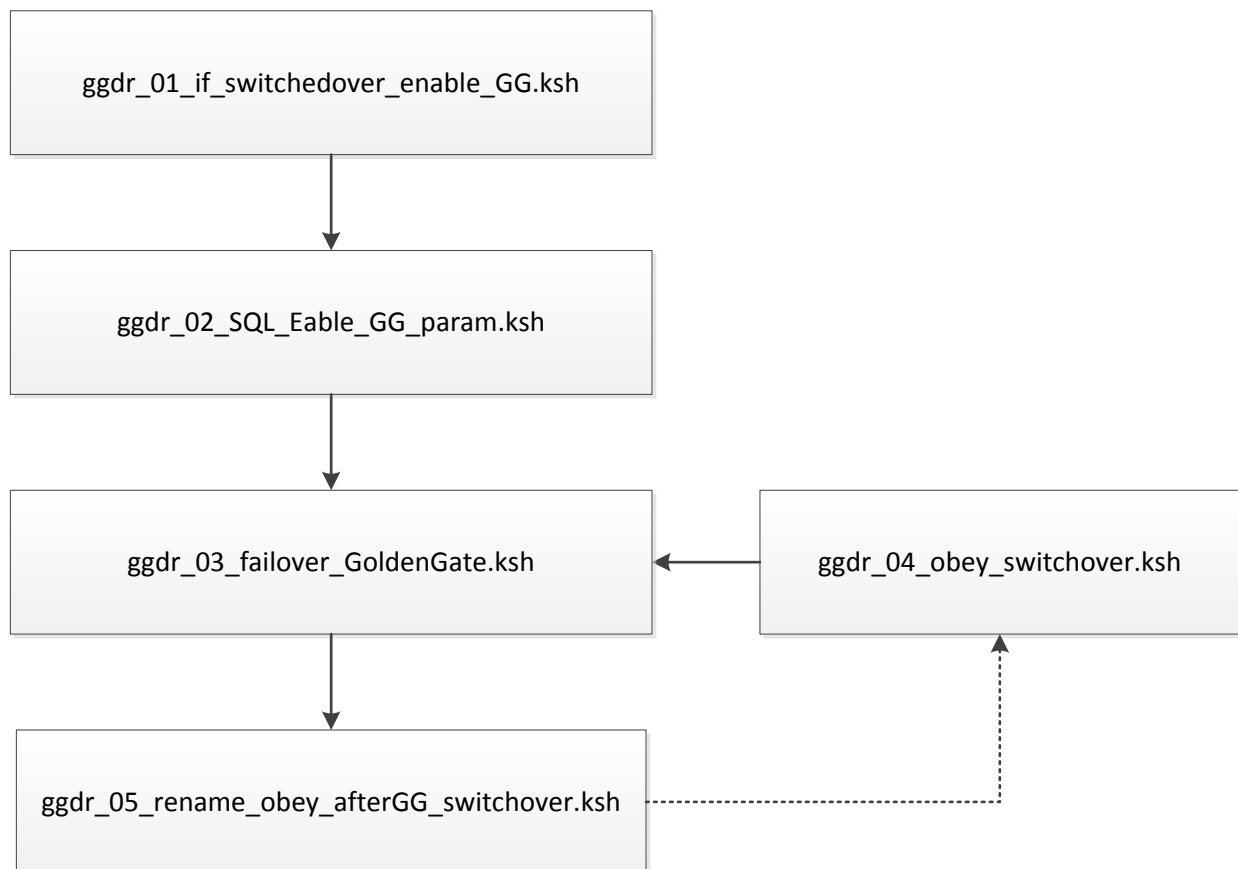


Fig 4. GoldenGate Failover Functionality

2. Implementation

To enable automatic DataGuard and GoldenGate failover capability the following tasks are executed:

- 1) Alter scripts in the APPENDIX of this document so they reflect your environment (\$GG, \$SID, \$ORACLE_HOME, etc.). Put them in \$GG/scripts
- 2) Schedule the sync up script to run from cron (the failover script is run on-demand). The failover script can be run on-demand. To failover GoldenGate only the first script needs to be run - ggdr_01_if_switchedover_enable_GG.ksh
- 3) Maintain scripts , especially the obey scripts, to reflect new processes. All this information can be received from dirprm and periodic reports.

Once these tasks are executed, GoldenGate will failover automatically 5 minutes after standby is started as the primary.

Task	Scripts	Server	Runs from
Sync up	ggdr_sync_01_rsync.ksh, ggdr_sync_02_rename_SID.ksh	PRIMARY	Cron, every 5 mins
GG Failover	ggdr_01_if_switchedover_enable_GG.ksh, ggdr_02_SQL_Eable_GG_param.ksh, ggdr_03_failover_GoldenGate.ksh, ggdr_04_obey_switchover.ksh, ggdr_05_rename_obey_afterGG_switchover.ksh	STANDBY	On-demand

Table 5. DataGuard and GoldenGate Failover Scripts Implementation

3. Testing of DataGuard GoldenGate Failover Capability

To test this functionality simply switchover Dataguard and the sync up scripts will be kicked off automatically. Don't forget to disable sync up scripts from the primary because they are based on the assumption that the primary server is out of commission and they therefore cannot run, which is not the case in the failover situation. The progress of the process can be derived from /tmp logs, ggserr.log or simple email alerts as shown below.

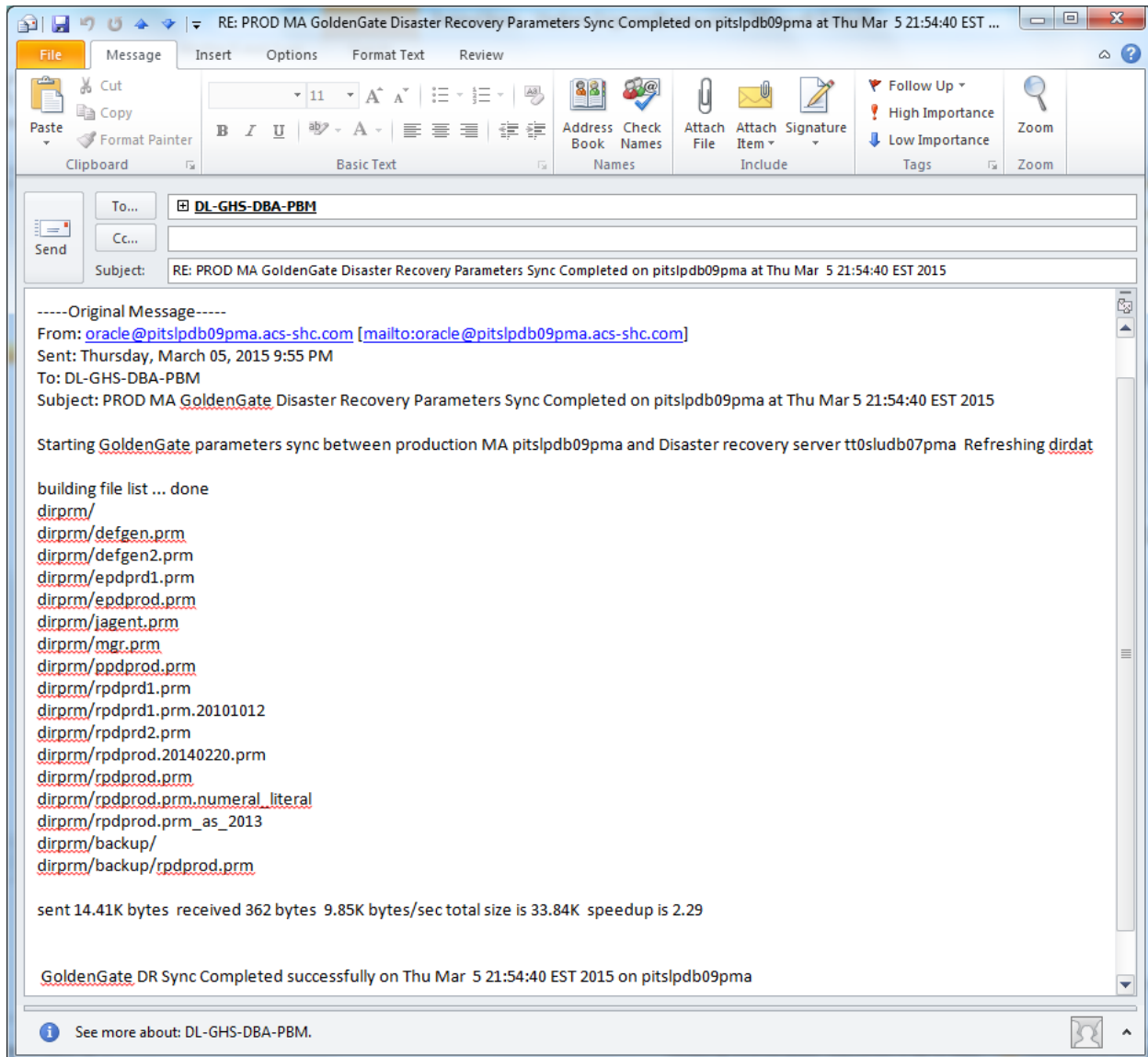


Fig 6. Email Notification for GoldenGate PRIM => STBY Parameters Sync Up

```
+++++
+ Oracle GoldenGate Disaster Recovery Failover
+ Step 3 of 5.
+ Start Goldengate wrapper OBEY script from new primary GG home.
+ Proceed to step 4.
+++++
```

```
Oracle GoldenGate Command Interpreter for Oracle
Version 12.1.2.0.2 19269784 19683584_FBO
Linux, x64, 64bit (optimized), Oracle 12c on Oct 19 2014 16:12:14
Operating system character set identified as UTF-8.
```

Copyright (C) 1995, 2014, Oracle and/or its affiliates. All rights reserved.

GGSCI (oralinux6) 1> Successfully logged into database.

GGSCI (oralinux6) 2> MGR is already running.

GGSCI (oralinux6) 3> ERROR: Invalid command.

GGSCI (oralinux6) 4>

GGSCI (oralinux6) 5>
Sending FORCESTOP request to EXTRACT ESNDRT01 ...
Request processed.

GGSCI (oralinux6) 6> Deleted EXTRACT ESNDRT01.

GGSCI (oralinux6) 7>

GGSCI (oralinux6) 8> EXTRACT added.

GGSCI (oralinux6) 9>

GGSCI (oralinux6) 10> EXTTRAIL added.

GGSCI (oralinux6) 11>

GGSCI (oralinux6) 12>

GGSCI (oralinux6) 13> EXTRACT altered.

GGSCI (oralinux6) 14>

GGSCI (oralinux6) 15>

Sending START request to MANAGER ...

EXTRACT ESNDRT01 starting

GGSCI (oralinux6) 16>

GGSCI (oralinux6) 17>

GGSCI (oralinux6) 18>

Program	Status	Group	Lag at Chkpt	Time Since Chkpt
MANAGER	RUNNING			
EXTRACT	STOPPED	ESNDRT01	00:00:00	00:00:00

MANAGER RUNNING

EXTRACT STOPPED ESNDRT01 00:00:00 00:00:00

GGSCI (oralinux6) 19>

GGSCI (oralinux6) 20>

GGSCI (oralinux6) 21> bash: EOF: command not found...

```

+++++
+ Oracle GoldenGate Disaster Recovery Failover
+ Step 4 of 5.
+ Wipe out old process. Add extract. Add exttrail. Start mgr and extract.
+ Proceed to step 5.
+++++

```

```

+++++
+ Renaming GG OBEY file ggdr_04_obey_switchover.ksh
+ to ggdr_04_obey_switchover.ksh.already_run
+ to prevent in-loop processes dropping
+ and recreation.
+++++

```

```
+++++
+ Oracle GoldenGate Disaster Recovery Failover
+ Step 5 of 5.
+ GoldenGate has now switched over and runs on STANDY
+ Comments to vladimir.grigorian@xerox.com.
+++++

Completed GoldenGate DR failover
```

Fig 7. A Completed GoldenGate Failover (from /tmp Log)

APPENDIX

Exclude_list.txt

```
mgr.prm
/u02/gg/target/dirprm/mgr.prm
jagent.prm
/u02/gg/target/dirprm/jagent.prm
```

ggdr_sync_01_rsync.ksh

```
#####
# Name: ggdr_sync_01_rsync.ksh #
# Author: vladimir.grigorian@xerox.com
#####
export GGATE=/opt/app/gg2/gg
alias gate='clear;cd $GGATE;./ggsci'
export PATH=/opt/app/gg2/gg:/usr/sbin:/usr/lib/qt-
3.3/bin:/usr/local/bin:/bin:/usr/bin:/usr/local/sbin:/usr/sbin:/sbin:
$PATH
export LD_LIBRARY_PATH=$ORACLE_HOME/lib:/usr/lib:/opt/app/gg2/gg:
LOGDIR=/opt/app/gg2/gg/log
EMAILFile=/tmp/ggdr.log
BOX=$(uname -a | awk '{print $2}')

rm -rf /tmp/ggdr.log

rm -rf /u02/gg/target/diprm

echo -e "Starting GoldenGate parameters sync between production MA
$BOX and Disaster recovery server tt0sludb07pma \n Refreshing
dirdat\n " >> /tmp/ggdr.log

rsync -avzhe ssh /u02/gg/source/dirprm --exclude-from
'/u02/gg/source/scripts/exclude_list.txt' localhost:/u02/gg/target/
>> /tmp/ggdr.log

echo -e " \n \n Changing DR GoldenGate parameter files to reflect the
Standby SID \n \n " >> /tmp/ggdr.log

/u02/gg/source/scripts/ggdr_sync_02_rename_SID.ksh >> /tmp/ggdr.log
```

```
echo -e " \n \n GoldenGate DR Sync Completed successfully on $(date)
on $BOX \n \n " >> /tmp/ggdr.log
```

```
#####
## SENDING EMAIL IF ERRORS ARE IN LOGFILE ###
#####
```

```
mailx -s "PROD MA GoldenGate Disaster Recovery Parameters Sync
Completed on $BOX at $(date)" grigorianvlad@gmail.com < $EMAILFile
```

ggdr_sync_02_rename_SID.ksh

```
#####
# Name: ggs_lag.ksh #
# Author: vladimir.grigorian@acs-in.com
# PURPOSE: TO MONITOR LAG OF GOLDEN GATE #
# NOTE: THIS SCRIPT CALLS ggs.ksh #
# THIS SCRIPT NOTIFY IF LAG IS MORE THEN 30 MIN #
# ONLY FOR FOR EXT AND PMP PROCESS GROUP #
#####
export GGATE=/opt/app/gg2/gg
alias gate='clear;cd $GGATE;./ggsci'
export PATH=/opt/app/gg2/gg:/usr/sbin:/usr/lib/qt-
3.3/bin:/usr/local/bin:/bin:/usr/bin:/usr/local/sbin:/usr/sbin:/sbin:
$PATH
export LD_LIBRARY_PATH=$ORACLE_HOME/lib:/usr/lib:/opt/app/gg2/gg:
LOGDIR=/opt/app/gg2/gg/log
EMAILFile=/tmp/ggdr.log
BOX=$(uname -a | awk '{print $2}')

filepath="/u02/gg/target/dirprm"
searchstring="PBMP"
replacestring="STBMP"

i=0;

for file in $(grep -l -R $searchstring $filepath)
do
    cp $file $file.bak
    sed -e "s/$searchstring/$replacestring/ig" $file > tempfile.tmp
    mv tempfile.tmp $file

    let i++;
```



```
echo "Modified: " $file
done
```

ggdr_01_if_switchedover_enable_GG.ksh

```
#!/bin/bash
echo -e "\n\n++++\n\n
+ Oracle GoldenGate Disaster Recovery Failover \n
+ Created 3/15/2015 vladimir.grigorian@xerox.com 5 \n
+ Step 1 of 5. Check if standby has failed or switched over, if it has get the first SCN for GoldenGate. \n
+ Proceed to step 2. \n
++++\n\n

./home/oracle/stbmp.env
export ORACLE_HOME=/u01/app/oracle/product/12.1.0/dbhome_1
export ORACLE_SID=STBMP
sqlplus -s sys/oracle12cDB@STBMP as sysdba <<EOF > get_STANDBY_BECAME_PRIMARY_SCN.log
SET PAGESIZE 0 FEEDBACK OFF VERIFY OFF HEADING OFF ECHO OFF trimspool on
select STANDBY_BECAME_PRIMARY_SCN from v\${database};
EXIT;
EOF
result=`cat get_STANDBY_BECAME_PRIMARY_SCN.log`
#echo "alter extract ESNDRT01 SCN $result " > /u02/gg/source/scripts/SCN.log
echo "alter extract ESNDRT01 SCN $result " >> /u02/gg/source/scripts/ggdr_04_obey_switchover.ksh
echo -e "\n start e*\n " >> /u02/gg/source/scripts/ggdr_04_obey_switchover.ksh
echo -e "\n info all\n " >> /u02/gg/source/scripts/ggdr_04_obey_switchover.ksh
echo -e "\n exit\n " >> /u02/gg/source/scripts/ggdr_04_obey_switchover.ksh
echo "The first after failover SCN is written to GoldenGate obey script $result "
/u02/gg/source/scripts/ggdr_02_SQL_Eable_GG_param.ksh
```

ggdr_02_SQL_Eable_GG_param.ksh

```
#!/bin/sh
echo -e "\n\n
++++\n\n + Oracle
GoldenGate Disaster Recovery Failover \n + Step 2 of 5. \n + Enable
SQL "enable_goldengate_replication=TRUE". \n + Proceed to step 3. \n
++++\n\n
export ORACLE_HOME=/u01/app/oracle/product/12.1.0/dbhome_1
export ORACLE_SID=STBMP
cd /home/oracle
. ./stbmp.env

sqlplus / as sysdba <<EOF

ALTER SYSTEM SET enable_goldengate_replication=TRUE SCOPE=BOTH;
exit
EOF
#exit
```

```
/u02/gg/source/scripts/ggdr_03_failover_GoldenGate.ksh
```

ggdr_03_failover_GoldenGate.ksh (identical to ggdr_04_obey_switchover_VANILLA.ksh)

```
#!/bin/bash
echo -e " \n \n
+++++ \n + Oracle
GoldenGate Disaster Recovery Failover \n + Step 3 of 5. \n + Start
Goldengate wrapper OBEY script from new primary GG home. \n + Proceed
to step 4. \n
+++++ \n "
. /home/oracle/stbmp.env
/u02/gg/target/ggsci <
/u02/gg/source/scripts/ggdr_04_obey_switchover.ksh
EOF
echo -e " \n \n
+++++ \n + Oracle
GoldenGate Disaster Recovery Failover \n + Step 4 of 5. \n + Wipe
out old process. Add extract. Add exttrail. Start mgr and extract. \n
+ Proceed to step 5. \n
+++++ \n "
/u02/gg/source/scripts/ggdr_05_rename_obey_afterGG_switchover.ksh
echo "Completed GoldenGate DR failover"
exit
```

ggdr_04_obey_switchover.ksh

```
dblogin userid ggate@stbmp, password oracle
start mgr
sleep 7
sh sleep 7
stop e*, forcestop!
delete ESNDRT01
sh sleep 5
add extract ESNDRT01, tranlog, begin now
sh sleep 5
add exttrail /u02/gg/source/dirdat/s1, extract ESNDRT01
sh sleep 5
```

ggdr_05_rename_obey_afterGG_switchover.ksh

```
echo -e " \n \n
+++++ \n +
Cleaning GG OBEY file ggdr_04_obey_switchover.ksh \n + for the next
failover \n
+++++ \n "
rm -rf /u02/gg/source/scripts/ggdr_04_obey_switchover.ksh
cp /u02/gg/source/scripts/ggdr_04_obey_switchover_VANILLA.ksh
/u02/gg/source/scripts/ggdr_04_obey_switchover.ksh
echo -e " \n \n
+++++ \n + Oracle
GoldenGate Disaster Recovery Failover \n + Step 5 of 5. \n +
GoldenGate has now switched over and runs on STANBY \n + Comments to
vladimir.grigorian@xerox.com. \n
+++++ \n "
```

END OF DOCUMENT