Oracle GoldenGate 12*c*: Troubleshooting and Tuning

Activity Guide

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ORACLE

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Chapter 1

Practices for Lesson 1

Overview

There are no scheduled practices for Lesson 1.

Note: For LVCs, you have the option of verifying connectivity to the hosted practice environment.

Practices for Lesson 2: Gathering Evidence

Chapter 2

Practices for Lesson 2: Overview

Overview

In this practice, you find clues in information commands and check files for more evidence.

Prerequisites

Before starting this practice for the first time, perform the following:

1. Open a new terminal or command window (double-click the Terminal icon), source the `ora12env.sh` file, and start the Oracle database. Exit SQL*Plus after the Oracle instance has started.

```
[OS prompt ~]$ source ora12env.sh
[OS prompt ~]$ sqlplus / as sysdba
SQL*Plus: Release 12.1.0.1.0 Production on Sun Jun 15 11:25:25 2014
Copyright (c) 1982, 2013, Oracle.  All rights reserved.
Connected to an idle instance.

SQL> startup open
ORACLE instance started.

Total System Global Area 3056513024 bytes
Fixed Size             2293056 bytes
Variable Size             1207960256 bytes
Database Buffers    1828716544 bytes
Redo Buffers                17543168 bytes
Database mounted.
Database opened.
SQL> exit
Disconnected from Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 -
64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real Application Testing
options
[OS prompt ~]$
```

2. Start the network listener.

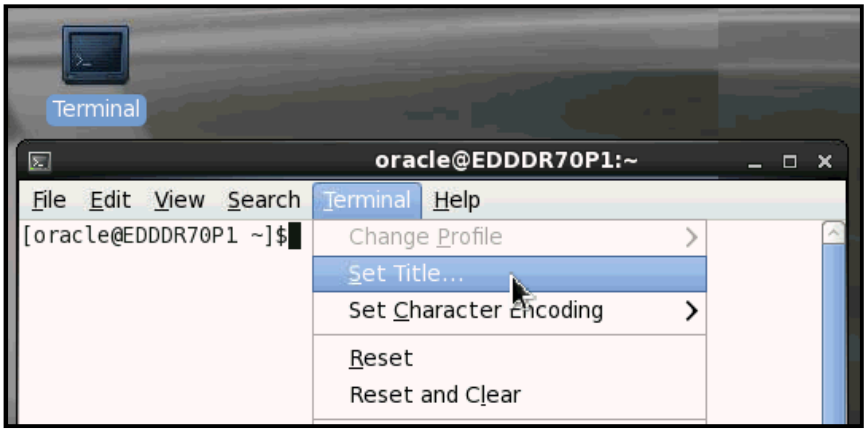
```
[OS prompt ~]$ lsnrctl start
LSNRCTL for Linux: Version 12.1.0.1.0 - Production on 15-JUN-2014 11:25:58
Copyright (c) 1991, 2013, Oracle.  All rights reserved.
Starting /u01/app/oracle/product/12.1.0/dbhome_1/bin/tnslsnr: please wait...
TNSLSNR for Linux: Version 12.1.0.1.0 - Production
System parameter file is
/u01/app/oracle/product/12.1.0/dbhome_1/network/admin/listener.ora
Log messages written to
/u01/app/oracle/diag/tnslsnr/edsyr83p0/listener/alert/log.xml
Listening on: (DESCRIPTION=(ADDRESS=(PROTOCOL=ipc)(KEY=EXTPROC1522)))
Listening on:
(DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=edSYr83p0.us.oracle.com)(PORT=1522))
)
Connecting to (DESCRIPTION=(ADDRESS=(PROTOCOL=IPC)(KEY=EXTPROC1522)))
STATUS of the LISTENER
```

```
------------------------
Alias                     LISTENER
Version                   TNSLSNR for Linux: Version 12.1.0.1.0 - Production
Start Date                15-JUN-2014 11:25:59
Uptime                    0 days 0 hr. 0 min. 0 sec
Trace Level               off
Security                  ON: Local OS Authentication
SNMP                      OFF
Listener Parameter File
/u01/app/oracle/product/12.1.0/dbhome_1/network/admin/listener.ora
Listener Log File
/u01/app/oracle/diag/tnslsnr/edsyr83p0/listener/alert/log.xml
Listening Endpoints Summary...
  (DESCRIPTION=(ADDRESS=(PROTOCOL=ipc)(KEY=EXTPROC1522)))

(DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=edSYr83p0.us.oracle.com)(PORT=1522))
)
The listener supports no services
The command completed successfully
[OS prompt ~]$
```

3. Start a source GGSCI session as follows:

```
[OS Prompt ~]$ ogg_src
[OS Prompt ogg_src]$ ggsci
```

Note: `ogg_src` is an alias defined at a shell level, which changes directory to `/u01/app/oracle/product/ogg_src`. You launch GGSCI by typing `ggsci` without prefixing it with a dot-slash (`./`) because `ggsci` is also an alias, which launches GGSCI through the `rlwrap readline` wrapper; `rlwrap` allows you to re-enter the GGSCI command by using the up and down arrows. Rename the terminal session “Source” (click `Terminal`, and then `Set Title`) so that you can easily identify your GGSCI source session. You will also shortly create another session, which you will name “Target” for the GGSCI target session. Here, source means replication source, which is the `source` schema in the Oracle database together with the Oracle GoldenGate source instance (the `/u01/app/oracle/product/ogg_src` directory), and target means replication target, which is the `target` schema in the Oracle database together with the Oracle GoldenGate target instance (the `/u01/app/oracle/product/ogg_trg` directory).




```
[OS ~]$ ogg_src
[OS ogg_src]$ ggsci

Oracle GoldenGate Command Interpreter for Oracle
Version 12.1.2.0.0 17185003
OGGCORE_12.1.2.0.0_PLATFORMS_130924.1316_FBO
Linux, x64, 64bit (optimized), Oracle 12c on Sep 25 2013 02:33:54
Copyright (C) 1995, 2013, Oracle and/or its affiliates. All rights
reserved.

GGSCI (SOURCE) 1>
```

Your GGSCI prompt will have an actual host name in it. The use of (`SOURCE`) and (`TARGET`) is only for clarity, to remind you which window to enter the commands in.

Leave this session running because you will be using it throughout the practice.

4. In the source GGSCI session, run the following commands:

```
GGSCI (SOURCE) > Obey /home/oracle/Labs/Practice_00/
cleanup_src.oby
GGSCI (SOURCE) > Obey /home/oracle/Labs/Practice_00/test.oby
```

The first command should be typed on one line.

Each script takes about a minute to run, including several `sleep` commands. You may see some errors as `cleanup_src` attempts to delete tables or files that might not exist yet. You can safely ignore those messages. Note that you cannot use a tilde ("~") as a shortcut for the home directory path inside of GGSCI.

Make sure that you scroll up the output window and verity the output. You must see the messages outlined as follows, in particular `LOG_MODE` (which *must* be set to `ARCHIVELOG`) and `Supp Log Data Min`, `Supp Log PK`, and `Supp Log UK`, which must be set to `YES`:

```
SQL>
NAME      LOG_MODE
--------- ------------
OGG12C    ARCHIVELOG

SQL>
NAME                      TYPE    VALUE
------------------------- ------- --------------------
db_recovery_file_des      string  /u02/oradata/ogg12c/fast_recov
                                  ery_area
db_recovery_file_dest_size big integer 12G
```

```
SQL>
Supp Log Data Min          Supp Log PK     Supp Log UK
--------------------       ------------    ------------
YES                        YES             YES

SQL>
db_recovery_file_dest                string
/u02/oradata/ogg12c/fast_recovery_area
```

When the script has finished executing, it displays "`--All done with Practice 00 setup.`"

Do not edit anything in the `~/Labs/Practice_nn` folders! All editing happens through the GGSCI interface in the `ogg_trg` and `ogg_src` folders.

NOTE: The value for `db_recovery_file_destination` can be different in your environment – that depends on the Oracle database installation. Just make sure that the database is running in ARCHIVELOG mode and that supplemental logging is set to "YES."

5. The tasks performed so far were crucial to setting up the environment for all practices. You can now run the setup script for Practice 2 titled "Gathering Evidence." While still connected to `SOURCE GGSCI`, run the obey script for Practice_02:

```
GGSCI (SOURCE) > Obey /home/oracle/Labs/Practice_02/test.oby
```

When the script has finished executing, it displays "`--All done with Practice 02 setup.`"

6. Open a new terminal or command window, source the `ora12env.sh` file, add the title `Target`, and start a target GGSCI session as follows:

Leave this session running because you will be using it throughout the practice.

```
[OS ~]$ source ora12env.sh
[OS ~]$ ogg_trg
[OS ogg_trg]$ ggsci
Oracle GoldenGate Command Interpreter for Oracle
Version 12.1.2.0.0 17185003
OGGCORE_12.1.2.0.0_PLATFORMS_130924.1316_FBO
Linux, x64, 64bit (optimized), Oracle 12c on Sep 25 2013 02:33:54
Operating system character set identified as UTF-8.
Copyright (C) 1995, 2013, Oracle and/or its affiliates. All rights
reserved.

GGSCI (TARGET) 1>
```

The actual host name of your GGSCI prompt will be different. Leave this session running as well, although you must close the target session if you run a cleanup `obey` script.

7. From your desktop, double-click the Terminal icon and open a new command window. Source the `ora12env.sh` file, start `sqlplus`, name this terminal window `SQL*Plus`, and log in to the Oracle source schema:

```
[OS ~]$ source ora12env.sh
[OS ~]$ sqlplus source/oracle@ogg12c
SQL*Plus: Release 12.1.0.1.0 Production on Sat Jun 7 11:31:05 2014
Copyright (c) 1982, 2013, Oracle.  All rights reserved.
Last Successful login time: Sat Jun 07 2014 11:30:51 +10:00
Connected to:
Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit
Production
With the Partitioning, OLAP, Advanced Analytics and Real Application
Testing options
SQL> show user
USER is "SOURCE"
SQL>
```

Leave this session running because you will be using it throughout the practice. You need to shut down SQL*Plus at the end of each practice as part of cleanup.

Note: If you want to restart this practice, exit all open SQL*Plus sessions, and then, from your Source GGSCI session, run the following:

```
GGSCI (SOURCE) > Obey /home/oracle/Labs/Practice_00/
cleanup_src.oby
GGSCI (SOURCE) > Obey /home/oracle/Labs/Practice_02/test.oby
```

Practice 2-1: Becoming Familiar with Your Oracle Environment

Overview

When using the Oracle University Grid virtual machine, use the following values:

Oracle Source Environment	
Operating System	
Type	**Linux**
<*userid*>	**oracle**
<*password*>	**Oracle**
Database	
<*login*>	**source**
<*password*>	**Oracle**
<*oracle_sid*>	**ogg12c**
RAC <*instances*>	**None**
Oracle GoldenGate	
<*source*> host name or IP address	**ogg_source**
Oracle GoldenGate <*install_location*>	**/u01/app/oracle/product/ogg_src**
Manager <*port*>	**7809**
Oracle GoldenGate administrative user	**Ogguser**
Password for administrative user	**Oracle**

Oracle Target Environment	
Operating System	
Type	**Linux**
<*userid*>	**oracle**
<*password*>	**oracle**
Database	
<*login*>	**target**
<*password*>	**oracle**
<*schema*>	**target**
<*oracle*_sid>	**ogg12c**
RAC <*instances*>	**None**
Oracle GoldenGate	
<*target*> host name or IP address	**ogg_target**
Oracle GoldenGate <*install_location*>	**/u01/app/oracle/product/ogg_trg**
Manager <*port*>	**7909**
Oracle GoldenGate administrative user	**ogguser**
Password for administrative user	**oracle**

Note: The Oracle GoldenGate administrative user `ogguser`, used in all the practices, is granted DBA privileges. In addition, the user is also granted specific GoldenGate admin privileges through the **`DBMS_GOLDENGATE_AUTH.GRANT_ADMIN_PRIVILEGE`** procedure.

The source and target users or schemas are unprivileged users. Only `connect` and `resource` privileges are granted to these users.

Practice 2-2: Finding Clues in Information Commands

Overview

This section shows you informational commands, as well as examples of output when processes are running without incidents. There are no planned errors in this section.

Tasks

1. View Extract details.
   a. In SQL*Plus, run the `insert_data` script to insert data into your source tables.

```
SQL> @/home/oracle/Labs/Practice_02/insert_data.sql
```

   Note: The script leaves one transaction uncommitted. Do *not* commit it.

   b. In the source GGSCI session, enter the `Info Extract` command to get a detailed view of the extraction status and environment.

```
GGSCI (SOURCE) > Info Extract ext_2a, Detail

EXTRACT    EXT_2A    Last Started 2014-06-07 12:06   Status RUNNING
Checkpoint Lag       00:00:00 (updated 00:00:07 ago)
Process ID           4841
Log Read Checkpoint  Oracle Redo Logs
                     2014-06-07 12:07:50  Seqno 230, RBA 1250304
                     SCN 0.8081780 (8081780)
  Target Extract Trails:
  Trail Name                            Seqno        RBA     Max MB Trail Type

  ./dirdat/vv                               0       1437          5  EXTTRAIL
  Extract Source                              Begin             End

/u02/oradata/OGG12C/onlinelog/o1_mf_1_9v29pbmj.log  2014-06-07 12:06  2014-06-07 12:07
  Not Available                           * Initialized *   2014-06-07 12:06

Current directory    /u01/app/oracle/product/ogg_src

Report file          /u01/app/oracle/product/ogg_src/dirrpt/EXT_2A.rpt
Parameter file       /u01/app/oracle/product/ogg_src/dirprm/ext_2a.prm
Checkpoint file      /u01/app/oracle/product/ogg_src/dirchk/EXT_2A.cpe
Process file         /u01/app/oracle/product/ogg_src/dirpcs/EXT_2A.pce
Error log            /u01/app/oracle/product/ogg_src/ggserr.log GGSCI

(SOURCE) >
```

   Your dates, times, and RBAs will be different.

   c. To familiarize yourself with the output, note the following:

   - Group name:

     _____

   - Startup time:

     _____

   - Run status:

_____

- Checkpoint lag (not as accurate as `Lag Extract`):

_____

- Current checkpoint in the data source (transaction log name, number, RBA, and time stamp):

_____

- Trail name:

_____

- History of transaction logs that were read (if any):

_____

- Locations of key Oracle GoldenGate files, such as the report file

_____

- Are they all in their default locations? **__Y __N**

2. View Replicat details.
   a. In the target GGSCI session, enter the `Info Replicat` command to get a general view of the replication status and environment.

```
GGSCI (TARGET) > Info Replicat rep_2a, Detail

REPLICAT   REP_2A    Last Started 2014-06-07 12:06   Status RUNNING
Checkpoint Lag       00:00:00 (updated 00:00:02 ago)
Process ID           4864
Log Read Checkpoint  File ./dirdat/rt000000
                     First Record  RBA 0
Current Log BSN value: (requires database login)

  Extract Source                          Begin             End

  ./dirdat/rt000000                       * Initialized *   First Record
  ./dirdat/rt000000                       * Initialized *   First Record
  ./dirdat/rt000000                       * Initialized *   First Record

Current directory    /u01/app/oracle/product/ogg_trg

Report file          /u01/app/oracle/product/ogg_trg/dirrpt/REP_2A.rpt
Parameter file       /u01/app/oracle/product/ogg_trg/dirprm/rep_2a.prm
Checkpoint file      /u01/app/oracle/product/ogg_trg/dirchk/REP_2A.cpr
Process file         /u01/app/oracle/product/ogg_trg/dirpcs/REP_2A.pcr
Error log            /u01/app/oracle/product/ogg_trg/ggserr.log

GGSCI (TARGET) >
```

   Your dates, times, and RBAs will be different.

   b. Notice how the output is similar to that of the Extract counterpart, except that instead of transaction logs as the data source, you see Oracle GoldenGate trails.

   To familiarize yourself with the output, note the following:

   - Group name:

   _____

- Startup time:

_____

- Run status:

_____

- Checkpoint lag (not as accurate as `Lag Replicat`):

_____

- Current checkpoint in the data source (trail file name and RBA):

_____

- Location of key Oracle GoldenGate files, such as the report file:

_____

3. View data pump details.
   a. Now enter `Info Extract` for the data pump.

```
GGSCI (SOURCE) > Info Extract pump_2a, Detail

EXTRACT    PUMP_2A   Last Started 2014-06-07 12:06   Status RUNNING
Checkpoint Lag       00:00:00 (updated 00:00:07 ago)
Process ID           4853
Log Read Checkpoint  File ./dirdat/vv000000
                     First Record  RBA 1437

  Target Extract Trails:

  Trail Name                            Seqno        RBA     Max MB Trail Type

  ./dirdat/rt                               0          0          5 RMTTRAIL

  Extract Source                            Begin             End

  ./dirdat/vv000000                         * Initialized *   First Record
  ./dirdat/vv000000                         * Initialized *   First Record


Current directory    /u01/app/oracle/product/ogg_src

Report file          /u01/app/oracle/product/ogg_src/dirrpt/PUMP_2A.rpt
Parameter file       /u01/app/oracle/product/ogg_src/dirprm/pump_2a.prm
Checkpoint file      /u01/app/oracle/product/ogg_src/dirchk/PUMP_2A.cpe
Process file         /u01/app/oracle/product/ogg_src/dirpcs/PUMP_2A.pce
Error log            /u01/app/oracle/product/ogg_src/ggserr.log

GGSCI (SOURCE) >
```

   b. Notice how the output is similar to that of the `Info Replicat rep_2a, Detail` command, because a data pump Extract reads from a trail.
      - What trail is the pump reading? _____
      - To what trail is it writing? _____

4. View the lag.

   In the Target terminal window, enter a `LAG REPLICAT` command.

```
GGSCI (TARGET) > Lag Replicat rep_2a

Sending GETLAG request to REPLICAT REP_2A ...
Last record lag: 34 seconds.
At EOF, no more records to process.

GGSCI (TARGET) >
```

   Notice how the value is different from the checkpoint lag that is shown with `INFO`. This command reports the actual lag. Your lag may vary slightly.

5. View processing statistics.

   a. Enter a `Stats Extract` command and note the number of operations since startup for each one.

```
GGSCI (SOURCE) > Stats Extract ext_2a
```

   b. How many operations were there for the `SOURCE.BIG_EMP` table?

   - Inserts _____
   - Updates _____
   - Deletes _____
   - Discards _____
   - Total _____

6. Enter the `Stats Replicat` command. Compare the results to the Extract results. They should be the same because this set of source and target tables is supposed to be in sync.

```
GGSCI (TARGET) > Stats Replicat rep_2a
```

7. If you see discards, view the discard file.

```
GGSCI (TARGET) > View Report dirrpt/rep_2a.dsc

Oracle GoldenGate Delivery for Oracle process started, group REP_2A discard
file opened: 2012-11-06 08:38:29

GGSCI (TARGET) >
```

8. View checkpoint details.

   a. Enter the `Info Extract` command to show checkpoints.

```
GGSCI (SOURCE)> Info Extract ext_2a, ShowCh
```

   b. What is the *current* read checkpoint position?

   - Sequence number _____
   - RBA _____
   - Transaction log name _____

   c. Which log would you have to restore (and all logs forward) to make sure that the oldest *uncommitted* transaction can be captured if Extract stops?

   - Sequence number _____
   - RBA _____
   - Transaction log name _____

d. Where is the last checkpoint in the trail?
   - Sequence number _____
   - RBA _____

9. View the oldest open transaction. Enter the `Send Extract` command to show open transactions.

```
GGSCI (SOURCE) > Send Extract ext_2a, ShowTrans

Sending SHOWTRANS request to EXTRACT EXT_2A ...
Oldest redo log file necessary to restart Extract is:
Redo Log Sequence Number 230, RBA 14087184
------------------------------------------------------------
XID:                30.28.3192
Items:              57344
Extract:            EXT_2A
Redo Thread:        1
Start Time:         2014-06-07:12:38:00
SCN:                0.8093070 (8093070)
Redo Seq:           230
Redo RBA:           14087184
Status:             Running

GGSCI (SOURCE) >
```

Note: The oldest one should match the recovery checkpoint that you saw in the `Info Extract` command to view checkpoints.

10. View trail information.
    a. Enter the `INFO RMTTRAIL` command to show the trails and the Extract groups writing to them. The asterisk shows all trails on the system.

```
GGSCI (SOURCE) > Info RmtTrail *
       Extract Trail: ./dirdat/vv
             Extract: EXT_2A
               Seqno: 2
                 RBA: 2399277
           File Size: 5M
       Extract Trail: ./dirdat/rt
             Extract: PUMP_2A
               Seqno: 2
                 RBA: 2399565
           File Size: 5M

GGSCI (SOURCE) >
```

    b. Note the file sizes and checkpoint positions.

_____

_____

11. View all processes.
    a. Enter the `Info All` command to view all Oracle GoldenGate processes on both the source and target systems.

```
GGSCI (SOURCE) > Info All, AllProcesses

Program     Status      Group       Lag at Chkpt  Time Since Chkpt
MANAGER     RUNNING
EXTRACT     RUNNING     EXT_2A      00:00:00      00:00:08
EXTRACT     STOPPED     INITLOAD
EXTRACT     RUNNING     PUMP_2A     00:00:00      00:00:07

GGSCI (SOURCE) >
```

```
GGSCI (TARGET) > Info All, AllProcesses

Program     Status      Group       Lag at Chkpt  Time Since Chkpt
MANAGER     RUNNING
REPLICAT    RUNNING     REP_2A      00:00:00      00:00:07
REPLICAT    STOPPED     REP_2B      00:00:00      00:25:58

GGSCI (TARGET) >
```

b. What additional process do you see with this command?

_____

Practice 2-3: Checking the Files for More Evidence

Overview

In this practice, you use the GGSCI informational commands, information in the report file, and information in the discard file to find the cause of a preprogrammed problem.

Tasks

1. Start `rep_2b`.
   a. Use the `Info All, AllProcesses` command to determine the processes that are running and those that are not running. Note that the Replicat group `rep_2b` is `STOPPED`.

```
GGSCI (TARGET) > Info All, AllProcesses

Program     Status      Group       Lag at Chkpt  Time Since Chkpt
MANAGER     RUNNING
REPLICAT    RUNNING     REP_2A      00:00:00      00:00:07
REPLICAT    STOPPED     REP_2B      00:00:00      00:25:58

GGSCI (TARGET) >
```

   b. Start Replicat group `rep_2b`.

```
GGSCI (TARGET)> Start rep_2b

Sending START request to MANAGER ...
REPLICAT REP_2B starting

GGSCI (TARGET) >
```

2. View the process status. Use the `Info All` command again to determine the processes that are running and those that are not running.

```
GGSCI (TARGET)> Info All

Program     Status      Group       Lag at Chkpt  Time Since Chkpt
MANAGER     RUNNING
REPLICAT    RUNNING     REP_2A      00:00:00      00:00:09
REPLICAT    ABENDED     REP_2B      00:00:00      00:33:04

GGSCI (TARGET) >
```

   Note the group that has a status of `ABENDED`: _____

3. View the Oracle GoldenGate log.
   a. Use the `View GGSEVT` command to determine the cause of the `ABEND`.

```
GGSCI (TARGET) > View GGSEVT
2014-06-07 12:49:32  INFO    OGG-00996  Oracle GoldenGate Delivery for Oracle,
rep_2b.prm:  REPLICAT REP_2B st
arted.
2014-06-07 12:49:32  INFO    OGG-03522  Oracle GoldenGate Delivery for Oracle,
rep_2b.prm:  Setting session ti
me zone to source database time zone 'GMT'.
2014-06-07 12:49:32  INFO    OGG-03506  Oracle GoldenGate Delivery for Oracle,
rep_2b.prm:  The source databas
e character set, as determined from the trail file, is UTF-8.
2014-06-07 12:49:33  WARNING OGG-00869  Oracle GoldenGate Delivery for Oracle,
rep_2b.prm:  OCI Error ORA-0000
1: unique constraint (TARGET.BIG_DEPT_PRIMARY_KEY) violated (status = 1), SQL <INSERT
INTO "TARGET"."BIG_DEPT"
 ("DEPTNO","DNAME","LOC") VALUES (:a0,:a1,:a2)>.
2014-06-07 12:49:33  WARNING OGG-01004  Oracle GoldenGate Delivery for Oracle,
rep_2b.prm:  Aborted grouped tr
ansaction on 'TARGET.BIG_DEPT', Database error 1 (OCI Error ORA-00001: unique constraint
(TARGET.BIG_DEPT_PRIM
ARY_KEY) violated (status = 1), SQL <INSERT INTO "TARGET"."BIG_DEPT"
("DEPTNO","DNAME","LOC") VALUES (:a0,:a1,
:a2)>).
2014-06-07 12:49:33  WARNING OGG-01003  Oracle GoldenGate Delivery for Oracle,
rep_2b.prm:  Repositioning to r
ba 1509 in seqno 0.
2014-06-07 12:49:33  WARNING OGG-01154  Oracle GoldenGate Delivery for Oracle,
rep_2b.prm:  SQL error 1 mappin
g SOURCE.BIG_DEPT to TARGET.BIG_DEPT OCI Error ORA-00001: unique constraint
(TARGET.BIG_DEPT_PRIMARY_KEY) viol
ated (status = 1), SQL <INSERT INTO "TARGET"."BIG_DEPT" ("DEPTNO","DNAME","LOC") VALUES
(:a0,:a1,:a2)>.
2014-06-07 12:49:33  WARNING OGG-01003  Oracle GoldenGate Delivery for Oracle,
rep_2b.prm:  Repositioning to r
ba 1509 in seqno 0.
2014-06-07 12:49:33  ERROR   OGG-01296  Oracle GoldenGate Delivery for Oracle,
rep_2b.prm:  Error mapping from
 SOURCE.BIG_DEPT to TARGET.BIG_DEPT.
2014-06-07 12:49:33  ERROR   OGG-01668  Oracle GoldenGate Delivery for Oracle,
rep_2b.prm:  PROCESS ABENDING.
GGSCI (TARGET) >
```

b. Note the history of the process startup, normal and abnormal terminations, and the warning and error messages.

c. Do you see a recent error message? __Y __N

4. View the process report.

   a. Use the `View Report` command to determine the cause of the `ABEND`. You should see the same error message as in the Oracle GoldenGate log, but with more detail.

```
GGSCI (TARGET)> View Report rep_2b

***********************************************************************
                Oracle GoldenGate Delivery for Oracle
 Version 12.1.2.0.0 17185003 OGGCORE_12.1.2.0.0_PLATFORMS_130924.1316_FBO
   Linux, x64, 64bit (optimized), Oracle 12c on Sep 25 2013 02:54:11
Copyright (C) 1995, 2013, Oracle and/or its affiliates. All rights reserved.

                    Starting at 2014-06-07 12:49:31
***********************************************************************
Operating System Version:
Linux
Version #1 SMP Wed May 25 17:46:45 EDT 2011, Release 2.6.32-
100.34.1.el6uek.x86_64
Node: host01.example.com
Machine: x86_64
                         soft limit   hard limit
Address Space Size   :    unlimited    unlimited
Heap Size            :    unlimited    unlimited
File Size            :    unlimited    unlimited
CPU Time             :    unlimited    unlimited
Process id: 6043
Description:

***********************************************************************
**            Running with the following parameters                  **
***********************************************************************
--More-- (11%)
```

b. Write down the error and what you think is the cause.

Error _____

Cause _____

c. Occasionally the process report file cannot be generated due to an OS issue (for example, the disk may be full, directory `dirrpt/` does not exist or has the wrong permissions, and so on). If that is the case, you can send the report to stdout (the screen) by running the process from the command shell instead of GGSCI. *Do not do it,* but if you needed to, you could run the following:

```
[OS OGG_Source]$ extract paramfile dirprm/ext_2a.prm
```

or

```
[OS OGG_Target]$ replicat paramfile dirprm/rep_2b.prm
```

and this will send the report to the screen for you to see.

5. Determine the discard file location.

a. View the Replicat parameter file to determine the location of the discard file for `rep_2b`, based on the `DiscardFile` parameter. (The discard file is not shown in the `Info` command's `Detail` output, as other Oracle GoldenGate configuration files are.)

```
GGSCI (TARGET) > View Param rep_2b
```

b. Record the location or copy it to the clipboard.

_____

6. View the discard file.
   a. Use `View Report` and supply the location of the discard file as input.

```
GGSCI (TARGET) > View Report ./dirrpt/rep_2b.dsc

Oracle GoldenGate Delivery for Oracle process started, group REP_2B discard
file opened: 2014-06-07 12:49:31.821874
Current time: 2014-06-07 12:49:33
Discarded record from action ABEND on error 1

OCI Error ORA-00001: unique constraint (TARGET.BIG_DEPT_PRIMARY_KEY) violated
(status = 1), SQL <INSERT INTO "
TARGET"."BIG_DEPT" ("DEPTNO","DNAME","LOC") VALUES (:a0,:a1,:a2)>
Aborting transaction on ./dirdat/rt beginning at seqno 0 rba 1509
                         error at seqno 0 rba 1509
Problem replicating SOURCE.BIG_DEPT to TARGET.BIG_DEPT
Mapping problem with insert record (target format)...
*
DEPTNO = 1
000000: 31                                              |1              |

DNAME = ACCOUNTING
000000: 41 43 43 4f 55 4e 54 49 4e 47                   |ACCOUNTING     |

LOC = NEW YORK
000000: 4e 45 57 20 59 4f 52 4b                         |NEW YORK       |
*

Process Abending : 2014-06-07 12:49:33

GGSCI (TARGET) >
```

   b. See if you can determine which data caused the problem.

How might you fix this error?

_____

_____

_____

Cleanup

When you have completed this practice, run the following script from your source GGSCI session before moving to the next practice:

Note: Before executing this script, you must exit all open SQL*Plus sessions.

```
GGSCI (SOURCE) > Obey ../Labs/Practice_00/cleanup_src.oby
```

Practices for Lesson 3: Tools

Chapter 3

Practices for Lesson 3: Examining the Evidence

Practices Overview

In these practices, you use `ShowSyntax` and `logdump`.

Prerequisites

First run: Before starting this practice for the first time, perform the following tasks:

1. From the source terminal, run the following script in GGSCI:

```
GGSCI (SOURCE) > Obey /home/oracle/Labs/Practice_03/test.oby
```

2. `Extract ext_3a` is started in the setup file. Ensure that it is running:

```
GGSCI (SOURCE) > Info ext_3a
EXTRACT    EXT_3A    Last Started 2014-06-07 14:19   Status RUNNING
Checkpoint Lag       00:00:00 (updated 00:00:01 ago)
Process ID           8572
Log Read Checkpoint  Oracle Redo Logs
                     2014-06-07 14:50:02  Seqno 232, RBA 36401152
                     SCN 0.8121739 (8121739)
GGSCI (SOURCE) >
```

Note: If you want to restart this practice, exit all open SQL*Plus sessions. Then run the following from your source GGSCI session:

```
GGSCI (SOURCE) > Obey /home/oracle/Labs/Practice_00/
cleanup_src.oby
GGSCI (SOURCE) > Obey /home/oracle/Labs/Practice_03/test.oby
```

Practice 3-1: Using `ShowSyntax`

Overview

In this practice, you first edit the Replicat parameter file to include the parameters required to display SQL statements, and then you execute the Replicat program from the command prompt. You explore two methods of viewing the SQL statements: by using `SQLEXEC` and by using `sql_trace`.

Tasks

1. Modify the Replicat parameter file to show the SQL syntax of a statement.
   a. Choose your editor for this session. By default, UNIX uses `vi`. If you want a GUI editor, such as `gedit`, specify it here (but you need to do it each time you restart GGSCI):

```
[OS OGG_Target]$ ./ggsci
GGSCI (TARGET) > Set Editor gedit
```

   b. Edit the parameter file for the Replicat group `rep_3a` and remove the `(--)` comments for `NoDynSQL`, `NoBinaryChars`, and `ShowSyntax` by issuing the following command:

```
GGSCI (TARGET) > Edit Param rep_3a
```

   The editor opens. Find the following keywords:

```
NoDynSQL
ShowSyntax
```

   Make the changes (remove the dashes):

```
GGSCI (TARGET) > View Param rep_3a

(...many lines omitted for clarity...)

NoDynSQL
-- Use SHOWSYNTAX to cause Replicat to display its SQL statements before
executing them.
ShowSyntax

GGSCI (TARGET) >
```

   c. Save and close the parameter file.

2. Run Replicat from the command line.
   a. Open a new terminal or command window, change to the `OGG_Target` directory, and execute Replicat from the command line:

```
[OS ~]$ source ora12env.sh
[OS ~]$ ogg_trg
[OS OGG_Trg]$ ./replicat PARAMFILE ./dirprm/rep_3a.prm
USESUBDIRS
```

   b. The SQL statement is displayed on the terminal. You are prompted to enter a value:

```
(...many lines omitted for clarity...)

********************************************************************
**                     Run Time Messages                          **
********************************************************************
Opened trail file ./dirdat/3a000000 at 2014-06-07 14:55:49
2014-06-07 14:55:49  INFO    OGG-03522  Setting session time zone to source
database time zone 'GMT'.
2014-06-07 14:55:49  INFO    OGG-03506  The source database character set, as
determined from the trail file, is UTF-8.
MAP resolved (entry source.big_dept):
  Map "SOURCE"."BIG_DEPT", Target target.big_dept;
Using following columns in default map by name:
  DEPTNO, DNAME, LOC
Using the following key columns for target table TARGET.BIG_DEPT: DEPTNO.
INSERT INTO "TARGET"."BIG_DEPT" ("DEPTNO","DNAME","LOC") VALUES
('1','ACCOUNTING','NEW YORK')
Statement length: 93

(S)top display, (K)eep displaying (default): K
```

Enter **K**, and then press Enter again. Continue entering **K** until you see an update statement.

Note: Despite the fact that it says "default," you do have to enter a **K**, because merely pressing Enter is not enough.

c. Copy the SQL syntax of that statement to the clipboard.

```
File  Edit  View  Terminal  Tabs  Help                                    _
     *Copy       Shift+Ctrl+C

INSERT INTO "TARGET"."BIG_EMP3"
("EMPNO","ENAME","JOB","MGR","HIREDATE","SAL","COMM","DEPTNO") VALUES
('4','JONES','MANAGER','7839',TO_DATE('1981-04-02 00:00:00','YYYY-MM-DD
HH24:MI:SS'),'2975.00',NULL,'2')
Statement length: 206

(S)top display, (K)eep displaying (default): K









Statement length: 230

(S)top display, (K)eep displaying (default):
```

d. Enter **S** (`stop display`) to resume normal processing and to stop printing SQL statements to the screen.

3. Create and view an explain plan.
   a. Open a SQL*Plus session. Add the title **SQL*Plus**. Then log in to the Oracle target schema:

```
[OS ~]$ sqlplus target/oracle@ogg12c
Connected to:
SQL>
```

   b. In SQL*Plus, create an explain plan table by using the following script:

```
SQL> @?/rdbms/admin/utlxplan.sql
Table created.

SQL>
```

   c. Generate an explain plan by pasting the copied SQL update statement in the EXPLAIN PLAN statement as shown as follows.

   Note: You need to enter **EXPLAIN PLAN for**, and then paste the copied update statement at the command line and end with a semi-colon.

   Note: Alternatively, you can use the following example:

```
SQL> explain plan for UPDATE "TARGET"."BIG_EMP3" x SET x."ENAME" =
'GEORGE',x."JOB" = 'PRESIDENT',x."MGR" = NULL,x."HIREDATE" =
TO_DATE('1981-11-17 00:00:00','YYYY-MM-DD HH24:MI:SS'),x."SAL" =
'5000.00',x."COMM" = NULL,x."DEPTNO" = '1' WHERE x."EMPNO"='1' AND
ROWNUM = 1 ;

Explained.

SQL>
```

4. Analyze the explain plan.
   a. In SQL*Plus, enter the dbms_xplan.display statement to view the plan.

```
SQL> SELECT * FROM TABLE(dbms_xplan.display);
```

```
PLAN_TABLE_OUTPUT
------------------------------------------------------------------------------
Plan hash value: 590204482

------------------------------------------------------------------------------
| Id  | Operation           | Name     | Rows | Bytes | Cost(%CPU)|  Time    |
------------------------------------------------------------------------------
|   0 | UPDATE STATEMENT    |          |    1 |    87 |     9  (0)| 00:00:01 |
|   1 |  UPDATE             | BIG_EMP3 |      |       |           |          |
|*  2 |   COUNT STOPKEY     |          |      |       |           |          |
|*  3 |    TABLE ACCESS FULL| BIG_EMP3 |    1 |    87 |     9  (0)| 00:00:01 |
------------------------------------------------------------------------------

PLAN_TABLE_OUTPUT
------------------------------------------------------------------------------
Predicate Information (identified by operation id):
---------------------------------------------------

   2 - filter(ROWNUM=1)
   3 - filter("X"."EMPNO"=1)

Note
-----
   - dynamic sampling used for this statement (level=2)

20 rows selected.
SQL>
```

b. In your opinion, which of the following caused the problem?
   - Absence of the **SET** clause
   - A **WHERE** clause on a non-indexed column
   - Replicat having a bad day

c. What would you do to fix the problem?

_____

_____

5. Re-comment the parameters.
   a. In the target GGSCI session, stop **rep_3a** and edit the Replicat parameter file:

```
GGSCI (TARGET) > Stop Replicat rep_3a

Sending STOP request to REPLICAT REP_3A ...
Request processed.

GGSCI (TARGET) > Edit Param rep_3a
```

   b. Add the comments again (-- double-dash) for NoDynSQL, NoBinaryChars, and ShowSyntax.

```
-- NoDynSQL
-- ShowSyntax
-- NoBinaryChars
```

   Do not close the file yet.

6. An alternative method is to use SQL Trace. Oracle tracing is an option that you can use to analyze processing. You use the SQLEXEC parameter with this method.
   a. Still in the **rep_3a** parameter file, uncomment the SQLEXEC parameter:

```
Replicat rep_3a
SQLEXEC (alter session set sql_trace=true)
UserID ogguser, Password oracle
DiscardFile dirrpt/rep_3a.dsc , Append
ReportCount Every 10000 Records, Rate
-- NoDynSQL
-- ShowSyntax
-- NoBinaryChars
AssumeTargetDefs
Map source.big_dept, Target target.big_dept;
Map source.big_emp,  Target target.big_emp3 KeyCols (empno);
```

b. Save and close the parameter file.

7. Start Replicat `rep_3a`.

```
GGSCI (TARGET) > Start Replicat rep_3a
```

8. Enter the `Info` command to check whether Replicat is running.

```
GGSCI (TARGET) > Info Replicat rep_3a
```

Is it running? __Y __N

9. If it is not running, view the report to help determine the cause.
   a. Execute the following command to view the report:

```
GGSCI (TARGET) > View Report ./dirrpt/REP_3A.rpt
```

   b. Look at the message. Did Replicat have a problem with the `SQLEXEC` statement, or was it a problem with the execution of the statement? Think about what is needed before you can execute a SQL statement successfully. What do you think is the problem?

_____

_____

10. Fix the problem, start Replicat, and enter the `Info rep_3a` command to make sure that it is `RUNNING`.

```
GGSCI (TARGET) 12> Start Replicat rep_3a

Sending START request to MANAGER ...
REPLICAT REP_3A starting

GGSCI (TARGET) 13> Info Replicat rep_3a

REPLICAT   REP_3A    Last Started 2012-11-14 13:00   Status RUNNING
Checkpoint Lag       00:00:00 (updated 00:00:09 ago)
Log Read Checkpoint  File ./dirdat/3a000000
                     First Record  RBA 9985
```

11. In a SQL*Plus window, run the following script to update the source tables.

```
SQL> @/home/oracle/Labs/Practice_03/update_data.sql
```

12. In your target GGSCI session, generate statistics to ensure that Replicat has processed some statements. Make sure that the numbers have increased.

```
GGSCI (TARGET) > Stats Replicat rep_3a
(...many lines omitted for clarity...)
*** Hourly statistics since 2014-06-07 16:44:26 ***
     Total inserts                                 0.00
     Total updates                                 1.00
     Total deletes                                 0.00
     Total discards                                0.00
     Total operations                              1.00

*** Latest statistics since 2014-06-07 16:44:26 ***
     Total inserts                                 0.00
     Total updates                                 1.00
     Total deletes                                 0.00
     Total discards                                0.00
     Total operations                              1.00

End of Statistics.

GGSCI (TARGET) >
```

13. Stop Replicat.

```
GGSCI (TARGET) > Stop Replicat rep_3a
```

14. In a SQL*Plus window, locate the Oracle `user_dump_dest` directory.

```
SQL> show parameter user_dump_dest
NAME                 TYPE      VALUE
-------------------- --------- ------------------------------
user_dump_dest       string    /u01/app/oracle/diag/rdbms/ogg
                               l2c/ogg12c/trace
```

15. Exit SQL*Plus.
16. Open the new terminal, navigate to the Oracle `user_dump_dest` directory, and look for a trace file named `orcl_ora_nnnn.trc` with the latest time stamp.

```
[OS ~]$ cd /u01/app/oracle/diag/rdbms/ogg12c/ogg12c/trace
[OS trace]$ ls -latr

(...many lines omitted for clarity...)

-rw-r-----. 1 oracle oinstall    4672 Jun  7 16:46 ogg12c_dbrm_3461.trm
-rw-r-----. 1 oracle oinstall   71487 Jun  7 16:46 ogg12c_dbrm_3461.trc
-rw-r-----. 1 oracle oinstall     940 Jun  7 16:47 ogg12c_mmon_3481.trm
-rw-r-----. 1 oracle oinstall    8592 Jun  7 16:47 ogg12c_mmon_3481.trc
[OS trace]$
```

Record the name of the last trace file: _____

If the trace file cannot be identified by the time stamp, use the `grep` command to look for the table named `BIG_EMP3`:

```
[OS trace] grep -Hl BIG_EMP3 *.trc
```

17. Run `tkprof` from the command line with the trace file (all on one line):

```
[OS trace]$ tkprof  orcl_ora_10264.trc  trace_out.txt
            explain=ogguser/oracle sys=no

TKPROF: Release 11.2.0.3.0 - Development on Wed Nov 14 13:23:25 2012
Copyright (c) 1982, 2011, Oracle and/or its affiliates.  All rights reserved.

[OS trace]$
```

Substitute your latest trace file for *10264*.

18. Locate and open the trace output (by double-clicking the report file in the window) and analyze the trace statements. Find the update statements and execution plans (**Hint:** Look for `BIG_EMP3`).

```
[OS trace]$ gedit trace_out.txt

TKPROF: Release 11.2.0.3.0 - Development on Wed Nov 14 13:23:25 2012
Copyright (c) 1982, 2011, Oracle and/or its affiliates.  All rights reserved.
Trace file: orcl_ora_10264.trc
Sort options: default

********************************************************************************
count    = number of times OCI procedure was executed
cpu      = cpu time in seconds executing
elapsed  = elapsed time in seconds executing
disk     = number of physical reads of buffers from disk
query    = number of buffers gotten for consistent read
current  = number of buffers gotten in current mode (usually for update)
rows     = number of rows processed by the fetch or execute call
********************************************************************************

(...many lines omitted for clarity...)
```

```
********************************************************************************

SQL ID: 1fhjbmdchw1rn Plan Hash: 590204482

UPDATE "TARGET"."BIG_EMP3" x SET x."ENAME" = :a1,x."JOB" = :a2,x."MGR" = :a3,
  x."HIREDATE" = :a4,x."SAL" = :a5,x."COMM" = :a6,x."DEPTNO" = :a7
WHERE
 x."EMPNO" = :b0 AND ROWNUM = 1

call     count       cpu    elapsed       disk      query    current        rows
------- ------  -------- ---------- ---------- ---------- ----------  ----------
Parse        1      0.00       0.00          0          0          0           0
Execute     22      0.00       0.00          0        155         45          22
Fetch        0      0.00       0.00          0          0          0           0
------- ------  -------- ---------- ---------- ---------- ----------  ----------
total       23      0.00       0.00          0        155         45          22

Misses in library cache during parse: 1
Misses in library cache during execute: 1
Optimizer mode: ALL_ROWS
Parsing user id: 142  (TARGET)
Number of plan statistics captured: 1

Rows (1st) Rows (avg) Rows (max)  Row Source Operation
---------- ---------- ----------  ---------------------------------------------------
         0          0          0  UPDATE BIG_EMP3(cr=17 pr=0 pw=0 time=1017 us)
         1          1          1   COUNT STOPKEY (cr=17 pr=0 pw=0 time=187 us)
         1          1          1    TABLE ACCESS FULL BIG_EMP3 (cr=17 pr=0 pw=0
                                        time=169 us cost=9 size=87
card=1)
Rows     Execution Plan
-------  ---------------------------------------------------
      0  UPDATE STATEMENT   MODE: ALL_ROWS
      0   UPDATE OF 'BIG_EMP3'
      1    COUNT (STOPKEY)
      1     TABLE ACCESS (FULL) OF 'BIG_EMP3' (TABLE)

********************************************************************************
```

Close the trace file.

19. Answer the following questions about the update:
    - Was an index used? __Y __N
    - How many rows were updated? _____

Practice 3-2: Using `logdump`

Overview

In this practice, you use the `logdump` utility to view information in the Oracle GoldenGate trail. You learn how to access specific trails, set up the `logdump` view, move through the records in the trail, filter for certain records, and write records to a log.

Note: To get help for `logdump` commands, enter **`help`** at the `logdump` prompt.

Tasks

1. Open a Terminal window, source the `ora12env.sh` file, and invoke the `ggs_src` macro to change directory to `/u01/app/oracle/product/ogg_src`. Open a trail file and set up the view.
   a. Change directory to `/u01/app/oracle/product/ogg_src`.

```
[OS ~]$ source ora12env.sh
[OS ~]$ ogg_src
[OS ogg_src]$
```

   b. Launch `logdump` from the OS shell command prompt.

```
[OS ogg_src]$ ./logdump

Oracle GoldenGate Log File Dump Utility for Oracle
Version 12.1.2.0.0 17185003 OGGCORE_12.1.2.0.0_PLATFORMS_130924.1316
Copyright (C) 1995, 2013, Oracle and/or its affiliates. All rights reserved.

Logdump 1 >
```

   c. Open the following Oracle GoldenGate trail:

```
Logdump > Open /home/oracle/Labs/Practice_03/pn000004
Current LogTrail is /home/oracle/Labs/Practice_03/pn000004
Logdump >
```

   d. Enable the display to show headers and detail.

```
Logdump > GHDR On
Logdump > Detail On
Logdump >
```

2. Practice moving through records.
   a. Enter **`n`** to view the first (next) record.

```
Logdump > N
2014/06/27 07:42:45.133.000 FileHeader           Len  1499 RBA 0
Name: *FileHeader*
 3000 037d 3000 0008 4747 0d0a 544c 0a0d 3100 0002 | 0..}0...GG..TL..1...
 0004 3200 0004 2000 0000 3300 0008 02f2 22f7 877b | ..2... ...3.....".{
 b6c8 3400 0050 004e 7572 693a 424f 4e41 5a5a 492d | ..4..P.Nuri:BONAZZI-
 5043 3a61 753a 6f72 6163 6c65 3a63 6f6d 3a64 7269 | PC:au:oracle:com:dri
 7665 2d44 3a61 7070 3a65 626f 6e61 7a7a 693a 7072 | ve-D:app:ebonazzi:pr
 6f64 7563 743a 3132 2e31 2e32 3a6f 6767 5f73 7263 | oduct:12.1.2:ogg_src
 3a50 494e 5441 3500 0054 3500 0050 004e 7572 693a | :PINTA5..T5..P.Nuri:
Logdump >
```

b. Enter **n** again to go to the next record.

```
Logdump > N
_____________________________________________________________________
Hdr-Ind    :     E  (x45)     Partition  :     .  (x00)
UndoFlag   :     .  (x00)     BeforeAfter:     A  (x41)
RecLength  :     0  (x0000)   IO Time    : 2014/06/27 07:42:28.717.000
IOType     :   151  (x97)     OrigNode   :     0  (x00)
TransInd   :     .  (x03)     FormatType :     R  (x52)
SyskeyLen  :     0  (x00)     Incomplete :     .  (x00)
AuditRBA   :          0       AuditPos   : 0
Continued  :     N  (x00)     RecCount   :     0  (x00)

2014/06/27 07:42:28.717.000 RestartOK            Len     0 RBA 1507
Name:
After  Image:                                             Partition 0   G  s
Logdump >
```

- What is the operation type of this record?
  (**Hint:** 5 = insert, 10 = update, 3 = delete, 151 = RestartOK)

  _____

- What is the transaction indicator of this record?
  (**Hint:** x00 = first statement, x01= middle of transaction, x02 = end of transaction, x03 = only statement in transaction)

  _____

- What is the position of this record in the trail file?
  (**Hint:** Do not confuse this with the position of the commit record in the data source or the position of Extract in the data source.)

  _____

- What other attributes of this record can you identify based on the class discussion?

  _____

  _____

  _____

c. Scan for the next record header. Note the transaction indicator.

```
Logdump> ScanForHeader

_____________________________________________________________________
Hdr-Ind    :     E  (x45)     Partition  :     .  (x04)
UndoFlag   :     .  (x00)     BeforeAfter:     A  (x41)
RecLength  :    92  (x005c)   IO Time    : 2014/06/27 07:45:27.000.000
IOType     :     5  (x05)     OrigNode   :   255  (xff)
TransInd   :     .  (x00)     FormatType :     R  (x52)
SyskeyLen  :     0  (x00)     Incomplete :     .  (x00)
AuditRBA   :         34       AuditPos   : 19288080
Continued  :     N  (x00)     RecCount   :     1  (x01)

2014/06/27 07:45:27.000.000 Insert               Len    92 RBA 1567
Name: SOURCE.TRANSACTION
After  Image:                                             Partition 4   G  b
 0000 0007 0000 0003 3630 3100 0100 0d00 0000 0941 | ........601........A
 5431 3435 3032 3030 0002 000e 0000 000a 4545 3031 | T1450200........EE01
 3038 3638 3030 0003 0007 0000 0003 3230 3800 0400 | 086800........208...
 1f00 0032 3031 342d 3036 2d32 373a 3037 3a34 353a | ...2014-06-27:07:45:
 3237 2e32 3531 3030 3030 3030                     | 27.251000000
Column     0 (x0000), Len     7 (x0007)
Column     1 (x0001), Len    13 (x000d)
Column     2 (x0002), Len    14 (x000e)
Column     3 (x0003), Len     7 (x0007)
Column     4 (x0004), Len    31 (x001f)
Logdump >
```

d. Scan for the end of the transaction. Note the transaction indicator.

```
Logdump > ScanForEndTrans
End of Transaction found at RBA 1784

_____________________________________________________________________
Hdr-Ind    :     E  (x45)     Partition  :     .  (x04)
UndoFlag   :     .  (x00)     BeforeAfter:     A  (x41)
RecLength  :   225  (x00e1)   IO Time    : 2014/06/27 07:45:27.000.000
IOType     :   134  (x86)     OrigNode   :   255  (xff)
TransInd   :     .  (x02)     FormatType :     R  (x52)
SyskeyLen  :     0  (x00)     Incomplete :     .  (x00)
AuditRBA   :         34       AuditPos   : 19288944
Continued  :     N  (x00)     RecCount   :     1  (x01)

2014/06/27 07:45:27.000.000 GGSUnifiedUpdate     Len   225 RBA 1784
Name: SOURCE.ACCOUNT
After  Image:                                             Partition 4   G  e
 0000 00bc 0000 000e 0000 000a 4545 3031 3038 3638 | ............EE010868
 3030 0001 0009 0000 0005 416e 6e69 6500 0200 0b00 | 00........Annie.....
 0000 0757 6865 656c 6572 0003 0017 0000 0013 6177 | ...Wheeler........aw
 6865 656c 6572 407a 6f6f 7a7a 792e 6d69 6c00 0400 | heeler@zoozzy.mil...
 1a00 0000 1630 3738 3230 2053 6163 6874 6a65 6e20 | .....07820 Sachtjen
 5061 726b 7761 7900 0500 0800 0000 0449 6f77 6100 | Parkway........Iowa.
 0600 0f00 0000 0b38 3738 2d34 332d 3237 3635 0007 | .......878-43-2765..
Before Image           Len   192 (x000000c0)
BeforeColumnLen    188 (x000000bc)
Column     0 (x0000), Len    14 (x000e)
Column     1 (x0001), Len     9 (x0009)
Column     2 (x0002), Len    11 (x000b)
Column     3 (x0003), Len    23 (x0017)
Column     4 (x0004), Len    26 (x001a)
Column     5 (x0005), Len     8 (x0008)
Column     6 (x0006), Len    15 (x000f)
Column     7 (x0007), Len    10 (x000a)
Column     8 (x0008), Len     8 (x0008)
Column     9 (x0009), Len    11 (x000b)
Column    10 (x000a), Len     9 (x0009)

After Image            Len    33 (x00000021)
Column     0 (x0000), Len    14 (x000e)
Column     9 (x0009), Len    11 (x000b)
Logdump >
```

e. Navigate to the record at `RBA 2631` in the trail file.

Note: This is to skip *past* the current transaction. The current is `1784`, found at the top of the `ScanForEndTrans` output.

```
Logdump > Pos 2631
Reading forward from RBA 2631
Logdump >
```

f. Scan for the end of the transaction. Note the transaction indicator.

```
Logdump > ScanForEndTrans
End of Transaction found at RBA 2850

_____________________________________________________________________
Hdr-Ind    :     E  (x45)     Partition  :     .  (x04)
UndoFlag   :     .  (x00)     BeforeAfter:     A  (x41)
RecLength  :   217  (x00d9)   IO Time    : 2014/06/27 07:45:37.000.000
IOType     :   134  (x86)     OrigNode   :   255  (xff)
TransInd   :     .  (x02)     FormatType :     R  (x52)
SyskeyLen  :     0  (x00)     Incomplete :     .  (x00)
AuditRBA   :         34       AuditPos   : 19303352
Continued  :     N  (x00)     RecCount   :     1  (x01)

2014/06/27 07:45:37.000.000 GGSUnifiedUpdate     Len   217 RBA 2850
Name: SOURCE.ACCOUNT
After  Image:                                             Partition 4   G  e
 0000 00b6 0000 000e 0000 000a 4545 3038 3334 3930 | ............EE083490
 3030 0001 0009 0000 0005 4a65 7373 6500 0200 0900 | 00........Jesse.....
 0000 0550 7269 6365 0003 0013 0000 000f 6a70 7269 | ...Price........jpri
 6365 4067 6562 612e 6e65 7400 0400 1700 0000 1331 | ce@geba.net........1
 3933 3320 426f 6277 6869 7465 2050 6c61 7a61 0005 | 933 Bobwhite Plaza..
 000c 0000 0008 436f 6c6f 7261 646f 0006 000f 0000 | ......Colorado......
 000b 3939 332d 3133 2d38 3332 3800 0700 0a00 0000 | ..993-13-8328.......
Before Image          Len   186 (x000000ba)
BeforeColumnLen    182 (x000000b6)
Column     0 (x0000), Len    14 (x000e)
Column     1 (x0001), Len     9 (x0009)
Column     2 (x0002), Len     9 (x0009)
Column     3 (x0003), Len    19 (x0013)
Column     4 (x0004), Len    23 (x0017)
Column     5 (x0005), Len    12 (x000c)
Column     6 (x0006), Len    15 (x000f)
Column     7 (x0007), Len    10 (x000a)
Column     8 (x0008), Len     8 (x0008)
Column     9 (x0009), Len    10 (x000a)
Column    10 (x000a), Len     9 (x0009)

After Image           Len    31 (x0000001f)
Column     0 (x0000), Len    14 (x000e)
Column     9 (x0009), Len     9 (x0009)
Logdump >
```

g. Search for insert records. Search for the first one, and then type `n` a few times to move through the next few.

```
Logdump> Show RecType
LogTrail record types
    1 - Abort                          2 - Commit
    3 - Delete                         4 - EndRollBack
    5 - Insert                         6 - Prepared
    7 - TMF-Shutdown                   8 - TransBegin
    9 - TransRelease                  10 - Update

(...many lines omitted for clarity...)

Logdump>
```

Note: You can also use the variations `SFT 5` or `SFT Insert`.

```
Logdump> ScanForType 5

_____________________________________________________________________
Hdr-Ind    :     E  (x45)     Partition  :     .  (x04)
UndoFlag   :     .  (x00)     BeforeAfter:     A  (x41)
RecLength  :    92  (x005c)   IO Time    : 2014/06/27 07:45:37.000.000
IOType     :     5  (x05)     OrigNode   :   255  (xff)
TransInd   :     .  (x00)     FormatType :     R  (x52)
SyskeyLen  :     0  (x00)     Incomplete :     .  (x00)
AuditRBA   :         34       AuditPos   : 19304464
Continued  :     N  (x00)     RecCount   :     1  (x01)

2014/06/27 07:45:37.000.000 Insert               Len    92 RBA 3160
Name: SOURCE.TRANSACTION
After  Image:                                             Partition 4   G  b
 0000 0007 0000 0003 3630 3400 0100 0d00 0000 0941 | ........604........A
 5433 3535 3630 3030 0002 000e 0000 000a 4545 3033 | T3556000........EE03
 3536 3637 3030 0003 0007 0000 0003 2d31 3700 0400 | 566700........-17...
 1f00 0032 3031 342d 3036 2d32 373a 3037 3a34 353a | ...2014-06-27:07:45:
 3337 2e34 3133 3030 3030 3030                     | 37.413000000
Column     0 (x0000), Len     7 (x0007)
Column     1 (x0001), Len    13 (x000d)
Column     2 (x0002), Len    14 (x000e)
Column     3 (x0003), Len     7 (x0007)
Column     4 (x0004), Len    31 (x001f)
Logdump >
```

h. Go back to the beginning of the trail file.

```
Logdump > Pos 0
Reading forward from RBA 0
Logdump >
```

3. Determine a count.
   a. Display a detailed count for this file.

```
Logdump > Count Detail
Reading forward from RBA 0
Logdump 38 >count detail
LogTrail /home/oracle/Labs/Practice_03/pn000004 has 9059 records
Total Data Bytes           1439100
  Avg Bytes/Record             158
Insert                        4789
RestartOK                        1
Others                           1
After Images                  9058

Average of 4270 Transactions
    Bytes/Trans .....         438
    Records/Trans ...           2
    Files/Trans .....           0
                                                    Partition 0
RestartOK                        1
After Images                     1

*FileHeader*                                        Partition 0
Total Data Bytes              1499
  Avg Bytes/Record            1499
Others                           1

SOURCE.ACCOUNT                                      Partition 4
Total Data Bytes            964996
  Avg Bytes/Record             226
After Images                  4268

SOURCE.EXCEPTION                                    Partition 4
Total Data Bytes             76927
  Avg Bytes/Record             147
Insert                        521
After Images                  521

SOURCE.TRANSACTION                                  Partition 4
Total Data Bytes            395678
  Avg Bytes/Record              92
Insert                        4268
After Images                  4268
Logdump >
```

- Determine the total number of tables that are present in the trail.

  _____

- Determine the number of operations per table.

  _____

b. Display a count of transactions for all the `rt` trail files.

```
Logdump > Count /home/oracle/Labs/Practice_03/pn*
Current LogTrail is /home/oracle/Labs/Practice_03/pn000004
LogTrail /home/oracle/Labs/Practice_03/pn000004 has 9059 records
LogTrail /home/oracle/Labs/Practice_03/pn000004 closed
LogTrail /home/oracle/Labs/Practice_03/pn* has 9059 records

 (...many lines omitted for clarity...)
After Images                 4268
Logdump >
```

4. Filter for a string.

a. If it is not still open from the previous section, open the following trail:

```
Logdump > Open /home/oracle/Labs/Practice_03/pn000004
LogTrail /home/oracle/Labs/Practice_03/pn000004 closed
Current LogTrail is /home/oracle/Labs/Practice_03/pn000004
Logdump >
```

b. Set a filter to include only records for the `SOURCE.ACCOUNT` table that contain the string value of “Kenneth.” To find the record for Kenneth Mitchell, execute the commands provided as follows.

Note: The `logdump Include Filename` command is case-sensitive, so a lowercase `source.account` will not match any records. `String` is case-sensitive as well.

```
Logdump >Filter include Filename SOURCE.ACCOUNT
Logdump >Filter String "Kenneth"
Logdump >Filter Match All
Logdump >Filter show
Data filters are ENABLED
Include  Match ALL
 Filename-0 : SOURCE.ACCOUNT
 String-0   : ( 7),  CaseSensitive
 4b65 6e6e 6574 68                                      | Kenneth
Exclude  Match ANY
Logdump > Next
Logdump 105 >n

_____________________________________________________________________

Hdr-Ind    :     E  (x45)     Partition  :     .  (x04)
UndoFlag   :     .  (x00)     BeforeAfter:     A  (x41)
RecLength  :   238  (x00ee)   IO Time    : 2014/06/27 07:47:04.000.000
IOType     :   134  (x86)     OrigNode   :   255  (xff)
TransInd   :     .  (x02)     FormatType :     R  (x52)
SyskeyLen  :     0  (x00)     Incomplete :     .  (x00)
AuditRBA   :         34       AuditPos   : 19558792
Continued  :     N  (x00)     RecCount   :     1  (x01)

2014/06/27 07:47:04.000.000 GGSUnifiedUpdate     Len   238 RBA 17213
Name: SOURCE.ACCOUNT
After  Image:                                             Partition 4   G  e
 0000 00c9 0000 000e 0000 000a 4545 3032 3836 3136 | ............EE028616
 3030 0001 000b 0000 0007 4b65 6e6e 6574 6800 0200 | 00........Kenneth...
 0c00 0000 084d 6974 6368 656c 6c00 0300 1b00 0000 | .....Mitchell.......
 176b 6d69 7463 6865 6c6c 4073 6b69 7066 6972 652e | .kmitchell@skipfire.
 6e61 6d65 0004 0018 0000 0014 3620 476f 6c66 2043 | name........6 Golf C
 6f75 7273 6520 4369 7263 6c65 0005 000f 0000 000b | ourse Circle........
 436f 6e6e 6563 7469 6375 7400 0600 0f00 0000 0b35 | Connecticut........5
Before Image          Len   205 (x000000cd)
BeforeColumnLen    201 (x000000c9)
Column     0 (x0000), Len    14 (x000e)
Column     1 (x0001), Len    11 (x000b)
Column     2 (x0002), Len    12 (x000c)
Column     3 (x0003), Len    27 (x001b)
Column     4 (x0004), Len    24 (x0018)
Column     5 (x0005), Len    15 (x000f)
Column     6 (x0006), Len    15 (x000f)
Column     7 (x0007), Len    10 (x000a)
Column     8 (x0008), Len     9 (x0009)
Column     9 (x0009), Len    11 (x000b)
Column    10 (x000a), Len     9 (x0009)
After Image           Len    33 (x00000021)
Column     0 (x0000), Len    14 (x000e)
Column     9 (x0009), Len    11 (x000b)

Filtering suppressed     61 records
Logdump >
```

This should display a record for `Kenneth Mitchell`.

Note the `RBA` of the record. _____

c. Continue using the **`Next`** command a few times until you get the idea that they are displaying all `"Kenneth"`. There are many of them.
Optional: See if you can find "Elvis." See if you can find "Waldo." What is the behavior for a not-found string?

d. Clear the filter.

```
Logdump > Filter Clear All
Logdump >
```

5. Filter for a record type between time stamps.

a. Navigate to the beginning of the file.

```
Logdump > Pos 0
Reading forward from RBA 0
```

b. Set a filter to include only inserts on the `SOURCE.TRANSACTION` table:

```
Logdump > Filter Include Filename SOURCE.TRANSACTION
Logdump > Filter RecType 5
Logdump > Filter Match all
Logdump > Filter show
```

Cleanup

When you have completed this practice, run the following from your source GGSCI session before moving to the next practice:

Note: Exit any open SQL*Plus sessions before executing this script.

```
GGSCI (SOURCE) > Obey
/home/oracle/Labs/Practice_00/cleanup_src.oby
```

Practices for Lesson 4: Basic and Startup Problems

Chapter 4

Practices for Lesson 4: Solving Cases: The Stubborn Startup

Practices Overview

In these practices, you analyze and solve the following startup problems:

- Extract startup problems
- Replicat startup problems

Prerequisites

First run: Before starting this practice for the first time, run the following file in GGSCI, and then exit GGSCI:

```
GGSCI (SOURCE) > Obey /home/oracle/Labs/Practice_04/test.oby
GGSCI (SOURCE) > Exit
```

Note: If you want to restart this practice, exit all open SQL*Plus sessions. Then, from your source GGSCI session, run the following:

```
GGSCI (SOURCE) > Obey
/home/oracle/Labs/Practice_00/cleanup_src.oby
GGSCI (SOURCE) > Obey /home/oracle/Labs/Practice_04/test.oby
```

Practice 4-1: Solving Extract Startup Problems

Overview

In this practice, you explore the problems that prevent Extract from starting successfully.

Note: The next three problems all exist in the same parameter file. Carefully consider the report information and the possible causes of the problem you are working on to ensure that if you see an error in the file, it is the error that will actually solve that problem.

Tasks

Problem One: "A case of mistaken identity"

1. In the source terminal, start a GGSCI session, and then start the Extract group `ext_4a`.

```
[OS ogg_src]$ ggsci
GGSCI (SOURCE) > Start Extract ext_4a

Sending START request to MANAGER ...
EXTRACT EXT_4A starting

GGSCI (SOURCE) >
```

2. Use the **`Info`** command to verify that the process is **`STOPPED`**.

```
GGSCI (SOURCE) > Info ext_4a

EXTRACT    EXT_4A    Initialized   2014-06-07 20:21   Status STOPPED
Checkpoint Lag       00:00:00 (updated 00:01:24 ago)
Log Read Checkpoint  Oracle Redo Logs
                     2014-06-07 20:21:26  Seqno 0, RBA 0
                     SCN 0.0 (0)
GGSCI (SOURCE) >
```

3. View the report and note that the process stopped on a group name error.

```
GGSCI (SOURCE) > View Report ext_4a

Source Context :
  SourceModule            : [er.init]
  SourceID                : [/scratch/aime1/adestore/views/aime1_adc4150256/o
ggcore/OpenSys/src/app/er/init.cpp]
  SourceFunction          : [init_functions]
  SourceLine              : [3985]
  ThreadBacktrace         : [7] elements
     :
[/u01/app/oracle/product/ogg_src/libgglog.so(CMessageContext::AddThreadContext
()+0x1e) [0x7f6d61a1670e]]
     :
[/u01/app/oracle/product/ogg_src/libgglog.so(CMessageFactory::CreateMessage(CS
ourceContext*, unsigned int, ...)+0x2cc) [0x7f6d61a0f6ac]]
     :
[/u01/app/oracle/product/ogg_src/libgglog.so(_MSG_ERR_STARTUP_PARAMERROR_ERROR
TEXT(CSourceContext*, char const*, CMessageFactory:: MessageDisposition)+0x31)
[0x7f6d61a02b8d]]
     : [/u01/app/oracle/product/ogg_src/extract(init_functions(int,
char**)+0x880) [0x54b5f0]]
     : [/u01/app/oracle/product/ogg_src/extract(main+0xbf) [0x57359f]]
     : [/lib64/libc.so.6(__libc_start_main+0xfd) [0x3fe861ec9d]]
     : [/u01/app/oracle/product/ogg_src/extract(__gxx_personality_v0+0x38a)
[0x4edaba]]

2014-06-07 20:22:42  ERROR   OGG-00303  Group name [ext4a] in param file does
not match PROCESS ID [EXT_4A].

2014-06-07 20:22:42  ERROR   OGG-01668  PROCESS ABENDING.

GGSCI (EDRSR42P1) >
```

- Note the name of the checkpoint file indicated in the error.

  _____

- In the report output, examine the parameters being used. What do you think is the cause of this problem?

  _____

4. Fix the problem.

Problem Two: "Everything checked out OK, sir."

5. Start the Extract group, `ext_4a`, again.

```
GGSCI (SOURCE) > Start Extract ext_4a

Sending START request to MANAGER ...
EXTRACT EXT_4A starting

GGSCI (SOURCE) >
```

6. Enter the **`Info`** command to verify that the process is still **`STOPPED`**.

```
GGSCI (SOURCE) > Info ext_4a

EXTRACT    EXT_4A    Initialized   2012-11-06 13:29   Status STOPPED
Checkpoint Lag       00:00:00 (updated 00:18:12 ago)
Log Read Checkpoint  Oracle Redo Logs
                     2012-11-06 13:29:08  Seqno 0, RBA 0
                     SCN 0.0 (0)

GGSCI (SOURCE) >
```

7. View the report file. Look for something that would cause Extract to stop without showing any errors.

```
GGSCI (SOURCE) > View Report ext_4a

(...many lines omitted for clarity...)

***********************************************************************
**            Running with the following parameters                  **
***********************************************************************

2014-06-07 20:26:38  INFO    OGG-03059  Operating system character set
identified as UTF-8.
2014-06-07 20:26:38  INFO    OGG-02695  ANSI SQL parameter syntax is used for
parameter parsing.
Extract ext_4a
UserID ogguser, Password ******
2014-06-07 20:26:38  INFO    OGG-03522  Setting session time zone to source
database time zone 'GMT'.
RmtHost ogg_target, MgrPort 7909
RmtTrail ./dirdat/44a
CheckParams
DiscardFile dirrpt/ext_4a.dsc , Append
ReportCount Every 10000 Records, Rate
Table source.*;
Parameters processed successfully.

GGSCI (SOURCE) >
```

What do you think caused Extract to stop?

a. The parameter file does not exist.
b. Parameter syntax checking was completed successfully.
c. There was incorrect database connection information.

8. Fix the problem.

Problem Three: "Headed down the wrong path"

9. Start the `ext_4a` group again.
10. Use the **`Info`** command to verify that the process is **`ABENDED`** again.

```
GGSCI (SOURCE) > Info ext_4a

EXTRACT    EXT_4A    Last Started 2012-11-06 13:56   Status ABENDED
Checkpoint Lag       00:00:00 (updated 00:27:23 ago)
Log Read Checkpoint  Oracle Redo Logs
                     2012-11-06 13:29:08  Seqno 26, RBA 15766032
                     SCN 0.0 (0)

GGSCI (SOURCE) >
```

11. View the report file.

```
GGSCI (SOURCE) > View Report ext_4a

(...many lines omitted for clarity...)

2014-06-07 22:12:38  ERROR   OGG-01044  The trail './dirdat/44a' is not
assigned to extract 'EXT_4A'. Assign the trail to the extract with the command
"ADD EXTTRAIL/RMTTRAIL ./dirdat/44a, EXTRACT EXT_4A".

2014-06-07 22:12:39  ERROR   OGG-01668  PROCESS ABENDING.

GGSCI (SOURCE) >
```

12. Note the error:

    _____

13. Enter the `Info` command to view the remote trail configuration.

```
GGSCI (SOURCE) > Info RmtTrail *

       Extract Trail: ./dirdat/4a
             Extract: EXT_4A
               Seqno: 0
                 RBA: 0
           File Size: 5M

GGSCI (SOURCE) >
```

14. What do you think is the cause of this problem?

    _____

    _____

15. Fix the problem.
16. Start the `ext_4a` group again.
17. Use the **`Info`** command to verify that the process is **`RUNNING`**.

```
GGSCI (SOURCE) > Info ext_4a
EXTRACT    EXT_4A    Last Started 2014-06-07 22:12   Status RUNNING
Checkpoint Lag       00:00:00 (updated 00:00:06 ago)
Process ID           20229
Log Read Checkpoint  Oracle Redo Logs
                     2014-06-07 22:12:40  Seqno 235, RBA 39887360
                     SCN 0.8161189 (8161189)

GGSCI (SOURCE) >
```

Practice 4-2: Solving Replicat Startup Problems

Overview

In this practice, you explore problems that prevent Replicat from starting successfully. You look at problems with Replicat parameters, at security problems, and at problems with connecting to the database.

Note: The problems in this section again exist in the same parameter file. Carefully consider the report information and the possible causes of the problem you are working on to ensure that if you see an error in the file, it is the error that will actually solve that problem.

Tasks

Problem Four: "Can you show me some identification, please?"

1. Start the Replicat group `rep_4a`.

```
[OS ogg_trg]$ ggsci
GGSCI (TARGET) > Start rep_4a

Sending START request to MANAGER ...
REPLICAT REP_4A starting

GGSCI (TARGET) >
```

2. Use the **`Info`** command to verify that the process is not running.

```
GGSCI (TARGET) > Info rep_4a
REPLICAT   REP_4A    Initialized   2014-06-07 20:21   Status STOPPED
Checkpoint Lag       00:00:00 (updated 01:55:04 ago)
Log Read Checkpoint  File ./dirdat/4a000000
                     First Record  RBA 0

GGSCI (TARGET) >
```

3. View the report file. You should see an error similar to the following:

```
GGSCI (TARGET) > View Report rep_4a

(...many lines omitted for clarity...)

                       : [/lib64/libc.so.6(__libc_start_main+0xfd) [0x3da7c1ed1d]]
                       : [/u01/app/oracle/product/ogg_trg/replicat() [0x508339]]
2014-06-07 22:16:17  ERROR   OGG-01453  Database login information not
specified in parameter file.

2014-06-07 22:16:17  ERROR   OGG-01668  PROCESS ABENDING.

GGSCI (TARGET >
```

4. What database user ID are you using to log in?

   _____

5. Edit the `rep_4a` parameter file. What deficiency in this file does the clue in the report point to?

```
GGSCI (TARGET) > Edit Param rep_4a
```

6. Fix the problem.

7. Save the parameter file.

Problem Five: "Another case of mistaken Identity"

8. Start the Replicat group, `rep_4a`.

```
GGSCI (TARGET) > Start Replicat rep_4a

Sending START request to MANAGER ...
REPLICAT REP_4A starting
```

9. Use the **`Info`** command to verify that the process is still not running.

```
GGSCI (TARGET) > Info rep_4a
REPLICAT   REP_4A    Initialized   2014-06-07 20:21   Status STOPPED
Checkpoint Lag       00:00:00 (updated 01:58:42 ago)
Log Read Checkpoint  File ./dirdat/4a000000
                     First Record  RBA 0
```

10. View the report. You should see an error similar to the following:

```
GGSCI (TARGET) > View Report rep_4a

(...many lines omitted for clarity...)

            : [/u01/app/oracle/product/ogg_trg/replicat(main+0x3f) [0x5be84f]]
            : [/lib64/libc.so.6(__libc_start_main+0xfd) [0x3da7c1ed1d]]
            : [/u01/app/oracle/product/ogg_trg/replicat() [0x508339]]


2014-06-07 22:20:07  ERROR   OGG-00664  OCI Error beginning session (status =
1034-ORA-01034: ORACLE not available
ORA-27101: shared memory realm does not exist
Linux-x86_64 Error: 2: No such file or directory).

2014-06-07 22:20:07  ERROR   OGG-01668  PROCESS ABENDING.

GGSCI (TARGET) >
```

Note: This error may take one or two minutes to show up.

11. What do you think is the cause of this problem?

    _____

    _____

12. View the `rep_4a` parameter file.

```
GGSCI (TARGET) > Edit Param rep_4a
```

13. Do you see anything in the file that is related to the cause of the problem?

    _____

14. Fix the problem, start Replicat `rep_4a` again, and then use the `Info` command to verify that Replicat is running.

    Note: In the parameters file, *some* of the parameters are case-sensitive. In particular, the problem at present is due to a mismatched case.

```
GGSCI (TARGET) > Start rep_4a

GGSCI (TARGET) > Info All

Program     Status      Group       Lag at Chkpt  Time Since Chkpt
MANAGER     RUNNING
REPLICAT    RUNNING     REP_4A      00:00:00      00:00:00
```

Cleanup

When you have completed this practice, run the following file from your source GGSCI session before moving to the next practice:

Note: If any SQL*Plus sessions are open, exit all of them before executing this script.

```
GGSCI (SOURCE) > Obey
/home/oracle/Labs/Practice_00/cleanup_src.oby
```

Practices for Lesson 5: Extraction Problems

Chapter 5

Practices for Lesson 5: Solving Cases: The Troublesome Extract

Practices Overview

In these practices, you analyze and solve the following extraction problems:

- Extract user problems
- Connection failures

Prerequisites

First run: Before starting this practice for the first time, run the following file in GGSCI:

```
GGSCI (SOURCE) > Obey /home/oracle/Labs/Practice_05/test.oby
```

Note: If you want to restart this practice, exit all open SQL*Plus sessions. Then, from your source GGSCI session, run the following:

```
GGSCI (SOURCE) > Obey
/home/oracle/Labs/Practice_00/cleanup_src.oby
GGSCI (SOURCE) > Obey /home/oracle/Labs/Practice_05/test.oby
```

Practice 5-1: Solving User Problems

Overview

In this practice, you look at Extract user problems.

Tasks

Problem: "Knock, knock." "Who's there?"

1. Start the Extract group, `ext_5a`.

```
[OS ogg_src]$ ggsci
GGSCI (SOURCE) > Start Extract ext_5a

Sending START request to MANAGER ...
EXTRACT EXT_5A starting
```

2. Use the **`Info`** command to verify that the process is **`STOPPED`**.

```
GGSCI (SOURCE) > Info ext_5a

EXTRACT    EXT_5A    Initialized   2012-11-07 09:05   Status STOPPED
Checkpoint Lag       00:00:00 (updated 00:01:30 ago)
Log Read Checkpoint  Oracle Redo Logs
                     2012-11-07 09:05:41  Seqno 0, RBA 0
                     SCN 0.0 (0)
```

3. View the report file. Execute the following command and look for an error that is similar to the following:

```
GGSCI (SOURCE) > View Report ext_5a

(...many lines omitted for clarity...)
2014-06-07 23:06:51  ERROR   OGG-00665  OCI Error describe for query (status =
942-ORA-00942: table or view does not exist), SQL<select value$ from
sys.props$ where name = 'NLS_CHARACTERSET'>.

2014-06-07 23:06:51  ERROR   OGG-01668  PROCESS ABENDING.
```

- Note the Oracle error `ORA-00942`. What do you think caused Extract to stop?
  i. The database did not have supplemental logging available.
  ii. The Extract user does not have permission to retrieve metadata.
  iii. The database is not running.

4. Is there anything in the Extract configuration that might be causing this problem?
   Hint: Check the `UserID` parameter or the `SourceDB` parameter (depending on the database type).
5. How would you fix this problem?

   _____

   _____

6. Fix this problem and try to run Extract `ext_5a` again. With the `Info` command, verify that Extract is now running.

```
GGSCI (SOURCE) > Set Editor gedit

GGSCI (SOURCE) > Edit Param ext_5a

GGSCI (SOURCE) > Start Extract ext_5a

Sending START request to MANAGER ...
EXTRACT EXT_5A starting

GGSCI (SOURCE) > Info ext_5a
EXTRACT    EXT_5A    Last Started 2014-06-07 23:08   Status RUNNING
Checkpoint Lag       00:03:30 (updated 00:00:04 ago)
Process ID           21766
Log Read Checkpoint  Oracle Redo Logs
                     2014-06-07 23:05:40  Seqno 236, RBA 25057460
                     SCN 0.8174375 (8174375)

GGSCI (SOURCE) >
```

Practice 5-2: Solving Connection Problems

Overview

In this practice, you look at Extract connection problems.

Tasks

Problem: "Return to sender, address unknown"

1. Start the Extract group, `ext_5b`.

```
GGSCI (SOURCE) > Start Extract ext_5b

Sending START request to MANAGER ...
EXTRACT EXT_5B starting
```

2. Use the **Info** command to verify that the process is **STOPPED**.

```
GGSCI (SOURCE) > Info ext_5b

EXTRACT    EXT_5B    Initialized   2014-06-07 23:05   Status STOPPED
Checkpoint Lag       00:00:00 (updated 00:04:36 ago)
Log Read Checkpoint  Oracle Redo Logs
                     2014-06-07 23:05:34  Seqno 0, RBA 0
                     SCN 0.0 (0)
```

3. View the report file.
   a. Execute the command to view the report:

```
GGSCI (SOURCE) > View Report ext_5b
```

   b. Notice the following error:

```
OGG-00303  Could not getaddrinfo for host.
```

```
(...many lines omitted for clarity...)

            : [/u01/app/oracle/product/ogg_src/extract(main+0x3f) [0x5b8b0f]]
            : [/lib64/libc.so.6(__libc_start_main+0xfd) [0x3da7c1ed1d]]
            : [/u01/app/oracle/product/ogg_src/extract() [0x526289]]
2014-06-07 23:10:02  ERROR   OGG-00303  Could not getaddrinfo for host.

2014-06-07 23:10:02  ERROR   OGG-01668  PROCESS ABENDING.

GGSCI (SOURCE) >
```

   c. Check the error log for any additional information. You see messages similar to the following:

```
GGSCI (SOURCE) > View GGSEVT

(...many lines omitted for clarity...)

2014-06-07 23:10:01  INFO    OGG-00975  Oracle GoldenGate Manager for Oracle, mgr.prm:
EXTRACT EXT_5B starting.
2014-06-07 23:10:01  INFO    OGG-00992  Oracle GoldenGate Capture for Oracle,
ext_5b.prm:  EXTRACT EXT_5B starting.
2014-06-07 23:10:01  INFO    OGG-03059  Oracle GoldenGate Capture for Oracle,
ext_5b.prm:  Operating system character set identified
 as UTF-8.
2014-06-07 23:10:01  INFO    OGG-02695  Oracle GoldenGate Capture for Oracle,
ext_5b.prm:  ANSI SQL parameter syntax is used for par
ameter parsing.
2014-06-07 23:10:02  INFO    OGG-03522  Oracle GoldenGate Capture for Oracle,
ext_5b.prm:  Setting session time zone to source datab
ase time zone 'GMT'.
2014-06-07 23:10:02  ERROR   OGG-00303  Oracle GoldenGate Capture for Oracle,
ext_5b.prm:  Could not getaddrinfo for host.
2014-06-07 23:10:02  ERROR   OGG-01668  Oracle GoldenGate Capture for Oracle,
ext_5b.prm:  PROCESS ABENDING.
2014-06-07 23:10:10  INFO    OGG-00987  Oracle GoldenGate Command Interpreter for
Oracle:  GGSCI command (oracle): info ext_5b.

GGSCI (SOURCE) >
```

Note: If you have a very long Event Log, it might be faster to do the following:

```
GGSCI > sh tail ggserr.log
```

d. See if you can find something in the Oracle GoldenGate configuration that is causing this problem.

_____

e. What do you think is the problem?
   i. The target system is not running.
   ii. A wrong version of Oracle GoldenGate is installed.
   iii. The machine name is incorrect.

4. Fix the problem based on what you have learned.
5. Start the `ext_5b` group again.

```
GGSCI (SOURCE) > Start Extract ext_5b
```

6. Use the **`Info`** command to check the status of Extract.

```
GGSCI (SOURCE) > Info ext_5b

EXTRACT    EXT_5B    Last Started 2012-11-07 11:30   Status RUNNING
Checkpoint Lag       00:00:00 (updated 02:41:44 ago)
Log Read Checkpoint  Oracle Redo Logs
                     2012-11-07 09:05:43  Seqno 29, RBA 43024
                     SCN 0.0 (0)
```

The status *looks* okay, but the lag is suspicious. Something is still wrong because the log indicates that the last update was nearly two hours ago.

7. Check the ongoing report. A connection is not being established somewhere.

```
GGSCI (SOURCE) > View Report ext_5b

(...many lines omitted for clarity...)

2014-06-14 10:42:43  WARNING OGG-01223  TCP/IP error 104 (Connection reset by
peer), endpoint: ogg_target:7909.

2014-06-14 10:42:48  INFO    OGG-01226  Socket buffer size set to 27985 (flush
size 27985).

2014-06-14 10:42:48  WARNING OGG-01223  TCP/IP error 104 (Connection reset by
peer), endpoint: ogg_target:7909.

2014-06-14 10:42:53  INFO    OGG-01226  Socket buffer size set to 27985 (flush
size 27985).

GGSCI (SOURCE) >
```

8. What do you think is the problem now?
   a. A wrong parameter was used to connect to the port.
   b. The port is not available.
   c. The Server Collector is busy.

Hint: You want the Manager process to dynamically start a Server Collector rather than communicating with a statically started Collector.

9. Fix the problem based on what you have learned.

```
GGSCI (SOURCE) > Edit Param ext_5b
```

10. Try to stop the extract gracefully. You will not be able to; even the suggested `ForceStop` will not work. Therefore, you must kill and restart the `ext_5b` group again.

```
GGSCI (SOURCE) > Stop Extract ext_5b

Sending STOP request to EXTRACT EXT_5B ...
Recovery is not complete.  This normal stop will wait and checkpoint
recovery's work when recovery has finished. To force Extract to stop now, use
the SEND EXTRACT EXT_5B, FORCESTOP command.

GGSCI (SOURCE) > Kill Extract ext_5b

Sending KILL request to MANAGER ...
Killed process (25580) for EXTRACT EXT_5B

GGSCI (SOURCE) > Start Extract ext_5b

Sending START request to MANAGER ...
EXTRACT EXT_5B starting
```

11. Wait for 10 seconds, and then use the **`Info`** command to check the status of Extract.

```
GGSCI (SOURCE) > Info ext_5b

EXTRACT    EXT_5B    Last Started 2014-06-07 23:18   Status RUNNING
Checkpoint Lag       00:00:00 (updated 00:13:42 ago)
Process ID           22037
Log Read Checkpoint  Oracle Redo Logs
```

```
                    2014-06-07 23:05:34  Seqno 236, RBA 14225424
                    SCN 0.0 (0)
```

Now the updated time looks more reasonable (under 10 seconds).

Cleanup

When you have completed this practice, run the following file from your source GGSCI session before starting the next practice:

Note: Exit all open SQL*Plus sessions before running this script.

```
GGSCI (SOURCE) > Obey
/home/oracle/Labs/Practice_00/cleanup_src.oby
```

Practices for Lesson 6: Replication Problems

Chapter 6

Practices for Lesson 6: Solving Cases: The Rebellious Replicat

Practices Overview

In these practices, you analyze and solve the following replication problems:

- Truncated checkpoint tables
- Transaction failure
- Trail issues

Prerequisites

First run: Before starting this practice for the first time, run the following script in GGSCI:

```
GGSCI (SOURCE) > Obey /home/oracle/Labs/Practice_06/test.oby
```

Note: If you want to restart this practice, exit all open SQL*Plus sessions. Then, from your source GGSCI session, run the following:

```
GGSCI (SOURCE) > Obey
/home/oracle/Labs/Practice_00/cleanup_src.oby
GGSCI (SOURCE) > Obey /home/oracle/Labs/Practice_06/test.oby
```

Note: If there are optional SQL*Plus column formatting commands, such as `set lines` and `col` *xxxxx* `format a15`, you can copy and paste them together as multiple lines simultaneously; you do not have to paste them as single lines.

Practice 6-1: Solving Replicat Problems

Overview

In this practice, you troubleshoot situations in which records are extracted but are not applied to the target database.

Tasks

Problem One: "Where have all the checkpoints gone?" (6a)

1. On the target side, start the Replicat group `rep_6a`.

```
[OS ] $ ogg_trg
[OS ogg_trg]$ ggsci
GGSCI (TARGET) > Start Replicat rep_6a

Sending START request to MANAGER ...
REPLICAT REP_6A starting
```

2. Use the **`Info`** command to verify that the process is **`STOPPED`**.

```
GGSCI (TARGET) > Info rep_6a
REPLICAT   REP_6A    Last Started 2014-06-08 13:12   Status STOPPED
Checkpoint Lag       00:00:00 (updated 00:01:10 ago)
Log Read Checkpoint  File ./dirdat/6a000000
                     First Record  RBA 1437
```

3. View the end of the report file. Evaluate the following message:

```
GGSCI (TARGET) > View Report rep_6a

(...many lines omitted for clarity...)

                  : [/u01/app/oracle/product/ogg_trg/replicat() [0x508339]]
2014-06-08 13:13:43  ERROR   OGG-00446  No data selecting position from
checkpoint table ogguser.checkpointtable for group 'REP_6A
', key 3485496340 (0xcfc07414), SQL <>.

2014-06-08 13:13:43  ERROR   OGG-01668  PROCESS ABENDING.
```

4. What do you think caused the error?
   a. The checkpoint table has the wrong name.
   b. The checkpoint table does not exist.
   c. Replicat cannot get its checkpoint from the checkpoint table.
5. Still not sure? Start a SQL*Plus session, name this terminal window `SQL*Plus`, and log in to the Oracle target schema:

```
[OS ~]$ sqlplus ogguser/oracle@ogg12c
SQL>
```

Leave this session running because you will use it throughout the practice.

6. Verify that the checkpoint table exists by issuing the following command:

```
SQL> desc ogguser.checkpointtable
 Name                      Null?    Type
 ------------------------- -------- ----------------------
 GROUP_NAME                NOT NULL VARCHAR2(8)
 GROUP_KEY                 NOT NULL NUMBER(19)
 SEQNO                              NUMBER(10)
 RBA                       NOT NULL NUMBER(19)
 AUDIT_TS                           VARCHAR2(29)
 CREATE_TS                 NOT NULL DATE
 LAST_UPDATE_TS            NOT NULL DATE
 CURRENT_DIR               NOT NULL VARCHAR2(255)
 LOG_CSN                            VARCHAR2(129)
 LOG_XID                            VARCHAR2(129)
 LOG_CMPLT_CSN                      VARCHAR2(129)
 LOG_CMPLT_XIDS                     VARCHAR2(2000)
 VERSION                            NUMBER(3)
```

7. Does the table exist? Y/N _____

8. Check the checkpoint table for data.

```
SQL> SELECT * FROM ogguser.checkpointtable;
```

9. What do you see? _____

   In the next few steps, you fix the problems.

10. Enter the `Info` command to verify that the checkpoint file `dirchk/rep_6a.cpr` is intact. Make a note of the sequence number and the RBA.

```
GGSCI (TARGET) > Info rep_6a

REPLICAT   REP_6A    Last Started 2014-06-08 13:12   Status STOPPED
Checkpoint Lag       00:00:00 (updated 00:13:29 ago)
Log Read Checkpoint  File ./dirdat/6a000000
                     First Record  RBA 1437
```

    If the file had been missing or was corrupt, the `Info` command would have failed. But, in this case, the file is intact. This information came from the `dirchk/rep_6a.cpr` file on disk. In this case, the sequence number is zero and the RBA is 1437.

11. Reset the checkpoint *table* in the database to the same value as in the `.cpr` *file.* Your sequence number and your RBA (highlighted in yellow) may be different.

```
GGSCI (TARGET) > Alter rep_6a, ExtSeqNo 0, ExtRBA 1437
REPLICAT altered.

[OS OGG_Target]$
```

12. Start the Replicat group `rep_6a`.

```
GGSCI (TARGET) > Start rep_6a

Sending START request to MANAGER ...
REPLICAT REP_6A starting
```

13. Use the `Info` command to verify that the process is **`RUNNING`**.

```
GGSCI (TARGET) > Info rep_6a
REPLICAT   REP_6A    Last Started 2014-06-08 13:28   Status RUNNING
Checkpoint Lag       00:00:00 (updated 00:00:08 ago)
Process ID           11629
Log Read Checkpoint  File ./dirdat/6a000000
                     First Record  RBA 1437
```

14. In a SQL*Plus terminal, execute commands to verify that checkpoints are being added again (the page and column formatting is optional):

```
SQL>  set lines 120
      set pages 120
      col current_dir format a25

SQL> SElect GROUP_NAME,GROUP_KEY,SEQNO,RBA,CREATE_TS,
LAST_UPDATE_TS, CURRENT_DIR from ogguser.checkpointtable;
GROUP_NA  GROUP_KEY   SEQNO    RBA CREATE_TS LAST_UPDA    CURRENT_DIR
-------- ---------- ------- ------ --------- ---------   ----------------------------
REP_6A   3485496340     0      1437 08-JUN-14 08-JUN-14  /u01/app/oracle/product/ogg_trg
```

Problem Two: "The key unlocks the truth" (6b)

15. Start the Replicat group `rep_6b`.

```
GGSCI (TARGET) > Start rep_6b

Sending START request to MANAGER ...
REPLICAT REP_6B starting
```

16. Use the **`Info`** command to verify that the process is **`ABENDED`**.

```
GGSCI (TARGET) > Info rep_6b

REPLICAT   REP_6B    Last Started 2012-11-08 12:44   Status ABENDED
Checkpoint Lag       00:03:26 (updated 00:00:04 ago)
Log Read Checkpoint  File ./dirdat/6b000000
                     2012-11-08 12:41:12.000158  RBA 194666
```

17. View the report file.

```
GGSCI (TARGET) > View Report rep_6b
```

Note the following error:

```
(...many lines omitted for clarity...)

2014-06-08 14:09:03  WARNING OGG-01004  Aborted grouped transaction on
'TARGET.EMP6B', Database error 1403 (OCI Error ORA-01403: n
o data found, SQL <UPDATE "TARGET"."EMP6B" x SET x."COMM" = :a1 WHERE
x."EMPNO" = :b0>).


2014-06-08 14:09:03  WARNING OGG-01003  Repositioning to rba 195086 in seqno
0.
2014-06-08 14:09:03  WARNING OGG-01154  SQL error 1403 mapping SOURCE.EMP6B to
TARGET.EMP6B OCI Error ORA-01403: no data found, SQ
L <UPDATE "TARGET"."EMP6B" x SET x."COMM" = :a1 WHERE x."EMPNO" = :b0>.


2014-06-08 14:09:03  WARNING OGG-01003  Repositioning to rba 195086 in seqno
0.
(...many lines omitted for clarity...)
```

18. View the discard file for the error description and column-level details:

```
GGSCI (TARGET) > View Report ./dirrpt/rep_6b.dsc
```

Note that the error description is the following:

```
Oracle GoldenGate Delivery for Oracle process started, group REP_6B discard
file opened: 2014-06-08 14:08:51.187164
Current time: 2014-06-08 14:09:03
Discarded record from action ABEND on error 1403
OCI Error ORA-01403: no data found, SQL <UPDATE "TARGET"."EMP6B" x SET
x."COMM" = :a1 WHERE x."EMPNO" = :b0>
Aborting transaction on ./dirdat/6b beginning at seqno 0 rba 195086
                        error at seqno 0 rba 195086
Problem replicating SOURCE.EMP6B to TARGET.EMP6B
Record not found
Mapping problem with compressed update record (target format)...
*
EMPNO =

COMM = 1.00
000000: 31 2e 30 30                                      |1.00            |

*
Process Abending : 2014-06-08 14:09:04
```

19. What information is missing from this record? _____

20. Which of the following do you believe caused Replicat to stop?
    a. The table did not have supplemental logging enabled. Therefore, the value of the primary key was not present in the transaction logs.
    b. The target database is out of sync.
    c. The table does not have a primary key.
    d. The target table does not exist.

21. In GGSCI, enter the following commands. The first command logs in to the database and the second command checks the `TranData` information.

```
GGSCI (SOURCE) > DBLogin UserID ogguser, Password oracle
Successfully logged into database.

GGSCI (SOURCE) > Info TranData source.emp6b
Logging of supplemental redo log data is disabled for table SOURCE.EMP6B.

GGSCI (SOURCE) >
```

22. How would you fix this problem?

_____

Problem Three: "Headed down the wrong trail" (6c)

23. Mind the source versus target tab. On the source, start the Extract group `ext_6c`.

```
GGSCI (SOURCE) > Start Extract ext_6c
```

24. On the target, start the Replicat group `rep_6c`.

```
GGSCI (TARGET) > Start Replicat rep_6c
```

25. Use the **`Info`** command to verify that both the source and target processes are **`RUNNING`**.

```
GGSCI (SOURCE) > Info *6c
EXTRACT    EXT_6C    Last Started 2014-06-08 14:37   Status RUNNING
Checkpoint Lag       00:00:00 (updated 00:00:08 ago)
Process ID           13691
Log Read Checkpoint  Oracle Redo Logs
                     2014-06-08 14:38:52  Seqno 241, RBA 466944
                     SCN 0.8257443 (8257443)
```

```
GGSCI (TARGET) > Info *6c
REPLICAT   REP_6C    Last Started 2014-06-08 14:38   Status RUNNING
Checkpoint Lag       00:00:00 (updated 00:00:07 ago)
Process ID           13736
Log Read Checkpoint  File ./dirdat/6y000000
                     First Record  RBA 0
```

26. Use the `Send Replicat` command to view the status of processing and continue issuing the command until the status is `EOF`.

```
GGSCI (TARGET) > Send Replicat rep_6c, Status

Sending STATUS request to REPLICAT REP_6C ...
  Current status: At EOF
  Sequence #: 0
  RBA: 0
  0 records in current transaction
```

There are zero records.

27. View the statistics for Extract. You should see several operations.

```
GGSCI (SOURCE) > Stats Extract ext_6c
Sending STATS request to EXTRACT EXT_6C ...
Start of Statistics at 2014-06-14 18:07:46.
Output to ./dirdat/6c:
Extracting from SOURCE.BIG_DEPT to SOURCE.BIG_DEPT:

*** Total statistics since 2014-06-14 18:04:17 ***
     Total inserts                                12.00
     Total updates                                 0.00
     Total deletes                                 0.00
     Total discards                                0.00
     Total operations                             12.00

(...many lines omitted for clarity...)
*** Latest statistics since 2014-06-14 18:04:17 ***
     Total inserts                               896.00
     Total updates                               600.00
     Total deletes                               150.00
     Total discards                                0.00
     Total operations                           1646.00
End of Statistics.

GGSCI (SOURCE) >
```

28. View the statistics for Replicat. This Replicat is processing the trail generated by the Extract `ext_6c`. You should see no operations performed. You also see the following message:

```
GGSCI (TARGET) > Stats Replicat rep_6c

Sending STATS request to REPLICAT REP_6C ...
No active replication maps.

GGSCI (TARGET) >
```

29. Use the **`Status`** command to verify that Replicat is **`RUNNING`**.

```
GGSCI (TARGET) > Status Replicat rep_6c
REPLICAT REP_6C: RUNNING
```

30. View detailed information for both the source Extract and the target Replicat.

```
GGSCI (SOURCE) > Info Ext_6c, Detail

EXTRACT    EXT_6C    Last Started 2014-06-08 14:37   Status RUNNING
Checkpoint Lag       00:00:00 (updated 00:00:05 ago)
Process ID           13691
Log Read Checkpoint  Oracle Redo Logs
                     2014-06-08 14:43:58  Seqno 241, RBA 493568
                     SCN 0.8257563 (8257563)
  Target Extract Trails:

  Trail Name                    Seqno        RBA     Max MB Trail Type
```

```
  ./dirdat/6c                       0      282260          5 RMTTRAIL

  Extract Source                                      Begin             End
/u02/oradata/OGG12C/onlinelog/ol_mf_1_9v29pbmj.log 2014-06-08 13:47  2014-06-
08
                                                                      14:43
  Not Available                           * Initialized *   2014-06-08 13:47

Current directory    /u01/app/oracle/product/ogg_src

Report file          /u01/app/oracle/product/ogg_src/dirrpt/EXT_6C.rpt
Parameter file       /u01/app/oracle/product/ogg_src/dirprm/ext_6c.prm
Checkpoint file      /u01/app/oracle/product/ogg_src/dirchk/EXT_6C.cpe
Process file         /u01/app/oracle/product/ogg_src/dirpcs/EXT_6C.pce
Error log            /u01/app/oracle/product/ogg_src/ggserr.log

GGSCI (SOURCE) >
```

```
GGSCI (TARGET) > Info Rep_6c, Detail

REPLICAT   REP_6C    Last Started 2014-06-08 14:38   Status RUNNING
Checkpoint Lag       00:00:00 (updated 00:00:09 ago)
Process ID           13736
Log Read Checkpoint  File ./dirdat/6y000000
                     First Record  RBA 0
Current Log BSN value: (requires database login)

  Extract Source                          Begin             End

  ./dirdat/6y000000                       * Initialized *   First Record
  ./dirdat/6y000000                       * Initialized *   First Record

Current directory    /u01/app/oracle/product/ogg_trg

Report file          /u01/app/oracle/product/ogg_trg/dirrpt/REP_6C.rpt
Parameter file       /u01/app/oracle/product/ogg_trg/dirprm/rep_6c.prm
Checkpoint file      /u01/app/oracle/product/ogg_trg/dirchk/REP_6C.cpr
Checkpoint table     ogguser.checkpointtable
Process file         /u01/app/oracle/product/ogg_trg/dirpcs/REP_6C.pcr
Error log            /u01/app/oracle/product/ogg_trg/ggserr.log

GGSCI (TARGET) >
```

31. Compare the output for the Extract and Replicat groups. Do you see any inconsistencies that could cause this problem?

    _____

    _____

32. Stop Replicat `rep_6c`, fix the problem, and then start Replicat `rep_6c` again.
33. View the statistics for Replicat.

```
GGSCI (TARGET) > Start rep_6c

Sending START request to MANAGER ...
REPLICAT REP_6C starting

GGSCI (TARGET) > Stats Replicat rep_6c
Sending STATS request to REPLICAT REP_6C ...
Start of Statistics at 2014-06-08 14:53:09.
Replicating from SOURCE.EMP6C to TARGET.EMP6C:

*** Total statistics since 2014-06-08 14:52:43 ***
     Total inserts                                896.00
     Total updates                                600.00
     Total deletes                                150.00
     Total discards                                 0.00
     Total operations                            1646.00

(...many lines omitted for clarity...)
```

You should now see operations being performed.

Practice 6-2: Solving Trail File Problems

Overview

In this practice, you deal with trails that:

- Cannot be read by Replicat
- Are encrypted

In the process, you force trails to roll over to a new file and you skip records in the trail.

Tasks

Problem One: "This isn't what I expected."

1. Start the Extract group `ext_6d`.

```
GGSCI (SOURCE) > Start Extract ext_6d

Sending START request to MANAGER ...
EXTRACT EXT_6D starting
```

2. From the Target window, start the Replicat group `rep_6d`.

```
GGSCI (TARGET) > Start Replicat rep_6d

Sending START request to MANAGER ...
REPLICAT REP_6D starting
```

3. Use the `Info All` command to see the status of each group.

```
GGSCI (SOURCE) > Info All

Program     Status      Group       Lag at Chkpt  Time Since Chkpt
MANAGER     RUNNING
EXTRACT     RUNNING     EXT_6A      00:00:00      00:00:10
EXTRACT     RUNNING     EXT_6B      00:00:00      00:00:02
EXTRACT     RUNNING     EXT_6C      00:00:00      00:00:03
EXTRACT     RUNNING     EXT_6D      00:00:00      00:00:05
EXTRACT     RUNNING     PUMP_6B     00:00:00      00:00:01
```

```
GGSCI (TARGET) > Info All

Program     Status      Group       Lag at Chkpt  Time Since Chkpt
MANAGER     RUNNING
REPLICAT    RUNNING     REP_6A      00:00:00      00:54:49
REPLICAT    ABENDED     REP_6B      00:03:26      00:51:09
REPLICAT    RUNNING     REP_6C      00:00:00      00:00:00
REPLICAT    ABENDED     REP_6D      00:00:00      00:02:12
```

Note that Replicat 6D is `ABENDED`. This may take a few minutes. Continue to enter the `Info All` command until you see the process as `ABENDED`.

4. In the Target window, view the report file for the Replicat group `rep_6d`.

```
GGSCI (TARGET) > View Report rep_6d

(...many lines omitted for clarity...)

            : [/u01/app/oracle/product/ogg_trg/replicat(main+0x3f) [0x5be84f]]
            : [/lib64/libc.so.6(__libc_start_main+0xfd) [0x3da7c1ed1d]]
            : [/u01/app/oracle/product/ogg_trg/replicat() [0x508339]]

2014-06-08 14:55:56  ERROR   OGG-01028  Incompatible record (101) in
./dirdat/6d000000, rba 0 (getting header).

(...many lines omitted for clarity...)
```

5. Do you see the previous `ERROR OGG-01028`? What does this tell you?

_____

_____

6. You have an idea, but are you not really sure? View the parameter file for the Extract group `ext_6d`.

```
GGSCI (SOURCE) > View Param ext_6d

Extract ext_6d
-- Use USERID to specify the type of database authentication for GoldenGate to
use.
UserID ogguser, Password oracle
-- Use EXTTRAIL to specify a trail on the local system. The
-- implementation of this parameter varies slightly, depending on the process.
-- Use FORMATSQL to output data in external SQL format,
-- instead of the default of universal data format.
-- FORMATSQL generates SQL statements (INSERT, UPDATE,
-- DELETE) that can be applied to both SQL and Enscribe
-- tables by utilities other than GoldenGate Replicat.
-- THIS MUST BE BEFORE THE TRAIL STATEMENT
FormatSQL ORACLE, NoNames

(...many lines omitted for clarity...)
```

7. What do you think caused the problem?

_____

_____

8. From inside GGSCI in the Target window, run the `logdump` executable.

```
GGSCI (TARGET) > sh ./logdump
Oracle GoldenGate Log File Dump Utility for Oracle
Version 12.1.2.0.0 17185003 OGGCORE_12.1.2.0.0_PLATFORMS_130924.1316
Copyright (C) 1995, 2013, Oracle and/or its affiliates. All rights reserved.

Logdump 1 >
```

9. Open the trail file in `logdump`.

```
Logdump 1> Open ./dirdat/6d000000
Current LogTrail is /u01/app/oracle/product/ogg_trg/dirdat/6d000000
Logdump 2 >
```

10. Enable the display of headers and details.

```
Logdump 2> GHDR On
Logdump 3> Detail On
Logdump 4>
```

11. Go to the first (next) record.

```
Logdump 4> N
Bad GHDR found at (RBA 0)
 2d2d 422c 3230 3134 2d30 362d 3038 3a31 343a 3037 | --B,2014-06-08:14:07
 3a32 372e 3030 3030 3030 2c31 3430 3232 3030 3434 | :27.000000,140220044
 372c 3234 300a 494e                               | 7,240.IN
Logdump 5 >
```

What you see is how a record in **`FormatSQL`** looks in the trail. Note the following message:

```
"Bad GHDR found at (RBA 0)"
```

Note that `logdump` does not display a record header even though `GHDR On` was used to display headers.

12. Exit `logdump` and return to GGSCI.

```
Logdump 5> Exit
GGSCI (TARGET) >
```

13. On the source side, stop the Extract `ext_6d`.

```
GGSCI (SOURCE) > Stop Extract ext_6d
```

14. Edit the Extract parameter file to comment out `FormatSQL` and **un**comment `EncryptTrail`.

```
GGSCI (SOURCE) > Edit Param ext_6d

Extract ext_6d
UserID ogguser, Password oracle
-- FormatSQL ORACLE, NoNames
ENCRYPTTRAIL AES128 KEYNAME mykey1
RmtHost localhost,  MgrPort 9000
RmtTrail ./dirdat/6d
DiscardFile dirrpt/ext_6d.dsc , Append
ReportCount Every 10000 Records, Rate
Table source.big_dept;
Table source.emp6d;
```

When the `EncryptTrail` parameter is uncommented, you see what encrypted data looks like in the trail. You also see the error message that is returned when `EncryptTrail` is used for Extract without `DecryptTrail` being used for Replicat.

In the following steps, you use `Alter Extract` to roll over the trail to a new file. This gives you a fresh trail that bypasses the `FormatSQL` data that caused the Replicat trouble before. The new trail now gives Replicat a new problem with encrypted data.

15. Get information about the Extract trail.

```
GGSCI (SOURCE) > Info RmtTrail ./dirdat/6d

       Extract Trail: ./dirdat/6d
             Extract: EXT_6D
               Seqno: 0
                 RBA: 161976
           File Size: 1M
```

Note the sequence number: _____ (probably zero)

16. Alter the Extract trail:

```
GGSCI (SOURCE) > Alter Extract ext_6d, ETRollover

2014-06-08 15:10:52  INFO    OGG-01520  Rollover performed.  For each affected
output trail of Version 10 or higher format, after starting the source
extract, issue ALTER EXTSEQNO for that trail's reader (either pump EXTRACT or
REPLICAT) to move the reader's scan to the new trail file;  it will not happen
automatically.
EXTRACT altered.
```

17. Look at the Extract trail again:

```
GGSCI (SOURCE) > Info RmtTrail ./dirdat/6d

       Extract Trail: ./dirdat/6d
             Extract: EXT_6D
               Seqno: 1
                 RBA: 0
           File Size: 1M
```

Note the ***new*** sequence number: _____ (probably one)

18. Start the Extract group `ext_6d`.

```
GGSCI (SOURCE) > Start Extract ext_6d

Sending START request to MANAGER ...
EXTRACT EXT_6D starting
```

19. Verify that the extract is running.

```
GGSCI (SOURCE) > Info Extract ext_6d
EXTRACT    EXT_6D    Last Started 2014-06-08 15:14   Status RUNNING
Checkpoint Lag       00:00:00 (updated 00:00:01 ago)
Process ID           14678
Log Read Checkpoint  Oracle Redo Logs
                     2014-06-08 15:14:25  Seqno 241, RBA 7302144
                     SCN 0.8259246 (8259246)
```

20. In a SQL*Plus session, connect to the Oracle source schema:

```
[OS ~]$ sqlplus ogguser/oracle@ogg12c
Connected to: Oracle Database 11g Enterprise Edition Release 11.2.0.3.0
SQL>
```

Leave this session running because you will use it throughout the practice.

21. In SQL*Plus, run the following script to insert more data into the source tables.

```
SQL> @/home/oracle/Labs/Practice_06/insert_more_data_d.sql
Connected.
99 rows created.
Commit complete.
SQL>
```

22. Use the **Info** command to verify that Replicat is **ABENDED**.

```
GGSCI (TARGET) > Info rep_6d

REPLICAT   REP_6D    Last Started 2014-06-08 14:55   Status ABENDED
Checkpoint Lag       00:00:00 (updated 00:21:41 ago)
Log Read Checkpoint  File ./dirdat/6d000000
                     First Record  RBA 0
```

23. Alter the Replicat group `rep_6d` to read from the new trail file. Use the new sequence number that was recorded earlier from the `Info RmtTrail` command.

```
GGSCI (TARG)> Alter Replicat rep_6d, ExtSeqNo <seq_#>, ExtRBA 0
REPLICAT altered.

GGSCI (TARGET) >
```

24. Start Replicat.

```
GGSCI (TARGET) > Start rep_6d

Sending START request to MANAGER ...
REPLICAT REP_6D starting
```

25. View the Replicat report. Look for the following message:

```
GGSCI (TARGET) > View Report rep_6d

(...many lines omitted for clarity...)

2014-06-14 18:17:27  ERROR   OGG-06119  Trail file ./dirdat/6d000001 is
encrypted but no decryption key was found.

***********************************************************************
*                     ** Run Time Statistics **                       *
***********************************************************************

(...many lines omitted for clarity...)
```

This message indicates that there is an encryption issue with the trail.

26. Start `logdump`. Then open the trail that *precedes* the trail with the sequence number you noted in step 17. For example, if in step 17 you noted the sequence number `1`, you open the *previous* trail with sequence number `0`.

Use the `Open /dirdat/6d00000<seq_num>` command followed by the `NextTrail` command to open the next file in the sequence (the one you created with the rollover).

Note: You may have different sequence numbers recorded in step 16, when you created the file with the rollover.

```
GGSCI (TARGET) > sh ./logdump

Logdump > Open ./dirdat/6d000000
Current LogTrail is /home/oracle/OGG_Target/dirdat/6d000000
Logdump > NextTrail
LogTrail /home/oracle/OGG_Target/dirdat/6d000000 closed
Current LogTrail is /home/oracle/OGG_Target/dirdat/6d000001
Logdump >
```

27. Enter the `Next` command twice to view the second record (the first is a trail file header).

```
Logdump> N
(...many lines omitted for clarity...)
Logdump> N

2014/06/14 18:00:32.054.047 Insert               Len    48 RBA 1437
Name: SOURCE.BIG_DEPT
After  Image:                                             Partition 4   G  b
 1348 9b3b a891 a401 863e 1bd9 4f35 2e5d 1c50 5a30 | .H.;.....>..O5.].PZ0
 b064 a478 fc3d 1942 e7a9 b45c c261 209a d8b2 66fc | .d.x.=.B...\.a ...f.
 a6f8 bc3c f9f8 7208                               | ...<..r.

Logdump >
```

Note the data portion of the record (the area on the right). It is gibberish (to humans), which indicates encryption.

28. Enable decryption in `logdump`.

```
Logdump > Decrypt On KeyName mykey1
Logdump >
```

29. Enter the `Next` command to view the next record.

```
Logdump > N

2014/06/14 18:00:32.054.047 Insert               Len    44 RBA 1604
Name: SOURCE.BIG_DEPT
After  Image:                                             Partition 4   G  m
 0000 000a 0000 0000 0000 0000 0002 0001 000c 0000 | ..................
 0008 5245 5345 4152 4348 0002 000a 0000 0006 4441 | ..RESEARCH........DA
 4c4c 4153                                         | LLAS
Logdump >
```

Now that the data has been decrypted, you can read it (RESEARCH, DALLAS).

30. Exit `logdump`.

```
Logdump> Exit
GGSCI (TARGET) >
```

31. In GGSCI, edit the Replicat parameter file to uncomment the `DecryptTrail` parameter.

```
GGSCI (TARGET) > Edit Param rep_6d

Replicat rep_6d
DECRYPTTRAIL AES128 KEYNAME mykey1
UserID ogguser, Password oracle
DiscardFile dirrpt/rep_6d.dsc , Append
ReportCount Every 10000 Records, Rate
AssumeTargetDefs
Map source.emp6d, Target target.emp6d;
```

32. Start Replicat:

```
GGSCI (TARGET) > Start rep_6d

Sending START request to MANAGER ...
REPLICAT REP_6D starting
```

33. Verify that Replicat is working.

```
GGSCI (TARGET) > Info rep_6d

REPLICAT   REP_6D    Last Started 2014-06-14 18:27   Status RUNNING
Checkpoint Lag       00:00:00 (updated 00:00:01 ago)
Process ID           9382
Log Read Checkpoint  File ./dirdat/6d000001
                     2014-06-14 18:28:33.000601  RBA 324700
GGSCI (TARGET) >
```

34. In SQL*Plus, rerun the following script to insert some more data in the source tables.

```
SQL> @/home/oracle/Labs/Practice_06/insert_more_data_d.sql
Connected.

99 rows created.

Commit complete.
SQL>
```

35. Use the **`Info`** command to verify that Replicat is still **`RUNNING`**.

```
GGSCI (TARGET) > Info rep_6d

REPLICAT   REP_6D    Last Started 2014-06-14 18:27   Status RUNNING
Checkpoint Lag       00:00:00 (updated 00:00:02 ago)
Process ID           9382
Log Read Checkpoint  File ./dirdat/6d000001
                     2014-06-14 18:29:57.000536  RBA 345914
GGSCI (TARGET) >
```

Problem Two: "Haven't I seen you before?"

Overview

For this problem, you alter the Extract group `ext_6d` to start at the point when the initial checkpoint was issued (when the group was added). The goal is to catch all transactions that were missed because of the `FormatSQL` setting in the previous problem.

36. Within the `ggserr.log` file, find the time that the `ext_6d` group was added. In the Source window, exit GGSCI, and then execute the following command:

```
GGSCI (SOURCE) > Exit
[OS OGG_Source]$ cat ggserr.log |grep 'Add Extract ext_6d'
```

Look for an entry like the following and copy the time stamp to your clipboard. If you restarted the practice, take the latest time stamp.

```
2012-11-08 12:40:40  INFO    OGG-00987  Oracle GoldenGate
Command Interpreter for Oracle:  GGSCI command (oracle): Add
Extract ext_6d  TranLog, Begin Now.
```

37. Start GGSCI, and then stop the group `ext_6d`.

```
[OS OGG_Source]$ ./ggsci
GGSCI (SOURCE) 1> Stop Extract ext_6d

Sending STOP request to EXTRACT EXT_6D ...
Request processed.
```

38. Alter Extract to restart at the time shown in the log (substitute your own time stamp).

```
GGSCI (SOURCE) 2> Alter Extract ext_6d, BEGIN 2012-11-08 12:40:40
EXTRACT altered.

GGSCI (SOURCE) 3>
```

39. Start the Extract `ext_6d` and verify that it is running.

```
GGSCI (SOURCE) 3> Start Extract ext_6d

Sending START request to MANAGER ...
EXTRACT EXT_6D starting

GGSCI (SOURCE) 4> Info ext_6d

EXTRACT    EXT_6D    Last Started 2014-06-14 18:34   Status RUNNING
Checkpoint Lag       00:30:52 (updated 00:00:09 ago)
Process ID           9582
Log Read Checkpoint  Oracle Redo Logs
                     2014-06-14 18:04:27  Seqno 596, RBA 15867636
                     SCN 0.17680120 (17680120)
GGSCI (SOURCE) 5>
```

40. Use the `Info` command to view the status of the Replicat process in the Target window.

```
GGSCI (TARGET) > Info rep_6d

REPLICAT   REP_6D    Last Started 2014-06-14 18:27   Status ABENDED
Checkpoint Lag       00:00:00 (updated 00:01:39 ago)
Log Read Checkpoint  File ./dirdat/6d000002
                     2014-06-14 18:34:59.509290  RBA 1498
GGSCI (TARGET) >
```

Note that it is ABENDED.

41. View the Replicat report file.

```
GGSCI (TARGET) > View Report rep_6d
```

42. Evaluate the following messages:

```
Processed extract process graceful restart record at seq 2, rba 1437.
2014-06-14 18:35:08  INFO    OGG-05520  Input trail file encryption: AES128.
2014-06-14 18:35:08  WARNING OGG-01003  Repositioning to rba 3187 in seqno 2.


2014-06-14 18:35:08  WARNING OGG-01154  SQL error 1 mapping SOURCE.EMP6D to
TARGET.EMP6D OCI Error ORA-00001: unique constraint
(TARGET.EMP6D_PRIMARY_KEY) violated (status = 1), SQL <INSERT INTO
"TARGET"."EMP6D" ("EMPNO","ENAME","JOB","MGR","HIREDATE","SAL
","COMM","DEPTNO") VALUES (:a0,:a1,:a2,:a3,:a4,:a5,:a6,:a7)>.

2014-06-14 18:35:08  WARNING OGG-01003  Repositioning to rba 3187 in seqno 2.
```

43. What do you think is causing this error? Suppose that you wanted to ignore or discard duplicate records. How would you configure Replicat?

_____

_____

_____

_____

44. Edit the parameter file for Replicat rep_6d and uncomment the HandleCollisions parameter (or you could add RepError, but you will look at that later).

```
GGSCI (TARGET) > Edit Param rep_6d

Replicat rep_6d
DECRYPTTRAIL
HANDLECOLLISIONS
UserID ogguser, Password oracle
DiscardFile dirrpt/rep_6d.dsc , Append
ReportCount Every 10000 Records, Rate
AssumeTargetDefs
Map source.emp6d, Target target.emp6d;
```

45. Restart Replicat 6D.

```
GGSCI (TARGET) > Start Replicat rep_6d


Sending START request to MANAGER ...
REPLICAT REP_6D starting
```

46. Use the **Info** command to view the status of the Replicat process.

```
GGSCI (TARGET) > Info rep_6d

REPLICAT   REP_6D    Last Started 2014-06-14 18:41   Status RUNNING
Checkpoint Lag       00:00:00 (updated 00:00:06 ago)
Process ID           9764
Log Read Checkpoint  File ./dirdat/6d000002
                     2014-06-14 18:29:57.000676  RBA 345975
```

47. In a SQL*Plus window, execute the following commands to verify that the source and target tables are back in sync.

```
SQL> SELECT count(*) FROM source.emp6d;

  COUNT(*)
----------
       944

SQL> SELECT count(*) FROM target.emp6d;

  COUNT(*)
----------
       944

SQL>
```

Note: The numbers may vary, just as long as they match each other.

48. Stop Replicat.

```
GGSCI (TARGET) > Stop Replicat rep_6d

Sending STOP request to REPLICAT REP_6D ...
Request processed.
```

49. Comment out the HandleCollisions parameter, and then save and close the file.

```
GGSCI (TARGET) > Edit Param rep_6d

Replicat rep_6d
DECRYPTTRAIL
--HANDLECOLLISIONS
UserID ogguser, Password oracle
DiscardFile dirrpt/rep_6d.dsc , Append
ReportCount Every 10000 Records, Rate
AssumeTargetDefs
Map source.emp6d, Target target.emp6d;
```

50. Start Replicat.

```
GGSCI (TARGET) > Start Replicat rep_6d

Sending START request to MANAGER ...
REPLICAT REP_6D starting
```

51. Use the **Info** command to verify that Replicat is **RUNNING**.

```
GGSCI (TARGET) > Info rep_6d

REPLICAT   REP_6D    Last Started 2014-06-14 18:45   Status RUNNING
Checkpoint Lag       00:00:00 (updated 00:00:04 ago)
Process ID           9864
Log Read Checkpoint  File ./dirdat/6d000002
                     First Record  RBA 345975
```

Problem Three: "Just skip it."

Overview

This exercise shows you how to skip a record in a trail.

Note: You may have to skip a second record to get around the problem and allow Replicat to process successfully.

52. In your SQL*Plus window, run the following script:

```
SQL> @/home/oracle/Labs/Practice_06/f_update.sql
100 rows updated.
Commit complete.
1 row deleted.
Commit complete.
SQL>
```

53. Use the **Info** command to verify that the Replicat group rep_6d is **ABENDED**.

```
GGSCI (TARGET) > Info rep_6d

REPLICAT   REP_6D    Last Started 2014-06-14 18:45   Status ABENDED
Checkpoint Lag       00:00:00 (updated 00:00:11 ago)
Log Read Checkpoint  File ./dirdat/6d000002
                     First Record  RBA 345975
```

54. View the report file.

```
GGSCI (TARGET) > View Report rep_6d

(...many lines omitted for clarity...)

2014-06-14 18:50:19  WARNING OGG-01004  Aborted grouped transaction on
'TARGET.EMP6D', Database error 1403 (OCI Error ORA-01403:
 no data found, SQL <UPDATE "TARGET"."EMP6D" x SET x."COMM" = :a1 WHERE
x."EMPNO" = :b0>).


2014-06-14 18:50:19  WARNING OGG-01003  Repositioning to rba 345975 in seqno
2.


2014-06-14 18:50:20  WARNING OGG-01154  SQL error 1403 mapping SOURCE.EMP6D to
TARGET.EMP6D OCI Error ORA-01403: no data found,
SQL <UPDATE "TARGET"."EMP6D" x SET x."COMM" = :a1 WHERE x."EMPNO" = :b0>.


2014-06-14 18:50:20  WARNING OGG-01003  Repositioning to rba 345975 in seqno
2.
```

55. Open the Replicat parameter file.

```
GGSCI (TARGET) > Edit Param rep_6d
```

56. Uncomment the GroupTransOps and MaxTransOps parameters. Note that they are set to a value of 1. This sets Replicat to commit after one transaction.

```
Replicat rep_6d
DECRYPTTRAIL
GROUPTRANSOPS 1
MAXTRANSOPS 1
UserID ogguser, Password oracle
DiscardFile dirrpt/rep_6d.dsc , Append
ReportCount Every 10000 Records, Rate
AssumeTargetDefs
Map source.emp6d, Target target.emp6d;
```

FYI: When `MaxTransOps` is specified as `1`, `GroupTransOps` is redundant because `MaxTransOps` takes precedence.

57. Save and close the parameter file.
58. Start Replicat and let it fail on that transaction.

```
GGSCI (TARGET) > Start Replicat rep_6d
```

59. Open the Replicat discard file. View the last error at the end of the file:

```
GGSCI (TARGET) > View Report dirrpt/rep_6d.dsc

(...many lines omitted for clarity...)

Discarded record from action ABEND on error 1403

OCI Error ORA-01403: no data found, SQL <UPDATE "TARGET"."EMP6D" x SET
x."COMM" = :a1 WHERE x."EMPNO" = :b0>
Aborting transaction on ./dirdat/6d beginning at seqno 2 rba 351832
                        error at seqno 2 rba 351832
Problem replicating SOURCE.EMP6D to TARGET.EMP6D
Record not found
Mapping problem with compressed update record (target format)...
*
EMPNO = 3159
000000: 33 31 35 39                                     |3159            |

COMM = 1850.00
000000: 31 38 35 30 2e 30 30                            |1850.00         |

*

Process Abending : 2014-06-14 18:52:32

GGSCI (TARGET) >
```

Note: The `EMPNO` number can differ in your environment. It depends on the sequence the Oracle database stores data in its tables. The relevant point is that a record was not found by Replicat, which was trying an `UPDATE` operation.

60. Write down (or copy) the `RBA` number on which Replicat failed.

    _____

61. In the `OGG_Target/` directory, run `logdump`.

```
GGSCI (TARGET) > sh ./logdump

Oracle GoldenGate Log File Dump Utility for Oracle
Version 11.2.1.0.3 14400833 OGGCORE_11.2.1.0.3_PLATFORMS_120823.1258
Copyright (C) 1995, 2012, Oracle and/or its affiliates. All rights reserved.
```

```
Logdump >
```

62. Open the trail file that contains the record. You can locate the sequence number from the discard file and open the trail file directly:

```
Logdump > Open ./dirdat/6d000002
Current LogTrail is /home/oracle/OGG_Target/dirdat/6d000002
Logdump >
```

63. Enable header and detail display and decryption.

```
Logdump > GHDR On
Logdump > Detail On
Logdump > Decrypt On KeyName mykey1
Logdump >
```

64. Use the following `logdump Pos` commands to position at the `RBA` of the bad record:

```
Logdump > Pos <RBA_from_the_error>
Reading forward from RBA 351832
Logdump 81 >N

_____________________________________________________________________
Hdr-Ind    :     E  (x45)     Partition  :     .  (x04)
UndoFlag   :     .  (x00)     BeforeAfter:     A  (x41)
RecLength  :    28  (x001c)   IO Time    : 2014/06/14 18:50:16.000.749
IOType     :    15  (x0f)     OrigNode   :   255  (xff)
TransInd   :     .  (x01)     FormatType :     R  (x52)
SyskeyLen  :     0  (x00)     Incomplete :     .  (x00)
AuditRBA   :        596       AuditPos   : 28641860
Continued  :     N  (x00)     RecCount   :     1  (x01)

2014/06/14 18:50:16.000.749 FieldComp            Len    28 RBA 351832
Name: SOURCE.EMP6D
After  Image:                                             Partition 4   G  m
 0000 000a 0000 0000 0000 0000 0c57 0006 000a 0000 | ..............W......
 0000 0000 0002 d2a8                               | ........
Column     0 (x0000), Len    10 (x000a)
Column     6 (x0006), Len    10 (x000a)
Logdump >
```

65. Go to the *next* record:

```
___________________________________________________________________
Hdr-Ind    :     E  (x45)     Partition  :     .  (x04)
UndoFlag   :     .  (x00)     BeforeAfter:     A  (x41)
RecLength  :    28  (x001c)   IO Time    : 2014/06/14 18:50:16.000.749
IOType     :    15  (x0f)     OrigNode   :   255  (xff)
TransInd   :     .  (x01)     FormatType :     R  (x52)
SyskeyLen  :     0  (x00)     Incomplete :     .  (x00)
AuditRBA   :        596       AuditPos   : 28642240
Continued  :     N  (x00)     RecCount   :     1  (x01)

2014/06/14 18:50:16.000.749 FieldComp            Len    28 RBA 351951
Name: SOURCE.EMP6D
After  Image:                                             Partition 4   G  m
 0000 000a 0000 0000 0000 0000 0c58 0006 000a 0000 | ..............X......
 0000 0000 0002 d30c                               | ........
Column     0 (x0000), Len    10 (x000a)
Column     6 (x0006), Len    10 (x000a)
Logdump > Exit
GGSCI (TARGET) >
```

66. Record the `RBA` number of this record, and then exit `logdump`.

_____

67. In GGSCI, alter Replicat to start at this record:
    `Alter Replicat <rep_ID>, ExtSeqNo <seq_num>, ExtRBA <rba>`

```
GGSCI (TARG)> Alter Replicat rep_6d, ExtSeqNo 2, ExtRBA 351951
REPLICAT altered.

GGSCI (TARGET) >
```

68. In GGSCI, edit the Replicat parameter file to comment out, or remove, `GroupTransOps` and `MaxTransOps`.

```
GGSCI (TARGET) > Edit Param rep_6d

Replicat rep_6d
DECRYPTTRAIL
-- GROUPTRANSOPS 1
-- MAXTRANSOPS 1
UserID ogguser, Password oracle
DiscardFile dirrpt/rep_6d.dsc , Append
ReportCount Every 10000 Records, Rate
AssumeTargetDefs
Map source.emp6d, Target target.emp6d;
```

69. Save and close the parameter file.
70. Restart Replicat.

```
GGSCI (TARGET) > Start Replicat rep_6d

Sending START request to MANAGER ...
REPLICAT REP_6D starting
```

71. Use the **Info** command to verify that Replicat is **RUNNING** and has not abended again.

```
GGSCI (TARGET) > Info rep_6d

REPLICAT   REP_6D    Last Started 2014-06-14 19:01   Status RUNNING
Checkpoint Lag       00:00:00 (updated 00:00:00 ago)
Process ID           10300
Log Read Checkpoint  File ./dirdat/6d000002
                     2014-06-14 18:50:16.000749  RBA 357901
```

Note: If Replicat has abended, repeat the preceding steps that identify and skip the second problem record.

72. In a SQL*Plus window, execute the following commands to verify that the source and target tables are in sync (except for the discarded record) by selecting all rows from each table.

```
SQL> SELECT count(*) FROM source.emp6d;

  COUNT(*)
----------
       944

SQL> SELECT count(*) FROM target.emp6d;

  COUNT(*)
----------
       943

SQL>
```

Note: The numbers may vary, but they should be different from each other by one.

Cleanup

When you have completed this practice, exit all open SQL*Plus sessions. Then run the following file from your source GGSCI session before moving to the next practice:

```
GGSCI (SOURCE) > Obey ../Labs/Practice_00/cleanup_src.oby
```

Practices for Lesson 7: Missed Transactions

Chapter 7

Practices for Lesson 7: Solving Cases: The Dissimilar Data

Practices Overview

In these practices, you learn to recognize and correct data synchronization problems:

- Errors in resolving source and target table information
- Handling errors

Prerequisites

First run: Before starting this practice for the first time, run the following script in GGSCI:

```
GGSCI (SOURCE) > Obey /home/oracle/Labs/Practice_07/test.oby
```

Note: If you want to restart this practice, exit all open SQL *Plus sessions. Then, from your source GGSCI session, run the following:

```
GGSCI (SOURCE) > Obey
/home/oracle/Labs/Practice_00/cleanup_src.oby
GGSCI (SOURCE) > Obey /home/oracle/Labs/Practice_07/test.oby
```

Practice 7-1: Solving Mismatch Problems

Overview

In this practice, you learn how to provide the system with the information that it needs to apply changes when data tables are not identical.

Tasks

Problem: "Lost in translation"

1. From the Target window, start the Replicat group `rep_7a`.

```
[OS ] ogg_trg
[OS OGG_Target]$ ggsci
GGSCI (TARGET) > Start Replicat rep_7a

Sending START request to MANAGER ...
REPLICAT REP_7A starting
```

2. Use the **`Info`** command to verify that the process is **`ABENDED`**.

```
GGSCI (TARGET) > Info rep_7a

REPLICAT   REP_7A    Last Started 2012-11-12 09:10   Status ABENDED
Checkpoint Lag       00:01:55 (updated 00:00:33 ago)
Log Read Checkpoint  File ./dirdat/7a000000
                     2012-11-12 09:09:04.980984  RBA 2734
```

3. View the report file.

```
GGSCI (TARGET) > View Report rep_7a
```

4. Evaluate the message that is in the report. It should be similar to the following:

```
(...many lines omitted for clarity...)
Using the following key columns for target table TARGET.EMP7A: EMPNO.

2014-06-08 15:36:26  WARNING OGG-01431  Aborted grouped transaction on
'TARGET.EMP7A', Mapping error.

2014-06-08 15:36:26  WARNING OGG-01003  Repositioning to rba 3125 in seqno 0.

2014-06-08 15:36:26  WARNING OGG-01151  Error mapping from SOURCE.EMP7A to
TARGET.EMP7A.

2014-06-08 15:36:26  WARNING OGG-01003  Repositioning to rba 3125 in seqno 0.
```

5. The preceding report was not very helpful (it does not tell you what the mapping error is), so look into the discard report and describe what you see.

```
GGSCI (TARGET) > View Report dirrpt/rep_7a.dsc
Oracle GoldenGate Delivery for Oracle process started, group REP_7A discard
file opened: 2014-06-08 15:35:57.405124
Mapping error to target column:  MGR
Mapping error to target column:  MGR
Current time: 2014-06-08 15:36:26
Discarded record from action ABEND on error 0

Aborting transaction on ./dirdat/7a beginning at seqno 0 rba 3125
                        error at seqno 0 rba 3125
Problem replicating SOURCE.EMP7A to TARGET.EMP7A
Mapping problem with insert record (source format)...
*
ENAME =
JOB = GEORGE
000000: 47 45 4f 52 47 45                                 |GEORGE          |
MGR = 2621589071022404
000000: 32 36 32 31 35 38 39 30 37 31 30 32 32 34 30 34 |2621589071022404|
HIREDATE = NULL
EMPNO = 3546927965393727789
000000: 33 35 34 36 39 32 37 39 36 35 33 39 33 37 32 37 |3546927965393727|
000010: 37 38 39                                          |789             |
SAL = 5000.00
000000: 35 30 30 30 2e 30 30                              |5000.00         |
COMM = NULL
DEPTNO = 1
000000: 31                                                |1               |
*
Process Abending : 2014-06-08 15:36:26
GGSCI (TARGET) >
```

6. View the definitions of both the source table and the target table.

```
GGSCI (TARGET) > DBLogin UserID ogguser, Password oracle
Successfully logged into database.

GGSCI (TARGET) > Capture TableDef source.emp7a
Table definitions for SOURCE.EMP7A:
EMPNO                          NUMBER (10) NOT NULL PK
ENAME                          VARCHAR (10)
JOB                            VARCHAR (9)
MGR                            NUMBER (4)
HIREDATE                       DATETIME
SAL                            NUMBER (7,2)
COMM                           NUMBER (7,2)
DEPTNO                         NUMBER (10) NOT NULL
```

```
GGSCI (TARGET) > Capture TableDef target.emp7a
Table definitions for TARGET.EMP7A:
ENAME                          VARCHAR (10)
JOB                            VARCHAR (9)
MGR                            NUMBER (4)
HIREDATE                       DATETIME
EMPNO                          NUMBER (10) NOT NULL PK
SAL                            NUMBER (7,2)
COMM                           NUMBER (7,2)
DEPTNO                         NUMBER (10) NOT NULL

GGSCI (TARGET) >
```

What do you see here that relates to the problem?

_____

_____

7. Look at the clues in the error message: the words `problem` and `mapping`.
   a. Could it be a missing definitions file? Look in the `/u01/app/oracle/product/ogg_trg/dirdef` directory. Is the file there?
   b. Could it be a missing `SourceDefs` parameter?
8. From the Target window, open the `rep_7a` parameter file.

```
GGSCI (TARGET) > Edit Param rep_7a
```

You see that the `SourceDefs` parameter has been commented out to make it look as if a user forgot to specify it, and that is causing the problem.

Note: If the definitions file is missing but the parameter exists, you would get the following error message:

```
Bad parameter -- Could not open
/u01/app/oracle/product/ogg_src/dirdef/defgen.prm: No such file
or directory.
```

9. Uncomment the `SourceDefs` parameter, comment out `AssumeTargetDefs`, and then save and close the parameter file.

```
Replicat rep_7a
UserID ogguser, Password oracle
DiscardFile dirrpt/rep_7a.dsc , Append
ReportCount Every 10000 Records, Rate
-- AssumeTargetDefs
SOURCEDEFS ./dirdef/lab_7_def.def
Map source.big_dept, Target target.big_dept;
Map source.emp7a, Target target.emp7a;
```

10. Start Replicat.

```
GGSCI (TARGET) > Start Replicat rep_7a

Sending START request to MANAGER ...
REPLICAT REP_7A starting
```

11. Use the **`Info`** command to verify that the process is **`RUNNING`**.

```
GGSCI (TARGET) > Info rep_7a

REPLICAT   REP_7A    Last Started 2014-06-08 15:54   Status RUNNING
Checkpoint Lag       00:00:00 (updated 00:00:02 ago)
Process ID           15861
Log Read Checkpoint  File ./dirdat/7a000000
                     2014-06-08 15:35:14.000689  RBA 282262
```

Note: If you *still* get an error, perform the following two steps:

a. Open the source definitions file and check whether it lists the source table. If it does not list the source file, you need to re-create the definitions file:

```
GGSCI (SOURCE) > sh ./defgen paramfile dirprm/lab_7_def.prm
                 reportfile dirrpt/defgen.rpt
```

b. Verify that a new `*.def` file was created in the `/u01/app/oracle/product/ogg_trg/dirdef` directory, and then restart Replicat. On a two-host system, you would have to copy the definition file from Source to Target.

```
GGSCI (TARGET) > Start Replicat rep_7a
```

Practice 7-2: Handling Errors

Overview

In this practice, you learn how to log errors to a table so that you can process them manually at a later time. This does not resolve errors but shows you how to skip records and continue processing the trail. This is sometimes used to queue errors into a table for bidirectional processing.

Tasks

Problem: Using `RepError`

1. Start the Replicat `rep_7b`.

```
GGSCI (TARGET) > Start Replicat rep_7b

Sending START request to MANAGER ...
REPLICAT REP_7B starting
```

2. Start a SQL*Plus session, name this terminal window `SQL*Plus`, and log in to the Oracle source schema:

```
[OS ~]$ sqlplus ogguser/oracle@ogg12c
SQL>
```

3. Run the following script to update the source tables:

```
SQL> @/home/oracle/Labs/Practice_07/update_emp.sql
1 row deleted.
Commit complete.
1 row deleted.
Commit complete.
25 rows updated.
Commit complete.
SQL>
```

4. From the Target window, use the **`Info`** command to verify that Replicat is **`ABENDED`**.

```
GGSCI (TARGET) > Info rep_7b

REPLICAT   REP_7B    Last Started 2014-06-08 15:57   Status ABENDED
Checkpoint Lag       00:00:00 (updated 00:00:13 ago)
Log Read Checkpoint  File ./dirdat/7a000000
                     2014-06-08 15:58:13.000496  RBA 285262
```

5. View the report file.

```
GGSCI (TARGET) > View Report rep_7b
```

6. Locate the SQL error number in the report text and copy it to the computer's clipboard (or write it down).

```
(...many lines omitted for clarity...)

2014-06-08 15:59:09  WARNING OGG-01004  Aborted grouped
transaction on 'TARGET.EMP7B', Database error 1403 (OCI Error
ORA-01403: n
o data found, SQL <UPDATE "TARGET"."EMP7B" x SET x."COMM" = :a1
WHERE x."EMPNO" = :b0>).

2014-06-08 15:59:09  WARNING OGG-01003  Repositioning to rba
285262 in seqno 0.

2014-06-08 15:59:09  WARNING OGG-01154  SQL error 1403 mapping
SOURCE.EMP7A to TARGET.EMP7B OCI Error ORA-01403: no data found,
SQ
L <UPDATE "TARGET"."EMP7B" x SET x."COMM" = :a1 WHERE x."EMPNO"
= :b0>.

2014-06-08 15:59:09  WARNING OGG-01003  Repositioning to rba
285262 in seqno 0.
```

7. Open the `rep_7b` parameter file.

```
GGSCI (TARGET) > Edit Param rep_7b
```

8. Uncomment the `REPERROR (<error_number>, EXCEPTION)` parameter statement. Paste or enter the SQL error number copied from the report file in place of the `<error_number>` in the statement:

```
Replicat rep_7b
UserID ogguser, Password oracle
DiscardFile dirrpt/rep_7b.dsc , Append
ReportCount Every 10000 Records, Rate
-- RepError (DEFAULT, ABEND)
RepError (1403, EXCEPTION)
AssumeTargetDefs
Map source.emp7a, Target target.emp7b;
```

   Do not close the file yet. These exceptions are mapped to the target `emp7b_exception` table.

   Note: The `RepError` parameter can be stand-alone (as shown in the preceding steps), and therefore global for the whole process, or can be for a specific `Map` statement. To restrict the error handling to a single `Map` statement, you could move the `RepError` clause to the end of the `Map` command, similar to the following:

   ```
   Map source.emp7a, Target target.emp7b, RepError (1403, exception);
   ```

9. Uncomment the entire `Map` statement that is commented. This is the exceptions statement that directs error handling for the error you encountered.

```
Replicat rep_7b
UserID ogguser, Password oracle
DiscardFile dirrpt/rep_7b.dsc , Append
ReportCount Every 10000 Records, Rate
-- RepError (DEFAULT, ABEND)
RepError (1403, EXCEPTION)
AssumeTargetDefs
Map source.emp7a, Target target.emp7b;
Map source.emp7a, Target target.emp7b_exception
  InsertAllRecords,
  ExceptionsOnly,
  ColMap ( usedefaults,
  error_type   = @GetEnv ("GGHEADER", "OPTYPE"),
  error_number = @GetEnv ("LASTERR", "DBERRNUM"),
  error_desc   = @GetEnv ("LASTERR", "DBERRMSG"));
```

Note that there are *two* `Map` statements for table `emp7a`: one for normal data, and one for exceptions. Both of them end with a semi-colon.

10. Save and close the parameter file.
11. Start Replicat and use the **`Info`** command to verify that it is **`RUNNING`**.

```
GGSCI (TARGET) > Start rep_7b

Sending START request to MANAGER ...
REPLICAT REP_7B starting

GGSCI (TARGET) > Info rep_7b

REPLICAT   REP_7B    Last Started 2014-06-08 16:34   Status RUNNING
Checkpoint Lag       00:00:00 (updated 00:00:05 ago)
Process ID           16913
Log Read Checkpoint  File ./dirdat/7a000000
                     2014-06-08 15:59:05.000626  RBA 288262
```

12. In your SQL*Plus session, check whether any of the errors are being added to the target `emp7b_exception` table.

```
SQL> SELECT EMPNO,ENAME,ERROR_NUMBER,ERROR_TYPE,ERROR_DESC from
target.emp7b_exception;

     EMPNO ENAME      ERROR_NUMBER
---------- ---------- ------------------------------
ERROR_TYPE                  ERROR_DESC
------------------------------ ------------------------------
       726         1403
SQL COMPUPDATE                     OCI Error ORA-01403: no data f

       736         1403
SQL COMPUPDATE                     OCI Error ORA-01403: no data f

SQL>
```

Optional: If you are interested in getting the preceding formatting, use SQL*Plus column formatting commands similar to the following:

```
SQL> set pages 999
     set lines 999
     col job format a3
```

```
col mgr format 999
col sal format 999
col comm format 9999
col empno format 99999
col deptno format 99999
col error_type format a15
col error_number format a15
```

13. View your report file and see if you are still getting the same errors.

```
GGSCI (TARGET) > View Report rep_7b

(...many lines omitted for clarity...)

MAP resolved (entry source.emp7a):
  Map "SOURCE"."EMP7A", Target target.emp7b_exception InsertAllRecords,
ExceptionsOnly, ColMap ( usedefaults, error_type   = @GetE
nv ('GGHEADER', 'OPTYPE'), error_number = @GetEnv ('LASTERR',  'DBERRNUM'),
error_desc   = @GetEnv ('LASTERR',  'DBERRMSG'));


2014-06-08 16:34:32  WARNING OGG-06439  No unique key is defined for table
EMP7B_EXCEPTION. All viable columns will be used to rep
resent the key, but may not guarantee uniqueness. KEYCOLS may be used to
define the key.
Using the following default columns with matching names:
  EMPNO=EMPNO, ENAME=ENAME, JOB=JOB, MGR=MGR, HIREDATE=HIREDATE, SAL=SAL,
COMM=COMM, DEPTNO=DEPTNO
Using the following key columns for target table TARGET.EMP7B_EXCEPTION:
EMPNO, ENAME, JOB, MGR, HIREDATE, SAL, COMM, DEPTNO, ERRO
R_TYPE, ERROR_NUMBER, ERROR_DESC.


2014-06-08 16:34:32  WARNING OGG-01154  SQL error 1403 mapping SOURCE.EMP7A to
TARGET.EMP7B OCI Error ORA-01403: no data found, SQ
L <UPDATE "TARGET"."EMP7B" x SET x."COMM" = :a1 WHERE x."EMPNO" = :b0>.

GGSCI (TARGET) >
```

Although you are still getting SQL error 1403, it is no longer `OGG-01004 Aborted`.

Cleanup

When you have completed this practice, exit all open SQL*Plus sessions. Then run the following file from your source GGSCI session before moving on to the next practice:

```
GGSCI (SOURCE) > Obey ../Labs/Practice_00/cleanup_src.oby
```

Practices for Lesson 8: Mapping and Synchronization Problems

Chapter 8

Practices for Lesson 8: Solving Cases: The Mangled Mapping

Practices Overview

In these practices, you analyze and solve the following mapping problems:

- Missing definitions
- Column mapping issues
- Issues with wildcards in table names

Prerequisites

First run: Before starting this practice for the first time, run the following script:

```
GGSCI (SOURCE) > Obey /home/oracle/Labs/Practice_08/test.oby
```

Note: If you want to restart this practice, exit all open SQL*Plus sessions. Then, from your source GGSCI session, run the following:

```
GGSCI (SOURCE) > Obey
/home/oracle/Labs/Practice_00/cleanup_src.oby
GGSCI (SOURCE) > Obey /home/oracle/Labs/Practice_08/test.oby
```

Practice 8-1: Solving Mapping Problems

Overview

In this practice, you deal with mismatches between the source and target column names by using column mapping and by using the DEFGEN utility to generate definition files. You also explore issues with wildcards (asterisks) in table names.

Tasks

Problem One: "Mixing things up a little" (8a)

1. Start the Extract group ext_8a and the Replicat group rep_8a.

```
GGSCI (SOURCE) > Start Extract ext_8a

Sending START request to MANAGER ...
EXTRACT EXT_8A starting
```

```
[OS ]$ ogg_trg
[OS OGG_Target]$ ggsci
GGSCI (TARGET) > Start Replicat rep_8a

Sending START request to MANAGER ...
REPLICAT REP_8A starting
```

2. Use the Info command to verify that Replicat is ABENDED. It could take a while before the process abends, so continue to enter the Info rep_8a command until you verify that the Replicat group is in the ABENDED state.

```
GGSCI (TARGET) > Info rep_8a

REPLICAT   REP_8A    Last Started 2014-06-08 16:51   Status ABENDED
Checkpoint Lag       00:01:36 (updated 00:00:10 ago)
Log Read Checkpoint  File ./dirdat/8a000000
                     2014-06-08 16:50:06.063594  RBA 3125
```

3. View the Replicat report file. Evaluate the following message:

```
GGSCI (TARGET) > View Report rep_8a
(...many lines omitted for clarity...)
2014-06-08 16:51:18  INFO    OGG-03506  The source database character set, as
determined from the trail file, is UTF-8.
MAP resolved (entry source.big_dept):
  Map "SOURCE"."BIG_DEPT", Target target.big_dept;
Using following columns in default map by name:
  DEPTNO, DNAME, LOC
Using the following key columns for target table TARGET.BIG_DEPT: DEPTNO.

MAP resolved (entry source.emp8a):
  Map "SOURCE"."EMP8A", Target target.emp8a, ColMap ( USEDEFAULTS, SALARY =
SAL);
...LTS, SALARY = SAL)...
                  ^
Error in COLMAP clause. Unrecognized clause or element.
```

4. What do you think caused this problem?
   a. The target column has the wrong name.
   b. The target column does not exist in the target database.
   c. The target column has quotes around the name in the `ColMap` clause.
5. Are you not sure what caused the problem? Start a SQL*Plus session, name this terminal window `SQL*Plus`, and log in to the Oracle source schema:

```
[OS ~]$ sqlplus ogguser/oracle@ogg12c
SQL>
```

Check the source and target table definitions by executing the `describe` command on the source and the target:

```
SQL> desc source.emp8a
 Name                      Null?    Type
 ------------------------- -------- ----------------------
 EMPNO                     NOT NULL NUMBER(10)
 ENAME                              VARCHAR2(10)
 JOB                                VARCHAR2(9)
 MGR                                NUMBER(4)
 HIREDATE                           DATE
 SAL                                NUMBER(7,2)
 COMM                               NUMBER(7,2)
 DEPTNO                    NOT NULL NUMBER(10)

SQL> desc target.emp8a
Name                       Null?    Type
 ------------------------- -------- ----------------------
 EMPNO                     NOT NULL NUMBER(10)
 ENAME                              VARCHAR2(10)
 JOB                                VARCHAR2(9)
 MGR                                NUMBER(4)
 HIREDATE                           DATE
 SALARY                             NUMBER(7,2)
 COMM                               NUMBER(7,2)
 DEPTNO                    NOT NULL NUMBER(10)

SQL>
```

6. Did you find any differences between the tables? If so, what were they?

   _____

   _____

7. Look at the `rep_8a` parameter file to see if `SourceDefs` is used. Note the name of the source definitions file.

```
GGSCI (TARGET) > View Param rep_8a
```

   _____

8. On the source tab, view the DEFGEN parameter file and verify that it will output the required source definitions file.

```
GGSCI (SOURCE) > View Param dirprm/defgen.prm

DefsFile /u01/app/oracle/product/ogg_trg/dirdef/source_defs.def, Purge
UserID ogguser, Password oracle
Table source.big_dept;
Table source.emp8a;
Table source.emp8c;

GGSCI (SOURCE) >
```

Note: It writes from source to /u01/app/oracle/product/ogg_trg/dirdef.

9. Create the definitions file:

```
GGSCI (SOURCE) > sh ./defgen paramfile dirprm/defgen.prm
                 reportfile dirrpt/defgen.rpt
```

10. Edit the parameter file for rep_8a and uncomment the SourceDefs statement. You should also comment out the AssumeTargetDefs parameter. It makes sense only to specify one or the other, never both.

```
GGSCI (TARGET) > Edit Param rep_8a

Replicat rep_8a
UserID ogguser, Password oracle
DiscardFile dirrpt/rep_8a.dsc , Append
ReportCount Every 10000 Records, Rate
-- AssumeTargetDefs
SourceDefs ./dirdef/source_defs.def
Map source.big_dept, Target target.big_dept;
Map source.emp8a, Target target.emp8a,
 ColMap ( USEDEFAULTS,
 SALARY = SAL);
```

Save and close the file.

11. Check the source definitions file to make sure that it has the source tables listed.

```
GGSCI (TARGET) > View Param ./dirdef/source_defs.def
```

12. Start Replicat and verify that it is RUNNING:

```
GGSCI (TARGET) > Start Replicat rep_8a

Sending START request to MANAGER ...
REPLICAT REP_8A starting

GGSCI (TARGET) > Info rep_8a

REPLICAT   REP_8A    Last Started 2014-06-08 17:04   Status RUNNING
Checkpoint Lag       00:00:00 (updated 00:00:08 ago)
Process ID           17845
Log Read Checkpoint  File ./dirdat/8a000000
                     2014-06-08 16:50:08.000728  RBA 655904
GGSCI (TARGET) >
```

Problem Two: "D is for Default" (8b)

This exercise illustrates another common mapping problem, but this time, you need to investigate it more because the error message is not as clear. You may need to confirm some parameter syntax to be sure.

13. Start Replicat, and then use the `Info` command to verify that it is **ABENDED**.

```
GGSCI (TARGET) > Start Replicat rep_8b

Sending START request to MANAGER ...
REPLICAT REP_8B starting

GGSCI (TARGET) > Info rep_8b

REPLICAT   REP_8B    Last Started 2014-06-08 17:08   Status ABENDED
Checkpoint Lag       00:18:09 (updated 00:00:06 ago)
Log Read Checkpoint  File ./dirdat/8a000000
                     2014-06-08 16:50:06.063594  RBA 3125

GGSCI (TARGET) >
```

14. View the Replicat report file.

```
GGSCI (TARGET) > View Report rep_8b
```

15. Evaluate the following series of messages in the report.

```
(...many lines omitted for clarity...)

Opened trail file ./dirdat/8a000000 at 2014-06-08 17:08:15
MAP resolved (entry source.emp8a):
  Map "SOURCE"."EMP8A", Target target.emp8b, ColMap ( ENAME  = ENAME, SALARY =
SAL, COMM = COMM, DEPTNO = DEPTNO);
...AME  = ENAME, SALARY = SAL, CO...
                  ^
Error in COLMAP clause. Unrecognized clause or element.
```

Note the columns that were mapped and those that were not mapped.

_____

_____

_____

_____

16. Why do you think the columns were not mapped?
    a. The source and target columns were not explicitly mapped.
    b. The `UseDefaults` keyword was omitted from the `ColMap` clause.
17. If you answered both (a) and (b), you are correct! Technically, (b) is the better answer. When you are mapping only one pair of columns and the other column names are identical between the source and the target, you should use the `UseDefaults` keyword to direct Oracle GoldenGate to use the default column mapping. As an alternative, however, you could explicitly map each source and target column. The result would be the same. Replicat would not get an error in either case.
18. Edit the Replicat parameter file, and then change the `Map` statement to include the `UseDefaults` keyword (and comma) as the first item within the `ColMap` statement.

```
GGSCI (TARGET) > Edit Param rep_8b

Replicat rep_8b
UserID ogguser, Password oracle
DiscardFile dirrpt/rep_8b.dsc , Append
ReportCount Every 10000 Records, Rate
SourceDefs dirdef/source_defs.def
Map source.emp8a, Target target.emp8b,
ColMap (UseDefaults,
ENAME   = ENAME,
SALARY  = SAL,
COMM    = COMM,
DEPTNO  = DEPTNO);
```

19. Save and close the file.
20. Start Replicat.

```
GGSCI (TARGET) > Start Replicat rep_8b
```

21. Use the `Info` command to verify the status of the Replicat.

```
GGSCI (TARGET) > Info rep_8b
```

22. If it is `RUNNING`, go to the last two steps. Otherwise, view the report. What does the error tell you?

```
OGG_Target) GGSCI> View Report rep_8b
```

_____

_____

23. Use SQL*Plus to investigate further. What do you need to do to fix the problem?

    Note: If you have not yet done so, open a SQL*Plus window.

    Hint: Do we need to have explicit mapping for all the columns?

    _____

    _____

    If one is not open, start a new terminal window and name it **`SQL Plus Source`**. Log in as `source` with the password `oracle@ogg12c`. Run the following command to describe the source table:

```
SQL> desc source.emp8a
Name                      Null?    Type
 ----------------------- -------- ----------------------
 EMPNO                    NOT NULL NUMBER(10)
 ENAME                             VARCHAR2(10)
 JOB                               VARCHAR2(9)
 MGR                               NUMBER(4)
 HIREDATE                          DATE
 SAL                               NUMBER(7,2)
 COMM                              NUMBER(7,2)
 DEPTNO                   NOT NULL NUMBER(10)
```

    Open a new terminal window and name it **`SQL Plus Target`**. Log in as `target` with the password `oracle@ogg12c`. Run the following command to describe the target table:

```
SQL> desc target.emp8b
Name                  Null?    Type
 --------------------- -------- ---------------------
 EMPNO                 NOT NULL NUMBER(10)
 ENAME                          VARCHAR2(10)
 JOB                            VARCHAR2(9)
 MGR                            NUMBER(4)
 HIREDATE                       DATE
 SAL                            NUMBER(7,2)
 COMM                           NUMBER(7,2)
 DEPTNO                NOT NULL NUMBER(10)
```

24. Edit the parameter file and fix the problem.

```
GGSCI (TARGET) > Edit Param rep_8b
```

25. Start Replicat.

```
GGSCI (TARGET) > Start Replicat rep_8b
```

26. Enter the `Info` command to verify that Replicat is **RUNNING**.

```
GGSCI (TARGET) > Info rep_8b

REPLICAT   REP_8B    Last Started 2014-06-08 17:16   Status RUNNING
Checkpoint Lag       00:00:00 (updated 00:00:01 ago)
Process ID           18134
Log Read Checkpoint  File ./dirdat/8a000000
                     2014-06-08 16:50:08.000728  RBA 655904
```

27. Enter the `Stats` command to verify that Replicat performed the DML.

```
GGSCI (TARGET) > Stats Replicat rep_8b, Table target.emp8b

Sending STATS request to REPLICAT REP_8B ...

Start of Statistics at 2014-06-08 17:17:24.

Replicating from SOURCE.EMP8A to TARGET.EMP8B:

*** Total statistics since 2014-06-08 17:16:02 ***
     Total inserts                                896.00
     Total updates                                600.00
     Total deletes                                600.00
     Total discards                                 0.00
     Total operations                            2096.00

*** Daily statistics since 2014-06-08 17:16:02 ***
     Total inserts                                896.00
     Total updates                                600.00
     Total deletes                                600.00
     Total discards                                 0.00
     Total operations                            2096.00

*** Hourly statistics since 2014-06-08 17:16:02 ***
     Total inserts                                896.00
     Total updates                                600.00
     Total deletes                                600.00
     Total discards                                 0.00
     Total operations                            2096.00

*** Latest statistics since 2014-06-08 17:16:02 ***
     Total inserts                                896.00
     Total updates                                600.00
     Total deletes                                600.00
     Total discards                                 0.00
     Total operations                            2096.00

End of Statistics.

GGSCI (TARGET) >
```

Problem Three: "Mapping Gone Wild" (8c)

28. If it is not already running, start the Extract group `ext_8a`.

```
GGSCI (SOURCE) > Start Extract ext_8a
```

29. Start the Replicat group `rep_8c`.

```
GGSCI (TARGET) > Start Replicat rep_8c

Sending START request to MANAGER ...
REPLICAT REP_8C starting
```

30. Use the `Stats` command to verify that Extract processed data.

```
GGSCI (SOURCE) > Stats Extract ext_8a

Sending STATS request to EXTRACT EXT_8A ...
Start of Statistics at 2014-06-08 17:19:27.
Output to ./dirdat/8a:

Extracting from SOURCE.BIG_DEPT to SOURCE.BIG_DEPT:

*** Total statistics since 2014-06-08 16:50:56 ***
     Total inserts                              12.00
     Total updates                               0.00
     Total deletes                               0.00
     Total discards                              0.00
     Total operations                           12.00

*** Daily statistics since 2014-06-08 16:50:56 ***
     Total inserts                              12.00
     Total updates                               0.00
     Total deletes                               0.00
     Total discards                              0.00
     Total operations                           12.00

*** Hourly statistics since 2014-06-08 16:50:56 ***
     Total inserts                              12.00
     Total updates                               0.00
     Total deletes                               0.00
     Total discards                              0.00
     Total operations                           12.00

*** Latest statistics since 2014-06-08 16:50:56 ***
     Total inserts                              12.00
     Total updates                               0.00
     Total deletes                               0.00
     Total discards                              0.00
     Total operations                           12.00
(...many lines omitted for clarity...)
```

31. Use the `Info` command to verify that Replicat is **ABENDED**.

```
GGSCI (TARGET) > Info Replicat rep_8c

REPLICAT   REP_8C    Last Started 2014-06-08 17:19   Status ABENDED
Checkpoint Lag       00:29:09 (updated 00:00:59 ago)
Log Read Checkpoint  File ./dirdat/8a000000
                     2014-06-08 16:50:06.063594  RBA 3125
```

32. View the Replicat report file. Evaluate the following error carefully:

```
GGSCI (TARGET) > View Report rep_8c

(...many lines omitted for clarity...)

Wildcard MAP resolved (entry source.*):
  Map "SOURCE"."EMP8C", Target target."empEMP8C";

2014-06-08 17:19:17  WARNING OGG-00869  Failed to retrieve column list handle
for table TARGET.empEMP8C.

(...many lines omitted for clarity...)

2014-06-08 17:19:17  ERROR   OGG-00199  Table target.empEMP8C does not exist
in target database.
```

Note: You can also use the `Stats` command to verify that you have no operations processed.

```
GGSCI (TARGET) > Stats Replicat rep_8c
```

33. What do you think caused the problem?
    a. The wildcard specification was incorrect.
    b. The target table was spelled incorrectly in the `Map` statement.
    c. Supplemental logging was not enabled.
34. View the Replicat parameter file.

```
GGSCI (TARGET) > Edit Param rep_8c
```

35. What is wrong with the `Map` statement?

    _____

    _____

36. Correct the `Map` statement, and then save and close the file.
37. Start Replicat again.

```
GGSCI (TARGET) > Start Replicat rep_8c
```

38. Use the `Info` command to verify that Replicat is **RUNNING**.

```
GGSCI (TARGET) > Info Replicat rep_8c

REPLICAT   REP_8C    Last Started 2014-06-08 17:30   Status RUNNING
Checkpoint Lag       00:40:28 (updated 00:00:00 ago)
Process ID           18508
Log Read Checkpoint  File ./dirdat/8a000000
                     2014-06-08 16:50:07.998749  RBA 543855
```

39. Use the `Stats` command to verify that Replicat processed the data that was written to the trail.

```
GGSCI (TARGET) > Stats Replicat rep_8c

Sending STATS request to REPLICAT REP_8C ...
Start of Statistics at 2014-06-08 17:31:18.

Replicating from SOURCE.EMP8C to TARGET.EMP8C:

*** Total statistics since 2014-06-08 17:30:35 ***
     Total inserts                               896.00
     Total updates                               600.00
     Total deletes                               600.00
     Total discards                                0.00
     Total operations                           2096.00

*** Daily statistics since 2014-06-08 17:30:35 ***
     Total inserts                               896.00
     Total updates                               600.00
     Total deletes                               600.00
     Total discards                                0.00
     Total operations                           2096.00

*** Hourly statistics since 2014-06-08 17:30:35 ***
     Total inserts                               896.00
     Total updates                               600.00
     Total deletes                               600.00
     Total discards                                0.00
     Total operations                           2096.00

(...many lines omitted for clarity...)
```

Your numbers may be slightly different. The main thing to observe is that now data is replicating.

Cleanup

When you have completed this practice, close all open SQL*Plus sessions. Then run the following file from your source GGSCI session before moving on to the next practice:

```
GGSCI (SOURCE) > Obey
/home/oracle/Labs/Practice_00/cleanup_src.oby
```

Practices for Lesson 9: SQLEXEC, File-Maintenance, and Other Problems

Chapter 9

Practices for Lesson 9: Solving Cases: The Filled Files

Practices Overview

In these practices, you analyze and solve the following file management problems:

- Trail file problems
- Report file problems

Prerequisites

First run: Before starting this practice for the first time, run the following script in GGSCI:

```
GGSCI (SOURCE) > Obey /home/oracle/Labs/Practice_09/test.oby
```

Note: If you want to restart this practice, exit all open SQL*Plus sessions. Then, from your source GGSCI session, run the following:

```
GGSCI (SOURCE) > Obey
/home/oracle/Labs/Practice_00/cleanup_src.oby
GGSCI (SOURCE) > Obey /home/oracle/Labs/Practice_09/test.oby
```

Practice 9-1: Solving Trail Maintenance Issues

Overview

In this practice, you check trail files and evaluate trail maintenance parameters.

Tasks

Problem: "The crowded trail"

1. If it is not started, start the GGSCI session for the Source and Target windows. Check both Managers to find information about trail maintenance.

```
GGSCI (SOURCE) > Send Manager GetPurgeOldExtracts
```

```
[OS ogg_trg]$ ggsci
GGSCI (TARGET) > Send Manager GetPurgeOldExtracts
```

   What do you see?

   _____

   _____

2. Issue the `INFO RMTTRAIL` command to view the trails on the system.

```
GGSCI (SOURCE) > Info RmtTrail *

       Extract Trail: ./dirdat/9a
             Extract: EXT_9A
               Seqno: 0
                 RBA: 0
           File Size: 1M
```

3. Start the Extract process `ext_9a`.

```
GGSCI (SOURCE) > Start Extract ext_9a
```

4. In the Target window, check the trails and see how many files you now have.

```
GGSCI (TARGET) > sh dir dirdat


9a000000  9a000001  9a000002  9a000003
```

5. What sequence number is the `./dirdat/9a` trail on? How many files does this trail have?

   Sequence number: _____ Number of trail files: _____

6. Edit the target Manager parameter file and uncomment the line with the `PurgeOldExtracts` parameter. Save and close the file.

```
GGSCI (TARGET) > Edit Param Mgr


Port 9000
LagCriticalSeconds 60
LagInfoMinutes 60
LagReportMinutes 10
PurgeOldExtracts ./dirdat/*, UseCheckpoints, FrequencyMinutes 1
CheckMinutes 2
```

7. Bounce (stop and restart) the Manager process.

```
GGSCI (TARGET) > Stop Mgr !

Sending STOP request to MANAGER...
Request processed.
Manager stopped.

GGSCI (TARGET) > Start Mgr


Manager started.
```

8. Now that the Manager has been restarted, are any of the trail files being purged? Execute the following commands:

```
GGSCI (TARGET) > View Report Mgr

GGSCI (TARGET) > sh dir dirdat
```

9. Check the Manager to find information about trail maintenance.

```
GGSCI (TARGET) > Send Manager GetPurgeOldExtracts

Sending GETPURGEOLDEXTRACTS request to MANAGER ...

PurgeOldExtracts Rules
Fileset                              MinHours MaxHours MinFiles MaxFiles UseCP
/home/oracle/OGG_Target/dirdat/*           0        0        1        0   Y
OK
Extract Trails
Filename                      Oldest_Chkpt_Seqno  IsTable  IsVamTwoPhaseCommit
/home/oracle/OGG_Target/dirdat/9a        0
```

What do you see? Compare this with the output in step 1.

_____

_____

10. Notice that `GetPurgeOldExtracts` is set to purge based on checkpoints. What clue does this provide about why trail files remain on the system?
    a. There is a checkpoint somewhere in the oldest file that some of the processes need.
    b. A `Min` option is needed.
    c. `GetPurgeOldExtracts` works only for one group at a time.
11. Issue the `Info` command to view all the Extract and Replicat processes on the system.

```
GGSCI (SOURCE) > Info ER *

EXTRACT    EXT_9A    Last Started 2014-06-08 18:02   Status RUNNING
Checkpoint Lag       00:00:00 (updated 00:00:07 ago)
Process ID           19389
Log Read Checkpoint  Oracle Redo Logs
                     2014-06-08 18:05:26  Seqno 242, RBA 25713152
                     SCN 0.8286545 (8286545)
```

```
GGSCI (TARGET) > Info ER *

REPLICAT   REP_9A    Initialized   2014-06-08 18:00   Status STOPPED
Checkpoint Lag       00:00:00 (updated 00:05:55 ago)
Log Read Checkpoint  File ./dirdat/9a000000
                     First Record  RBA 0

REPLICAT   REP_9B    Initialized   2014-06-08 18:00   Status STOPPED
Checkpoint Lag       00:00:00 (updated 00:05:55 ago)
Log Read Checkpoint  File ./dirdat/9a000000
                     First Record  RBA 0
```

12. Start the Replicat process `rep_9a`.

```
GGSCI (TARGET) > Start Replicat rep_9a
```

13. Issue the `INFO` command for all the processes and view the trail files.

```
GGSCI (TARGET) > Info ER *

REPLICAT   REP_9A    Last Started 2014-06-08 18:07   Status RUNNING
Checkpoint Lag       00:00:00 (updated 00:07:00 ago)
Process ID           19529
Log Read Checkpoint  File ./dirdat/9a000000
                     First Record  RBA 0

REPLICAT   REP_9B    Initialized   2014-06-08 18:00   Status STOPPED
Checkpoint Lag       00:00:00 (updated 00:07:00 ago)
Log Read Checkpoint  File ./dirdat/9a000000
                     First Record  RBA 0
```

14. Look for processes that read the `./dirdat/9a` trail. Do you see that there are more Replicat processes reading that trail? Note the trail sequence number of the read checkpoint of the `rep_9a` Replicat group. Compare it to the checkpoint of the other group, `rep_9b`. What do you see?

    _____

15. What should you do so that the Manager purges some of the files? (More than one of the following responses could apply.)
    a. Delete the Replicat group that has the checkpoint in the earlier trail file, if it is a group that is no longer needed.
    b. Diagnose and fix whatever is causing the lag that is causing the checkpoint to be so far back in the trail.
    c. Other: _____.

    Hint: In the Manager parameter file, the `PurgeOldExtracts` parameter is set to purge based on checkpoints.

16. Fix the problem, stop and restart Manager, and then start the Replicat group `rep_9b`.

```
GGSCI (TARGET) > Edit Param mgr
GGSCI (TARGET) > Stop Mgr!
GGSCI (TARGET) > Start Mgr
GGSCI (TARGET) > Start Replicat rep_9b

Sending START request to MANAGER ...
REPLICAT REP_9B starting
```

17. Check the trails and see how many files you now have.

Note: It may take a couple of minutes for the system to reflect the change. The two exclamation points in the following script are about 90 seconds apart:

```
GGSCI (TARGET) > sh dir dirdat

9a000000  9a000001  9a000002  9a000003

GGSCI (TARGET) > !
sh dir dirdat

9a000000  9a000001  9a000002  9a000003

GGSCI (TARGET) > !
sh dir dirdat

9a000003

GGSCI (TARGET) >
```

18. View the Manager Report file to see what is being cleaned up.

```
GGSCI (TARGET) > View Report Mgr

(...many lines omitted for clarity...)

***********************************************************************
**                     Run Time Messages                             **
***********************************************************************

2014-06-08 18:13:01  INFO    OGG-00983  Manager started (port 7909).

2014-06-08 18:13:01  INFO    OGG-00957  Purged old extract file
/u01/app/oracle/product/ogg_trg/dirdat/9a000000, applying MinKeepF
iles purge rule: (3 - 0) >= 1.

2014-06-08 18:13:01  INFO    OGG-00957  Purged old extract file
/u01/app/oracle/product/ogg_trg/dirdat/9a000001, applying MinKeepF
iles purge rule: (3 - 1) >= 1.

2014-06-08 18:13:01  INFO    OGG-00957  Purged old extract file
/u01/app/oracle/product/ogg_trg/dirdat/9a000002, applying MinKeepF
iles purge rule: (3 - 2) >= 1.

2014-06-08 18:13:15  INFO    OGG-00963  Command received from GGSCI on host
[192.168.10.192]:33529 (START REPLICAT REP_9B ).

2014-06-08 18:13:15  INFO    OGG-00975  REPLICAT REP_9B starting.

GGSCI (TARGET) >
```

You can tell by the time stamps that the old files were purged about 90 seconds after the Replicat started.

Cleanup

When you have completed this practice, exit all open SQL*Plus sessions. Then run the following file from your source GGSCI session before moving on to the next practice:

```
GGSCI (SOURCE) > Obey
/home/oracle/Labs/Practice_00/cleanup_src.oby
```

Practices for Lesson 10: Performance Tuning

Chapter 10

Practices for Lesson 10: Overview

Practices Overview

In these practices, you learn some tips that get your data to the target faster. You tune replication performance through:

- Parallel processing
- Partitioning into ranges

Prerequisites

First run: Before starting this practice for the first time, perform the following steps:

1. Run the following script in GGSCI:

```
GGSCI (SOURCE) > Obey /home/oracle/Labs/Practice_10/test.oby
```

2. Start a SQL*Plus session, name this terminal window `SQL*Plus`, and log in to the Oracle source schema:

```
[OS ~]$ sqlplus ogguser/oracle@ogg12c
Connected:
```

   Leave this session running because you will use it throughout the practice.

3. Issue the following command to increase undo retention from whatever it was (probably 15 minutes) to 30 hours:

```
SQL > sho parameter undo_ret
NAME                 TYPE        VALUE
-------------------- ----------- ----------------
undo_retention       integer     900

SQL> ALTER SYSTEM SET undo_retention = 108000 SCOPE = both;
System altered.
SQL>
```

Note: If you want to restart this practice, exit all open SQL*Plus sessions. Then, from your source GGSCI session, run the following:

```
GGSCI (SOURCE) > Obey
/home/oracle/Labs/Practice_00/cleanup_src.oby
GGSCI (SOURCE) > Obey /home/oracle/Labs/Practice_10/test.oby
```

Practice 10-1: Tuning Replication

Overview

For the first part of this practice, you generate standard operations and large LOB operations and observe the resulting processing rate. Then you split the activity so that the LOB operations are handled by a second Replicat and observe the effect of this on the rate.

In the second part of the practice, you try to improve the processing rate by splitting large tables into ranges that are processed by different Replicats.

A word about naming conventions: the group names can be a maximum of only eight characters, so with `ext_` and `rep_` as prefixes, only four characters are left for a suffix. The trail prefixes can be only two characters, so in the past, prefixes such as 5a, 6b, 7c, and so on, were used. For Practice 10 (two digits), however, there was a problem making a trail prefix of 10a, and a problem with the suffix of _10b2. So for this practice, "10" will be "t" (as in "ten"). You will notice this as you continue with the practices.

Tasks

Part One: Split processing into parallel threads

1. Issue the `Status` command to verify that both the Extract `ext_tb` and the Replicat `rep_tb` groups are stopped.

```
GGSCI (SOURCE) > Status *_tb
EXTRACT EXT_TB: STOPPED
```

```
GGSCI (TARGET) > Status *_tb
REPLICAT REP_TB: STOPPED
```

2. Run the following SQL script to generate transactions on the `apartments` and `emp10a` tables. The transactions on `apartments` contain large LOB operations. The others do not.

```
SQL> @/home/oracle/Labs/Practice_10/update_data_b.sql

(...many lines omitted for clarity...)

Commit complete.
SQL>
```

3. From the Source window, start the Extract group `ext_tb`.

```
GGSCI (SOURCE) > Start Extract ext_tb

Sending START request to MANAGER ...
EXTRACT EXT_TB starting
```

4. Issue the `Status` command to verify that the group is **RUNNING**.

```
GGSCI (SOURCE) > Status ext_tb
EXTRACT EXT_TB: RUNNING
```

5. Start the Replicat group `rep_tb`.

```
GGSCI (TARGET) > Start Replicat rep_tb

Sending START request to MANAGER ...
REPLICAT REP_TB starting
```

6. Issue the `Status` command to verify that the group is **RUNNING**.

```
GGSCI (TARGET) > Status rep_tb
REPLICAT REP_TB: RUNNING
```

7. Use the `Send Replicat` command to view the status of processing and continue issuing the command until the status is `EOF`.

```
GGSCI (TARGET) > Send Replicat rep_tb, Status

Sending STATUS request to REPLICAT REP_TB ...
  Current status: At EOF
  Sequence #: 2
  RBA: 900808
  0 records in current transaction
```

8. View the processing statistics for the Replicat group `rep_tb`.

```
GGSCI (TARGET) > Stats Replicat rep_tb, ReportRate SEC

Sending STATS request to REPLICAT REP_TB ...
Start of Statistics at 2012-11-15 11:30:15.
Replicating from SOURCE.BIG_DEPT to TARGET.BIG_DEPT:

*** Total statistics since 2012-11-15 11:27:45 ***
     Total inserts/second:                    0.08
     Total updates/second:                    0.00
     Total deletes/second:                    0.00
     Total discards/second:                   0.00
     Total operations/second:                 0.08

*** Daily statistics since 2012-11-15 11:27:45 ***
     Total inserts/second:                    0.08
     Total updates/second:                    0.00
     Total deletes/second:                    0.00
     Total discards/second:                   0.00
     Total operations/second:                 0.08

*** Hourly statistics since 2012-11-15 11:27:45 ***
     Total inserts/second:                    0.08
     Total updates/second:                    0.00
     Total deletes/second:                    0.00
     Total discards/second:                   0.00
     Total operations/second:                 0.08

(...many lines omitted for clarity...)

GGSCI (TARGET) >
```

Make a note of the processing total statistics for the `emp10a` and `apartments` tables (or copy and paste them into some text editor such as `gedit` or Notepad):

	emp10a	apartments
Inserts/sec		
Updates/sec		
Deletes/sec		
Total operations/sec		

9. View the report file for the group `rep_tb`. Notice the `ReportCount` parameter. Scroll down and view the rate and delta.

```
GGSCI (TARGET) > View Report rep_tb

(...many lines omitted for clarity...)

***********************************************************************
**            Running with the following parameters                  **
***********************************************************************
2014-06-08 19:22:50  INFO    OGG-03059  Operating system character set
identified as UTF-8.


2014-06-08 19:22:50  INFO    OGG-02695  ANSI SQL parameter syntax is used for
parameter parsing.
Replicat rep_tb
UserID ogguser, Password ******
DiscardFile dirrpt/rep_tb.dsc , Append
ReportCount Every 100 Records, Rate
AssumeTargetDefs
Map source.*, Target target.*;
(...many lines omitted for clarity...)

Using the following key columns for target table TARGET.EMP10A: EMPNO.

         100 records processed as of 2014-06-08 19:23:21 (rate 33,delta 33)
         200 records processed as of 2014-06-08 19:23:21 (rate 64,delta 820)
         300 records processed as of 2014-06-08 19:23:21 (rate 93,delta 839)
         400 records processed as of 2014-06-08 19:23:21 (rate 119,delta 800)
         500 records processed as of 2014-06-08 19:23:21 (rate 144,delta 823)
         600 records processed as of 2014-06-08 19:23:21 (rate 167,delta 807)
         700 records processed as of 2014-06-08 19:23:21 (rate 188,delta 782)
         800 records processed as of 2014-06-08 19:23:21 (rate 208,delta 820)
         900 records processed as of 2014-06-08 19:23:22 (rate 227,delta 831)
        1000 records processed as of 2014-06-08 19:23:22 (rate 245,delta 801)

(...many lines omitted for clarity...)

GGSCI (TARGET) >
```

Note: Alternatively, to view the count of records, rate, and delta, you can shell out and then execute the following piped commands:

```
GGSCI (TARGET) > sh cat dirrpt/REP_TB.rpt | grep records | more
```

```
         100 records processed as of 2014-06-08 19:23:21 (rate 33,delta 33)
         200 records processed as of 2014-06-08 19:23:21 (rate 64,delta 820)
         300 records processed as of 2014-06-08 19:23:21 (rate 93,delta 839)
         400 records processed as of 2014-06-08 19:23:21 (rate 119,delta 800)
         500 records processed as of 2014-06-08 19:23:21 (rate 144,delta 823)
         600 records processed as of 2014-06-08 19:23:21 (rate 167,delta 807)
         700 records processed as of 2014-06-08 19:23:21 (rate 188,delta 782)
         800 records processed as of 2014-06-08 19:23:21 (rate 208,delta 820)
         900 records processed as of 2014-06-08 19:23:22 (rate 227,delta 831)
        1000 records processed as of 2014-06-08 19:23:22 (rate 245,delta 801

GGSCI (TARGET) >
```

Now we compare the previous performance with the performance of the same load, but with two Replicat groups running in parallel.

10. Stop all Extract and Replicat groups.

```
GGSCI (SOURCE) > Stop Extract *
```

```
GGSCI (TARGET) > Stop Replicat *
```

11. Open the parameter files for the following `*tb` groups:

    Exclude the `apartments` table by removing the comment dashes from `TableExclude` and `MapExclude`.

```
GGSCI (SOURCE) > Edit Param ext_tb

Extract ext_tb
UserID ogguser, Password oracle
StatOptions , ReportFetch
RmtHost localhost,  MgrPort 9000
RmtTrail ./dirdat/tb
DiscardFile dirrpt/ext_tb.dsc , Append
ReportCount Every 1000 Records, Rate
Table source.*;
TableExclude source.apartments
```

```
GGSCI (TARGET) > Edit Param rep_tb

Replicat rep_tb
UserID ogguser, Password oracle
DiscardFile dirrpt/rep_tb.dsc , Append
ReportCount Every 100 Records, Rate
AssumeTargetDefs
Map source.*, Target target.*;
-- MAP source.apartments, TARGET target.apartments;
MapExclude source.apartments;
```

12. Now open the parameter files for the new groups that will take a part of the load.

```
GGSCI (SOURCE) > Edit Param ext_tb2

Extract ext_tb2
UserID ogguser, Password oracle
StatOptions , ReportFetch
RmtHost localhost,  MgrPort 9000
RmtTrail ./dirdat/t2
DiscardFile dirrpt/ext_tb2.dsc , Append
ReportCount Every 10000 Records, Rate
Table source.apartments;
```

There is no action to be performed here. Simply make a note of the tables involved.

```
GGSCI (TARGET) > Edit Param rep_tb2

Replicat rep_tb2
UserID ogguser, Password oracle
DiscardFile dirrpt/rep_tb2.dsc , Append
ReportCount Every 100 Records, Rate
AssumeTargetDefs
Map source.apartments, Target target.apartments;
```

Make sure that the `apartments` table is the only one listed for these files.

13. Find the recovery checkpoints for the Extract `ext_tb`.

```
GGSCI (SOURCE) > Info Extract ext_tb, ShowCh

EXTRACT    EXT_TB    Last Started 2014-06-08 19:22   Status STOPPED
Checkpoint Lag       00:00:00 (updated 00:12:20 ago)
Log Read Checkpoint  Oracle Redo Logs
                     2014-06-08 19:31:39  Seqno 243, RBA 14038528
                     SCN 0.8296505 (8296505)

Current Checkpoint Detail:
Read Checkpoint #1
  Oracle Redo Log
  Startup Checkpoint (starting position in the data source):
    Thread #: 1
    Sequence #: 243
    RBA: 1371152
    Timestamp: 2014-06-08 19:13:14.000000
    SCN: Not available
    Redo File:
  Recovery Checkpoint (position of oldest unprocessed transaction in the data
source):
    Thread #: 1
    Sequence #: 243
    RBA: 14037008
    Timestamp: 2014-06-08 19:31:39.000000
    SCN: 0.8296504 (8296504)
    Redo File: /u02/oradata/ogg12c/redo03.log

  Current Checkpoint (position of last record read in the data source):
    Thread #: 1
    Sequence #: 243
    RBA: 14038528
    Timestamp: 2014-06-08 19:31:39.000000
    SCN: 0.8296505 (8296505)
    Redo File: /u02/oradata/ogg12c/redo03.log
(...many lines omitted for clarity...)

GGSCI (SOURCE) >
```

Note the Recovery Checkpoint Sequence number and RBA. Yours may be different.

14. Add the new Extract that starts with the Recovery checkpoint transaction:

```
GGSCI (SOURCE) > Add Extract ext_tb2, TranLog, ExtSeqNo
    <recovery_seq#> ExtRBA <recovery_checkpoint>
```

Note: The Extract is set to start at the recovery checkpoint in order to pick up any transactions that were still open when the Extract `ext_tb` stopped.

```
GGSCI (SOURCE) > Add Extract ext_tb2, TranLog, ExtSeqNo 243
                 ExtRBA 14037008

EXTRACT added.
```

15. Add the new Extract's trail and the new Replicat.

```
GGSCI (SOURCE) > Add RmtTrail ./dirdat/t2, Extract ext_tb2,
                 Megabytes 1
RMTTRAIL added.
```

```
GGSCI (TARGET) > Add Replicat rep_tb2, ExtTrail ./dirdat/t2
REPLICAT added.
```

Note: You may need to add `HandleCollisions` to the parameters. If you do so, you must also remember to remove it when you have passed the point of the overlap.

16. Run the following SQL script to generate transactions on the `apartments` and `emp10a` tables. The transactions on `apartments` contain large LOB operations. The others do not.

```
SQL> @/home/oracle/Labs/Practice_10/update_data_b.sql

(...many lines omitted for clarity...)

Commit complete.
SQL>
```

17. Start the Extract groups `ext_tb` and `ext_tb2`.

```
GGSCI (SOURCE) > Start Extract ext_tb

Sending START request to MANAGER ...
EXTRACT EXT_TB starting

GGSCI (SOURCE) > Start Extract ext_tb2

Sending START request to MANAGER ...
EXTRACT EXT_TB2 starting
```

18. Issue the `Status` command to verify that `ext_tb` and `ext_tb2` are **RUNNING**.

```
GGSCI (SOURCE) > Status ext_t*
EXTRACT EXT_TA: STOPPED
EXTRACT EXT_TB: RUNNING
EXTRACT EXT_TB2: RUNNING
```

19. Start both the Replicat groups, `rep_tb` and `rep_tb2`.

```
GGSCI (TARGET) > Start Replicat rep_tb

Sending START request to MANAGER ...
REPLICAT REP_TB starting

GGSCI (TARGET) > Start Replicat rep_tb2

Sending START request to MANAGER ...
REPLICAT REP_TB2 starting
```

20. Issue the `Status` command to verify that the group is **RUNNING**.

```
GGSCI (TARGET) > Status Replicat rep_t*
REPLICAT REP_TA: STOPPED
REPLICAT REP_TB: RUNNING
REPLICAT REP_TB2: RUNNING
REPLICAT REP_TC1: STOPPED
REPLICAT REP_TC2: STOPPED
```

21. Use the `Send Replicat` command for the groups, `rep_tb` and `rep_tb2`, to view the status of processing, and continue issuing the command until the status is `EOF`.

```
GGSCI (TARGET) > Send Replicat rep_tb, Status

Sending STATUS request to REPLICAT REP_TB ...
  Current status: At EOF
  Sequence #: 4
  RBA: 198098
  0 records in current transaction
GGSCI (TARGET) > Send Replicat rep_tb2, Status
Sending STATUS request to REPLICAT REP_TB2 ...
  Current status: At EOF
  Sequence #: 0
  RBA: 57064
  0 records in current transaction

GGSCI (TARGET) >
```

22. View the processing statistics for the groups, `rep_tb` and `rep_tb2`.

```
GGSCI (TARGET) > Stats Replicat rep_t*, ReportRate Sec

ERROR: REPLICAT REP_TA not currently running.
Sending STATS request to REPLICAT REP_TB ...
Start of Statistics at 2014-06-08 19:53:37.
Replicating from SOURCE.EMP10A to TARGET.EMP10A:

*** Total statistics since 2014-06-08 19:51:13 ***
     Total inserts/second:                      34.78
     Total updates/second:                       3.48
     Total deletes/second:                       0.00
     Total discards/second:                      0.00
     Total operations/second:                   38.25

*** Daily statistics since 2014-06-08 19:51:13 ***
     Total inserts/second:                      34.78
     Total updates/second:                       3.48
     Total deletes/second:                       0.00
     Total discards/second:                      0.00
     Total operations/second:                   38.25

*** Hourly statistics since 2014-06-08 19:51:13 ***
     Total inserts/second:                      34.78
     Total updates/second:                       3.48
     Total deletes/second:                       0.00
     Total discards/second:                      0.00
     Total operations/second:                   38.25

*** Latest statistics since 2014-06-08 19:51:13 ***
     Total inserts/second:                      34.78
     Total updates/second:                       3.48
     Total deletes/second:                       0.00
     Total discards/second:                      0.00
     Total operations/second:                   38.25

(...many lines omitted for clarity...)
```

Note: Ignore any error messages for other Replicats that are not currently running.

23. Make a note of the processing statistics for the `emp10a` and `apartments` tables from the report for the group `rep_tb`, or copy and paste them into Notepad or `gedit`.

	emp10a	apartments
Inserts/sec		
Updates/sec		
Deletes/sec		
Total Operations/sec		

24. Make a note of the processing statistics for the `emp10a` and `apartments` tables from the report for the group `rep_tb2`, or copy and paste them into Notepad or `gedit`.

	emp10a	apartments
Inserts/sec		
Updates/sec		
Deletes/sec		
Total Operations/sec		

25. What do you notice about the differences in performance now?

_____

_____

Part Two: Split a large table into ranges

26. View the parameter file for the Replicat group `rep_tc1`.

```
GGSCI (TARGET) > View Param rep_tc1
```

27. Notice the `Map` statement:

```
Replicat rep_tc1
UserID ogguser, Password oracle
DiscardFile dirrpt/rep_tc1.dsc , Append
ReportCount Every 1000 Records, Rate
SourceDefs dirdef/source_defs.def
-- MAP source.emp10a, TARGET target.emp10b;
Map source.emp10a, Target target.emp10c,
ColMap (UseDefaults, rep_name = "REP_TC1")
Filter (@RANGE (1, 2, empno));
```

- The `Filter` clause uses the `@RANGE` function to partition rows into a range based on the `empno` column. Notice how it is the first range in a set of two.
- The `ColMap` statement uses default mappings for all columns, except the `rep_name` column. The `rep_name` column is mapped to the string `REP_TC1`. This string will be inserted into the `rep_name` column in the target table on every operation made by the Replicat group `rep_tc1`.

28. View the parameter file for the Replicat group `rep_tc2`.

```
GGSCI (TARGET) > View Param rep_tc2
```

29. Notice the `Map` statement:

```
Replicat rep_tc2
UserID ogguser, Password oracle
DiscardFile dirrpt/rep_tc2.dsc , Append
ReportCount Every 1000 Records, Rate
SourceDefs dirdef/source_defs.def
Map source.emp10a, Target target.emp10c,
ColMap (UseDefaults, rep_name = 'REP_TC2'),
FILTER (@RANGE (2, 2, empno));
-- Note single quotes around the string
```

- The `Filter` clause also uses the `@RANGE` function based on the `empno` column, but now the range is the second of two.
- The `ColMap` statement uses a similar `ColMap` clause, except that the `rep_name` column is mapped to a different string, `REP_TC2`.

  For each operation on the target, one or the other of the two strings will be inserted into the `rep_name` column, depending on which Replicat group performed the operation. At the end of this practice, you will be able to query the `rep_name` column and confirm that the partitioning worked based on those string values.

30. Start the Extract group `ext_ta`.

```
GGSCI (SOURCE) > Start Extract ext_ta

Sending START request to MANAGER ...
EXTRACT EXT_TA starting
```

31. Use the **Info** command to verify that the process is **RUNNING**.

```
GGSCI (SOURCE) > Info Extract ext_ta

EXTRACT    EXT_TA    Last Started 2014-06-08 20:08   Status RUNNING
Checkpoint Lag       00:55:09 (updated 00:00:06 ago)
Process ID           22727
Log Read Checkpoint  Oracle Redo Logs
                     2014-06-08 19:13:12  Seqno 243, RBA 1359888
                     SCN 0.0 (0)
```

32. Start both the Replicat groups, `tc1` and `tc2`.

```
GGSCI (TARGET) > Start Replicat rep_tc*
```

33. Use the **Info** command to verify that those `tc*` processes are **RUNNING**.

```
GGSCI (TARGET) > Info Replicat rep_tc*

REPLICAT   REP_TC1   Last Started 2014-06-08 23:03   Status RUNNING
Checkpoint Lag       00:00:00 (updated 00:00:00 ago)
Process ID           27427
Log Read Checkpoint  File ./dirdat/ta000001
                     2014-06-08 23:01:30.002365  RBA 669743

REPLICAT   REP_TC2   Last Started 2014-06-08 23:03   Status RUNNING
Checkpoint Lag       00:00:00 (updated 00:00:00 ago)
Process ID           27428
Log Read Checkpoint  File ./dirdat/ta000001
                     2014-06-08 23:01:30.002365  RBA 669743
```

34. Run the following script to generate activity on the `source.emp10a` table that will be replicated to `target.emp10c`:

```
SQL> @/home/oracle/Labs/Practice_10/insert_data_a.sql

(...many lines omitted for clarity...)

Commit complete.
SQL>
```

35. Check the status of both the Replicat groups, `tc1` and `tc2`, until the status is `EOF`, showing that all data has been processed.

```
GGSCI (TARGET) > Send Replicat *, Status

ERROR: REPLICAT REP_TA not currently running.

Sending STATUS request to REPLICAT REP_TB ...
  Current status: At EOF
  Sequence #: 15
  RBA: 605118
  0 records in current transaction

Sending STATUS request to REPLICAT REP_TB2 ...
  Current status: At EOF
  Sequence #: 0
  RBA: 57548
  0 records in current transaction

Sending STATUS request to REPLICAT REP_TC1 ...
  Current status: At EOF
  Sequence #: 13
  RBA: 84098
  0 records in current transaction

Sending STATUS request to REPLICAT REP_TC2 ...
  Current status: At EOF
  Sequence #: 13
  RBA: 84098
  0 records in current transaction

GGSCI (TARGET) >
```

Note: Ignore any error messages for other Replicats that are not running.

36. View processing statistics for each Replicat group to see that both groups processed data.

```
GGSCI (TARGET) > Stats Replicat rep_tc*
Sending STATS request to REPLICAT REP_TC1 ...
Start of Statistics at 2014-06-08 23:08:20.
Replicating from SOURCE.EMP10A to TARGET.EMP10C:

*** Total statistics since 2014-06-08 23:03:41 ***
     Total inserts                          28551.00
     Total updates                            167.00
     Total deletes                            167.00
     Total discards                             0.00
     Total operations                       28885.00

(...many lines omitted for clarity...)

End of Statistics.
```

```
Sending STATS request to REPLICAT REP_TC2 ...
Start of Statistics at 2014-06-08 23:08:20.
Replicating from SOURCE.EMP10A to TARGET.EMP10C:

*** Total statistics since 2014-06-08 23:03:41 ***
     Total inserts                          28622.00
     Total updates                            133.00
     Total deletes                            133.00
     Total discards                             0.00
     Total operations                       28888.00

(...many lines omitted for clarity...)

End of Statistics.

GGSCI (TARGET >
```

37. In SQL*Plus, issue the following query on the `emp10c` table to view the data processed by the first Replicat group.

```
SQL> connect ogguser/oracle@ogg12c
Connected.
SQL> SELECT COUNT (*) FROM target.emp10c
      WHERE rep_name = 'REP_TC1';

  COUNT(*)
----------
     28384
```

38. Repeat the query, but now use the `REP_TC2` string in the `WHERE` clause to view data processed by the second Replicat group. Now you can see how the ranges were processed. They are not exactly identical but approximately handled evenly.

```
SQL> SELECT COUNT (*) FROM target.emp10c
      WHERE rep_name = 'REP_TC2';

  COUNT(*)
----------
     28489
```

39. View the report file for the Replicats, `rep_tC1` and `rep_tC2`. Notice the `ReportCount` parameter for each group.

```
GGSCI (TARGET) > View Report rep_tc1
GGSCI (TARGET) > View Report rep_tc2
```

Scroll down and view the rate and delta for the processes in each Replicat group. Compare the rate and delta with those shown in the report for the group `rep_tb` (step 9).

What do you notice about the differences in performance now? Has performance improved? Make your own statement.

_____

_____

```
***********************************************************************
**            Running with the following parameters                  **
***********************************************************************
2014-06-08 23:03:17  INFO    OGG-03059  Operating system character set
identified as UTF-8.
2014-06-08 23:03:17  INFO    OGG-02695  ANSI SQL parameter syntax is used for
parameter parsing.
Replicat rep_tc1
UserID ogguser, Password ******
DiscardFile dirrpt/rep_tc1.dsc , Append
ReportCount Every 1000 Records, Rate
SourceDefs dirdef/source_defs.def
2014-06-08 23:03:19  INFO    OGG-03528  The source database character set, as
determined from the table definition file, is UTF-8.
Map source.emp10a, Target target.emp10c,
ColMap (UseDefaults, rep_name = 'REP_TC1')
FILTER (@RANGE (1, 2, empno));

(...many lines omitted for clarity...)

***********************************************************************
**                     Run Time Messages                             **
***********************************************************************

Opened trail file ./dirdat/ta000000 at 2012-11-15 14:51:10

MAP resolved (entry source.emp10a):
  Map "SOURCE"."EMP10A", Target target.emp10c, ColMap (UseDefaults, rep_name =
'REP_TC1') FILTER (@RANGE (1, 2, empno));
Using the following default columns with matching names:
  EMPNO=EMPNO, ENAME=ENAME, JOB=JOB, MGR=MGR, HIREDATE=HIREDATE, SAL=SAL,
COMM=COMM, DEPTNO=DEPTNO, MISC_TEXT=MISC_TEXT
Using the following key columns for target table TARGET.EMP10C: EMPNO.

        1000 records processed as of 2014-06-08 23:03:43 (rate 792,delta 792)
        2000 records processed as of 2014-06-08 23:03:44 (rate 790,delta 789)

Switching to next trail file ./dirdat/ta000001 at 2014-06-08 23:03:44 due to
EOF, with current RBA 999904
Opened trail file ./dirdat/ta000001 at 2014-06-08 23:03:44
        3000 records processed as of 2014-06-08 23:03:45 (rate 794,delta 802)
        4000 records processed as of 2014-06-08 23:04:58 (rate 52,delta 13)
Switching to next trail file ./dirdat/ta000002 at 2014-06-08 23:04:58 due to
EOF, with current RBA 999949
Opened trail file ./dirdat/ta000002 at 2014-06-08 23:04:58
       5000 records processed as of 2014-06-08 23:04:59 (rate 64,delta 853)
       6000 records processed as of 2014-06-08 23:05:00 (rate 76,delta 852)

(...many lines omitted for clarity...)
```

```
***********************************************************************
**            Running with the following parameters                  **
***********************************************************************
2012-11-15 14:51:09  INFO    OGG-03035  Operating system character set 2014-
06-08 23:03:17  INFO    OGG-03059  Operating system character set identified
as UTF-8.
2014-06-08 23:03:17  INFO    OGG-02695  ANSI SQL parameter syntax is used for
parameter parsing.
Replicat rep_tc2
UserID ogguser, Password ******
DiscardFile dirrpt/rep_tc2.dsc , Append
ReportCount Every 1000 Records, Rate
SourceDefs dirdef/source_defs.def
2014-06-08 23:03:19  INFO    OGG-03528  The source database character set, as
determined from the table definition file, is UTF-8.
Map source.emp10a, Target target.emp10c,
ColMap (UseDefaults, rep_name = 'REP_TC2'),
FILTER (@RANGE (2, 2, empno));
(...many lines omitted for clarity...)

***********************************************************************
**                     Run Time Messages                             **
***********************************************************************

Opened trail file ./dirdat/ta000000 at 2012-11-15 14:51:10

MAP resolved (entry source.emp10a):
  Map "SOURCE"."EMP10A", Target target.emp10c, ColMap (UseDefaults, rep_name =
'REP_TC2'), FILTER (@RANGE (2, 2, empno));
Using the following default columns with matching names:
  EMPNO=EMPNO, ENAME=ENAME, JOB=JOB, MGR=MGR, HIREDATE=HIREDATE, SAL=SAL,
COMM=COMM, DEPTNO=DEPTNO, MISC_TEXT=MISC_TEXT
Using the following key columns for target table TARGET.EMP10C: EMPNO.
       1000 records processed as of 2014-06-08 23:03:43 (rate 760,delta 760)
       2000 records processed as of 2014-06-08 23:03:44 (rate 771,delta 782)

Switching to next trail file ./dirdat/ta000001 at 2014-06-08 23:03:44 due to
EOF, with current RBA 999904
Opened trail file ./dirdat/ta000001 at 2014-06-08 23:03:44
       3000 records processed as of 2014-06-08 23:03:45 (rate 782,delta 804)
       4000 records processed as of 2014-06-08 23:04:58 (rate 52,delta 13)

Switching to next trail file ./dirdat/ta000002 at 2014-06-08 23:04:58 due to
EOF, with current RBA 999949
Opened trail file ./dirdat/ta000002 at 2014-06-08 23:04:58


       5000 records processed as of 2014-06-08 23:04:59 (rate 64,delta 883)
       6000 records processed as of 2014-06-08 23:05:00 (rate 76,delta 903)
(...many lines omitted for clarity...)
```

```
GGSCI (TARGET) > Stats Replicat rep_tc*
Sending STATS request to REPLICAT REP_TC1 ...
Start of Statistics at 2014-06-08 23:29:15.
Replicating from SOURCE.EMP10A to TARGET.EMP10C:

*** Total statistics since 2014-06-08 23:03:41 ***
     Total inserts                          28551.00
     Total updates                            167.00
     Total deletes                            167.00
     Total discards                             0.00
     Total operations                       28885.00

*** Daily statistics since 2014-06-08 23:03:41 ***
     Total inserts                          28551.00
     Total updates                            167.00
     Total deletes                            167.00
     Total discards                             0.00
     Total operations                       28885.00

(...many lines omitted for clarity...)
```

Cleanup

When you have completed this practice, exit all open SQL*Plus sessions. Then run the following file from your source GGSCI session:

```
GGSCI (SOURCE) > Obey
/home/oracle/Labs/Practice_00/cleanup_src.oby
```

Note: Leave the PCs running at the end of class; do *not* turn them off.

Practices for Lesson 11: "Integrated" Performance Tuning

Chapter 11

Practices for Lesson 11: Integrated Performance Tuning

Practices Overview

In these practices, you prepare the database environment and configure an integrated Extract and an integrated Replicat, initially making sure that the replication setup works; subsequently, you stress test the replication environment and monitor the performance in real time by using the new `V$` views provided by the Oracle database and the Oracle GoldenGate monitoring facilities.

Note: In all previous practices, the environment was set up automatically, by using one or two Oracle GoldenGate `obey` scripts. In these practices, however, you go through all the steps required to configure replication.

Practice 11-1: Preparing the Environment

Overview

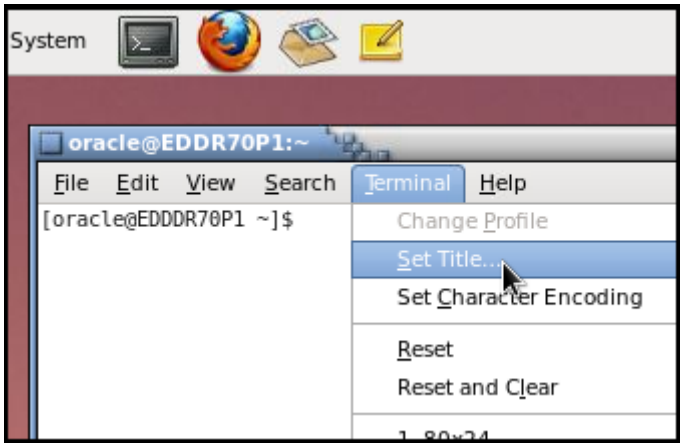
In this practice, you perform those tasks that are necessary to prepare the environment so that it is ready to implement Integrated replication.

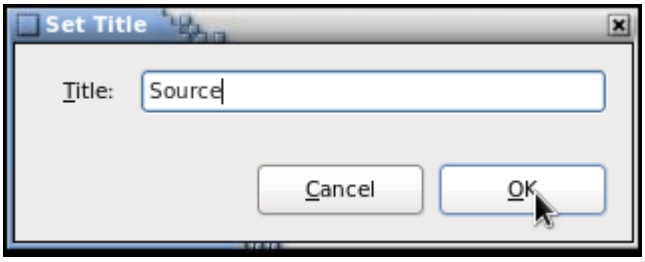
Assumptions

The Oracle RDBMS instance `ogg12c` is running in `ARCHIVELOG` mode and it has been enabled for supplemental logging, including `FORCE` logging.

Tasks

1. Open a new terminal or command window, add the title `Source`, source the `ora12env.sh` file to set up the required environment variables, and invoke a few shell commands (stored in `~/Labs/Practice_11`) to prepare your environment, as follows:






```
[oracle@EDDDR70P1 ~]$ source ora12env.sh
[oracle@EDDDR70P1 ~]$ cd Labs/Practice_11
[oracle@EDDDR70P1 Practice_11]$
```

Note: Make sure that you do not have any session connected to the Oracle database; otherwise you will not be able to drop and re-create the `source` and the `target` database users. Now is the time to check if you have any lingering sessions from the previous practices in your environment.

2. Connect to the Oracle database by using `sqlplus` as `system` (password `oracle`), invoking the script `drop_create_source.sql`. The script drops the `source` user and re-creates it so that the environment starts cleanly.

```
[oracle@EDDDR70P1 Practice_11]$ sqlplus system/oracle@ogg12c

SQL*Plus: Release 12.1.0.1.0 Production on Sat May 24 16:28:44 2014
Copyright (c) 1982, 2013, Oracle.  All rights reserved.
Last Successful login time: Sat May 24 2014 16:26:48 +10:00
Connected to:
Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit
Production
With the Partitioning, OLAP, Advanced Analytics and Real Application
Testing options
SQL> @drop_create_source.sql

User dropped.

User created.

Grant succeeded.

Disconnected from Oracle Database 12c Enterprise Edition Release
12.1.0.1.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real Application
Testing options
[oracle@EDDDR70P1 Practice_11]$
```

3. Use the `imp` utility to import the database objects needed by the practice into the `source` schema. For convenience, the `imp` command is included in the shell file `src_import.sh`. You are welcome to display the content of `src_import.sh` to assess the `imp` syntax.

```
[oracle@EDDDR70P1 Practice_11]$ ./src_import.sh
Import: Release 12.1.0.1.0 - Production on Sat May 24 16:35:27 2014
Copyright (c) 1982, 2013, Oracle and/or its affiliates.  All rights
reserved.


Connected to: Oracle Database 12c Enterprise Edition Release
12.1.0.1.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real Application
Testing options
Export file created by EXPORT:V12.01.00 via conventional path
import done in US7ASCII character set and AL16UTF16 NCHAR character set
import server uses AL32UTF8 character set (possible charset conversion)
. importing SOURCE's objects into SOURCE
. . importing table                       "ACCOUNT"     100000 rows imported
. . importing table                    "ATMDETAIL"      50000 rows imported
. . importing table        "CREATE$JAVA$LOB$TABLE"          5 rows imported
. . importing table                    "EXCEPTION"          0 rows imported
. . importing table         "JAVA$CLASS$MD5$TABLE"          3 rows imported
. . importing table        "JAVA_STPROC_PARAMETER"          1 rows imported
. . importing table                  "TRANSACTION"          0 rows imported
Import terminated successfully without warnings.
[oracle@EDDDR70P1 Practice_11]$
```

The `imp` command uploads to the `source` schema the objects needed by this practice, in particular the following:

Object	Type	Purpose
CREATE$JAVA$LOB$TABLE	Table	It contains Java code elements. It is created by the `loadjava` utility.
JAVA$CLASS$MD5$TABLE	Table	A hash table used to track the loading of Java elements into a given schema
ACCOUNT	Table	Table holding user accounts
ATMDETAIL	Table	Table holding Automatic Teller Machine information
EXCEPTION	Table	Table, which stores exceptions generated during transaction processing
TRANSACTION	Table	Table holding transaction information
EXCEPTIONID_SEQ	Sequence	Sequence used to generate the primary key for the Exception table
TXNID_SEQ	Sequence	Sequence used to generate the primary key for the Transaction table
GENERATE_ACTIVITY	Stored Procedure	`Generate_Activity()` randomly generates a high volume of transactions, simulating users withdrawing money from or uploading money to their accounts.

4. Open a new terminal or command window, add the title `Target`, source the `ora12env.sh` file to set up the required environment variables, and invoke a few shell commands (stored in `~/Labs/Practice_11`) to prepare your environment, as follows:

```
[oracle@EDDDR70P1 ~]$ source ora12env.sh
[oracle@EDDDR70P1 ~]$ cd Labs/Practice_11
[oracle@EDDDR70P1 Practice_11]$
```

5. Connect to the Oracle database by using `sqlplus` as `system` (password `oracle`), invoking the script `drop_create_target.sql`. The script drops the `target` user and re-creates it so that the environment starts cleanly.

```
[oracle@EDDDR70P1 Practice_11]$ sqlplus system/oracle@ogg12c

SQL*Plus: Release 12.1.0.1.0 Production on Sat May 24 16:28:44 2014
Copyright (c) 1982, 2013, Oracle.  All rights reserved.
Last Successful login time: Sat May 24 2014 16:26:48 +10:00
```

```
Connected to:
Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit
Production
With the Partitioning, OLAP, Advanced Analytics and Real Application
Testing options
SQL> @drop_create_target.sql

User dropped.

User created.

Grant succeeded.

Disconnected from Oracle Database 12c Enterprise Edition Release
12.1.0.1.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real Application
Testing options
[oracle@EDDDR70P1 Practice_11]$
```

6. Use the `imp` utility to import the database objects needed by the practice into the `target` schema. For convenience, the `imp` command is included in the shell file `trg_import.sh`. You are welcome to display the content of `trg_import.sh` to assess the `imp` syntax.

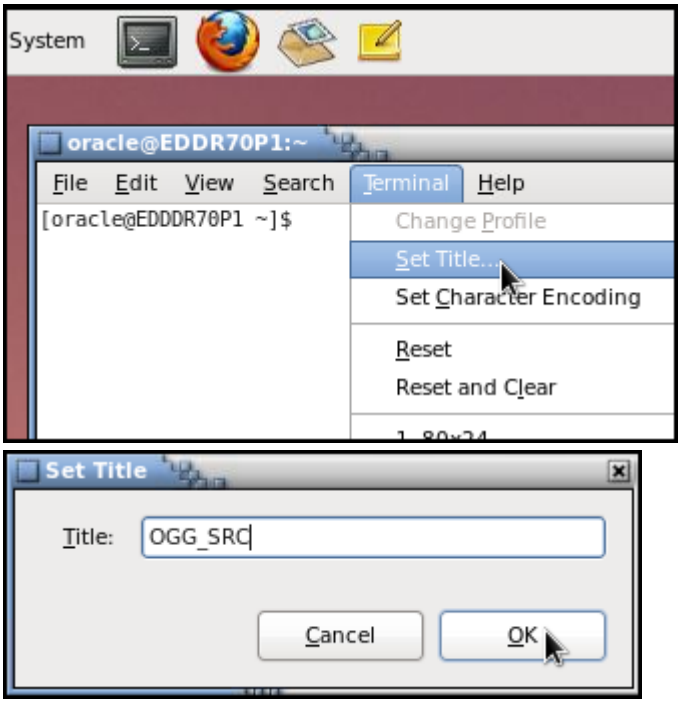
```
[oracle@EDDDR70P1 Practice_11]$ ./trg_import.sh
Import: Release 12.1.0.1.0 - Production on Sat May 24 17:23:23 2014
Copyright (c) 1982, 2013, Oracle and/or its affiliates.  All rights
reserved.


Connected to: Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 -
64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real Application Testing
options


Export file created by EXPORT:V12.01.00 via conventional path
import done in US7ASCII character set and AL16UTF16 NCHAR character set
import server uses AL32UTF8 character set (possible charset conversion)
. importing TARGET's objects into TARGET
. . importing table                      "ACCOUNT"     100000 rows imported
. . importing table                   "ATMDETAIL"      50000 rows imported
. . importing table                    "EXCEPTION"          0 rows imported
. . importing table                  "TRANSACTION"          0 rows imported
About to enable constraints...
Import terminated successfully without warnings.
[oracle@EDDDR70P1 Practice_11]$
```

Note that in the target schema, you define only four tables:

1. ACCOUNT
2. ATMDETAILS
3. EXCEPTION
4. TRANSACTION

The CREATE$JAVA$LOB$TABLE and JAVA$CLASS$MD5$TABLE tables, which are created with the running of the loadjava utility connected to the source schema, do not need to be replicated into the target schema, as well as the sequences and the stored procedure.

7. Open a new terminal or command window, add the title OGG_SRC, source the ora12env.sh file to set up the environment variables, and start a source GGSCI session as follows:




```
[oracle@EDDDR70P1 ~]$ source ora12env.sh
[oracle@EDDDR70P1 ~]$ ogg_src
[oracle@EDDDR70P1 ogg_src]$ pwd
/u01/app/oracle/product/ogg_src
[oracle@EDDDR70P1 ogg_src]$ ggsci
Oracle GoldenGate Command Interpreter for Oracle
Version 12.1.2.0.0 17185003
OGGCORE_12.1.2.0.0_PLATFORMS_130924.1316_FBO
Linux, x64, 64bit (optimized), Oracle 12c on Sep 25 2013 02:33:54
Operating system character set identified as UTF-8.

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reserved.

GGSCI (host) 1>
```

Note: ogg_src is a shell-defined alias, which changes the default directory to /u01/app/oracle/product/ogg_src. ggsci is another alias, which invokes GGSCI wrapped in the readline utility, so that you can recall your commands by using the up arrow.

8. Make sure that the OGG manager is running by entering the `info mgr` command:

```
GGSCI (host) 1> info mgr
Manager is running (IP port host01.example.com.7809, Process ID
14606).
```

Using the Oracle GoldenGate Wallet Facility

To avoid storing passwords in clear text in the various Extract and Replicat parameter files, Oracle GoldenGate 12*c* offers the new wallet facility. You can store encrypted credentials in the wallet credential store and refer to them through an alias, rather than the combination of a username and a password.

9. Create the wallet, add a credential store to it, and add the user credentials for the `OGGUSER` user.

```
GGSCI (host) 2> Create Wallet
Created wallet at location 'dirwlt'.
Opened wallet at location 'dirwlt'.
GGSCI (host) 3> Add CredentialStore
Credential store created in ./dircrd/.
GGSCI (host) 4> Alter CredentialStore Add User ogguser@ogg12c
Password oracle Alias ogg_user
Credential store in ./dircrd/ altered.
GGSCI (host) 5> Info CredentialStore
Reading from ./dircrd/:
Domain: OracleGoldenGate

  Alias: ogg_user
  Userid: ogguser@ogg12

GGSCI (host) 6>
```

10. Make sure that the Oracle GoldenGate user can connect to the Oracle database by using a credential alias and leave the `GGSCI` utility.

```
GGSCI (host) 6> DBLogin UserIDAlias ogg_user
Successfully logged into database.

GGSCI (host01.example.com) 7> exit
[oracle@EDDDR70P1 ogg_src]$
```

11. At the OS prompt, you must copy the wallet and credential files from `OGG_SRC` to `OGG_TRG`.

```
[oracle@EDDDR70P1 ogg_src]$ ogg_trg
[oracle@EDDDR70P1 ogg_trg]$ pwd
/u01/app/oracle/product/ogg_trg
[oracle@EDDDR70P1 ogg_trg]$ cp
/u01/app/oracle/product/ogg_src/dircrd/* ./dircrd
[oracle@EDDDR70P1 ogg_trg]$ ls ./dircrd
cwallet.sso
[oracle@EDDDR70P1 ogg_trg]$ cp
/u01/app/oracle/product/ogg_src/dirwlt/* ./dirwlt
[oracle@EDDDR70P1 ogg_trg]$ ls ./dirwlt
cwallet.sso
```

12. Set the default environment back to `OGG_SRC` in the `OGG_SRC` terminal window and launch GGSCI:

```
[oracle@EDDDR70P1 ogg_trg]$ ogg_src
[oracle@EDDDR70P1 ogg_src]$ ggsci
Oracle GoldenGate Command Interpreter for Oracle
Version 12.1.2.0.0 17185003
OGGCORE_12.1.2.0.0_PLATFORMS_130924.1316_FBO
Linux, x64, 64bit (optimized), Oracle 12c on Sep 25 2013 02:33:54
Operating system character set identified as UTF-8.

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reserved.

GGSCI (host) 1>
```
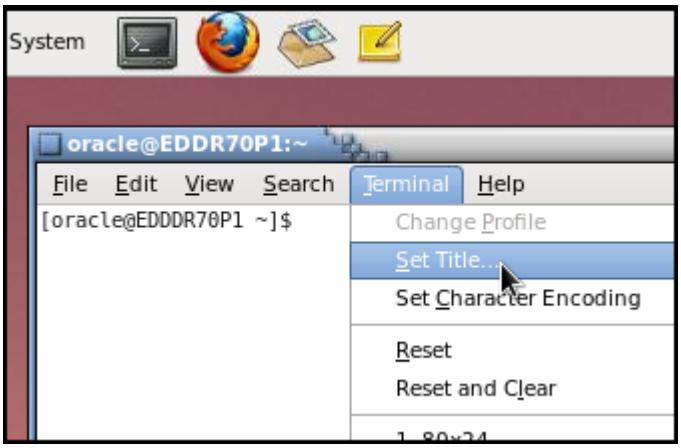
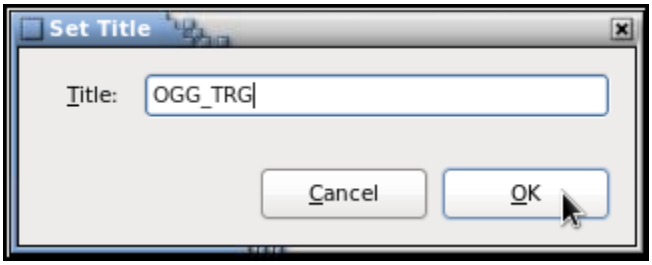

13. Open a new terminal or command window, add the title `OGG_TRG`, source the `ora12env.sh` file to set up the environment variables, and start a target GGSCI session as follows:






```
[oracle@EDDDR70P1 ~]$ source ora12env.sh
[oracle@EDDDR70P1 ~]$ ogg_trg
[oracle@EDDDR70P1 ogg_trg]$ pwd
/u01/app/oracle/product/ogg_trg
[oracle@EDDDR70P1 ogg_trg]$ ggsci
Oracle GoldenGate Command Interpreter for Oracle
Version 12.1.2.0.0 17185003
OGGCORE_12.1.2.0.0_PLATFORMS_130924.1316_FBO
Linux, x64, 64bit (optimized), Oracle 12c on Sep 25 2013 02:33:54
Operating system character set identified as UTF-8.

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reserved.

GGSCI (host) 1>
```

14. Make sure that the Oracle GoldenGate user can connect to the Oracle database by using a credential alias also from the replication target instance:

```
GGSCI (host) 1> DBLogin UserIDAlias ogg_user
Successfully logged into database.
```

15. This last step marks the end of the preparation of the environment. In the next practice, you configure an integrated Extract and a data pump. Leave the four terminal windows ("Source", "Target", "OGG_SRC," and "OGG_TRG") open because you will use them in the next practice.

Practice 11-2: Configuring an Integrated Extract and a Data Pump

Overview

In this practice, you configure an integrated Extract and a data pump to ensure data capture for the tables stored in the `source` schema. The tables, which are going to be replicated, are:

1. ACCOUNT
2. ATMDETAIL
3. EXCEPTION
4. TRANSACTION

Tasks

1. Select the `OGG_SRC` window. The GGSCI utility should still be running there (step 12 of the previous practice.) Connect to the database by using the Oracle GoldenGate privileged user (`ogguser`) with its alias (`ogg_user`) and enter the `TranData` command to enable supplemental logging on the source database for the specified tables. Before you can start capturing real-time data, the Oracle database must be set to log the table key values whenever it logs a rows change, so that they are available to Oracle GoldenGate in Redo. By default, the database logs only those column values that change. This is required so that Oracle GoldenGate can locate the correct row on the target for update and delete operations. Enter the "`add Trandata … ALLCOLS`" command for the four tables that you are going to replicate (`ACCOUNT`, `ATMDETAIL`, `EXCEPTION`, and `TRANSACTION`).

```
GGSCI (host) 1> dblogin UserIdAlias ogg_user
Successfully logged into database.

GGSCI (host) 2> add TranData source.ACCOUNT ALLCOLS
Logging of supplemental redo data enabled for table
SOURCE.ACCOUNT.
TRANDATA for scheduling columns has been added on table
'SOURCE.ACCOUNT'.TRANDATA for all columns has been added on
table 'SOURCE.ACCOUNT'.
GGSCI (host) 3> add TranData source.ATMDETAIL ALLCOLS
Logging of supplemental redo data enabled for table
SOURCE.ATMDETAIL.
TRANDATA for scheduling columns has been added on table
'SOURCE.ATMDETAIL'.TRANDATA for all columns has been added on
table 'SOURCE.ATMDETAIL'.
GGSCI (host) 4> add TranData source.EXCEPTION ALLCOLS
Logging of supplemental redo data enabled for table
SOURCE.EXCEPTION.
TRANDATA for scheduling columns has been added on table
'SOURCE.EXCEPTION'.TRANDATA for all columns has been added on
table 'SOURCE.EXCEPTION'.
GGSCI (host) 5> add TranData source.TRANSACTION ALLCOLS
Logging of supplemental redo data enabled for table
SOURCE.TRANSACTION.
```

```
TRANDATA for scheduling columns has been added on table
'SOURCE.TRANSACTION'.TRANDATA for all columns has been added on
table 'SOURCE.TRANSACTION'.
GGSCI (host) 6>
```

2. Create the primary Extract parameter file for the Extract group EINTA:

```
GGSCI (host) 6> edit param einta
```

```
Extract einta
SETENV (ORACLE_SID='ogg12c')
UserIdAlias ogg_user
TranlogOptions IntegratedParams (max_sga_size 256, parallelism
1)
Exttrail ./dirdat/in
LOGALLSUPCOLS
UPDATERECORDFORMAT COMPACT
Table source.ACCOUNT;
Table source.ATMDETAIL;
Table source.EXCEPTION;
Table source.TRANSACTION;
```

Save the parameter file and leave the editor. Note the two parameters **LOGALLSUPCOLS** and **UPDATERECORDFORMAT**. The integrated Replicat, which you are going to configure shortly, requires the source extract parameter file to contain these new parameters that were introduced in Oracle GoldenGate 12*c*.

LOGALLSUPCOLS causes Extract to do the following with these supplementally logged columns:

1. Automatically includes in the trail record the before image for UPDATE operations
2. Automatically includes in the trail record the before image of all supplementally logged columns for both UPDATE and DELETE operations

When two records are generated for an update to a single row, additional disk I/O and processing are incurred for both Extract and Replicat. If supplemental logging is enabled on all columns, the unmodified columns may be repeated in both the before and after records. The overall size of the trail is larger as well. This overhead is reduced by using UPDATERECORDFORMAT COMPACT. Also, note that you are overriding the default parallelism setting by explicitly starting only one preparer process, rather than two. You will change this setting later, to monitor the effect on the replication chain.

3. Your GGSCI session is already logged in to the Oracle database. Register the integrated Extract and create the Extract group and the local Extract trail file:

```
GGSCI (host) 7> register extract einta database
Extract EINTA successfully registered with database at SCN
1905933.
GGSCI (host) 8> add extract einta, integrated tranlog, begin now
EXTRACT added.
GGSCI (host) 9> add exttrail ./dirdat/in, extract einta,
megabytes 50
EXTTRAIL added.
GGSCI (host) 10>
```

Your SCN will be different. The "Megabytes 50" is optional. The default is 100 Megabytes.

The primary Extract has been created and configured, but not yet started.

4. Create the secondary Extract (data pump) parameter file for the PINTA data pump.

```
GGSCI (host) 10> edit param pinta
```

```
Extract  pinta
SETENV (ORACLE_SID='ogg12c')
UserIdAlias ogg_user
rmthost ogg_target, mgrport 7909
rmttrail ./dirdat/pn
Table source.ACCOUNT;
Table source.ATMDETAIL;
Table source.EXCEPTION;
Table source.TRANSACTION;
```

Save the file and exit the editor. You can check your work by entering View Param pinta any time.

5. Create the data pump group PINTA and the remote Extract trail file:

```
GGSCI (host) 10> add extract pinta, exttrailsource ./dirdat/in
EXTRACT added.
GGSCI (host) 11> add rmttrail ./dirdat/pn, extract pinta,
megabytes 50
RMTTRAIL added.
GGSCI (host) 12>
```

The data pump reads from the local trail file in and writes to the remote trail file pn. The remote trail file that is created will be named dirdat/pn000000; when that one fills up, the next will be dirdat/pn000001, then dirdat/pn000002, and so on.

The secondary Extract has been created and configured, but not yet started.

6. Start the two Extract processes EINTA and PINTA:

```
GGSCI (host) 12> start Extract einta
Sending START request to MANAGER ...
EXTRACT EINTA starting

GGSCI (host) 13> start Extract pinta
Sending START request to MANAGER ...
EXTRACT PINTA starting
```

7. Enter the `Info All` command to assess the status of the two Extract processes. It is not unusual for the integrated Extract to take a few seconds to start. In this case, the status for the integrated Extract is `STARTING`. Enter the `Info All` command until both the Extract groups are in the `RUNNING` state:

```
GGSCI (host) 14> Info All
Program     Status      Group   Lag at Chkpt  Time Since Chkpt

MANAGER     RUNNING
EXTRACT     STARTING    EINTA       00:00:00      00:00:05
EXTRACT     RUNNING     PINTA       00:00:00      00:00:03
GGSCI (host) 15> Info All

Program     Status      Group   Lag at Chkpt  Time Since Chkpt

MANAGER     RUNNING
EXTRACT     RUNNING     EINTA       00:00:05      00:00:09
EXTRACT     RUNNING     PINTA       00:00:00      00:00:12

GGSCI (host) 16>
```

Leave the windows and the GGSCI session open.

Practice 11-3: Configuring an Integrated Replicat

Overview

In this practice, you go through all the steps required to configure and start an integrated Replicat.

Assumptions

Practice 11-2 has been successfully completed and the Extract groups `EINTA` and `PINTA` are running.

Tasks

1. Select the `OGG_TRG` window, where a GGSCI session is running, connected to the Oracle database (as the `ogguser` user). Create the Replicat parameter file for the Replicat group `RINTA`:

   ```
   GGSCI (host) 2> edit param rinta
   ```

   ```
   Replicat rinta
   SETENV(ORACLE_SID='ogg12c')
   DBOPTIONS INTEGRATEDPARAMS(parallelism 3)
   AssumeTargetDefs
   DiscardFile ./dirrpt/rpdw.dsc, Purge
   UserIdAlias ogg_user
   Map source.*, Target target.*;
   ```

   Leave the editor, saving the file `rinta.prm`. The parameter `DBOPTIONS INTEGRATEDPARAMS(parallelism 6)` denotes that for this integrated Replicat, you are specifying the minimum number of parallel apply processes as 6.

2. Your GGSCI session that is running in `OGG_TRG` should already be connected to the Oracle database by using the alias `ogg_user` (step 14 in practice 11-1). However, you can enter the command "`DbLogin UserIdAlias ogg_user`" again, just to make sure that you are effectively connected to Oracle. Add the Replicat group `RINTA` and start it:

```
GGSCI (host) 3> dblogin useridalias ogg_user
Successfully logged into database.

GGSCI (host) 4> Add Replicat rinta Integrated  exttrail
./dirdat/pn
REPLICAT (Integrated) added.
GGSCI (host) 5> info all
Program     Status      Group       Lag at Chkpt  Time Since
Chkpt

MANAGER     RUNNING
REPLICAT    STOPPED     RINTA       00:00:00      00:00:05

GGSCI (host) 6> start rinta
Sending START request to MANAGER ...
REPLICAT RINTA starting

GGSCI (host) 7> info all
Program     Status      Group       Lag at Chkpt  Time Since
Chkpt

MANAGER     RUNNING
REPLICAT    RUNNING     RINTA       00:00:00      00:00:12

GGSCI (host) 8>
```

3. When you are sure that the `RINTA` Replicat group has started, view the report produced by GGSCI and verify that the newly created Replicat is, in fact, an integrated Replicat. Enter the `view report rinta` command in GGSCI and look for the line containing the message: `"Integrated replicat successfully attached to inbound server OGG$RINTA."`

```
GGSCI (host) 8> view report rinta
```

```
… Many omitted lines…
NLS_CHARACTERSET = "AL32UTF8"
2014-05-25 11:02:39  INFO    OGG-02527  Integrated Replicat does
not populate a trace table.
2014-05-25 11:02:39  INFO    OGG-02545  Parameter GROUPTRANSOPS
is ignored by Integrated Replicat when parallelism is greater
than 1.
2014-05-25 11:02:43  INFO    OGG-02528  REPLICAT RINTA
successfully registered with database as inbound server
OGG$RINTA.

2014-05-25 11:02:44  INFO    OGG-02530  Integrated replicat
successfully attached to inbound server OGG$RINTA.
```

4. You can also enter the command `Info rinta` to verify that the Replicat group is an integrated Replicat:

```
GGSCI (host) 9> Info rinta

REPLICAT   RINTA     Last Started 2014-05-25 11:02   Status RUNNING
INTEGRATED
Checkpoint Lag       00:00:00 (updated 00:00:06 ago)
Process ID           10814
Log Read Checkpoint  File ./dirdat/pn000000
                     First Record  RBA 0
```

5. You can also enter `Info rinta, Detail` to display the most detailed information:

```
GGSCI (host) 10> Info rinta, Detail

REPLICAT   RINTA  Last Started 2014-05-25 11:02 Status RUNNING
INTEGRATED
Checkpoint Lag       00:00:00 (updated 00:00:05 ago)
Process ID           10814
Log Read Checkpoint  File ./dirdat/pn000000
                     First Record  RBA 0

INTEGRATED Replicat
DBLOGIN Provided, inbound server name is OGG$RINTA in ATTACHED state

Current Log BSN value: <NULL>
Extract Source                          Begin             End
./dirdat/pn000000                       * Initialized *   First Record
./dirdat/pn000000                       * Initialized *   First Record
./dirdat/pn000000                       * Initialized *   First Record

Current directory    /u01/app/oracle/product/ogg_trg

Report file          /u01/app/oracle/product/ogg_trg/dirrpt/RINTA.rpt
Parameter file       /u01/app/oracle/product/ogg_trg/dirprm/rinta.prm
Checkpoint file      /u01/app/oracle/product/ogg_trg/dirchk/RINTA.cpr
Checkpoint table     ogguser.checkpointtable
Process file         /u01/app/oracle/product/ogg_trg/dirpcs/RINTA.pcr
Error log            /u01/app/oracle/product/ogg_trg/ggserr.log
```

6. The `rinta` Replicat process is Integrated, which means that the Oracle database knows about it. There are several Oracle GoldenGate views defined in the database data dictionary, which can be queried to display information about Oracle GoldenGate queues and processes. Select the Source window and launch `sqlplus`, connecting to the Oracle database by using a privileged user (`system`.) Query the `DBA_GOLDENGATE_INBOUND` and `DBA_APPLY` DBA views to display information about the integrated Replicat.

```
[oracle@host01 Practice_11]$ sqlplus system/oracle@ogg12c

SQL*Plus: Release 12.1.0.1.0 Production on Sun May 25 13:42:29 2014
Copyright (c) 1982, 2013, Oracle.  All rights reserved.
Last Successful login time: Sat May 24 2014 18:30:22 +10:00
Connected to:
Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real Application Testing
options

SQL> column replicat_name format a30
SQL> column server_name format a30
SQL> select replicat_name,server_name, status from DBA_GOLDENGATE_INBOUND;

REPLICAT_NAME                  SERVER_NAME            STATUS
------------------------------ ---------------------- ----------------------
RINTA                          OGG$RINTA              ATTACHED

SQL> column apply_name format a30
SQL> column queue_name format a30
SQL> select apply_name,queue_name from DBA_APPLY;

APPLY_NAME                     QUEUE_NAME
------------------------------ ------------------------------
OGG$RINTA                      OGGQ$RINTA
OGG$EINTA                      OGG$Q_EINTA
SQL>
```

7. Select the OGG_SRC window. Display information about all the processes on the replication source instance:

```
GGSCI (host) > Info Extract *

EXTRACT    EINTA     Last Started 2014-05-25 10:16   Status RUNNING
Checkpoint Lag       00:00:05 (updated 00:00:03 ago)
Process ID           9433
Log Read Checkpoint  Oracle Integrated Redo Logs
                     2014-05-25 14:17:46
                     SCN 0.6157415 (6157415)
EXTRACT    PINTA     Last Started 2014-05-25 12:25   Status RUNNING
Checkpoint Lag       00:00:00 (updated 00:00:01 ago)
Process ID           12985
Log Read Checkpoint  File ./dirdat/in000000
                     First Record  RBA 1435

GGSCI (host) >
```

Display even more detailed information:

```
GGSCI (host) > Info Extract *, Detail

EXTRACT    EINTA     Last Started 2014-05-25 10:16   Status RUNNING
Checkpoint Lag       00:00:06 (updated 00:00:06 ago)
Process ID           9433
Log Read Checkpoint  Oracle Integrated Redo Logs
                     2014-05-25 14:20:45
                     SCN 0.6158108 (6158108)
  Target Extract Trails:
  Trail Name                          Seqno       RBA     Max MB Trail Type
  ./dirdat/in                             0       1435         50 EXTTRAIL

Integrated Extract outbound server first scn: 0.6078449 (6078449)

  Extract Source                          Begin             End

  Not Available                           2014-05-25 09:27  2014-05-25 14:20
  Not Available                           * Initialized *   2014-05-25 09:27

Current directory    /u01/app/oracle/product/ogg_src

Report file          /u01/app/oracle/product/ogg_src/dirrpt/EINTA.rpt
Parameter file       /u01/app/oracle/product/ogg_src/dirprm/einta.prm
Checkpoint file      /u01/app/oracle/product/ogg_src/dirchk/EINTA.cpe
Process file         /u01/app/oracle/product/ogg_src/dirpcs/EINTA.pce
Error log            /u01/app/oracle/product/ogg_src/ggserr.log

EXTRACT    PINTA     Last Started 2014-05-25 12:25   Status RUNNING
Checkpoint Lag       00:00:00 (updated 00:00:04 ago)
Process ID           12985
Log Read Checkpoint  File ./dirdat/in000000
                     First Record  RBA 1435
  Target Extract Trails:

  Trail Name                           Seqno        RBA     Max MB Trail Type
  ./dirdat/pn                              0          0         50  RMTTRAIL
  Extract Source                          Begin             End
  ./dirdat/in000000                       * Initialized *   First Record
  ./dirdat/in000000                       * Initialized *   First Record
  ./dirdat/in000000                       * Initialized *   First Record
  ./dirdat/in000000                       * Initialized *   First Record
  ./dirdat/in000000                       * Initialized *   First Record
  ./dirdat/in000000                       * Initialized *   First Record

Current directory    /u01/app/oracle/product/ogg_src
Report file          /u01/app/oracle/product/ogg_src/dirrpt/PINTA.rpt
Parameter file       /u01/app/oracle/product/ogg_src/dirprm/pinta.prm
Checkpoint file      /u01/app/oracle/product/ogg_src/dirchk/PINTA.cpe
Process file         /u01/app/oracle/product/ogg_src/dirpcs/PINTA.pce
Error log            /u01/app/oracle/product/ogg_src/ggserr.log
```

Everything should show a status of RUNNING. The source tables are still empty. No data has flowed yet; nothing has replicated yet.

Practice 11-4: Generating Data on the Source Schema and Verifying That Replication Is Occurring

Overview

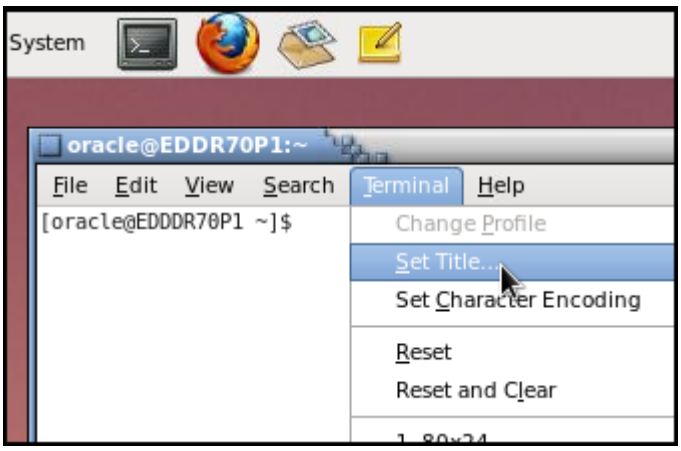
In this practice, you use the `GENERATE_ACTIVITY()` stored procedure to randomly generate rows in the `TRANSACTION` and `EXCEPTION` tables and verify that replication is occurring as intended.

Assumptions

Practices 11-1 through Practice 11-3 have been successfully completed. The integrated Extract `EINTA`, the data pump `PINTA`, and the integrated Replicat `RINTA` are all running in their respective Oracle GoldenGate instances.

Tasks

1. The `GENERATE_ACTIVITY()` stored procedure is controlled via the table `JAVA_STPROC_PARAMETER`, which must contain only one row. Open a new terminal or command window, add the title `StoredProcRunning`, source the `ora12env.sh` file to set up the required environment variables, and launch `sqlplus` by connecting to the source schema:




```
[oracle@EDDR70P1 ~]$ source ora12env.sh
[oracle@EDDR70P1 ~]$ sqlplus source/oracle@ogg12c
SQL*Plus: Release 12.1.0.1.0 Production on Sun May 25 14:51:17 2014
Copyright (c) 1982, 2013, Oracle.  All rights reserved.
Last Successful login time: Sun May 25 2014 14:51:04 +10:00
Connected to:
Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options
```

2. Describe the JAVA_STPROC_PARAMETER table and display its content:

```
SQL> desc java_stproc_parameter
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------
 PAUSE_AFTER_#TXNS                                  NUMBER
 PAUSE_FOR_MSECS_MIN                                NUMBER
 PAUSE_FOR_MSECS_MAX                                NUMBER

SQL> select * from java_stproc_parameter;

PAUSE_AFTER_#TXNS PAUSE_FOR_MSECS_MIN PAUSE_FOR_MSECS_MAX
----------------- ------------------- -------------------
                0                5000               10000
```

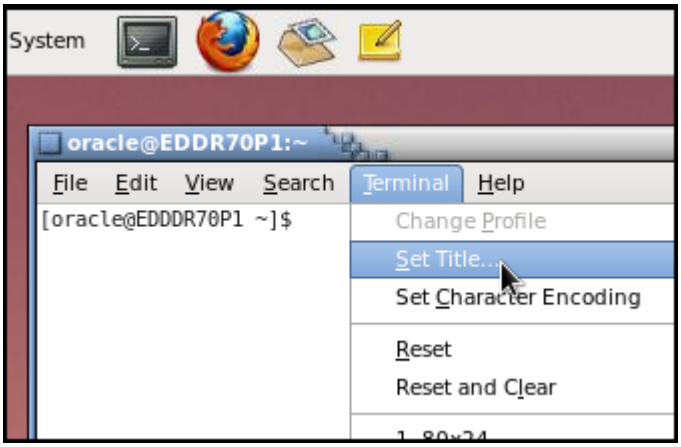
The GENERATE_ACTIVITY() stored procedure inserts rows containing random values into the TRANSACTION table (possibly into the EXCEPTION table), and then sleeps for an interval of time specified by PAUSE_FOR_MSECS_MIN and PAUSE_FOR_MSECS_MAX. The values in these columns are expressed in milliseconds. The sleep interval is a random number generated between PAUSE_FOR_MSECS_MIN and PAUSE_FOR_MSECS_MAX. The PAUSE_AFTER_#TXNS column dictates the number of rows that are inserted by GENERATE_ACTIVITY() before invoking the Thread.sleep() Java method. A value of zero stored in the PAUSE_AFTER_#TXNS column forces the completion of GENERATE_ACTIVITY(). Initially, you want to generate random rows at a slow pace, just to verify that everything is working as intended.

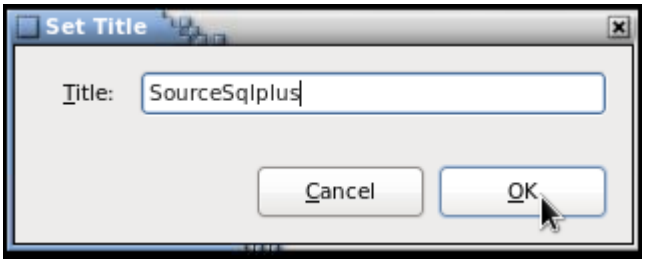
3. Update the JAVA_STPROC_PARAMETER table and store the value 1 in the PAUSE_AFTER_#TXNS column. The effect of this modification is to force the GENERATE_ACTIVITY() stored procedure to insert one row into the TRANSACTION table, and then sleep for a random interval of time between five and 10 seconds before inserting the next row. The pace at which the stored procedure inserts rows is initially slow.

```
SQL> update java_stproc_parameter set PAUSE_AFTER_#TXNS = 1;

1 row updated.
SQL> commit;
Commit complete.
```

4. Open a new terminal or command window, add the title SourceSqlplus, source the ora12env.sh file to set up the required environment variables, and launch sqlplus by connecting to the source schema:





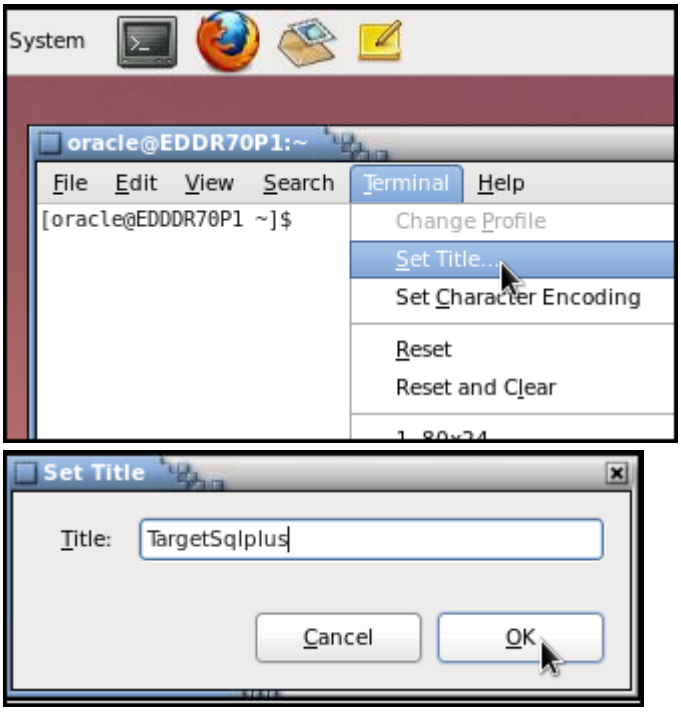

```
[oracle@EDDDR70P1 ~]$ source ora12env.sh
[oracle@EDDDR70P1 ~]$ sqlplus source/oracle@ogg12c
SQL*Plus: Release 12.1.0.1.0 Production on Sun May 25 14:51:17 2014
Copyright (c) 1982, 2013, Oracle.  All rights reserved.
Last Successful login time: Sun May 25 2014 14:51:04 +10:00
Connected to:
Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real Application Testing options
```

You use this `sqlplus` session to control the running of the `GENERATE_ACTIVITY()` stored procedure, which runs in the `StoredProcRunning`, window. After the `GENERATE_ACTIVITY()` stored procedure is called, control is not returned to the `sqlplus` session that is running the stored procedure. In order to increase or decrease the pace at which the stored procedure inserts random rows, you use this open terminal window, `SourceSqlplus`, to modify the content of the `JAVA_STPROC_PARAMETER` table. Remember that storing the value `0` in the `PAUSE_AFTER_#TXNS` column forces the procedure to terminate. So if you want to stop `GENERATE_ACTIVITY()` from creating any more rows, simply issue the following command:

```
SQL> update java_stproc_parameter set PAUSE_AFTER_#TXNS = 0;
1 row updated.
SQL> commit;
Commit complete.
```

Note: Do not reset the `PAUSE_AFTER_#TXNS` column to `0` now. Leave it set to `1`. You need the `GENERATE_ACTIVITY()` procedure to be able to generate activity for the next steps.

5. Open a new terminal or command window, add the title `TargetSqlplus`, source the `ora12env.sh` file to set up the required environment variables, and launch `sqlplus`, connecting to the target schema:




```
[oracle@EDDDR70P1 ~]$ source ora12env.sh
[oracle@EDDDR70P1 ~]$ sqlplus target/oracle@ogg12c
SQL*Plus: Release 12.1.0.1.0 Production on Sun May 25 14:51:17 2014
Copyright (c) 1982, 2013, Oracle.  All rights reserved.
Last Successful login time: Sun May 25 2014 14:51:04 +10:00
Connected to:
Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real Application Testing
options
SQL>
```

You use this window to check whether replication is occurring and the rows in the target schema are populated via the combination of an integrated Extract and an integrated Replicat.

6. Select the `StoredProcRunning` window, which you opened in step 1 of this practice. Invoke the `GENERATE_ACTIVITY()` stored procedure:

```
SQL> exec generate_activity;
```

The stored procedure begins execution and `sqlplus` does not return the prompt while the stored procedure is running.

7. Select the SourceSqlplus window, where sqlplus is connected to the source schema. Display the count of rows for the TRANSACTION table, to verify that the GENERATE_ACTIVITY() stored procedure is inserting random rows:

```
SQL> select count(*) from transaction;

  COUNT(*)
----------
         4
SQL>
```

Your count() will obviously be different, but it must be greater than zero; otherwise the stored procedure is either not running, or it is not inserting rows. Re-compute the count for the transaction table a few times, to make sure that the number of inserted rows increases.

8. Select the TargetSqlplus window. This is the point where you find out if replication is in fact occurring and the rows stored in the source schema by the GENERATE_ACTIVITY() stored procedure are being replicated in the corresponding tables in the target schema:

```
SQL> select count(*) from transaction;
  COUNT(*)
----------
        12
SQL>
```

The count of rows in the TRANSACTION table must be greater than zero. If no rows have been replicated, you must check all settings and parameters to find out why replication is not occurring.

9. If replication is working and you see rows in the TRANSACTION table (target schema), you can ask Oracle GoldenGate to provide statistics on the extraction and replication. Select the OGG_SRC window where the Oracle GoldenGate source instance is running and enter the stats einta and stats pinta command to display statistics on the data extraction performed by Oracle GoldenGate:

```
GSCI (host) > stats einta
```

```
GSCI (host) > stats pinta
```

You can assess the rate at which rows are extracted by Oracle GoldenGate. You can do the same for the integrated Replicat. Select the OGG_TRG window and enter the stats rinta command:

```
GSCI (host) > stats rinta
```

10. When you are satisfied that replication is taking place in the system, you can stop the GENERATE_ACTIVITY() stored procedure. Select the SourceSqlplus window and store the value 0 in the PAUSE_AFTER_#TXNS column (JAVA_STPROC_PARAMETER table):

```
SQL> update java_stproc_parameter set PAUSE_AFTER_#TXNS = 0;
1 row updated.
SQL> commit;
Commit complete.
SQL>
```

The `GENERATE_ACTIVITY()` stored procedure, which is running in the `StoredProcRunning` window, should terminate its execution and return the prompt to the `sqlplus` session.

This last step concludes practice 11-4. Leave all windows open because they will be re-used in practice 11-5.

Practice 11-5: Gathering Performance Statistics from GoldenGate V$ Views

Overview

In this practice, you use the GENERATE_ACTIVITY() stored procedure to control the random generation of rows, which are replicated to the target instance. The speed at which the replication occurs can be monitored by using the GoldenGate V$ views. The GENERATE_ACTIVITY() stored procedure allows the random generation pace to be modified on-the-fly, without stopping and restarting the stored procedure.

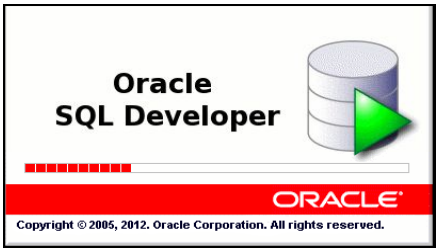
In order to examine the new Oracle GoldenGate V$ views exposed by the Oracle database, it is better to interact with a GUI grid rather than the text output provided by sqlplus. You use Oracle SQL Developer to display the content of the V$ views in a nicely formatted SQL Developer data grid.

Tasks

1. Open a terminal window and launch Oracle SQL Developer.

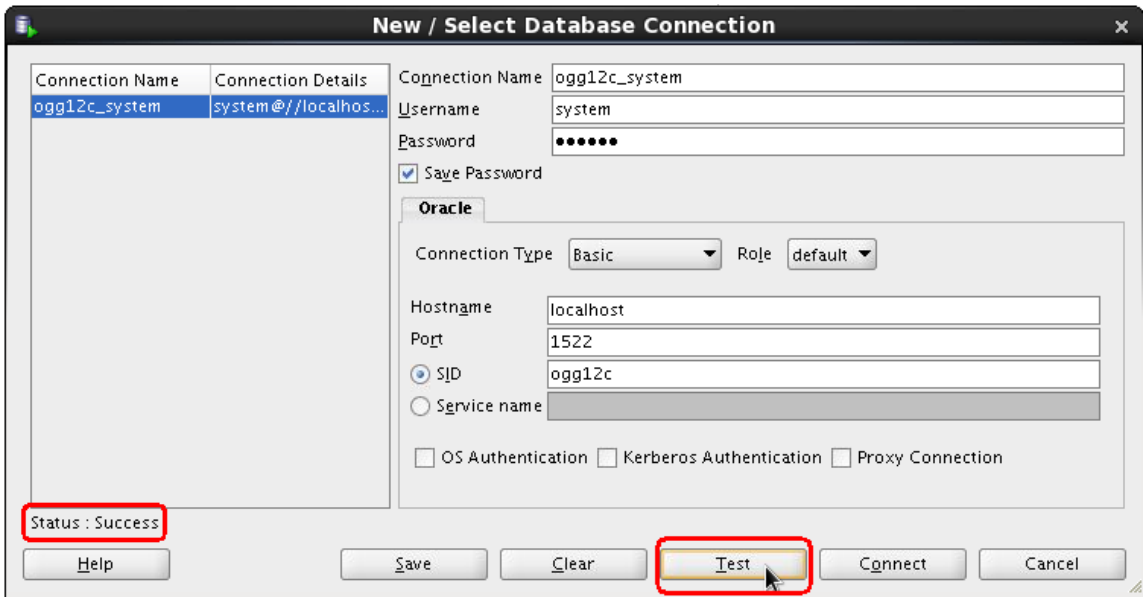
```
[OS ~]$ source ora12env.sh
[OS ~]$ $ORACLE_HOME/sqldeveloper/sqldeveloper.sh &
```

   Note the ampersand (&) sign at the end of the command. Oracle SQL Developer is launched in the background, while the terminal window receives the prompt back. The SQL Developer splash window appears:



2. After a few seconds, the Oracle SQL Developer main window appears on the screen. Click the green plus sign on the Connections tab to create a new connection.

3. When the New/Select Database Connection form is displayed, enter ogg12c_system as the connection name, system as the Username and oracle as the password. Select the Save Password check box. Accept the default (localhost) for Hostname and 1522 for port. Select the SID option button and enter ogg12c as the SID name. Click the Test button and verify that the status, which is indicated on the lower left side of the form, shows Success.



4. Click the Save button to save your connection properties. Click Connect to connect to Oracle as `system`. Leave the SQL Developer window and select the `SourceSqlplus` window. Modify the values stored in the `JAVA_STPROC_PARAMETER` table to force the `GENERATE_ACTIVITY()` stored procedure to randomize the insertion of rows in the `TRANSACTION` and `EXCEPTION` tables at an increased pace:

```
SQL> update java_stproc_parameter set PAUSE_AFTER_#TXNS = 10,
PAUSE_FOR_MSECS_MIN = 200 , PAUSE_FOR_MSECS_MAX = 600;
1 row updated.
SQL> commit;
Commit complete.
```

The preceding SQL statement instructs the `GENERATE_ACTIVITY()` stored procedure to generate 10 transactions, and then sleep for a random interval between 200 and 600 milliseconds.

5. Select the `StoredProcRunning` window, which you opened in step 1 of the previous practice. Invoke the `GENERATE_ACTIVITY()` stored procedure:

```
SQL> exec generate_activity;
```

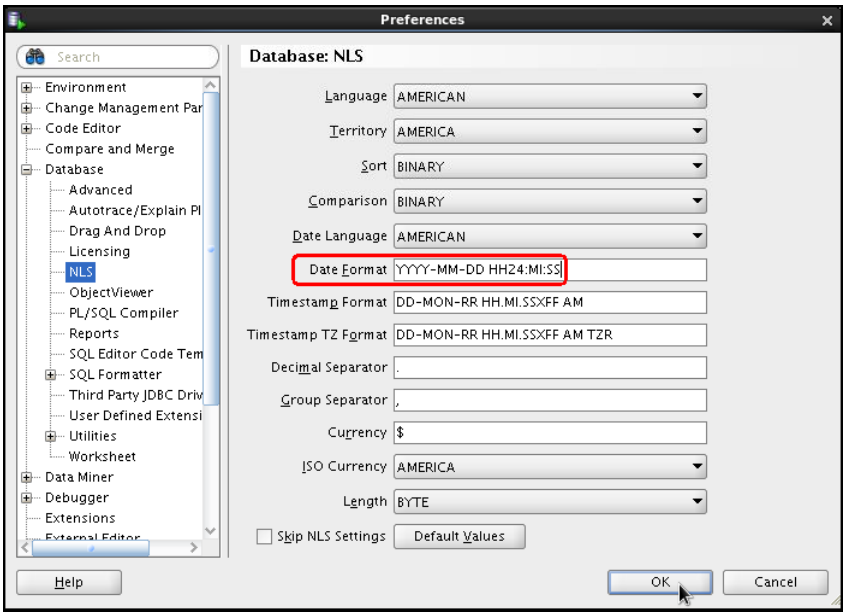
The stored procedure begins execution and `sqlplus` does not return the prompt while the stored procedure is running.

6. Select the `OGG_TRG` window. Enter the `stats rinta` command, followed by `stats rinta, ReportRate SEC` and `lag rinta`. Write down the stats related to the rate at which the apply servers are inserting rows in the target database.

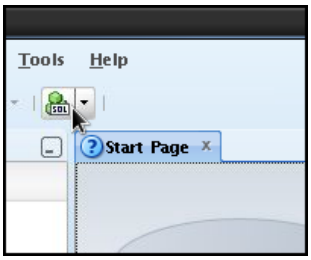
```
GGSCI (TARGET) > lag rinta
Sending GETLAG request to REPLICAT RINTA ...
Last record lag 8 seconds.
Low watermark lag: 9.
High watermark lag: 9.
Low watermark position: 8784986.
High watermark position: 8784988.
At EOF, no more records to process.
GGSCI (TARGET) > stats rinta, ReportRate SEC
Sending STATS request to REPLICAT RINTA ...
(...many lines omitted for clarity...)
Replicating from SOURCE.TRANSACTION to TARGET.TRANSACTION:

*** Total statistics since 2014-06-10 20:41:35 ***
    Total inserts/second:                      26.22
    Total updates/second:                       0.00
    Total deletes/second:                       0.00
    Total discards/second:                      0.00
    Total operations/second:                   26.22
(...many lines omitted for clarity...)
```

7. Select the Oracle SQL Developer window and modify the default formatting for dates. From the Tools menu, and select Preferences. In the tree on the left, select Database, and then select NLS. In the Date Format field, enter `YYYY-MM-DD HH24:MI:SS`. Click OK.



8. Open a new SQL window in Oracle SQL Developer. Click the SQL icon:

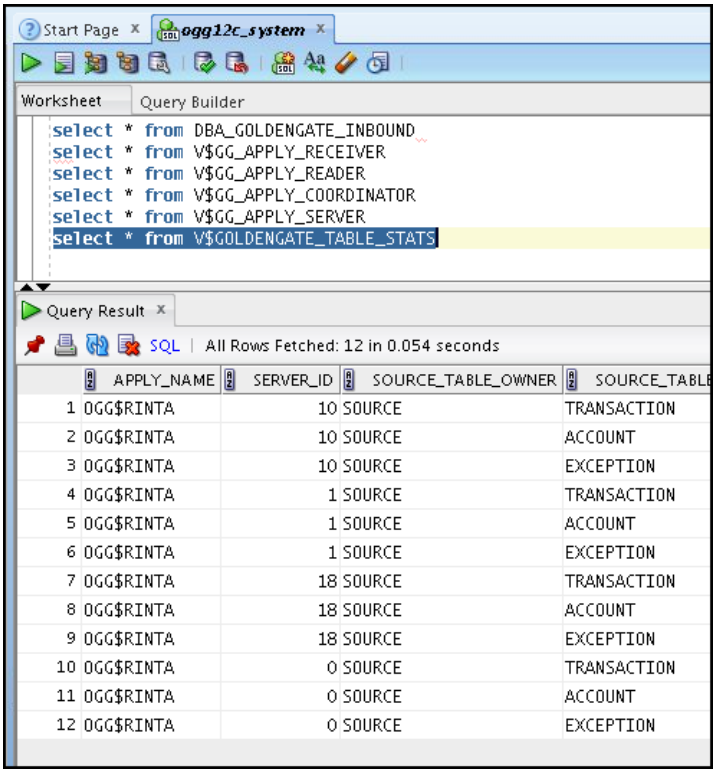


Accept the default connection (`ogg12c_system`). Click OK.

9. Display the content of the `V$` views, which show Oracle GoldenGate related information. In the Oracle SQL Developer SQL window, enter the following queries, one by one:

```
Select * from DBA_GOLDENGATE_INBOUND
select * from V$GG_APPLY_RECEIVER
select * from V$GG_APPLY_READER
select * from V$GG_APPLY_COORDINATOR
select * from V$GG_APPLY_SERVER
select * from V$GOLDENGATE_TABLE_STATS
```

10. While the `GENERATE_ACTIVITY()` stored procedure is still running, generating random inserts in the `TRANSACTION` and `EXCEPTION` tables and random updates in the `ACCOUNT` table, repeat the selects on the `V$` views in the Oracle SQL Developer SQL window. Note how the values change.



11. After a few minutes, when you have run the preceding queries a few times, select the `SourceSqlplus` window. Modify the value stored in the `JAVA_STPROC_PARAMETER` table to force the `GENERATE_ACTIVITY()` stored procedure to stop running:

```
SQL> update java_stproc_parameter set PAUSE_AFTER_#TXNS = 0;
1 row updated.
SQL> commit;
Commit complete.
```

12. Almost immediately, the `GENERATE_ACTIVITY()` stored procedure, which is running in the `StoredProcRunning` window, exits, returning the prompt to `sqlplus`. This last step terminates Practice 11-5. Leave all windows open because they will be re-used in the next practice.

Practices for Lesson 12: Integrated Capture and Delivery Troubleshooting

Chapter 12

Practices for Lesson 12: Integrated Capture and Delivery Troubleshooting

Practices Overview

In these practices, you install and use the utilities, which can be very helpful in troubleshooting Oracle GoldenGate performance issues:

- `UTL_SPADV` package
- Healthcheck script
- Enhanced AWR report for GoldenGate

Practice 12-1: Capturing AWR Snapshots

Overview

In this practice, you erase all AWR repository snapshots, which could be accumulated in the database, in order to have a clean start and unbiased statistics. You then create a baseline snapshot and you invoke the GENERATE_ACTIVITY() stored procedure to generate random rows at a moderate pace.

Tasks

1. Select the Oracle SQL Developer window, which you left open in Practice 11 titled "Integrated Performance Tuning." List the contents of the table DBA_HIST_SNAPSHOT to identify the AWR repository snapshots, which could be already automatically created in the database. Click the SQL icon located under Tools and accept the default connection (ogg12c_system). In the new SQL editor window, enter the following query:

```
select snap_id, dbid, con_id from DBA_HIST_SNAPSHOT order by
snap_id;
```

   If the query returns one or more rows, write down the lowest and the highest values for the SNAP_ID column. If the query does not return any row, you can skip the next step.

2. If the query in step 1 returns rows, you need to execute the DROP_SNAPSHOT_RANGE procedure provided by the DBMS_WORKLOAD_REPOSITORY package to erase all snapshots from the database:

```
exec DBMS_WORKLOAD_REPOSITORY.DROP_SNAPSHOT_RANGE(low_snap_id =>
<lowest snap id>, high_snap_id =><highest snap id>);
```

   After the procedure returns successfully, query the DBA_HIST_SNAPSHOT table again to make sure that there are zero rows.

3. Take a workload repository snapshot by using the CREATE_SNAPSHOT procedure:

```
exec DBMS_WORKLOAD_REPOSITORY.CREATE_SNAPSHOT();
PL/SQL procedure successfully completed.
```

4. Select the SourceSqlplus window. Modify the values stored in the JAVA_STPROC_PARAMETER table to allow the GENERATE_ACTIVITY() stored procedure to run:

```
SQL> update java_stproc_parameter set PAUSE_AFTER_#TXNS = 10;
1 row updated.
SQL> commit;
Commit complete.
```

5. Select the StoredProcRunning window, which you opened in step 1 of the previous practice. Invoke the GENERATE_ACTIVITY() stored procedure:

```
SQL> exec generate_activity;
```

6. Select the SourceSqlplus window, where sqlplus is connected to the source schema. Display the count of rows for the TRANSACTION table, to verify that the GENERATE_ACTIVITY() stored procedure is inserting random rows:

```
SQL> select count(*) from transaction;

  COUNT(*)
----------
      4678
SQL>
```

Your count will obviously be different. Submit the same query again a few times to make sure that the stored procedure is in fact adding rows.

7. Select the `TargetSqlplus` window. Display the count of rows for the `TRANSACTION` table, to verify that replication is working:

```
SQL> select count(*) from transaction;
  COUNT(*)
----------
     4589
SQL>
```

Submit the same query again a few times to make sure that the number of rows is increasing. If replication has stopped for some reason, you must find out why and have it operational again before continuing the practice.

8. Select the Oracle SQL Developer window and take another workload repository snapshot by using the `CREATE_SNAPSHOT` procedure:

```
exec DBMS_WORKLOAD_REPOSITORY.CREATE_SNAPSHOT();
anonymous block completed.
```

Practice 12-2: Installing the UTL_SPADV Package

Overview

In this practice, you install and use the UTL_SPADV package.

Tasks

1. The Oracle GoldenGate administrator user (in these practices OGGUSER) must be granted admin privileges by using the GRANT_ADMIN_PRIVILEGE procedure (DBMS_GOLDENGATE_AUTH package). Select the Oracle SQL Developer window and enter the following PL/SQL code:

```
exec
dbms_goldengate_auth.grant_admin_privilege('OGGUSER',PRIVILEGE_T
YPE=>'*',GRANT_SELECT_PRIVILEGES=>true);
anonymous block completed
```

2. Select the SourceSqlplus window, where sqlplus is connected to the source schema. You must connect to Oracle as OGGUSER before you can install the UTL_SPADV package.

```
SQL> connect ogguser/oracle@ogg12c
Connected.
```

3. Install the UTL_SPADV utility:

```
SQL> @?/rdbms/admin/utlspadv.sql
drop table streams$_pa_monitoring
           *
ERROR at line 1:
ORA-00942: table or view does not exist
(...many lines omitted for clarity...)
Package created.
No errors.
Package body created.
No errors.

PL/SQL procedure successfully completed.
SQL>
```

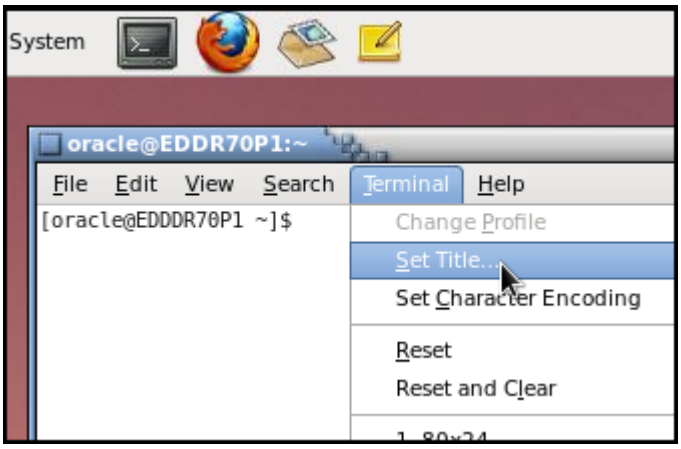
4. After the UTL_SPADV utility is successfully installed, you can start monitoring. You want a short interval, for example, 10 seconds:

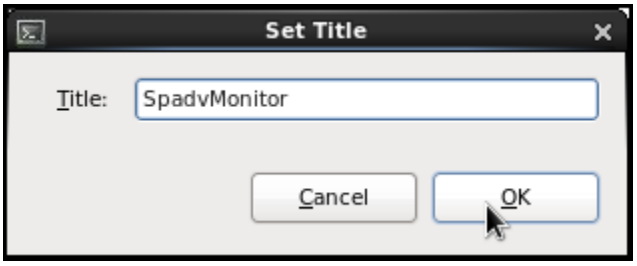
```
SQL> exec UTL_SPADV.START_MONITORING(interval=>10);
PL/SQL procedure successfully completed.
```

5. To make sure that everything is fine, and that a monitoring job has been queued, the UTL_SPADV utility provides an IS_MONITORING() procedure. Run the following PL/SQL lines to check if monitoring is occurring:

```
SQL> SET SERVEROUTPUT ON
DECLARE
is_mon BOOLEAN;
BEGIN
is_mon := UTL_SPADV.IS_MONITORING(
job_name => 'STREAMS$_MONITORING_JOB',
client_name => NULL);
IF is_mon=TRUE THEN
DBMS_OUTPUT.PUT_LINE('The monitoring job is running.');
ELSE
DBMS_OUTPUT.PUT_LINE('No monitoring job was found.');
END IF;
END;
/
The monitoring job is running.
PL/SQL procedure successfully completed.
SQL>
```

6. Open a new terminal or command window, add the title `SpadvMonitor`, source the `ora12env.sh` file to set up the required environment variables, and change directory to `/home/oracle/Labs/Practice_12`.






```
[OS ~] cd Labs/Practice_12
[OS Practice_12]
```

Use the Linux `cat` command to display the content of the file `spadv_mon.sh`. This bash shell file is a wrapper around the `SHOW_STATS` procedure provided by the `UTL_SPADV` package, and refreshes the textual output on screen every 10 seconds.

```
[OS Practice_12] cat spadv_mon.sh
#!/bin/bash
(...Script header lines omitted for brevity...)
# Set the Oracle environment variables
export ORACLE_SID=ogg12c
export ORACLE_HOME=/u01/app/oracle/product/12.1.0/dbhome_1
export PATH=$PATH:$ORACLE_HOME/bin
sqlplus -s ogguser/oracle@ogg12c <<!EOS
set feedback off serveroutput on
-- First need to show first stat line with the legend:
begin
utl_spadv.show_stats(path_stat_table=>'STREAMS\$_PA_SHOW_PATH_ST
AT',
bgn_run_id=> -1,
end_run_id=> -1,
show_legend=> TRUE);
end;
/
!EOS
sleep 10
-- Now loop through showing results every 10 seconds, until
CTRL-C is issued
d=0
while [ $d -lt 1 ];
do
date
sqlplus -s ogguser/oracle@ogg12c <<!EOS
set feedback off serveroutput on
begin
utl_spadv.show_stats(path_stat_table=>'STREAMS\$_PA_SHOW_PATH_ST
AT',
bgn_run_id=> -1,
end_run_id=> -1,
show_legend=> FALSE);
end;
/
!EOS
sleep 10
done
```

7. Run `spadv_mon.sh`. The output, which is refreshed every 10 seconds, should display replication statistics on the screen, together with a reassuring `NO BOTTLENECK IDENTIFIED` message.

```
[OS Practice_12] ./spadv_mon.sh
PATH 1 RUN_ID 104 RUN_TIME 2014-JUN-11 23:56:39 CCA N
|<C> OGG$CAP_EINTA 0.01 0.01 2909 LMR 0% 100% 0% ""
LMP (1) 0% 100% 0% "" LMB 0% 100% 0% "" CAP 0% 100% 0% ""
|<Q> "OGGUSER"."OGG$Q_EINTA" 0.01 0.01 0
|<E> EINTA 0.01 0.01 -1 0% 100% |<B> NO BOTTLENECK IDENTIFIED

PATH 2 RUN_ID 104 RUN_TIME 2014-JUN-11 22:42:15 CCA Y
|<R> RINTA 0.01 0.01 0 100% 0% |<Q> "OGGUSER"."OGGQ$RINTA" 0.01
0.01 0 |<A>
OGG$RINTA 0.01 0.01 0 APR 100% 0% 0% "" APC 100% 0% 0% "" APS
(4) 400% 0% 0% ""
|<B> NO BOTTLENECK IDENTIFIED
```

`PATH 1` refers to data capture, whereas `PATH 2` refers to data delivery.

The statistics displayed on your screen are provided by the `SHOW_STATS()` procedure in `UTL_SPADV`. The following table tells you how to interpret the output of `spadv_mon.sh`:

```
LEGEND
<statistics>= <capture>|<replicat> [ <queue> <psender> <preceiver> <queue> ]
<apply>|<extract> <bottleneck>
<capture>   = '|<C>' <name> <msgs captured/sec> <msgs enqueued/sec> <latency>
               'LMR' <idl%> <flwctrl%> <topevt%> <topevt>
               'LMP' (<parallelism>) <idl%> <flwctrl%> <topevt%> <topevt>
               'LMB' <idl%> <flwctrl%> <topevt%> <topevt>
               'CAP' <idl%> <flwctrl%> <topevt%> <topevt>
               'CAP+PS' <msgs sent/sec> <bytes sent/sec> <latency> <idl%>
                        <flwctrl%> <topevt%> <topevt>
<apply>     = '|<A>' <name> <msgs applied/sec> <txns applied/sec> <latency>
               'PS+PR' <idl%> <flwctrl%> <topevt%> <topevt>
               'APR' <idl%> <flwctrl%> <topevt%> <topevt>
               'APC' <idl%> <flwctrl%> <topevt%> <topevt>
               'APS' (<parallelism>) <idl%> <flwctrl%> <topevt%> <topevt>
<extract>   = '|<E>' <name> <msgs sent/sec> <bytes sent/sec> <latency> <idl%>
                  <flwctrl%> <topevt%> <topevt>
<replicat>  = '|<R>' <name> <msgs recd/sec> <bytes recd/sec> <idl%>
                  <flwctrl%> <topevt%> <topevt>
<queue>     = '|<Q>' <name> <msgs enqueued/sec> <msgs spilled/sec> <msgs in
                  queue>
<psender>   = '|<PS>' <name> <msgs sent/sec> <bytes sent/sec> <latency> <idl%>
                  <flwctrl%> <topevt%> <topevt>
<preceiver> = '|<PR>' <name> <idl%> <flwctrl%> <topevt%> <topevt>
<bottleneck>= '|<B>' <name> <sub_name> <sessionid> <serial#> <topevt%>
                  <topevt>
```

8. Try and dissect the output you are seeing on your screen according to the preceding legend. For example, `spadv_mon.sh` has displayed the following statistics shown:

```
PATH 1 RUN_ID 11712 RUN_TIME 2014-JUN-13 22:36:48 CCA N
|<C> OGG$CAP_EINTA 1424 1184 0 LMR 100% 0% 0% "" LMP (1) 76.9% 0% 23.1% "CPU +
Wait for CPU" LMB 84.6% 0% 15.4% "CPU + Wait for CPU" CAP 100% 0% 0% "" |<Q>
"OGGUSER"."OGG$Q_EINTA" 0.01 0.01 0 |<E> EINTA 714 170629 3 100% 0% |<B> NO
BOTTLENECK IDENTIFIED

PATH 2 RUN_ID 11712 RUN_TIME 2014-JUN-13 22:36:48 CCA Y
|<R> RINTA 390 82357  23.1% 0% 76.9% "SQL*Net more data from client" |<Q>
"OGGUSER"."OGGQ$RINTA" 390 0.01 0 |<A> OGG$RINTA 722 229 0 APR 100% 0% 0% ""
APC
92.3% 0% 7.7% "" APS (30) 30.8% 0% 53.8% "CPU + Wait for CPU" |<B> RINTA 197
367 76.9% "SQL*Net more data from client"
```

For PATH 1 (data capture), the series of numbers displayed by `spadv_mon.sh` have the following meaning:

- LogMiner captured an average of 1,424 messages per second and enqueued 1,184 messages per second.
- LogMiner latency is currently 0 seconds.
- The reader server (LMR) process spent:
    - 100% of its time idle
    - 0% of its time in flow control (waiting for the next process in the chain (LMP)
    - 0% in any wait event
- The preparer server (LMP) process spent:
    - 76.9% idle
    - 0% of its time in flow control
    - 23.1% of its time consuming or waiting for CPU
- The builder server (LMB) process spent:
    - 84.6% idle
    - 0% its time in flow control
    - 15.4% of its time consuming or waiting for CPU
- The capture process (CAP) session spent:
    - 100% of its time idle
    - 0% of its time in flow control
    - 0% in any wait event
- The queue `OGGUSER.OGG$Q_EINTA`:
    - Enqueued 0.1 messages per second
    - Spilled 0.1 messages per second
    - Putting 0 messages in the queue
- The Extract `EINTA`:
    - Sent an average of 714 messages per second
    - Sent an average of 1,70,629 bytes per second
    - Had a latency of 3 seconds
    - Has been idle 100% of its time
    - Spent 0% of its time in flow control

For PATH 2 (data delivery), the series of numbers displayed by `spadv_mon.sh` have the following meaning:

- The Replicat `RINTA`:
  - Received an average of 390 messages per second
  - Received an average of 82,357 bytes per second
  - Has been idle 23.1% of its time
  - Spent 0% of its time in flow control
  - Spent 76.9% of its time waiting for more data from SQL*Net
- The queue `OGGUSER.OGGQ$RINTA`:
  - Enqueued an average of 390 messages per second
  - Spilled an average of 0.01 messages per second
  - Currently has 0 messages in the queue
- The Apply process `OGG$RINTA`:
  - Applied an average of 722 messages per second
  - Applied an average of 229 transactions per second
  - Had 0 latency
- The Apply Reader:
  - Was idle 100% of its time
  - Spent 0% of its time in flow control
  - Spent 0% of its time in any wait event
- The Apply Coordinator:
  - Was idle 92.3% of its time
  - Spent 0% of its time in flow control
  - Spent 7.7% of its time in an unidentified wait event
- The Apply Slave:
  - Has a parallelism of 30
  - Was idle 30.8%of its time
  - Spent 0% of its time in flow control
  - Spent 53.8% of its time consuming or waiting for CPU
- There is a bottleneck in the session `RINTA`, session ID: 197, serial# 367:
  - 76.9% of wait event for "SQL*Net more data from client"

9. Leave the `SpadvMonitor` window open, continuously refreshing its output. Select the `SourceSqlplus` window. Modify the values stored in the `JAVA_STPROC_PARAMETER` table to increase the pace at which the `GENERATE_ACTIVITY()` stored procedure produces random rows, forcing the `GENERATE_ACTIVITY()` stored procedure to generate 100 insert statements, and then to sleep between 200 and 600 milliseconds:

```
SQL> update java_stproc_parameter set PAUSE_AFTER_#TXNS = 100,
PAUSE_FOR_MSECS_MIN = 200, PAUSE_FOR_MSECS_MAX = 600;
1 row updated.
SQL> commit;
Commit complete.
```

10. Watch the SpadvMonitor window. Look for deteriorating statistics and bottlenecks. Your mileage can vary; you could see different types of wait events. If you still do not see any wait event, further increase the pace of the GENERATE_ACTIVITY() stored procedure, for instance, by increasing the value for PAUSE_AFTER_#TXNS to 1000.
11. Select the Oracle SQL Developer window and take another workload repository snapshot by using the CREATE_SNAPSHOT procedure:

```
exec DBMS_WORKLOAD_REPOSITORY.CREATE_SNAPSHOT();
anonymous block completed.
```

12. Force the GENERATE_ACTIVITY() stored procedure to stop:

```
SQL> update java_stproc_parameter set PAUSE_AFTER_#TXNS = 0;
1 row updated.
SQL> commit;
Commit complete.
```

13. Select the OGG_SRC window and stop the EINTA Extract group:

```
GGSCI (host) 31> info all

Program     Status      Group       Lag at Chkpt  Time Since Chkpt

MANAGER     RUNNING
EXTRACT     RUNNING     EINTA       00:00:07      00:00:02
EXTRACT     RUNNING     PINTA       00:00:00      00:00:04

GGSCI (host) 32> stop einta

Sending STOP request to EXTRACT EINTA ...
Request processed.

GGSCI (host) 33>
```

14. Edit the EINTA Extract group parameter file, increasing parallelism from one to two and MAX_SGA_SIZE from 256 to 324:

```
Edit param einta
```

```
Extract einta
SETENV (ORACLE_SID='ogg12c')
UserIdAlias ogg_user
TranlogOptions IntegratedParams (max_sga_size 324, parallelism
2)
Exttrail ./dirdat/in
LOGALLSUPCOLS
UPDATERECORDFORMAT COMPACT
Table source.ACCOUNT;
Table source.ATMDETAIL;
Table source.EXCEPTION;
Table source.TRANSACTION;
```

15. Save the EINTA parameter file and restart the EINTA Extract group:

```
GGSCI (host) 34> start einta

Sending START request to MANAGER ...
EXTRACT EINTA starting

GGSCI (host) 35> info all

Program     Status      Group       Lag at Chkpt  Time Since Chkpt

MANAGER     RUNNING
EXTRACT     RUNNING     EINTA       00:07:30      00:00:07
EXTRACT     RUNNING     PINTA       00:00:00      00:00:00
```

16. Select the SourceSqlplus window. Modify the value for the PAUSE_AFTER_#TXNS column in the JAVA_STPROC_PARAMETER table to 100 and commit the transaction:

```
SQL> update java_stproc_parameter set PAUSE_AFTER_#TXNS = 100;
1 row updated.
SQL> commit;
Commit complete.
```

17. Select the StoredProcRunning window and invoke the GENERATE_ACTIVITY() stored procedure to resume the random generation of rows:

```
SQL> exec generate_activity;
```

18. Select the SpadvMonitor window. If the spadv_mon.sh shell script is not running, re-launch it, and observe the statistics displayed on screen. Can you note any improvement after you doubled data capture parallelism?
19. If you do not notice any significant improvement, it is time to try and increase parallelism on the data delivery side. Select the OGG_TRG window, stop the RINTA Replicat group, and increase the parallelism from three to six. Restart the RINTA Replicat group and monitor the statistics produced by UTL_SPADV again to assess if the parameter change made any impact on replication performance.

Generating an HTML Report: `show_stats_html()`

So far you have used the text output of `UTL_SPADV`, which is very useful to assess replication statistics in real time. If you incur replication issues, however, and you seek help from Oracle support, you will be asked to send an HTML report of your replication topology, which is produced by the `UTL_SPADV` package.

In order to create such a report in HTML format, you must create a directory in the Oracle database by using the `CREATE OR REPLACE DIRECTORY` command. The `sqlplus` utility must be tweaked to format the output to facilitate the creation of the HTML file. Finally, the `UTL_SPADV.SHOW_STATS_HTML()` procedure can be called to produce the HTML file.

20. Select the `SpadvMonitor` window and stop the `spadv_mon.sh` shell process if it is still running. At the OS level, create the `spadv_html` directory under `~/Labs/Practice_12`. Use `sqlplus` to connect to Oracle as `ogguser`. Create the `SPADVDIR` directory:

```
[OS Practice_12]$ mkdir spadv_html
[OS Practice_12]$ sqlplus ogguser/oracle@ogg12c

SQL*Plus: Release 12.1.0.1.0 Production on Sat Jun 14 00:41:35 2014

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

Last Successful login time: Fri Jun 13 2014 23:44:24 +10:00

Connected to:
Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real Application Testing
options

SQL> create or replace directory SPADVDIR as
'/home/oracle/Labs/Practice_12/spadv_html';
```

21. Set a few `sqlplus` parameters to control the output produced by `show_stats_html()`.

```
SQL> set linesize 1000 echo off serveroutput on feedback off
verify off;
SQL> SET SERVEROUTPUT ON SIZE UNLIMITED
```

22. In order to create the HTML report, you must find out the oldest `ADVISOR_RUN_ID` and the most recent, which correspond to the first and the last set of statistics accumulated by the `UTL_SPADV` monitoring job:

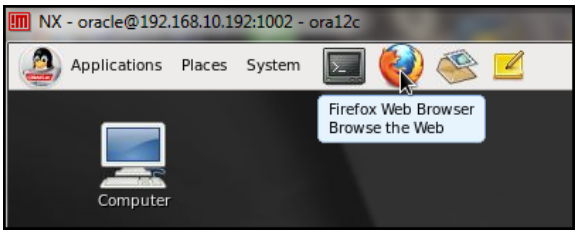
```
SQL> select min(advisor_run_id),max(advisor_run_id) from
     ogguser.streams$_pa_show_comp_stat;
```

23. Write down the two numbers. Invoke the `UTL_SPADV.SHOW_STATS_HTML()` procedure, providing the required parameters:

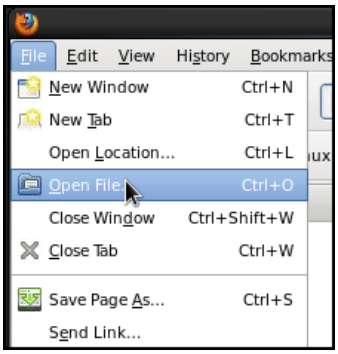
```
SQL> exec utl_spadv.show_stats_html(directory=>'SPADVDIR',
reportname=>'spadvrpt.html',
comp_stat_table=>'STREAMS$_PA_SHOW_COMP_STAT',path_id=>null,
bgn_run_id=><min_advisor_id>, end_run_id=><max_advisor_id>);
```

Naturally, you must replace `<min_advisor_id>` and `<max_advisor_id>` with the values you obtained from the SQL select in step 22.

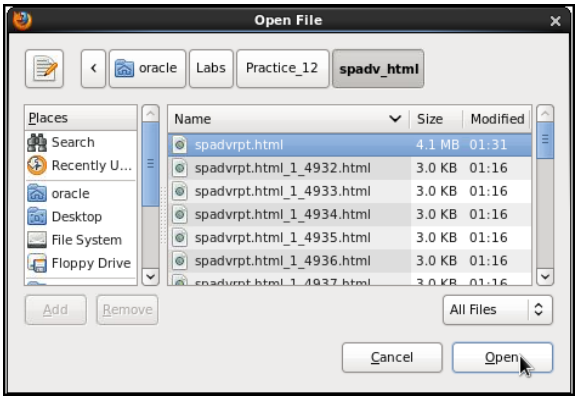
24. Depending on how many statistics snapshots are available in the table `STREAMS$_PA_SHOW_COMP_STAT`, it can take several minutes to create the report. When the stored procedure finishes running and the prompt is given back to `sqlplus`, you can click the Firefox icon to launch the browser:



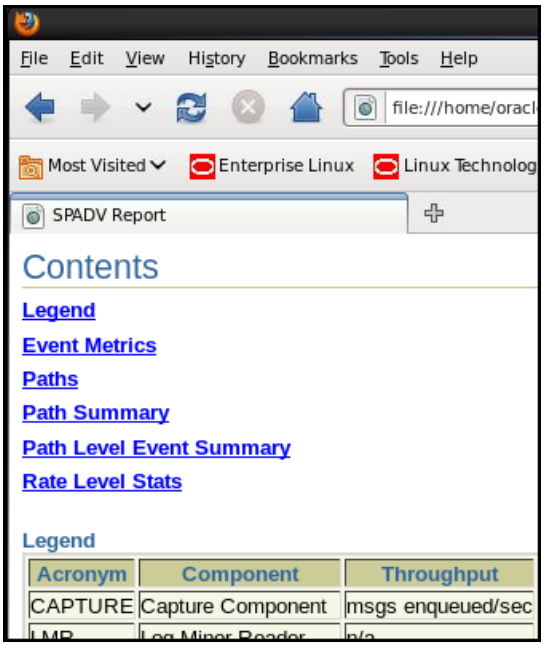
25. From File, select Open File.



26. Navigate to the `~/Labs/Practice_12/spadv_html` directory and select the `spadvrpt.html` file:



27. Click Open.



28. Use the links displayed at the top of the HTML SPADV report to assess the various statistics produced by the `UTL_SPADV` package. Thoroughly assess the entire report, looking at each section and understanding the statistics and how they were gathered. Spend a considerable amount of time (maybe 10 minutes) reading the report.
29. After the report has been generated, you must purge the accumulated statistics in order not to bias the statistics that you will generate in the future. Select the `SpadvMonitor` window and purge the SPADV statistics:

```
SQL> exec UTL_SPADV.STOP_MONITORING(PURGE=>TRUE);
```

This last step completes practice 12-2. Leave all terminal windows open, but you can close the Firefox browser window.

Practice 12-3: Running and Analyzing the Healthcheck Script

Overview

In this practice, you run the `icrhc_12101.sql` healthcheck script, producing an HTML output. You then use the Firefox browser to display the content of the healthcheck script.

Tasks

1. Make sure that the `GENERATE_ACTIVITY()` stored procedure is running in the background. Select the `StoredProcRunning` window and verify that the procedure is running. If it is not running, restart it.
2. Select the `TargetSqlplus` window and exit (temporarily) `sqlplus`. At the OS level, change directory to `/home/oracle/Labs/Practice_12` and re-launch `sqlplus`, this time connecting to Oracle as `sysdba`:

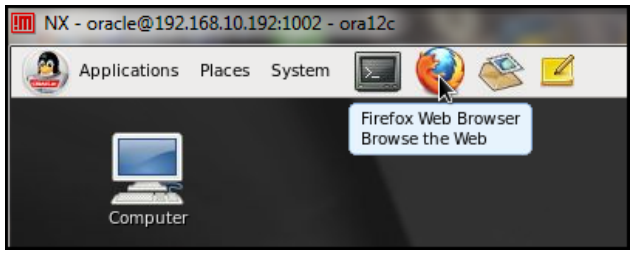
```
SQL> exit
Disconnected from Oracle Database 12c Enterprise Edition Release
12.1.0.1.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real
Application Testing options
[OS ~] cd /home/oracle/Labs/Practice_12
[OS Practice_12] sqlplus / as sysdba
SQL*Plus: Release 12.1.0.1.0 Production on Thu Jun 12 01:14:54
2014
Copyright (c) 1982, 2013, Oracle.  All rights reserved.
Connected to:
Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 -
64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real
Application Testing options


SQL>
```

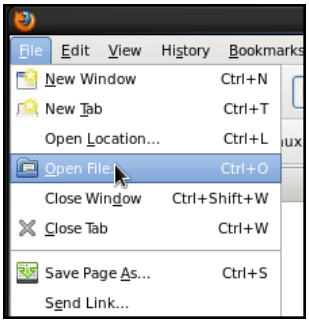
3. The `icrhc_12101.sql` script is stored in the `Practice_12` directory. But you must capture its output by using the `sqlplus` "`spool`" command. Create a file called `healthcheck.html` by spooling the `sqlplus` output, and then invoke the following script:

```
SQL> spool healthcheck.html
SQL> @icrhc_12101.sql
<br>
++ Summary Overview ++
<br>
(...many lines omitted for clarity...)
currently spooling to healthcheck.html
Turning Spool OFF!!!
SQL>
```

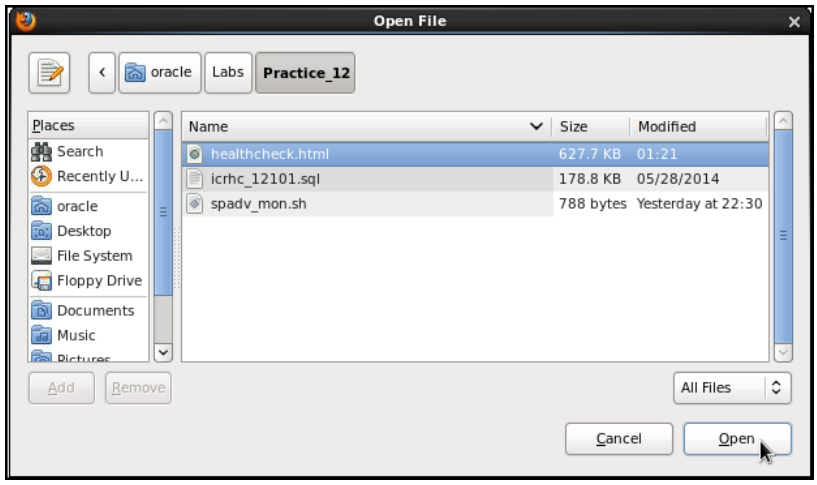
4. Click the Firefox icon to launch the browser:



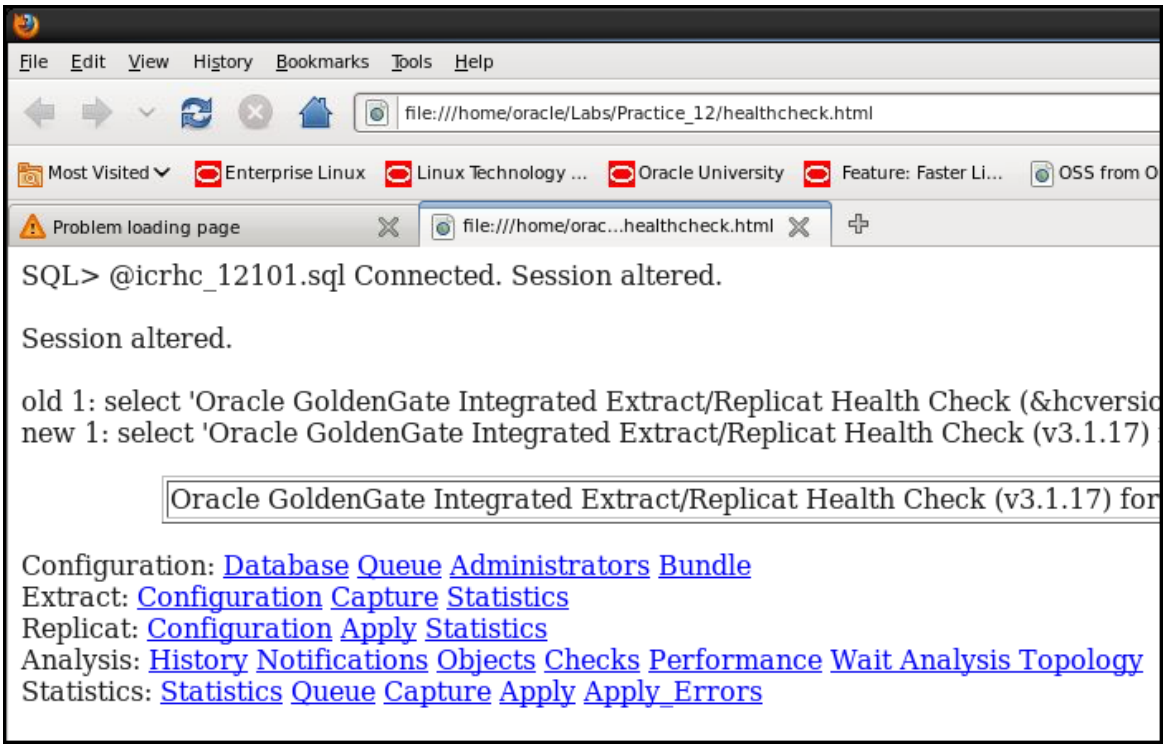
5. From File, select Open File.



6. Navigate to `/home/oracle/Labs/Practice_12` and select `healthcheck.html`. Click Open.



7. The healthcheck report is displayed in the Firefox browser.



8. Before you start exploring the various sections of the heath check report, take another AWR snapshot. Select the Oracle SQL Developer window and call the `CREATE_SNAPSHOT` procedure:

```
exec DBMS_WORKLOAD_REPOSITORY.CREATE_SNAPSHOT();
anonymous block completed.
```

   You are taking several snapshots while replication is active with the goal of running a comprehensive AWR report in the next practice.

9. Spend a few minutes examining the healthcheck report. Visit the most important sections and assess the information gathered by the healthcheck script. The `GENERATE_ACTIVITY()` stored procedure is still running in the background. After you have finished assessing the healthcheck report, take one more AWR snapshot. Select the Oracle SQL Developer window and call the `CREATE_SNAPSHOT` procedure:

```
exec DBMS_WORKLOAD_REPOSITORY.CREATE_SNAPSHOT();
anonymous block completed.
```

10. Leave all terminal windows open for the next practice. You can close the browser window.

Practice 12-4: Generating AWR Reports and Analyzing the Results

Overview

In this practice, you generate an AWR report in HTML format from the workload repository snapshots that you created in the previous practice, and you analyze it by using the Firefox browser.

Tasks

1. Query the `DBA_HIST_SNAPSHOT` table to check the information about the workload repository snapshots that you accumulated so far. Select the Oracle SQL Developer window and submit the following query:

```
select * from  DBA_HIST_SNAPSHOT order by snap_id;
```

   SQL Developer displays a grid with the content of the rows returned by the query. Write down the snapshot ID for the first row (the oldest snapshot) and the last row (the most recent snapshot).

2. Select the `TargetSqlplus` window, where `sqlplus` is connected to Oracle as the user `target`. Exit `sqlplus`. At the OS prompt, change directory to `/home/oracle/Labs/Practice_12` and re-launch `sqlplus`, this time connecting to Oracle as `system`.

```
SQL> show user
USER is "SYS"
SQL> exit
Disconnected from Oracle Database 12c Enterprise Edition Release
12.1.0.1.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real
Application Testing options
[oracle@host01 ~]$ cd ~/Labs/Practice_12
[oracle@host01 Practice_12]$ sqlplus system/oracle@ogg12c
SQL*Plus: Release 12.1.0.1.0 Production on Thu Jun 12 20:49:50
2014
Copyright (c) 1982, 2013, Oracle.  All rights reserved.
Last Successful login time: Thu Jun 12 2014 20:28:26 +10:00
Connected to:
Oracle Database 12c Enterprise Edition Release 12.1.0.1.0 -
64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real
Application Testing options
SQL>
```

3. To generate an AWR report, you use the `awrrpti.sql` script, which is in the `$ORACLE_HOME/rdbms/admin` directory. You can use the question mark shortcut for `$ORACLE_HOME`:

```
SQL> @?/rdbms/admin/awrrpti.sql
Specify the Report Type
~~~~~~~~~~~~~~~~~~~~~~~
Would you like an HTML report, or a plain text report?
Enter 'html' for an HTML report, or 'text' for plain text
Defaults to 'html'
Enter value for report_type:
```

4. Press Enter to accept the default (HTML output). The script displays the DB Id and the instance number on the screen. Enter the DB Id, and then the Instance number.

```
Type Specified:  html
Instances in this Workload Repository schema
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
   DB Id     Inst Num DB Name      Instance     Host
------------ -------- ------------ ------------ ------------
* 3122218363        1 OGG12C       ogg12c       host01.examp
                                                le.com
Enter value for dbid: 3122218363
Enter value for inst_num: 1
Using 1 for instance number
```

5. The next screen gives you the chance to limit the search for snapshots to the most recent days according to the number you enter. Just press Enter to have the script display all snapshots accumulated so far.

```
Specify the number of days of snapshots to choose from
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Entering the number of days (n) will result in the most recent
(n) days of snapshots being listed.  Pressing <return> without
specifying a number lists all completed snapshots.
Enter value for num_days:
```

6. The script displays a list of all available workload repository snapshots. Enter the oldest snapshot ID, which you find in step 1 of this practice.

```
Specify the Begin and End Snapshot Ids
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Enter value for begin_snap: <your initial snapshot id>
```

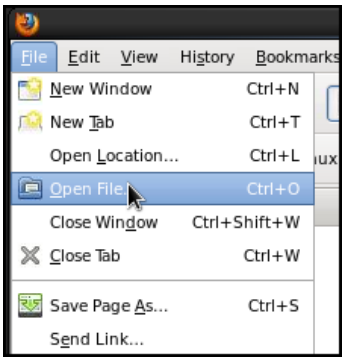
The script confirms the number you chose and requests the snapshot ID for the most recent snapshot that you want in the AWR report. Enter the most recent snapshot ID that you find in step 1 of this practice. The script automatically names the HTML report file:

```
Specify the Report Name
~~~~~~~~~~~~~~~~~~~~~~~
The default report file name is awrrpt_1_<begin>_<end>.html.
    To use this name,
press <return> to continue, otherwise enter an alternative.
Enter value for report_name:
```

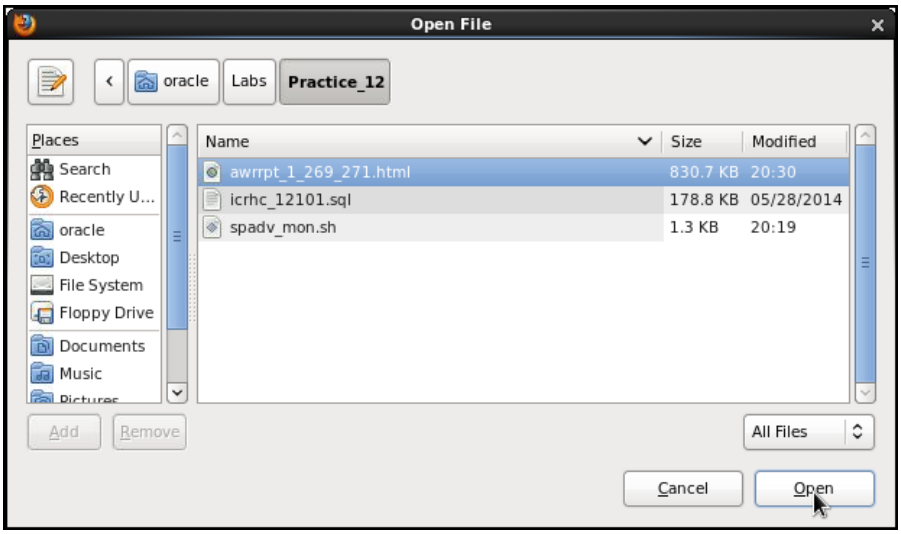
7. The default name is `awrrpt_1_<begin snapshot id>_<end_snapshot_id>.html`. Press Enter to accept the default. The script initially displays the name chosen, and then it floods the screen with thousands of lines (which are also spooled into the file named in the previous step). At the end, the script displays a message stating that the report has been written:

```
Report written to awrrpt_1_<begin>_<end>.html
```

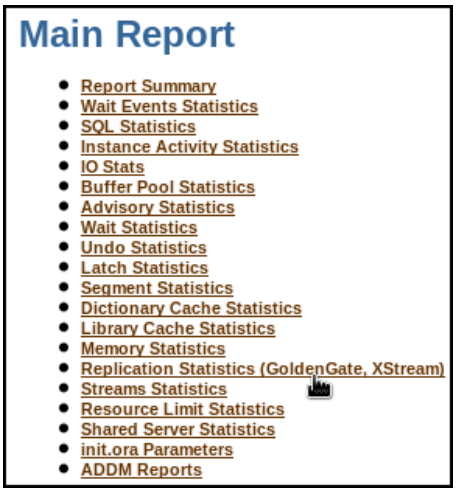
8. Select the Firefox window. From File, select Open File.



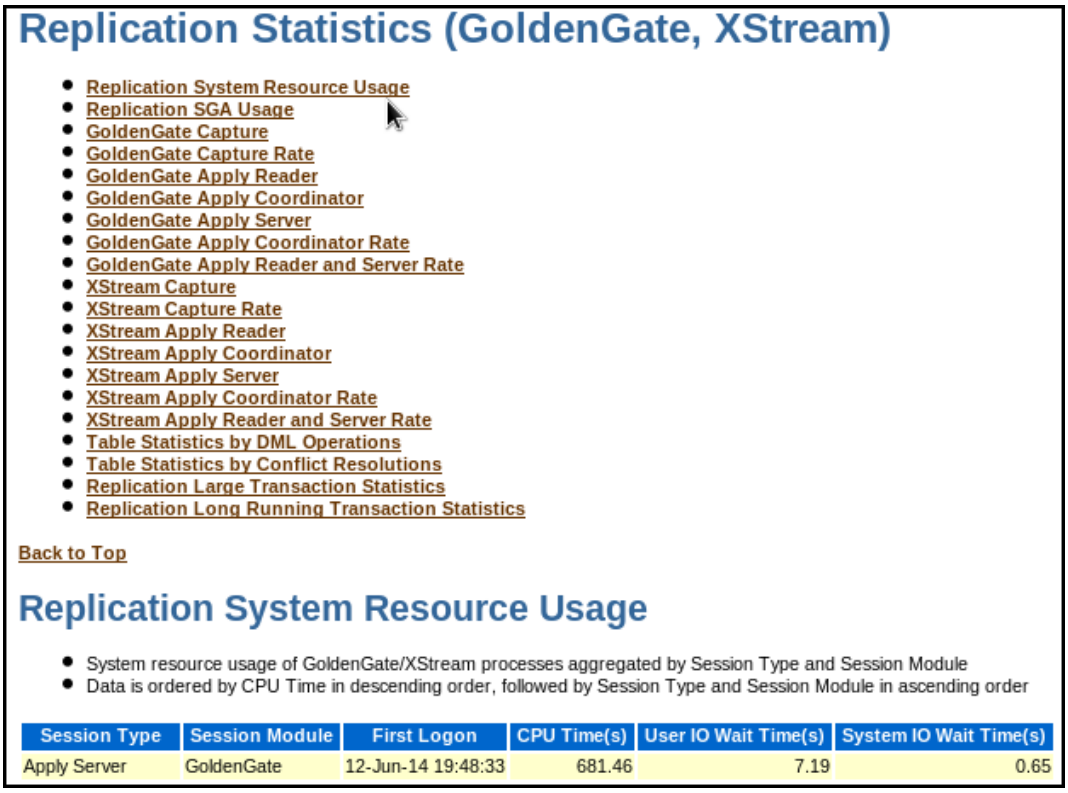
9. Navigate to the `/home/oracle/Labs/Practice_12` directory and select the AWR report HTML file (it starts with `awrrpt`). Click Open.



10. The AWR report is displayed in your browser. Examine the report summary at the top, and then scroll down to the Main Report section, which displays links to the various aspects of information covered by the report. Click Replication Statistics (GoldenGate, XStreams) to select the Oracle GoldenGate section:



11. Examine all Oracle GoldenGate sections.



This step concludes the practice. Stop the `GENERATE_ACTIVITY()` stored procedure (you can select the `StoredProcRunning` window and type `CTRL-C` in the `sqlplus` session where the stored procedure is running).