# Configuration of DB2 to Oracle11gR2 GoldenGate Replication


| | |
|---|---|
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# Document Control

## Change Record

| Date | Author | Version | Change Reference |
|---|---|---|---|
| November 17, 2011 | Vladimir Grigorian | 1.0 | First Draft |
| November 17, 2011 | Vladimir Grigorian | 1.1 | Changed reference to checkpoint table from 1.1.6, added DataPump configuration details |

## Reviewers

| Name | Position |
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## Distribution

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# 1. Preparation of Environment

Fig 1. Flow of Data in DB2 to Oracle GoldenGate Replication

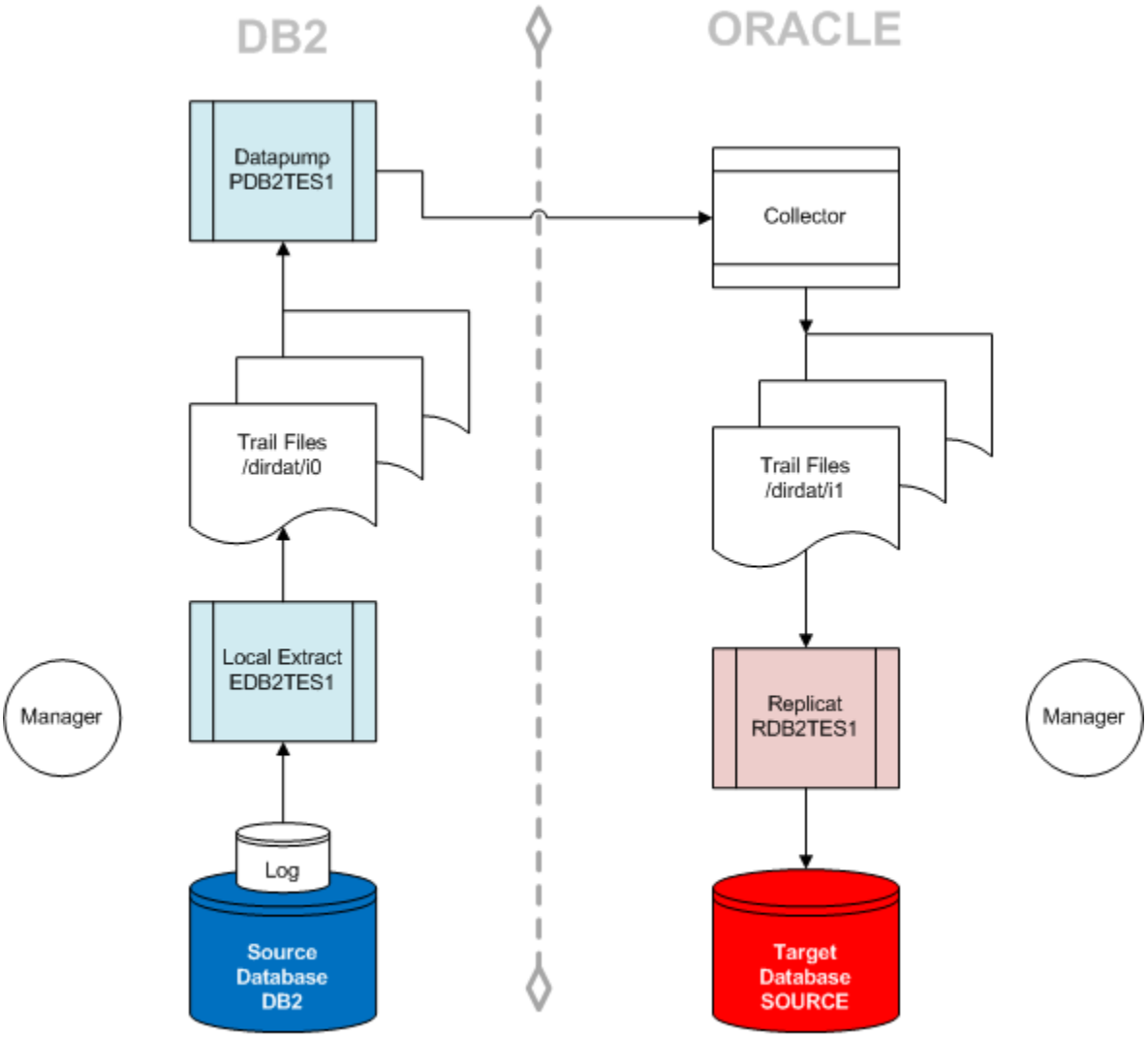




Table 1. Servers and Processes

| | SOURCE | DESTINATION |
|---|---|---|
| **RDBMS VENDOR** | IBM DB2 9.7 | Oracle 11gR2 |

| | | |
|---|---|---|
| **HOSTNAME** | Db2linux | SOURCE |
| **OS** | Suse Linux | Oracle Enterprise LINUX |
| **Database name** | Db2 (local), DB2INST1 | SOURCE |
| **SCHEMA** | DB2INST1 | SOURCE |
| **TABLE** | TEST | TEST |
| **GG home** | /home/dbinst1/gg | /u01gg |
| **EXTRACT** | EDB2TES1 | NA |
| **TYPE OF REPLICATION** | DML ONLY (NO DDL), UNIDIRECTIONAL | DML ONLY (NO DDL), UNIDIRECTIONAL |
| **DATAPUMP** | PDB2TES1 | NA |
| **REPLICAT** | NA | RDB2TES1 |

Purpose: need to replicate DML only from table TEST (no DDL since in this DB2-to-Oracle configuration it is NOT supported) table DB2INST1.TEST from DB2 database on db2linux to Oracle SOURCE database (so even though oracle database is called source, it is actually the target, destination).

## 1.1 Preparation of DB2 Database

Before configuring environments, add both source and target to /etc/hosts and make sure they are pingable and can connect to each other on manager port 7809.

### 1.1.1 Start DB2 Database, if Not Already Running

As root:

db2linux:~ # rcdb2 start

Starting DAS: done

Starting instance db2inst1 (50001) (/opt/ibm/db2/V9.7): done

Activating database DB2 for db2inst1 done

As DB2 user check DB2 host information:

db2linux:~ # su - db2inst1

db2inst1@db2linux:~> db2set -all

[i] DB2COMM=tcpip

[g] DB2FCMCOMM=TCPIP4

[g] DB2SYSTEM=db2linux

[g] DB2INSTDEF=db2inst1

[g] DB2ADMINSERVER=dasusr1

To check version in order to get the correct GoldenGate binaries downloaded:

db2inst1@db2linux:~/> cd ~/sqllib

db2inst1@db2linux:~/sqllib> set | grep DB2

DB2DIR=/opt/ibm/db2/V9.7

DB2INSTANCE=db2inst1

db2inst1@db2linux:~/sqllib>

## 1.1.2 Enable Supplemental Logging in DB2 for GoldenGate

db2inst1@db2linux:~> db2 connect to db2

Database Connection Information

Database server = DB2/LINUX 9.7.5

SQL authorization ID = DB2INST1

Local database alias = DB2

The following will output a hundred parameters in which we are interested in only two which are at default:

db2inst1@db2linux:~> db2 get db cfg show detail

Database Configuration for Database

```
 Description                  Parameter   Current Value         Delayed Value
 ------------------------------------------------------------------------------
 Log retain for recovery enabled              (LOGRETAIN) = OFF          OFF
 User exit for logging enabled                 (USEREXIT) = OFF          OFF
```

These need to be enabled so GoldenGate can capture data changes from logs.

db2inst1@db2linux:~> db2 attach to db2inst1

Instance Attachment Information

Instance server = DB2/LINUX 9.7.5

Authorization ID = DB2INST1

Local instance alias = DB2INST1

db2inst1@db2linux:~> db2 update db cfg for db2 using userexit on

DB20000I The UPDATE DATABASE CONFIGURATION command completed successfully.

SQL1363W One or more of the parameters submitted for immediate modification

were not changed dynamically. For these configuration parameters, all

applications must disconnect from this database before the changes become

effective.

```
db2inst1@db2linux:~> db2 update db cfg for db2 using LOGRETAIN ON
DB20000I  The UPDATE DATABASE CONFIGURATION command completed successfully.
SQL1363W  One or more of the parameters submitted for immediate modification
were not changed dynamically. For these configuration parameters, all
applications must disconnect from this database before the changes become
effective.
db2inst1@db2linux:~>

db2 => db2stop force
DB20000I  The DB2STOP command completed successfully.

db2 => db2start
DB20000I  The DB2START command completed successfully.
db2 =>
```

The changes will require a database backup, or it will refuse to start.

BACKUP FROM db2cc or command line:

```
BACKUP DATABASE DB2 TO "/home/db2inst1/backup" WITH 2 BUFFERS BUFFER 1024 PARALLELISM 4
WITHOUT PROMPTING;
```

Check the changed parameters :

```
db2 => connect to db2

   Database Connection Information
```

Database server = DB2/LINUX 9.7.5

SQL authorization ID = DB2INST1

Local database alias = DB2

db2 => get db cfg show detail

```
Description                  Parameter   Current Value         Delayed Value
 ------------------------------------------------------------------------------
 Log retain for recovery enabled       (LOGRETAIN) = RECOVERY        RECOVERY
 User exit for logging enabled         (USEREXIT) = ON               ON
```

### 1.1.3 Create Table TEST on DB2 Side

CONNECT TO DB2;

CREATE TABLE DB2INST1.TEST ( TEST VARCHAR (100) NOT NULL , CONSTRAINT CC1321376867243 PRIMARY KEY ( TEST) ) IN TEST

COMMENT ON TABLE DB2INST1.TEST IS 'GoldenGate source table';

CONNECT RESET;

### 1.1.4 Download and Unzip GG on DB2

Download Oracle GoldenGate for Non Oracle Database v11.1.1.1.0 Media Pack for Linux x86. Make sure you are downloading the right DB2 media pack (9.7 in this case).

Download Oracle GoldenGate V11.1.1.1.1 for DB2 9.7 on Linux x86 V27854-01 81M

## Oracle GoldenGate for Non Oracle Database v11.1.1.1.0 Media Pack for Linux x86

Search Again

TIP View the Readme file(s) to help decide which files you need to download.

Print this page with the list of downloadable files. It contains a list of the part numbers and their corresponding description that you may need to reference during the installation process.

**Oracle GoldenGate for Non Oracle Database v11.1.1.1.0 Media Pack v2 for Linux x86**

Readme | View Digest

| Select | Name | Part Number | Size (Bytes) |
|---|---|---|---|
| Download | Oracle GoldenGate V11.1.1.1.1 for DB2 9.1/9.5 on Linux x86 | V27853-01 | 81M |
| Download | Oracle GoldenGate V11.1.1.1.1 for DB2 9.7 on Linux x86 | V27854-01 | 81M |
| Download | Oracle GoldenGate V11.1.1.1.1 for MySQL 5.x on Linux x86 | V27855-01 | 92M |
| Download | Oracle GoldenGate V11.1.1.1.1 for Teradata on Linux x86 | V27867-01 | 114M |
| Download | Oracle GoldenGate V11.1.1.1.2 for Sybase 12.5.4 on Linux x86 | V28958-01 | 83M |
| Download | Oracle GoldenGate V11.1.1.1.2 for Sybase 15 on Linux x86 | V28960-01 | 83M |
| Download | Oracle GoldenGate V11.1.1.1.2 for Sybase 15.5 on Linux x86 | V28959-01 | 83M |
| Total: 7 | | | |

db2inst1@db2linux:~/sqllib> cd ~/gg

db2inst1@db2linux:~/gg> ls -l

total 84216

db2inst1@db2linux:~/gg> unzip V27854-01.zip

Archive:  V27854-01.zip

 inflating: ggs_Linux_x86_db297_32bit.tar

 inflating: OGG_WinUnix_Rel_Notes_11.1.1.1.1.pdf

 inflating: Oracle_GoldenGate_11.1.1.1_README.txt

db2inst1@db2linux:~/gg> tar -xvf  ggs_Linux_x86_db297_32bit.tar

Export PATH and add $GGATE to profile

db2inst1@db2linux:~/gg> echo $LD_LIBRARY_PATH

/home/db2inst1/sqllib/lib32:/home/db2inst1/gg

db2inst1@db2linux:~/gg> echo $PATH

/home/db2inst1/bin:/usr/local/bin:/usr/bin:/bin:/usr/bin/X11:/usr/X11R6/bin:/usr/games:/usr/lib/mit/bin:/usr/lib/mit/sbin:.:/home/db2inst1/sqllib/bin:/home/db2inst1/sqllib/adm:/home/db2inst1/sqllib/misc:/home/db2inst1/sqllib/db2tss/bin:/home/db2inst1/gg

db2inst1@db2linux:~/gg>

db2inst1@db2linux:~/sqllib> cd $GGATE

db2inst1@db2linux:~/gg> ./ggsci

Oracle GoldenGate Command Interpreter for DB2

Version 10.4.0.19 Build 002

Linux, x86, 32bit (optimized), DB2 8.1.2.96 on Sep 23 2009 14:05:08

```
GGSCI (db2linux) 1> info all

Program     Status      Group       Lag           Time Since Chkpt

MANAGER     STOPPED
```

### 1.1.5 Create Subdirectories on DB2

```
GGSCI (db2linux) 2> CREATE SUBDIRS

Creating subdirectories under current directory /home/db2inst1/gg

Parameter files                /home/db2inst1/gg/dirprm: created
Report files                   /home/db2inst1/gg/dirrpt: created
Checkpoint files               /home/db2inst1/gg/dirchk: created
Process status files           /home/db2inst1/gg/dirpcs: created
SQL script files               /home/db2inst1/gg/dirsql: created
Database definitions files     /home/db2inst1/gg/dirdef: created
Extract data files             /home/db2inst1/gg/dirdat: created
Temporary files                /home/db2inst1/gg/dirtmp: created
Veridata files                 /home/db2inst1/gg/dirver: created
Veridata Lock files            /home/db2inst1/gg/dirver/lock: created
Veridata Out-Of-Sync files     /home/db2inst1/gg/dirver/oos: created
Veridata Out-Of-Sync XML files /home/db2inst1/gg/dirver/oosxml: created
Veridata Parameter files       /home/db2inst1/gg/dirver/params: created
```

Veridata Report files /home/db2inst1/gg/dirver/report: created

Veridata Status files /home/db2inst1/gg/dirver/status: created

Veridata Trace files /home/db2inst1/gg/dirver/trace: created

Stdout files /home/db2inst1/gg/dirout: created

GGSCI (db2linux) 3> exit

db2inst1@db2linux:~/gg>

### 1.1.6 Configure Manager on DB2

An important difference between configuration of GoldenGate on DB2 as opposed to Oracle is that you have to specify SOURCEDB. Another difference is users access in DB2, which is beside the point here since we are not configuring GGATE admin user on DB2 side, as we do in Oracle.



GGSCI (db2linux) 1> dblogin ***sourcedb db2***, userid db2inst1, password oracle

Successfully logged into database.

GGSCI (db2linux) 5> edit params mgr

---

-- GoldenGate Manager --

-- Last updated on 20111115 by vladimir.grigorian@acs-inc.com --

---

PORT 7809

***SOURCEDB db2***, USERID db2inst1, PASSWORD oracle

--AUTOSTART *

--AUTORESTART EXTRACT *, RETRIES 3, WAITMINUTES 1, RESETMINUTES 60

PURGEOLDEXTRACTS /home/db2inst1/gg/dirdat/*, USECHECKPOINTS, MINKEEPDAYS 2

GGSCI (db2linux) 6> start mgr

Manager started.

GGSCI (db2linux) 25> info all

Program Status Group Lag Time Since Chkpt

MANAGER RUNNING

### 1.1.7 Enable Supplemental Logging from GoldenGate

GGSCI (db2linux) 2> add trandata test

Logging of supplemental log data (include longvar) is enabled for table "DB2INST1"."TEST"

### 1.1.8 Add Checkpoint Table on DB2 Side

If this is to be configured as bidirectional replication (otherwise checkpoint table is needed only on replicat side) – add checkpoint table:

GGSCI (db2linux) 4> ADD CHECKPOINTTABLE db2inst1.chkptab

Successfully created checkpoint table DB2INST1.CHKPTAB.

For this demo checkpoint table is not needed, though.

### 1.1.9 Configure Source Definition Generator (DEFGEN) on DB2

GGSCI (db2linux) 29> edit param defgen

DEFSFILE dirdef/source.def, PURGE

SOURCEDB db2, USERID db2inst1, PASSWORD oracle

TABLE DB2INST1.TEST;

GGSCI (db2linux) 3> exit

db2inst1@db2linux:~/gg> defgen paramfile dirprm/defgen.prm

**********

Oracle GoldenGate Table Definition Generator for DB2

Version 10.4.0.19 Build 002

Linux, x86, 32bit (optimized), DB2 8.1.2.96 on Sep 23 2009 14:10:43

```
            Starting at 2011-11-15 16:51:04
************************************************************************


Operating System Version:

Linux

Version #1 SMP 2010-05-20 11:14:20 +0200, Release 2.6.32.12-0.7-default

Node: db2linux

Machine: i686

                soft limit   hard limit

Address Space Size   :   1689763840    unlimited

Heap Size        :    unlimited    unlimited

File Size        :    unlimited    unlimited

CPU Time         :    unlimited    unlimited


Process id: 15863


************************************************************************

**          Running with the following parameters                **

************************************************************************

DEFSFILE dirdef/source.def, PURGE

SOURCEDB db2, USERID db2inst1, PASSWORD ******

TABLE DB2INST1.TEST;

Retrieving definition for DB2INST1.TEST
```

Definitions generated for 1 tables in dirdef/source.def

db2inst1@db2linux:~/gg>

FTP file to Oracle target server called target Oracle database server SOURCE in dirdef directory.

## 2. Prepare Oracle Database for Replication

On TARGET Oracle11g db is called SOURCE (this instance will replicate to yet another database called TARGET hence the name SOURCE, even though it is a target for DB2). As with DB2, make sure it /etc/hosts contains both servers and can connect to source server on port 7809.

Download GoldenGate software from Edelivery, but make sure it is for Oracle database. Create subdirectories as shown in DB2 section above. Configure manager.

```
[oracle@source ~]$ cd $GGATE

[oracle@source gg]$ ./ggsci


Oracle GoldenGate Command Interpreter for Oracle

Version 11.1.1.1 OGGCORE_11.1.1_PLATFORMS_110421.2040

Linux, x86, 32bit (optimized), Oracle 11g on Apr 21 2011 22:38:06


Copyright (C) 1995, 2011, Oracle and/or its affiliates. All rights reserved.


GGSCI (source) 1> edit params mgr

------------------------------------------------------------------

-- GoldenGate Manager on oracle database server                 --

-- Last updated on 20111015 by VG                               --

------------------------------------------------------------------
```

```
PORT 7809
USERID ggate, PASSWORD oracle
AUTOSTART EXTRACT *
AUTORESTART EXTRACT *, RETRIES 3, WAITMINUTES 1, RESETMINUTES 60
PURGEOLDEXTRACTS /u01/gg/dirdat/*, USECHECKPOINTS, MINKEEPDAYS 2
```

[oracle@source ~]$ sqlplus /nolog

SQL*Plus: Release 11.2.0.1.0 Production on Tue Nov 15 17:07:38 2011

Copyright (c) 1982, 2009, Oracle.  All rights reserved.

SQL> connect source/oracle;

Connected.

Create target table TEST:

SQL> create table test  (test VARCHAR (100)  NOT NULL  );

Table created.

SQL>

# 3. Configure Change Capture on DB2 Side

## 3.1 Add and Start Extract EDBTES1

GGSCI (db2linux) 3> add ext edb2tes1, tranlog eof

EXTRACT added.

GGSCI (db2linux) 4> ADD EXTTRAIL ./dirdat/i0, EXTRACT EDB2TES1, MEGABYTES 100

EXTTRAIL added.

GGSCI (db2linux) 5> edit params edb2tes1

```
------------------------------------------------------------------
-- GoldenGate extract EDB2TES1 on DB2 source server             --
-- Last updated on 20111015 by VG                               --
------------------------------------------------------------------
```

EXTRACT EDB2TES1

SOURCEDB db2, USERID db2inst1, PASSWORD oracle

RMTHOST source, MGRPORT 7809

EXTTRAIL ./dirdat/i0

TABLE DB2INST1.TEST;

GGSCI (db2linux) 11> start extract EDB2TES1

Sending START request to MANAGER ...

EXTRACT EDB2TES1 starting

## 3.2 Add and Start DataPump PDB2TES1

GGSCI (db2linux) 6> ADD EXTRACT pdb2tes1, EXTTRAILSOURCE ./dirdat/i0, begin now

EXTRACT added.

GGSCI (db2linux) 7> edit params pdb2tes1

```
------------------------------------------------------------------
-- GoldenGate DataPump PDB2TES1 on DB2 source server             --
-- Last updated on 20111015 by VG                               --
------------------------------------------------------------------
```

--dataPump group--

extract pdb2tes1

PassThru

--hostname and port for trail--

rmthost source, mgrport 7809

--path and name for remote destination trail--

rmttrail ./dirdat/i1

table DB2INST1.TEST ;

GGSCI (db2linux) 8> ADD RMTTRAIL ./dirdat/i1, EXTRACT pdb2tes1, MEGABYTES 100

RMTTRAIL added.

GGSCI (db2linux) 10> start mgr

Manager started.

GGSCI (db2linux) 12> start extract PDB2TES1

Sending START request to MANAGER ...

EXTRACT PDB2TES1 starting

GGSCI (db2linux) 14> info all

Program Status Group Lag Time Since Chkpt

MANAGER RUNNING

EXTRACT RUNNING EDB2TES1 00:00:00 00:00:06

EXTRACT RUNNING PDB2TES1 00:00:00 00:12:25

# 4. Configure Change Delivery on TARGET Oracle Database

## 4.1 Add and Start Replicat RDB2TES1

On target Oracle database

GGSCI (source) 12> ADD REPLICAT RDB2TES2, EXTTRAIL ./dirdat/i1

REPLICAT added.

GGSCI (source) 13>

GGSCI (source) 13> edit params RDB2TES2

```
------------------------------------------------------------------
-- GoldenGate replicat RDB2TES1 on oracle target server         --
-- Last updated on 20111015 by VG                               --
------------------------------------------------------------------
```

REPLICAT RDB2TES2

USERID ggate, PASSWORD oracle

HANDLECOLLISIONS

SOURCEDEFS ./dirdef/source.def

DISCARDFILE ./dirrpt/RDB2TES2_discard.dsc, PURGE

MAP DB2INST1.TEST, TARGET SOURCE.TEST;

GGSCI (source) 14> start replicat RDB2TES2

Sending START request to MANAGER ...

REPLICAT RDB2TES2 starting

```
GGSCI (source) 15> info replicat RDB2TES2

REPLICAT   RDB2TES2  Last Started 2011-11-15 20:35   Status RUNNING
Checkpoint Lag       00:00:00 (updated 00:00:05 ago)
Log Read Checkpoint  File ./dirdat/i1000000
                     First Record  RBA 0

GGSCI (source) 16>
```

## 5. Test Replication

On source DB2 database lets insert a few rows into TEST:

```
db2 => connect to db2

  Database Connection Information

 Database server        = DB2/LINUX 9.7.5

 SQL authorization ID   = DB2INST1

 Local database alias   = DB2


db2 => insert into test values ('Kurosawa, Akira')
DB20000I The SQL command completed successfully.


db2 => insert into test values ('Bergman, Ingmar')
DB20000I The SQL command completed successfully.


db2 => insert into test values ('Tarkovsky, Andrey')
DB20000I The SQL command completed successfully.


db2 => insert into test values ('Kubrik, Stanley')
DB20000I The SQL command completed successfully.


db2 => commit
DB20000I The SQL command completed successfully.
db2 =>
```

On source, lets make sure changes are written to trail files:

```
GGSCI (db2linux) 11> stats EDB2TES1

Sending STATS request to EXTRACT EDB2TES1 ...
```

Start of Statistics at 2011-11-16 18:48:12.

Output to ./dirdat/i1:

Extracting from DB2INST1.TEST to DB2INST1.TEST:

*** Total statistics since 2011-11-16 18:47:08 ***
Total inserts 4.00
Total updates 0.00
Total deletes 0.00
Total discards 0.00
Total operations 4.00

*** Daily statistics since 2011-11-16 18:47:08 ***
Total inserts 4.00
Total updates 0.00
Total deletes 0.00
Total discards 0.00
Total operations 4.00

*** Hourly statistics since 2011-11-16 18:47:08 ***
Total inserts 4.00
Total updates 0.00
Total deletes 0.00
Total discards 0.00
Total operations 4.00

*** Latest statistics since 2011-11-16 18:47:08 ***
Total inserts 4.00
Total updates 0.00
Total deletes 0.00
Total discards 0.00
Total operations 4.00

End of Statistics.

Test if rows are replicated to target Oracle Database

SQL> connect source/oracle

```
SQL> select * from test;

TEST
--------------------------------------------------------------------------------
Kurosawa, Akira
Bergman, Ingmar
Tarkovsky, Andrey
Kubrik, Stanley
TEST
TEST1
TEST

7 rows selected.

SQL>
```

We now have successfully configured a simple DB2 to Oracle GoldenGate replication.