

【OGG】OGG 的单向 DML 复制配置(一)

1.1 BLOG 文档结构图

└─ 【OGG】 OGG 的单向 DML 复制配置(一)
└─ 1.1 BLOG 文档结构图
└─ 1.2 前言部分
└─ 1.2.1 导读
└─ 1.2.2 实验环境介绍
└─ 1.2.3 相关参考文章链接
└─ 1.2.4 本文简介
└─ 1.3 实验部分
└─ 1.3.1 实验目标
└─ 1.3.2 准备工作，在 source 和 target 端都配置
└─ 1.3.2.1 确保/etc/hosts 配置正确
└─ 1.3.2.2 dbca 创建 2 套新环境用于实验
└─ 1.3.2.3 配置环境变量、listener 和 tnsnames.ora 文件
└─ 1.3.2.4 数据库设置
└─ 1.3.3 安装 ogg 软件，配置及启动 mgr 管理进程，sourc ...
└─ 1.3.3.1 安装 OGG 软件
└─ 1.3.3.2 配置及启动 mgr 管理进程
└─ 1.3.3.3 准备测试用户及表
└─ 1.3.4 初始化数据
└─ 1.3.4.1 source 端添加 extract 进程
└─ 1.3.4.2 target 端添加 replicat 进程
└─ 1.3.4.3 source 端启动 extract 进程，查看日志输出
└─ 1.3.4.4 target 端查看日志，并且数据量验证
└─ 1.3.5 配置 OGG 的实时同步功能
└─ 1.3.5.1 开启 hr 用户下所有表的附加日志
└─ 1.3.5.2 在 source 上添加及配置 extract 进程，进程的 ...
└─ 一、添加并配置 extract 进程
└─ 二、添加 trail 文件，文件名前缀不能超过 2 个字符
└─ 1.3.5.3 添加并启动 pump 进程
└─ 1.3.5.4 在 target 端添加检查表，配置 replicat 进程
└─ 一、添加检查表
└─ 二、添加并启动 replicat 进程
└─ 1.3.5.5 测试 OGG 的实时同步功能
└─ 一、源库插入数据分析
└─ 二、抽取 trail 文件中可打印的内容分析
└─ 三、删除测试
└─ 1.3.6 实验总结

1.2 前言部分

1.2.1 导读

各位技术爱好者，看完本文后，你可以掌握如下的技能，也可以学到一些其它你所不知道的知识，~O(∩_∩)O~：

- ① OGG 的单向 DML 实时复制功能
- ② 数据库的静默安装
- ③ OGG 的安装
- ④ OGG 下数据的初始化工作

注意：本篇 BLOG 中代码部分需要特别关注的地方我都用黄色背景和红色字体来表示，比如下边的例子中，thread 1 的最大归档日志号为 33，thread 2 的最大归档日志号为 43 是需要特别关注的地方。

List of Archived Logs in backup set 11						
Thrd	Seq	Low SCN	Low Time	Next SCN	Next Time	
1	32	1621589	2015-05-29 11:09:52	1625242	2015-05-29 11:15:48	
1	33	1625242	2015-05-29 11:15:48	1625293	2015-05-29 11:15:58	
2	42	1613951	2015-05-29 10:41:18	1625245	2015-05-29 11:15:49	
2	43	1625245	2015-05-29 11:15:49	1625253	2015-05-29 11:15:53	

本文如有错误或不完善的地方请大家多多指正，ITPUB 留言或 QQ 皆可，您的批评指正是我写作的最大动力。

1.2.2 实验环境介绍

项目	source db	target db
db 类型	单实例	单实例

http://blog.itpub.net/26736162

db version	11.2.0.3	11.2.0.3
db 存储	FS type	FS type
ORACLE_SID	ogg1	ogg2
db_name	ogg1	ogg2
主机 IP 地址：	192.168.59.129	192.168.59.130
OS 版本及 kernel 版本	RHEL6.5 64 位， 2.6.32-504.16.2.el6.x86_64	RHEL6.5 64 位， 2.6.32-504.16.2.el6.x86_64
OGG 版本	11.2.1.0.1 64 位	11.2.1.0.1 64 位
OS hostname	orcltest	rhel6_lhr

1. 2. 3 相关参考文章链接

【OGG】OGG 的下载和安装篇：<http://blog.itpub.net/26736162/viewspace-1693241/>

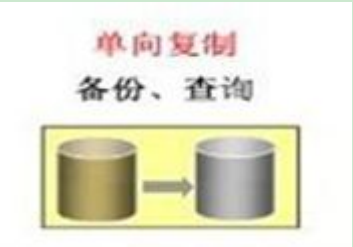
1. 2. 4 本文简介

本文基于 OGG 的 DML 复制功能，后续会推出系列的 OGG 配置，包括 DDL 复制，双向复制，还有 rac 到单实例的复制等等，主要参考网址为：
<http://ylw6006.blog.51cto.com/all/470441/16>，非常感谢斩月大师。

1. 3 实验部分

1.3.1 实验目标

配置 2 台服务器，搭建 OGG,实现 hr 用户下的数据 dml 复制功能。



1.3.2 准备工作，在 source 和 target 端都配置

1.3.2.1 确保/etc/hosts 配置正确

首先在 source 和 target 端确保/etc/hosts 中的主机名到 ip 地址的解析是正确的，且 127.0.0.1 没有指向本主机名，这里以 target 端为例：

```
[oracle@rhel6_lhr ~]$ hostname
rhel6_lhr
[oracle@rhel6_lhr ~]$ more /etc/hosts
127.0.0.1    localhost localhost.localdomain localhost4 localhost4.localdomain4
::1         localhost localhost.localdomain localhost6 localhost6.localdomain6

192.168.59.130 rhel6_lhr
[oracle@rhel6_lhr ~]$ ifconfig
eth0      Link encap:Ethernet  HWaddr 00:0C:29:C0:A7:56
          inet addr:192.168.59.130  Bcast:192.168.59.255  Mask:255.255.255.0
          inet6 addr: fe80::20c:29ff:fec0:a756/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:650153 errors:0 dropped:0 overruns:0 frame:0
          TX packets:160873 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:824479355 (786.2 MiB)  TX bytes:16495312 (15.7 MiB)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:104417 errors:0 dropped:0 overruns:0 frame:0
          TX packets:104417 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:26855022 (25.6 MiB)  TX bytes:26855022 (25.6 MiB)

[oracle@rhel6_lhr ~]$
```

1.3.2.2 dbca 创建 2 套新环境用于实验

source 端：

```
[oracle@orcltest ~]$ dbca -silent -createDatabase -templateName General_Purpose.dbc -gdbname ogg1 -sid ogg1 -sysPassword lhr -systemPassword lhr -responseFile NO_VALUE -datafileDestination /u01/app/oracle/oradata
-redoLogFileSize 50 -recoveryAreaDestination /u01/app/oracle/flash_recovery_area -storageType FS -characterSet ZHS16GBK -nationalCharacterSet AL16UTF16 -sampleSchema true -memoryPercentage 30 -totalMemory 200
-databaseType OLTP -emConfiguration NONE -automaticMemoryManagement true

Copying database files
1% complete
3% complete
10% complete
17% complete
24% complete
35% complete
Creating and starting Oracle instance
37% complete
42% complete
47% complete
52% complete
53% complete
56% complete
58% complete
Registering database with Oracle Restart
64% complete
Completing Database Creation
68% complete
71% complete
75% complete
85% complete
96% complete
100% complete
Look at the log file "/u02/app/oracle/cfgtoollogs/dbca/ogg1/ogg1.log" for further details.
[oracle@orcltest ~]$
[oracle@orcltest ~]$ ps -ef|grep ora_
oracle  20620      1  0 10:18 ?        00:00:00 ora_pmon_ogg1
oracle  20622      1  0 10:18 ?        00:00:00 ora_psp0_ogg1
oracle  20624      1  0 10:19 ?        00:00:00 ora_vktm_ogg1
oracle  20628      1  0 10:19 ?        00:00:00 ora_gen0_ogg1
oracle  20630      1  0 10:19 ?        00:00:00 ora_diag_ogg1
oracle  20632      1  0 10:19 ?        00:00:00 ora_dbrm_ogg1
oracle  20634      1  0 10:19 ?        00:00:00 ora_dia0_ogg1
oracle  20636      1  0 10:19 ?        00:00:00 ora_mman_ogg1
oracle  20638      1  0 10:19 ?        00:00:00 ora_dbw0_ogg1
oracle  20640      1  0 10:19 ?        00:00:00 ora_lgwr_ogg1
oracle  20642      1  0 10:19 ?        00:00:00 ora_ckpt_ogg1
oracle  20644      1  0 10:19 ?        00:00:00 ora_smon_ogg1
oracle  20646      1  0 10:19 ?        00:00:00 ora_reco_ogg1
oracle  20648      1  0 10:19 ?        00:00:00 ora_mmon_ogg1
oracle  20650      1  0 10:19 ?        00:00:00 ora_mmn1_ogg1
oracle  20652      1  0 10:19 ?        00:00:00 ora_d000_ogg1
oracle  20654      1  0 10:19 ?        00:00:00 ora_s000_ogg1
oracle  20690      1  0 10:19 ?        00:00:00 ora_arc0_ogg1
oracle  20692      1  0 10:19 ?        00:00:00 ora_arc1_ogg1
oracle  20694      1  0 10:19 ?        00:00:00 ora_arc2_ogg1
oracle  20696      1  0 10:19 ?        00:00:00 ora_arc3_ogg1
oracle  20698      1  0 10:19 ?        00:00:00 ora_qmnc_ogg1
oracle  20729      1  0 10:19 ?        00:00:00 ora_cjq0_ogg1
oracle  20744      1  0 10:19 ?        00:00:00 ora_q000_ogg1
oracle  20746      1  0 10:19 ?        00:00:00 ora_q001_ogg1
oracle  20768 19494  0 10:21 pts/0    00:00:00 grep ora_
[oracle@orcltest ~]$
```

target 端：

```
[oracle@rhel6_lhr ~]$ dbca -silent -createDatabase -templateName General_Purpose.dbc -gdbname ogg2 -sid ogg2 -sysPassword lhr -systemPassword lhr -responseFile NO_VALUE -datafileDestination /u01/app/oracle/oradata
-redoLogFileSize 50 -recoveryAreaDestination /u01/app/oracle/flash_recovery_area -storageType FS -characterSet ZHS16GBK -nationalCharacterSet AL16UTF16 -sampleSchema true -memoryPercentage 30 -totalMemory 200
-databaseType OLTP -emConfiguration NONE -automaticMemoryManagement true
Copying database files
1% complete
3% complete
10% complete
17% complete
24% complete
31% complete
35% complete
Creating and starting Oracle instance
37% complete
42% complete
47% complete
52% complete
53% complete
56% complete
58% complete
Registering database with Oracle Restart
64% complete
Completing Database Creation
68% complete
71% complete
75% complete
85% complete
96% complete
100% complete
Look at the log file "/u01/app/oracle/cfgtoollogs/dbca/ogg2/ogg2.log" for further details.
You have new mail in /var/spool/mail/oracle
[oracle@rhel6_lhr ~]$ ps -ef|grep ora_
oracle  12227      1  0 20:12 ?        00:00:00 ora_pmon_ogg2
oracle  12229      1  0 20:12 ?        00:00:00 ora_psp0_ogg2
oracle  12231      1  1 20:12 ?        00:00:03 ora_vktm_ogg2
oracle  12235      1  0 20:12 ?        00:00:00 ora_gen0_ogg2
oracle  12237      1  0 20:12 ?        00:00:00 ora_diag_ogg2
oracle  12239      1  0 20:12 ?        00:00:00 ora_dbrm_ogg2
oracle  12241      1  0 20:12 ?        00:00:00 ora_dia0_ogg2
oracle  12243      1  0 20:12 ?        00:00:00 ora_mman_ogg2
oracle  12245      1  0 20:12 ?        00:00:00 ora_dbw0_ogg2
oracle  12247      1  0 20:12 ?        00:00:00 ora_lgwr_ogg2
oracle  12249      1  0 20:12 ?        00:00:00 ora_ckpt_ogg2
oracle  12251      1  0 20:12 ?        00:00:00 ora_smon_ogg2
oracle  12253      1  0 20:12 ?        00:00:00 ora_reco_ogg2
oracle  12255      1  0 20:12 ?        00:00:00 ora_mmon_ogg2
oracle  12257      1  0 20:12 ?        00:00:00 ora_mmn1_ogg2
oracle  12259      1  0 20:12 ?        00:00:00 ora_d000_ogg2
oracle  12261      1  0 20:12 ?        00:00:00 ora_s000_ogg2
oracle  12289      1  0 20:12 ?        00:00:00 ora_arc0_ogg2
oracle  12291      1  0 20:12 ?        00:00:00 ora_arc1_ogg2
oracle  12293      1  0 20:12 ?        00:00:00 ora_arc2_ogg2
oracle  12295      1  0 20:12 ?        00:00:00 ora_arc3_ogg2
oracle  12297      1  0 20:12 ?        00:00:00 ora_qmnc_ogg2
oracle  12330      1  0 20:12 ?        00:00:00 ora_cjq0_ogg2
oracle  12347      1  0 20:13 ?        00:00:00 ora_q000_ogg2
oracle  12349      1  0 20:13 ?        00:00:00 ora_q001_ogg2
oracle  12492  7669  0 20:15 pts/2    00:00:00 grep ora_
[oracle@rhel6_lhr ~]$
```

1.3.2.3 配置环境变量、listener 和 tnsnames.ora 文件

该步骤确保 ORACLE 和 OGG 的环境变量正确，listener 启动即可。

```
[oracle@orcltest ~]$ more .bash_profile
# .bash_profile

# Get the aliases and functions
if [ -f ~/.bashrc ]; then
    . ~/.bashrc
fi

# User specific environment and startup programs

export PATH=$PATH:/sbin/:$HOME/bin

# for oracle user

unset USERNAME

export EDITOR=vi
export ORACLE_SID=ogg1
export ORACLE_BASE=/u02/app/oracle
export ORACLE_HOME=$ORACLE_BASE/product/11.2.0/dbhome_1
export LD_LIBRARY_PATH=$ORACLE_HOME/lib:/usr/lib:/usr/local/lib
export PATH=$ORACLE_HOME/bin:$PATH
export CLASSPATH=$ORACLE_HOME/JRE:$ORACLE_HOME/jlib:$ORACLE_HOME/rdbms/jlib:$ORACLE_HOME/network/jlib
export TNS_ADMIN=$ORACLE_HOME/network/admin

umask 022

#export NLS_LANG="SIMPLIFIED CHINESE_CHINA.AL32UTF8"
export NLS_LANG=AMERICAN_AMERICA.ZHS16GBK
export SQLPATH=$ORACLE_HOME/sqlplus/admin

alias sqlplus='rlwrap sqlplus'
alias rman='rlwrap rman'
alias asmcmd='rlwrap asmcmd'
alias alert_log='tail -200f $ORACLE_BASE/diag/rdbms/$ORACLE_SID/$ORACLE_SID/trace/alert_$ORACLE_SID.log'

export OGG_HOME=/u01/gg11
export PATH=$OGG_HOME:$ORACLE_HOME/bin:$PATH
export LD_LIBRARY_PATH=$OGG_HOME:$ORACLE_HOME/lib:$LD_LIBRARYPATH

alias ggsci='rlwrap ggsci'

export NLS_DATE_FORMAT='YYYY-MM-DD HH24:mi:ss'
[oracle@orcltest ~]$
[oracle@orcltest ~]$ more $TNS_ADMIN/tnsnames.ora
# tnsnames.ora Network Configuration File: /u02/app/oracle/product/11.2.0/dbhome_1/network/admin/tnsnames.ora
# Generated by Oracle configuration tools.

OGG1 =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP) (HOST = 192.168.59.129) (PORT = 1521))
    (CONNECT_DATA =
      (SERVER = DEDICATED)
```

```
(SERVICE_NAME = ogg1)
)
)
OGG2 =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP) (HOST = 192.168.59.130) (PORT = 1521))
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SERVICE_NAME = ogg2)
    )
  )
)
```

```
[oracle@orcltest ~]$
[oracle@orcltest ~]$ tnsping ogg1
```

TNS Ping Utility for Linux: Version 11.2.0.3.0 - Production on 10-JUN-2015 10:29:54

Copyright (c) 1997, 2011, Oracle. All rights reserved.

Used parameter files:
/u02/app/oracle/product/11.2.0/dbhome_1/network/admin/sqlnet.ora

Used TNSNAMES adapter to resolve the alias
Attempting to contact (DESCRIPTION = (ADDRESS = (PROTOCOL = TCP) (HOST = 192.168.59.129) (PORT = 1521)) (CONNECT_DATA = (SERVER = DEDICATED) (SERVICE_NAME = ogg1)))
OK (0 msec)
[oracle@orcltest ~]\$ tnsping ogg2

TNS Ping Utility for Linux: Version 11.2.0.3.0 - Production on 10-JUN-2015 10:30:02

Copyright (c) 1997, 2011, Oracle. All rights reserved.

Used parameter files:
/u02/app/oracle/product/11.2.0/dbhome_1/network/admin/sqlnet.ora

Used TNSNAMES adapter to resolve the alias
Attempting to contact (DESCRIPTION = (ADDRESS = (PROTOCOL = TCP) (HOST = 192.168.59.130) (PORT = 1521)) (CONNECT_DATA = (SERVER = DEDICATED) (SERVICE_NAME = ogg2)))
OK (0 msec)
[oracle@orcltest ~]\$ sqlplus sys/lhr@ogg1 as sysdba

SQL*Plus: Release 11.2.0.3.0 Production on Wed Jun 10 10:30:13 2015

Copyright (c) 1982, 2011, Oracle. All rights reserved.

Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.3.0 - 64bit Production
With the Partitioning, OLAP, Data Mining and Real Application Testing options

```
SQL>
SQL> exit
Disconnected from Oracle Database 11g Enterprise Edition Release 11.2.0.3.0 - 64bit Production
With the Partitioning, OLAP, Data Mining and Real Application Testing options
[oracle@orcltest ~]$ sqlplus sys/lhr@ogg2 as sysdba
```

SQL*Plus: Release 11.2.0.3.0 Production on Wed Jun 10 10:30:21 2015

Copyright (c) 1982, 2011, Oracle. All rights reserved.

Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.3.0 - 64bit Production
With the Partitioning, OLAP, Data Mining and Real Application Testing options

```
SQL> exit
Disconnected from Oracle Database 11g Enterprise Edition Release 11.2.0.3.0 - 64bit Production
```


1.3.2.4 数据库设置

这里需要确保 source 端数据库运行在归档模式，且开启最小数据库附加日志，可以不用打开 force logging,但是建议打开这个功能，然后在 source 和 target 端都创建用于复制的数据库账号 ggusr，为了方便，这里直接赋予 dba 权限，如果对数据库安全要求高，可以去查询 ogg 文档，赋予复制需要的最小权限！

source 端：

```
[oracle@orcltest ~]$ sqlplus sys/lhr@ogg1 as sysdba

SQL*Plus: Release 11.2.0.3.0 Production on Wed Jun 10 10:31:52 2015

Copyright (c) 1982, 2011, Oracle. All rights reserved.

Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.3.0 - 64bit Production
With the Partitioning, OLAP, Data Mining and Real Application Testing options

SQL> show parameter name

NAME                                TYPE      VALUE
-----
db_file_name_convert                string
db_name                             string     ogg1
db_unique_name                      string     ogg1
global_names                        boolean    FALSE
instance_name                       string     ogg1
lock_name_space                     string
log_file_name_convert               string
processor_group_name                string
service_names                       string     ogg1
SQL> archive log list;
Database log mode                   Archive Mode
Automatic archival                  Enabled
Archive destination                 USE_DB_RECOVERY_FILE_DEST
Oldest online log sequence          3
Next log sequence to archive        5
Current log sequence                 5
SQL> select name,SUPPLEMENTAL_LOG_DATA_MIN, FORCE_LOGGING from v$database;

NAME      SUPPLEME FOR
-----
OGG1      NO        NO

SQL> alter database add supplemental log data ;

Database altered.

SQL> alter system switch logfile;

System altered.

SQL> select name,SUPPLEMENTAL_LOG_DATA_MIN, FORCE_LOGGING from v$database;
```

```
NAME      SUPPLEME FOR
-----
OGG1      YES      NO

SQL> select name from v$datafile;

NAME
-----
/u01/app/oracle/oradata/ogg1/system01.dbf
/u01/app/oracle/oradata/ogg1/sysaux01.dbf
/u01/app/oracle/oradata/ogg1/undotbs01.dbf
/u01/app/oracle/oradata/ogg1/users01.dbf
/u01/app/oracle/oradata/ogg1/example01.dbf

SQL> create tablespace TS_OGG datafile '/u01/app/oracle/oradata/ogg1/ts_ogg01.dbf' size 50M ;

Tablespace created.

SQL> create user ggusr identified by lhr default tablespace TS_OGG;

User created.

SQL> grant resource, connect, dba to ggusr;

Grant succeeded.

SQL>
```

target 端：

```
[oracle@orcltest ~]$ sqlplus sys/lhr@ogg2 as sysdba

SQL*Plus: Release 11.2.0.3.0 Production on Wed Jun 10 10:37:08 2015

Copyright (c) 1982, 2011, Oracle. All rights reserved.

Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.3.0 - 64bit Production
With the Partitioning, OLAP, Data Mining and Real Application Testing options

SQL> show parameter name

NAME                                TYPE      VALUE
-----
db_file_name_convert               string
db_name                            string    ogg2
db_unique_name                     string    ogg2
global_names                       boolean   FALSE
instance_name                      string    ogg2
lock_name_space                    string
log_file_name_convert              string
processor_group_name               string
service_names                      string    ogg2
SQL> archive log list;
Database log mode                   Archive Mode
Automatic archival                  Enabled
Archive destination                 USE_DB_RECOVERY_FILE_DEST
Oldest online log sequence         3
Next log sequence to archive       5
Current log sequence                5
SQL> select name,SUPPLEMENTAL_LOG_DATA_MIN, FORCE_LOGGING from v$database;

NAME      SUPPLEME FOR
```

```
-----  
OGG2      NO      NO
```

```
SQL> select name from v$datafile;
```

```
NAME  
-----
```

```
/u01/app/oracle/oradata/ogg2/system01.dbf  
/u01/app/oracle/oradata/ogg2/sysaux01.dbf  
/u01/app/oracle/oradata/ogg2/undotbs01.dbf  
/u01/app/oracle/oradata/ogg2/users01.dbf  
/u01/app/oracle/oradata/ogg2/example01.dbf
```

```
SQL> create tablespace TS_OGG datafile '/u01/app/oracle/oradata/ogg2/ts_ogg01.dbf' size 50M ;
```

```
Tablespace created.
```

```
SQL> create user ggusr identified by lhr default tablespace TS_OGG;
```

```
User created.
```

```
SQL> grant resource, connect, dba to ggusr;
```

```
Grant succeeded.
```

```
SQL>
```

备注：在 oracle 中可以通过 rowid 来定位某条记录，但是目标端的数据库和源端数据库的数据库可能完全不一样，所以无法通过 rowid 来确定源端数据库的逻辑变化，这时附加日志 supplemental log 便登上了表演的舞台。数据库在开启附加日志功能后，对于源端的修改操作，oracle 会同时追加能够唯一标示记录的列到 redo log。这样目标端数据库就可以知道源端发生了哪些具体的变化。

1.3.3 安装 ogg 软件，配置及启动 mgr 管理进程，source 和 target 端做相同的操作

以下操作在 source 和 target 端都需要做：

1.3.3.1 安装 OGG 软件

参考：[Oracle_lhr_gg 安装.doc](#)

<http://blog.itpub.net/26736162/viewspace-1693241/>

1.3.3.2 配置及启动 mgr 管理进程

source 和 target 端均操作：

```
[oracle@orcltest gg11]$ cd $OGG_HOME
[oracle@orcltest gg11]$ ggsci

Oracle GoldenGate Command Interpreter for Oracle
Version 11.2.1.0.1 OGGCORE_11.2.1.0.1_PLATFORMS_120423.0230_FBO
Linux, x64, 64bit (optimized), Oracle 11g on Apr 23 2012 08:32:14

Copyright (C) 1995, 2012, Oracle and/or its affiliates. All rights reserved.

GGSCI (orcltest) 1> edit params mgr
PORT 7809
~
~
. . . . .
~
"dirprm/mgr.prm" 1L, 10C written

GGSCI (orcltest) 2> view params mgr

PORT 7809

GGSCI (orcltest) 3> info all

Program      Status      Group      Lag at Chkpt  Time Since Chkpt
MANAGER      STOPPED

GGSCI (orcltest) 4> start mgr

Manager started.

GGSCI (orcltest) 5> info mgr

Manager is running (IP port orcltest.7809).

GGSCI (orcltest) 6> view report mgr

*****
      Oracle GoldenGate Manager for Oracle
      Version 11.2.1.0.1 OGGCORE_11.2.1.0.1_PLATFORMS_120423.0230
      Linux, x64, 64bit (optimized), Oracle 11g on Apr 23 2012 04:27:29

Copyright (C) 1995, 2012, Oracle and/or its affiliates. All rights reserved.

      Starting at 2015-06-10 10:49:05
*****

Operating System Version:
Linux
Version #1 SMP Sun Nov 10 22:19:54 EST 2013, Release 2.6.32-431.el6.x86_64
```

```
Node: orcltest
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: 21192

Parameters...

PORT 7809

*****
**                Run Time Messages                **
*****

2015-06-10 10:49:05  INFO      OGG-00983  Manager started (port 7809).
```

ogg 告警日志内容 (/u01/gg11/ggserr.log) :

```
2015-06-09 20:46:45  INFO      OGG-00987  Oracle GoldenGate Command Interpreter for Oracle: GGSCI command (oracle): edit params mgr.
2015-06-09 20:46:58  INFO      OGG-00987  Oracle GoldenGate Command Interpreter for Oracle: GGSCI command (oracle): start mgr.
2015-06-09 20:46:58  INFO      OGG-00983  Oracle GoldenGate Manager for Oracle, mgr.prm: Manager started (port 7809).
```

1.3.3.3 准备测试用户及表

解锁 hr 用户，并在 hr 用户下创建表 t1：

```
[oracle@orcltest gg11]$ sqlplus sys/lhr@ogg1 as sysdba

SQL*Plus: Release 11.2.0.3.0 Production on Wed Jun 10 10:56:45 2015

Copyright (c) 1982, 2011, Oracle. All rights reserved.

Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.3.0 - 64bit Production
With the Partitioning, OLAP, Data Mining and Real Application Testing options

SQL> alter user hr identified by hr account unlock;

User altered.

SQL> grant connect,resource,select_catalog_role to hr;

Grant succeeded.

SQL> create table hr.t1 as select * from dba_objects;
```

```
Table created.

SQL> alter table hr.t1 add constraint pk_t1 primary key(object_id);

Table altered.

SQL> select count(*) from hr.t1;

COUNT(*)
-----
75203

SQL>
SQL> conn sys/lhr@ogg2 as sysdba
Connected.
SQL> alter user hr identified by hr account unlock;

User altered.

SQL> grant connect,resource,select_catalog_role to hr;

Grant succeeded.

SQL> create table hr.t1 as select * from dba_objects where 1=2;

Table created.

SQL> alter table hr.t1 add constraint pk_t1 primary key(object_id);

Table altered.

SQL> select count(*) from hr.t1;

COUNT(*)
-----
0

SQL>
```

1. 3. 4 初始化数据

初始化加载数据,在异构数据库平台(例如 oracle-mysql), 这个功能显得非常的有用！而在 oracle-oracle 的数据复制条件下, oracle 推荐使用 expdp/impdp 工具

1. 3. 4. 1 source 端添加 extract 进程

```
GGSCI (orcltest) 1> add extract einigl,sourceistable //sourceistable 代表直接从表中读取数据
EXTRACT added.

GGSCI (orcltest) 2> info all

Program      Status      Group      Lag at Chkpt  Time Since Chkpt
MANAGER      RUNNING
```

```
GGSCI (orcltest) 3> info einigl,task

EXTRACT      EINIG1      Initialized    2015-06-10 11:03    Status STOPPED
Checkpoint Lag      Not Available
Log Read Checkpoint      Not Available
First Record              Record 0
Task                      SOURCEISTABLE

GGSCI (orcltest) 4> info einigl,showch

EXTRACT      EINIG1      Initialized    2015-06-10 11:03    Status STOPPED
Checkpoint Lag      Not Available
Log Read Checkpoint      Not Available
First Record              Record 0
Task                      SOURCEISTABLE

Current Checkpoint Detail:

Read Checkpoint #1

    Database Table

    Startup Checkpoint (starting position in the data source):
    Record #: 0
    Timestamp: Not Available
    Table:

    Current Checkpoint (position of last record read in the data source):
    Record #: 0
    Timestamp: Not Available
    Table:

CSN state information:
CRC: 7F-47-3E-B8
CSN: Not available

Header:
Version = 2
Record Source = U
Type = 3
# Input Checkpoints = 1
# Output Checkpoints = 0

File Information:
Block Size = 2048
Max Blocks = 100
Record Length = 2048
Current Offset = 0

Configuration:
Data Source = 2
Transaction Integrity = 0
Task Type = 1

Status:
Start Time = 2015-06-10 11:03:37
Last Update Time = 2015-06-10 11:03:37
Stop Status = G
Last Result = 0

GGSCI (orcltest) 5>

GGSCI (orcltest) 5> edit params einigl  //einigl 代表 extract initial load group 1 缩写
```

```
extract einigl  
setenv (NLS_LANG=AMERICAN_AMERICA.ZHS16GBK)  
userid ggusr,password lhr  
rmthost 192.168.59.130,mgrport 7809  
rmttask replicat,group rinigl  
extract einigl  
setenv (ORACLE_SID=ogg1)  
setenv (NLS_LANG=AMERICAN_AMERICA.ZHS16GBK)  
userid ggusr,password lhr  
rmthost 192.168.59.130,mgrport 7809  
rmttask replicat,group rinigl  
table hr.tl;  
  
~  
~  
~  
  
o o o o o o o o o o o o o o o o o  
~  
~  
~  
~
```

"dirprm/einigl.prm" 7L, 189C written

```
GGSCI (orcltest) 6> view params einigl
```

```
extract einigl
setenv (ORACLE_SID=ogg1)
setenv (NLS_LANG=AMERICAN_AMERICA.ZHS16GBK)
userid ggusr,password lhr
rmthost 192.168.59.130,mgrport 7809
rmthost replicat,group rinigl
table hr.t1;
```

GGSCI (orcltest) 7>

```
GGSCI (orcltest) 9> info *,task
```

EXTRACT	EINIG1	Initialized	2015-06-10 11:03	Status	STOPPED
Checkpoint Lag		Not Available			
Log Read Checkpoint		Not Available			
		First Record	Record 0		
Task		SOURCEISTABLE			

GGSCI (orcltest) 10>

1.3.4.2 target 端添加 replicat 进程

```
[oracle@rhel6_lhr gg11]$ ggsci
```

```
Oracle GoldenGate Command Interpreter for Oracle
Version 11.2.1.0.1 OGGCORE_11.2.1.0.1_PLATFORMS_120423.0230_FBO
Linux, x64, 64bit (optimized), Oracle 11g on Apr 23 2012 08:32:14
```

Copyright (C) 1995, 2012, Oracle and/or its affiliates. All rights reserved.


```
GGSCI (rhel6_lhr) 1> info *,task
No ER groups exist.

GGSCI (rhel6_lhr) 2> add replicat rinigl,specialrun //specialrun 代表只运行一次
REPLICAT added.

GGSCI (rhel6_lhr) 3> info *,task

REPLICAT   RINIG1      Initialized   2015-06-09 22:18   Status STOPPED
Checkpoint Lag      00:00:00 (updated 00:00:03 ago)
Log Read Checkpoint Not Available
Task              SPECIALRUN

GGSCI (rhel6_lhr) 4> info all

Program      Status      Group      Lag at Chkpt  Time Since Chkpt

MANAGER      RUNNING

GGSCI (rhel6_lhr) 5> edit params rinigl //rinigl 的名字必须同 source 端定义的 group 名字相同，rinigl 代表 replicat initial load group 1 缩写

GGSCI (rhel6_lhr) 6> view params rinigl

replicat rinigl
setenv (ORACLE_SID=ogg2)
setenv (ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1)
setenv (NLS_LANG=AMERICAN_AMERICA.ZHS16GBK)
assumetargetdefs
userid ggusr,password lhr
discardfile ./dirrpt/rinigl.dsc,purge
map hr.*,target hr.*;

GGSCI (rhel6_lhr) 7>
GGSCI (rhel6_lhr) 7> info einigl,task
ERROR: Invalid command.

GGSCI (rhel6_lhr) 8> info rinigl

REPLICAT   RINIG1      Initialized   2015-06-09 22:18   Status STOPPED
Checkpoint Lag      00:00:00 (updated 00:03:33 ago)
Log Read Checkpoint Not Available
Task              SPECIALRUN

GGSCI (rhel6_lhr) 9> info rinigl,task

REPLICAT   RINIG1      Initialized   2015-06-09 22:18   Status STOPPED
Checkpoint Lag      00:00:00 (updated 00:03:52 ago)
Log Read Checkpoint Not Available
Task              SPECIALRUN

GGSCI (rhel6_lhr) 10> info rinigl,showch

REPLICAT   RINIG1      Initialized   2015-06-09 22:18   Status STOPPED
Checkpoint Lag      00:00:00 (updated 00:03:58 ago)
Log Read Checkpoint Not Available
Task              SPECIALRUN
```

```
Current Checkpoint Detail:

Read Checkpoint #1

SPECIALRUN task -- ** Initialized **
CSN state information:
  CRC: AF-F4-5D-35
  CSN: Not available

Header:
  Version = 2
  Record Source = U
  Type = -1
  # Input Checkpoints = 1
  # Output Checkpoints = 0

File Information:
  Block Size = 2048
  Max Blocks = 100
  Record Length = 2048
  Current Offset = 0

Configuration:
  Data Source = -1
  Transaction Integrity = -1
  Task Type = 2

Status:
  Start Time = 2015-06-09 22:18:34
  Last Update Time = 2015-06-09 22:18:34
  Stop Status = G
  Last Result = 0

GGSCI (rhel6_lhr) 11>
```

1. 3. 4. 3 **source 端启动 extract 进程，查看日志输出**

```
GGSCI (orcltest) 1> start extract einigl

Sending START request to MANAGER ...
EXTRACT EINIG1 starting

GGSCI (orcltest) 2> info *,task

EXTRACT      EINIG1      Initialized    2015-06-10 11:03    Status RUNNING
Checkpoint Lag      Not Available
Log Read Checkpoint Not Available
First Record      Record 0
Task              SOURCEISTABLE

GGSCI (orcltest) 3> view report einigl

2015-06-10 12:40:54  INFO      OGG-01017  Wildcard resolution set to IMMEDIATE because SOURCEISTABLE is used.
```

```
*****
      Oracle GoldenGate Capture for Oracle
      Version 11.2.1.0.1 OGGCORE_11.2.1.0.1_PLATFORMS_120423.0230_FBO
      Linux, x64, 64bit (optimized), Oracle 11g on Apr 23 2012 08:42:16

Copyright (C) 1995, 2012, Oracle and/or its affiliates. All rights reserved.

      Starting at 2015-06-10 12:40:54
*****

Operating System Version:
Linux
Version #1 SMP Sun Nov 10 22:19:54 EST 2013, Release 2.6.32-431.el6.x86_64
Node: orcltest
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: 21707

Description:

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

2015-06-10 12:40:54  INFO    OGG-03035  Operating system character set identified as UTF-8. Locale: en_US, LC_ALL:.
extract einigl
setenv (ORACLE_SID=ogg1)
Set environment variable (ORACLE_SID=ogg1)
setenv (ORACLE_HOME=/u02/app/oracle/product/11.2.0/dbhome_1)
Set environment variable (ORACLE_HOME=/u02/app/oracle/product/11.2.0/dbhome_1)
setenv (NLS_LANG=AMERICAN_AMERICA.ZHS16GBK)
Set environment variable (NLS_LANG=AMERICAN_AMERICA.ZHS16GBK)
userid ggusr,password ***
rmthost 192.168.59.130,mgrport 7809
rmttask replicat,group rinigl
table hr.t1;
Using the following key columns for source table HR.T1: OBJECT_ID.

2015-06-10 12:40:55  INFO    OGG-01815  Virtual Memory Facilities for: COM
      anon alloc: mmap(MAP_ANON)  anon free: munmap
      file alloc: mmap(MAP_SHARED) file free: munmap
      target directories:
      /u01/gg11/dirtmp.

CACHEMGR virtual memory values (may have been adjusted)
CACHESIZE:                64G
CACHEPAGEOUTSIZE (normal): 8M
PROCESS VM AVAIL FROM OS (min): 128G
CACHESIZEMAX (strict force to disk): 96G

Database Version:
Oracle Database 11g Enterprise Edition Release 11.2.0.3.0 - 64bit Production
PL/SQL Release 11.2.0.3.0 - Production
CORE    11.2.0.3.0        Production
TNS for Linux: Version 11.2.0.3.0 - Production
NLSRTL Version 11.2.0.3.0 - Production

Database Language and Character Set:
NLS_LANG          = "AMERICAN_AMERICA.ZHS16GBK"
NLS_LANGUAGE      = "AMERICAN"
```

NLS_TERRITORY = "AMERICA"
NLS_CHARACTERSET = "ZHS16GBK"

Processing table HR.T1

GGSCI (orcltest) 4> view report einigl

2015-06-10 12:40:54 INFO OGG-01017 Wildcard resolution set to IMMEDIATE because SOURCEISTABLE is used.

Oracle GoldenGate Capture for Oracle
Version 11.2.1.0.1 OGGCORE_11.2.1.0.1_PLATFORMS_120423.0230_FBO
Linux, x64, 64bit (optimized), Oracle 11g on Apr 23 2012 08:42:16

Copyright (C) 1995, 2012, Oracle and/or its affiliates. All rights reserved.

Starting at 2015-06-10 12:40:54

Operating System Version:
Linux
Version #1 SMP Sun Nov 10 22:19:54 EST 2013, Release 2.6.32-431.el6.x86_64
Node: orcltest
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: 21707

Description:

** Running with the following parameters **

2015-06-10 12:40:54 INFO OGG-03035 Operating system character set identified as UTF-8. Locale: en_US, LC_ALL:.
extract einigl
setenv (ORACLE_SID=ogg1)
Set environment variable (ORACLE_SID=ogg1)
setenv (ORACLE_HOME=/u02/app/oracle/product/11.2.0/dbhome_1)
Set environment variable (ORACLE_HOME=/u02/app/oracle/product/11.2.0/dbhome_1)
setenv (NLS_LANG=AMERICAN_AMERICA.ZHS16GBK)
Set environment variable (NLS_LANG=AMERICAN_AMERICA.ZHS16GBK)
userid ggusr,password ***
rmthost 192.168.59.130,mgrport 7809
rmttask replicat,group rinigl
table hr.t1;
Using the following key columns for source table HR.T1: OBJECT_ID.

2015-06-10 12:40:55 INFO OGG-01815 Virtual Memory Facilities for: COM
anon alloc: mmap(MAP_ANON) anon free: munmap
file alloc: mmap(MAP_SHARED) file free: munmap
target directories:
/u01/gg11/dirtmp.

CACHEMGR virtual memory values (may have been adjusted)
CACHESIZE: 64G
CACHEPAGEOUTSIZE (normal): 8M
PROCESS VM AVAIL FROM OS (min): 128G
CACHESIZEMAX (strict force to disk): 96G

```
Database Version:
Oracle Database 11g Enterprise Edition Release 11.2.0.3.0 - 64bit Production
PL/SQL Release 11.2.0.3.0 - Production
CORE      11.2.0.3.0      Production
TNS for Linux: Version 11.2.0.3.0 - Production
NLSRTL Version 11.2.0.3.0 - Production
```

```
Database Language and Character Set:
NLS_LANG           = "AMERICAN_AMERICA.ZHS16GBK"
NLS_LANGUAGE       = "AMERICAN"
NLS_TERRITORY      = "AMERICA"
NLS_CHARACTERSET   = "ZHS16GBK"
```

Processing table HR.T1

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

Report at 2015-06-10 12:42:01 (activity since 2015-06-10 12:40:55)

Output to rinigl:

```
From Table HR.T1:
#           inserts:      75203
#           updates:      0
#           deletes:      0
#           discards:      0
```

REDO Log Statistics

```
Bytes parsed          0
Bytes output          21007968
```

GGSCI (orcltest) 5> info *,task //再次查看的时候，数据已经初始化完成。

```
EXTRACT   EINIG1    Last Started 2015-06-10 12:41    Status STOPPED
Checkpoint Lag      Not Available
Log Read Checkpoint Table HR.T1
                2015-06-10 12:42:00    Record 75203
Task                SOURCEISTABLE
```

GGSCI (orcltest) 6>

第一次查看日志，Processing table HR.T1 表示正在处理，第二次查看出现 Run Time Statistics 信息，表示数据已经初始化完成，insert 了 75203 条数据。

1.3.4.4 target 端查看日志，并且数据量验证

GGSCI (rhe16_lhr) 1> view report rinigl

```
*****
Oracle GoldenGate Delivery for Oracle
Version 11.2.1.0.1 OGGCORE_11.2.1.0.1_PLATFORMS_120423.0230_FBO
```

Linux, x64, 64bit (optimized), Oracle 11g on Apr 23 2012 08:48:07

Copyright (C) 1995, 2012, Oracle and/or its affiliates. All rights reserved.

Starting at 2015-06-09 22:34:42

Operating System Version:

Linux
Version #1 SMP Tue Apr 21 08:37:59 PDT 2015, Release 2.6.32-504.16.2.el6.x86_64
Node: rhel6_lhr
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: 19600

Description:

** Running with the following parameters **

2015-06-09 22:34:47 INFO OGG-03035 Operating system character set identified as UTF-8. Locale: en_US, LC_ALL:.
replicat rinigl
setenv (ORACLE_SID=ogg2)
Set environment variable (ORACLE_SID=ogg2)
setenv (ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1)
Set environment variable (ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1)
setenv (NLS_LANG=AMERICAN_AMERICA.ZHS16GBK)
Set environment variable (NLS_LANG=AMERICAN_AMERICA.ZHS16GBK)
assumetargetdefs
userid ggusr,password ***
discardfile ./dirrpt/rinigl.dsc,purge
map hr.*,target hr.*;

2015-06-09 22:34:48 INFO OGG-01815 Virtual Memory Facilities for: COM
anon alloc: mmap(MAP_ANON) anon free: munmap
file alloc: mmap(MAP_SHARED) file free: munmap
target directories:
/u01/gg11/dirtmp.

CACHEMGR virtual memory values (may have been adjusted)
CACHESIZE: 2G
CACHEPAGEOUTSIZE (normal): 8M
PROCESS VM AVAIL FROM OS (min): 4G
CACHEsizEMAX (strict force to disk): 3.41G

Database Version:

Oracle Database 11g Enterprise Edition Release 11.2.0.3.0 - 64bit Production
PL/SQL Release 11.2.0.3.0 - Production
CORE 11.2.0.3.0 Production
TNS for Linux: Version 11.2.0.3.0 - Production
NLSRTL Version 11.2.0.3.0 - Production

Database Language and Character Set:

NLS_LANG = "AMERICAN_AMERICA.ZHS16GBK"
NLS_LANGUAGE = "AMERICAN"
NLS_TERRITORY = "AMERICA"
NLS_CHARACTERSET = "ZHS16GBK"

** Run Time Messages **

Wildcard MAP resolved (entry hr.*):
map "HR"."T1",target hr."T1";
Using following columns in default map by name:
OWNER, OBJECT_NAME, SUBOBJECT_NAME, OBJECT_ID, DATA_OBJECT_ID,
OBJECT_TYPE, CREATED, LAST_DDL_TIME, TIMESTAMP, STATUS, TEMPORARY,
GENERATED, SECONDARY, NAMESPACE, EDITION_NAME
Using the following key columns for target table HR.T1: OBJECT_ID.

* ** Run Time Statistics ** *

Report at 2015-06-09 22:35:53 (activity since 2015-06-09 22:34:49)

From Table HR.T1 to HR.T1:
inserts: 75203
updates: 0
deletes: 0
discards: 0

CACHE OBJECT MANAGER statistics

CACHE MANAGER VM USAGE
vm current = 0 vm anon queues = 0
vm anon in use = 0 vm file = 0
vm used max = 0 ==> CACHE BALANCED

CACHE CONFIGURATION
cache size = 2G cache force paging = 3.41G
buffer min = 64K buffer highwater = 8M
pageout eligible size = 8M

=====
RUNTIME STATS FOR SUPERPOOL

CACHE Transaction Stats
trans active = 0 max concurrent = 0
non-zero total = 0 trans total = 0

CACHE File Caching
disk current = 0 disk total = 0
disk caching = 0 file cached = 0
file retrieves = 0

CACHE MANAGEMENT
buffer links = 0 anon gets = 0
forced unmaps = 0 cnnbl try = 0
cached out = 0 force out = 0

Allocation Request Distribution
< 128B: 0
128B: 0 0 | 512B: 0 0
2K: 0 0 | 8K: 0 0
32K: 0 0 | 128K: 0 0
512K: 0 0 | 2M: 0 0
8M: 0 0 | 32M: 0 0
128M: 0 0 | 512M: 0 0
2G: 0 0 | 8G: 0

Cached Transaction Size Distribution

```

  0:      0
< 4K:      0
  4K:      0      0      |   16K:      0      0
 64K:      0      0      |  256K:      0      0
  1M:      0      0      |   4M:      0      0
 16M:      0      0      |  64M:      0      0
256M:      0      0      |  1G:      0      0
   4G:      0      0      |  16G:      0      0
  64G:      0      0      | 256G:      0      0
   1T:      0      0      |   4T:      0      0
  16T:      0      0      |  64T:      0      0
256T:      0      0      |1024T:      0      0

=====

CUMULATIVE STATS FOR SUPERPOOL

CACHE Transaction Stats
trans active  =      0      max concurrent =      0
non-zero total =      0      trans total   =      0

CACHE File Caching
disk current  =      0      disk total   =      0
disk caching  =      0      file cached  =      0
file retrieves =      0

CACHE MANAGEMENT
buffer links  =      0      anon gets   =      0
forced unmaps =      0      cnnbl try   =      0
cached out    =      0      force out   =      0

Allocation Request Distribution
< 128B:      0
 128B:      0      0      |  512B:      0      0
   2K:      0      0      |   8K:      0      0
  32K:      0      0      |  128K:      0      0
 512K:      0      0      |   2M:      0      0
   8M:      0      0      |  32M:      0      0
 128M:      0      0      |  512M:      0      0
   2G:      0      0      |   8G:      0

Cached Transaction Size Distribution
  0:      0
< 4K:      0
  4K:      0      0      |   16K:      0      0
 64K:      0      0      |  256K:      0      0
  1M:      0      0      |   4M:      0      0
 16M:      0      0      |  64M:      0      0
256M:      0      0      |  1G:      0      0
   4G:      0      0      |  16G:      0      0
  64G:      0      0      | 256G:      0      0
   1T:      0      0      |   4T:      0      0
  16T:      0      0      |  64T:      0      0
256T:      0      0      |1024T:      0      0

QUEUE Statistics:
num queues   =     15      default index =      0
cur len      =      0      max len       =      0
q vm current  =      0      vm max         =      0
q hits       =      0      q misses      =      0

queue size  q hits  curlen  maxlen  cannibalized
0  64K      0      0      0      0
1 128K      0      0      0      0
2 256K      0      0      0      0
3 512K      0      0      0      0
4  1M      0      0      0      0
```



```

5      2M      0      0      0      0
6      4M      0      0      0      0
7      8M      0      0      0      0
8     16M      0      0      0      0
9     32M      0      0      0      0
10    64M      0      0      0      0
11   128M      0      0      0      0
12   256M      0      0      0      0
13   512M      0      0      0      0
14     1G      0      0      0      0

=====

RUNTIME STATS FOR CACHE POOL #0
POOL INFO  group: rinigl id: p19600_BLOB
trans active =      0  trans concurrent (max) =      0
trans total  =      0  (0 )
flag         = 0x00000030
last error   = (0=<none>)

Allocation Request Distribution
< 128B:      0
128B:      0      0      | 512B:      0      0
  2K:      0      0      |   8K:      0      0
 32K:      0      0      | 128K:      0      0
512K:      0      0      |   2M:      0      0
   8M:      0      0      |  32M:      0      0
128M:      0      0      | 512M:      0      0
   2G:      0      0      |   8G:      0

=====

CUMULATIVE STATS FOR CACHE POOL #0
POOL INFO  group: rinigl id: p19600_BLOB
trans active =      0  trans concurrent (max) =      0
trans total  =      0  (0 )
flag         = 0x00000030
last error   = (0=<none>)

Allocation Request Distribution
< 128B:      0
128B:      0      0      | 512B:      0      0
  2K:      0      0      |   8K:      0      0
 32K:      0      0      | 128K:      0      0
512K:      0      0      |   2M:      0      0
   8M:      0      0      |  32M:      0      0
128M:      0      0      | 512M:      0      0
   2G:      0      0      |   8G:      0

QUEUE Statistics:
num queues  =     15    default index =      0
cur len     =      0    max len      =      0
q vm current =      0    vm max       =      0
q hits      =      0    q misses     =      0

queue size  q hits  curlen  maxlen  cannibalized
0  64K      0      0      0      0
1 128K      0      0      0      0
2 256K      0      0      0      0
3 512K      0      0      0      0
4   1M      0      0      0      0
5   2M      0      0      0      0
6   4M      0      0      0      0
7   8M      0      0      0      0
8  16M      0      0      0      0
9  32M      0      0      0      0
10 64M      0      0      0      0
11 128M      0      0      0      0
```

```
12 256M    0      0      0      0
13 512M    0      0      0      0
14  1G     0      0      0      0

=====

RUNTIME STATS FOR CACHE POOL #0
POOL INFO  group: rinigl id: p19600_BLOB
trans active =      0  trans concurrent (max) =      0
trans total  =      0  (0 )
flag         = 0x00000030
last error   = (0=<none>)

Allocation Request Distribution
< 128B:      0
128B:      0      0  | 512B:      0      0
 2K:      0      0  |  8K:      0      0
32K:      0      0  |128K:      0      0
512K:      0      0  |  2M:      0      0
 8M:      0      0  | 32M:      0      0
128M:      0      0  |512M:      0      0
 2G:      0      0  |  8G:      0

=====

CUMULATIVE STATS FOR CACHE POOL #0
POOL INFO  group: rinigl id: p19600_BLOB
trans active =      0  trans concurrent (max) =      0
trans total  =      0  (0 )
flag         = 0x00000030
last error   = (0=<none>)

Allocation Request Distribution
< 128B:      0
128B:      0      0  | 512B:      0      0
 2K:      0      0  |  8K:      0      0
32K:      0      0  |128K:      0      0
512K:      0      0  |  2M:      0      0
 8M:      0      0  | 32M:      0      0
128M:      0      0  |512M:      0      0
 2G:      0      0  |  8G:      0

GGSCI (rhel6_lhr) 2> info *,task

REPLICAT  RINIG1    Initialized   2015-06-09 22:18   Status STOPPED
Checkpoint Lag      00:00:00 (updated 00:23:29 ago)
Log Read Checkpoint Not Available
Task           SPECIALRUN

GGSCI (rhel6_lhr) 3>
```

数据量验证：

```
[oracle@orcltest ~]$ sqlplus sys/lhr@ogg2 as sysdba

SQL*Plus: Release 11.2.0.3.0 Production on Wed Jun 10 12:41:48 2015

Copyright (c) 1982, 2011, Oracle. All rights reserved.

Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.3.0 - 64bit Production
With the Partitioning, OLAP, Data Mining and Real Application Testing options
```

```
SQL> select count(*) from hr.t1;
```

```
  COUNT(*)  
-----  
      75203
```

1.3.5 配置 OGG 的实时同步功能

1.3.5.1 开启 hr 用户下所有表的附加日志

打开需要传输的 schema 的表的附加日志：

```
[oracle@orcltest gg11]$ ggsci  
  
Oracle GoldenGate Command Interpreter for Oracle  
Version 11.2.1.0.1 OGGCORE_11.2.1.0.1_PLATFORMS_120423.0230_FBO  
Linux, x64, 64bit (optimized), Oracle 11g on Apr 23 2012 08:32:14  
  
Copyright (C) 1995, 2012, Oracle and/or its affiliates. All rights reserved.  
  
GGSCI (orcltest) 1> dblogin userid ggusr, password lhr  
ERROR: Unable to connect to database using user ggusr. Please check privileges.  
ORA-01034: ORACLE not available  
ORA-27101: shared memory realm does not exist  
Linux-x86_64 Error: 2: No such file or directory.  
  
GGSCI (orcltest) 2> dblogin userid ggusr@ogg1, password lhr  
Successfully logged into database.  
  
GGSCI (orcltest) 3> info trandata hr.*  
  
Logging of supplemental redo log data is disabled for table HR.COUNTRIES.  
  
Logging of supplemental redo log data is disabled for table HR.DEPARTMENTS.  
  
Logging of supplemental redo log data is disabled for table HR.EMPLOYEES.  
  
Logging of supplemental redo log data is disabled for table HR.JOBS.  
  
Logging of supplemental redo log data is disabled for table HR.JOB_HISTORY.  
  
Logging of supplemental redo log data is disabled for table HR.LOCATIONS.  
  
Logging of supplemental redo log data is disabled for table HR.REGIONS.  
  
Logging of supplemental redo log data is disabled for table HR.T1.  
  
GGSCI (orcltest) 4> add trandata hr.*  
  
Logging of supplemental redo data enabled for table HR.COUNTRIES.  
  
Logging of supplemental redo data enabled for table HR.DEPARTMENTS.  
  
Logging of supplemental redo data enabled for table HR.EMPLOYEES.  
  
Logging of supplemental redo data enabled for table HR.JOBS.
```

Logging of supplemental redo data enabled for table HR.JOB_HISTORY.

Logging of supplemental redo data enabled for table HR.LOCATIONS.

Logging of supplemental redo data enabled for table HR.REGIONS.

Logging of supplemental redo data enabled for table HR.T1.

```
GGSCI (orcltest) 5>  
GGSCI (orcltest) 5> info  trandata hr.*
```

Logging of supplemental redo log data is enabled for table HR.COUNTRIES.

Columns supplementally logged for table HR.COUNTRIES: COUNTRY_ID.

Logging of supplemental redo log data is enabled for table HR.DEPARTMENTS.

Columns supplementally logged for table HR.DEPARTMENTS: DEPARTMENT_ID.

Logging of supplemental redo log data is enabled for table HR.EMPLOYEES.

Columns supplementally logged for table HR.EMPLOYEES: EMPLOYEE_ID.

Logging of supplemental redo log data is enabled for table HR.JOBS.

Columns supplementally logged for table HR.JOBS: JOB_ID.

Logging of supplemental redo log data is enabled for table HR.JOB_HISTORY.

Columns supplementally logged for table HR.JOB_HISTORY: EMPLOYEE_ID, START_DATE.

Logging of supplemental redo log data is enabled for table HR.LOCATIONS.

Columns supplementally logged for table HR.LOCATIONS: LOCATION_ID.

Logging of supplemental redo log data is enabled for table HR.REGIONS.

Columns supplementally logged for table HR.REGIONS: REGION_ID.

Logging of supplemental redo log data is enabled for table HR.T1.

Columns supplementally logged for table HR.T1: OBJECT_ID.

1. 3. 5. 2 在 source 上添加及配置 extract 进程，进程的名字不能超过 8 个字符；添加 trail 文件，文件名前缀不能超过 2 个字符

一、 添加并配置 extract 进程

```
GGSCI (orcltest) 1> add extract eora_hr, tranlog, begin now  
EXTRACT added.
```

```
GGSCI (orcltest) 2> info all
```

Program	Status	Group	Lag at Chkpt	Time Since Chkpt
MANAGER	RUNNING			

```
GGSCI (orcltest) 2> view params eora_tl
```

GGSCI (orcltest) 3>

```
GGSCI (orcltest) 6> add exttrail ./dirdat/hr,extract eora_hr,megabytes 100
EXTTRAIL added.
```

Program	Status	Group	Lag at Chkpt	Time Since Chkpt
MANAGER	RUNNING			
EXTRACT	STOPPED	EORA_HR	00:00:00	00:05:08

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

Program	Status	Group	Lag at Chkpt	Time Since Chkpt
---------	--------	-------	--------------	------------------

[illegible]

```
Program      Status      Group      Lag at Chkpt  Time Since Chkpt

MANAGER      RUNNING
EXTRACT      RUNNING      EORA_HR    00:00:00      00:00:00
EXTRACT      STOPPED      PORA_HR    00:00:00      00:00:02

GGSCI (orcltest) 20> add rmttrail ./dirdat/pa,extract_pora_hr,megabytes 100 //添加传输到 target 数据库的 trail 文件名，应该同参数文件中描述的一致

RMTTRAIL added.

GGSCI (orcltest) 21>
GGSCI (orcltest) 21> start extract PORA_HR

Sending START request to MANAGER ...
EXTRACT PORA_HR starting

GGSCI (orcltest) 22> info all

Program      Status      Group      Lag at Chkpt  Time Since Chkpt

MANAGER      RUNNING
EXTRACT      RUNNING      EORA_HR    00:00:00      00:00:04
EXTRACT      RUNNING      PORA_HR    00:00:00      00:03:47

GGSCI (orcltest) 23>

GGSCI (orcltest) 24> view report PORA_HR

*****
      Oracle GoldenGate Capture for Oracle
      Version 11.2.1.0.1 OGGCORE_11.2.1.0.1_PLATFORMS_120423.0230_FBO
      Linux, x64, 64bit (optimized), Oracle 11g on Apr 23 2012 08:42:16

Copyright (C) 1995, 2012, Oracle and/or its affiliates. All rights reserved.

      Starting at 2015-06-10 15:10:37
*****

Operating System Version:
Linux
Version #1 SMP Sun Nov 10 22:19:54 EST 2013, Release 2.6.32-431.el6.x86_64
Node: orcltest
Machine: x86_64

Address Space Size      :      soft limit      hard limit
Heap Size               :      unlimited      unlimited
File Size               :      unlimited      unlimited
CPU Time                :      unlimited      unlimited

Process id: 22326

Description:

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

2015-06-10 15:10:37  INFO      OGG-03035  Operating system character set identified as UTF-8. Locale: en_US, LC_ALL:.
extract_pora_hr
setenv (ORACLE_SID=ogg1)
Set environment variable (ORACLE_SID=ogg1)
```

```
setenv (ORACLE_HOME=/u02/app/oracle/product/11.2.0/dbhome_1)
Set environment variable (ORACLE_HOME=/u02/app/oracle/product/11.2.0/dbhome_1)
setenv (NLS_LANG=AMERICAN_AMERICA.ZHS16GBK)
Set environment variable (NLS_LANG=AMERICAN_AMERICA.ZHS16GBK)
passthru
rmthost 192.168.59.130,mgrport 7809
rmtrail ./dirdat/pa
table hr.*;

2015-06-10 15:10:37  INFO      OGG-01815  Virtual Memory Facilities for: COM
      anon alloc: mmap(MAP_ANON)  anon free: munmap
      file alloc: mmap(MAP_SHARED)  file free: munmap
      target directories:
      /u01/gg11/dirtmp.

CACHEMGR virtual memory values (may have been adjusted)
CACHESIZE:                64G
CACHEPAGEOUTSIZE (normal):    8M
PROCESS VM AVAIL FROM OS (min): 128G
CACHESIZEMAX (strict force to disk): 96G

2015-06-10 15:10:42  INFO      OGG-01226  Socket buffer size set to 27985 (flush size 27985).

2015-06-10 15:10:42  INFO      OGG-01052  No recovery is required for target file ./dirdat/pa000000, at RBA 0 (file not opened).

2015-06-10 15:10:42  INFO      OGG-01478  Output file ./dirdat/pa is using format RELEASE 11.2.

*****
**                                Run Time Messages                                **
*****

Opened trail file ./dirdat/hr000000 at 2015-06-10 15:10:42

GGSCI (orcltest) 25>
```

1.3.5.4 在 target 端添加检查表，配置 replicat 进程

一、添加检查表

```
GGSCI (rhel6_lhr) 12> edit params ./GLOBALS

GGSCI (rhel6_lhr) 13> view params ./GLOBALS
checkpointtable ggusr.rep_demo_ckpt

GGSCI (rhel6_lhr) 14>

GGSCI (rhel6_lhr) 15> dblogin userid ggusr, password lhr
ERROR: Unable to connect to database using user ggusr. Please check privileges.
ORA-00942: table or view does not exist.
```



```
GGSCI (rhel6_lhr) 16> dblogin userid ggusr@ogg2, password lhr
Successfully logged into database.

GGSCI (rhel6_lhr) 3> add checkpointtable ggusr.rep_demo_ckpt

Successfully created checkpoint table ggusr.rep_demo_ckpt.

GGSCI (rhel6_lhr) 4> add checkpointtable ggusr.rep_demo_ckpt
ERROR: OCI Error ORA-00955: name is already used by an existing object (status = 955). Creating checkpoint table ggusr.rep_demo_ckpt, SQL <CREATE TABLE ggusr.rep_demo_ckpt ( group_name VARCHAR2(8) NOT NULL, group_key
NUMBER(19) NOT NULL, seqno NUMBER(10), rba NUMBER(19) NOT NULL, audit_ts VARCHAR2(29), create_ts DATE NOT NULL, last_update_ts DATE NOT NULL, current_dir VARCHAR2(255) NOT NULL, log_csn VARCHAR2(129), log_xid
VARCHAR2(129), log_cmplt_csn VARCHAR2(129), log_cmplt_xids VARCHAR2(2000), version NUMBER(3), PRIMARY KEY (group_name, group_key))>.

[oracle@rhel6_lhr admin]$ sqlplus ggusr/lhr@ogg2

SQL*Plus: Release 11.2.0.3.0 Production on 星期三 6月 10 01:19:16 2015

Copyright (c) 1982, 2011, Oracle. All rights reserved.

连接到:
Oracle Database 11g Enterprise Edition Release 11.2.0.3.0 - 64bit Production
With the Partitioning, OLAP, Data Mining and Real Application Testing options

01:19:16 SQL> select tname from tab;

TNAME
-----
REP_DEMO_CKPT
REP_DEMO_CKPT_LOX

已用时间: 00: 00: 00.01
01:19:19 SQL>
```

```
select * from REP_DEMO_CKPT;
```

	GROUP_NAME	GROUP_KEY	SEQNO	RBA	AUDIT_TS	CREATE_TS	LAST_UPDATE_TS	CURRENT_DIR	LOG_CSN	LOG_XID	LOG_CMPLT_CSN	LOG_CMPLT_XIDS	VERSION
1	RORA_HR	3329965214	0	0	...	2015-06-10 01:50:18	2015-06-10 01:50:28	/u01/gg11	1

备注：

在 target 端配置 replicat 进程之前，通常需要在目标端的数据库中创建一个 checkpoint 表，这个表是基于 ogg checkpoint 文件的，它记录了所有 ogg 可恢复的 checkpoint 以及 sequence，这个操作不是必须的，但 oracle 强烈建议使用它，因为它可以使得 checkpoint 包含在 replicat 的事务中，保证了可以从各类失败场景中恢复！

二、 添加并启动 replicat 进程

```
GGSCI (rhel6_lhr) 1> edit params rora_hr

GGSCI (rhel6_lhr) 2> view params rora_hr

replicat rora_hr
setenv (ORACLE_SID=ogg2)
setenv (ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1)
```

```
setenv (NLS_LANG=AMERICAN_AMERICA.ZHS16GBK)
userid ggusr,password lhr
handlecollisions
assumetargetdefs
discardfile ./dirrpt/rora_hr.dsc,purge
map hr.* ,target hr.*;
```

```
GGSCI (rhel6_lhr) 3> add replicat rora_hr,exttrail ./dirdat/pa
REPLICAT added.
```

```
GGSCI (rhel6_lhr) 4> info all
```

Program	Status	Group	Lag at Chkpt	Time Since Chkpt
MANAGER	RUNNING			
REPLICAT	STOPPED	RORA_HR	00:00:00	00:00:05

```
GGSCI (rhel6_lhr) 5> start replicat rora_hr //或者 start RORA_HR
```

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

```
GGSCI (rhel6_lhr) 6> info all
```

Program	Status	Group	Lag at Chkpt	Time Since Chkpt
MANAGER	RUNNING			
REPLICAT	RUNNING	RORA_HR	00:00:00	00:00:01

```
GGSCI (rhel6_lhr) 7> info replicat rora_hr
```

```
REPLICAT  RORA_HR  Last Started 2015-06-10 01:50  Status RUNNING
Checkpoint Lag      00:00:00 (updated 00:00:05 ago)
Log Read Checkpoint File ./dirdat/pa000000
                  First Record  RBA 0
```

```
GGSCI (rhel6_lhr) 8> view report rora_hr
```

```
*****
      Oracle GoldenGate Delivery for Oracle
      Version 11.2.1.0.1 OGGCORE_11.2.1.0.1_PLATFORMS_120423.0230_FBO
      Linux, x64, 64bit (optimized), Oracle 11g on Apr 23 2012 08:48:07
```

```
Copyright (C) 1995, 2012, Oracle and/or its affiliates. All rights reserved.
```

```
      Starting at 2015-06-10 01:50:28
*****
```

```
Operating System Version:
Linux
Version #1 SMP Tue Apr 21 08:37:59 PDT 2015, Release 2.6.32-504.16.2.el6.x86_64
Node: rhel6_lhr
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: 30015
```

Description:

** Running with the following parameters **

2015-06-10 01:50:28 INFO OGG-03035 Operating system character set identified as UTF-8. Locale: en_US, LC_ALL:.
replicat rora_hr
setenv (ORACLE_SID=ogg2)
Set environment variable (ORACLE_SID=ogg2)
setenv (ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1)
Set environment variable (ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1)
setenv (NLS_LANG=AMERICAN_AMERICA.ZHS16GBK)
Set environment variable (NLS_LANG=AMERICAN_AMERICA.ZHS16GBK)
userid ggusr@ogg2,password ***
handlecollisions
assumetargetdefs
discardfile ./dirrpt/rora_hr.dsc,purge
map hr.* ,target hr.*;

2015-06-10 01:50:28 INFO OGG-01815 Virtual Memory Facilities for: COM
anon alloc: mmap(MAP_ANON) anon free: munmap
file alloc: mmap(MAP_SHARED) file free: munmap
target directories:
/u01/gg11/dirtmp.

CACHEMGR virtual memory values (may have been adjusted)
CACHESIZE: 2G
CACHEPAGEOUTSIZE (normal): 8M
PROCESS VM AVAIL FROM OS (min): 4G
CACHEsizEMAX (strict force to disk): 3.41G

Database Version:
Oracle Database 11g Enterprise Edition Release 11.2.0.3.0 - 64bit Production
PL/SQL Release 11.2.0.3.0 - Production
CORE 11.2.0.3.0 Production
TNS for Linux: Version 11.2.0.3.0 - Production
NLSRTL Version 11.2.0.3.0 - Production

Database Language and Character Set:
NLS_LANG = "AMERICAN_AMERICA.ZHS16GBK"
NLS_LANGUAGE = "AMERICAN"
NLS_TERRITORY = "AMERICA"
NLS_CHARACTERSET = "ZHS16GBK"

** Run Time Messages **

Opened trail file ./dirdat/pa000000 at 2015-06-10 01:50:28

GGSCI (rhel6_lhr) 9>

1.3.5.5 测试 OGG 的实时同步功能

一、源库插入数据分析

```
[oracle@orcltest ~]$ sqlplus hr/hr@ogg1

SQL*Plus: Release 11.2.0.3.0 Production on Wed Jun 10 16:01:33 2015

Copyright (c) 1982, 2011, Oracle. All rights reserved.

Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.3.0 - 64bit Production
With the Partitioning, OLAP, Data Mining and Real Application Testing options

SQL> select max(object_id) from t1;

MAX(OBJECT_ID)
-----
          76834

SQL> insert into t1 (object_id,object_name) values (76835,'ogg_test');

1 row created.

SQL> commit;

Commit complete.

SQL> select max(object_id) from t1;

MAX(OBJECT_ID)
-----
          76835

SQL> conn hr/hr@ogg2
Connected.
SQL> select max(object_id) from t1;

MAX(OBJECT_ID)
-----
          76835

SQL> select object_name from t1 where object_id=76835;

OBJECT_NAME
-----
ogg_test

SQL>
```

可以看到数据实时同步了，我们看看备库的检查表的数据：

```
select * from REP_DEMO_CKPT;
```

GROUP_NAME	GROUP_KEY	SEQNO	RBA	AUDIT_TS	CREATE_TS	LAST_UPDATE_TS	CURRENT_DIR	LOG_CSN	LOG_XID	LOG_CMPLT_CSN	LOG_CMPLT_XIDS	VERSION
RORA_HR	3329965214	0	1320	2015-06-10 01:57:52.404541	2015-06-10 01:50:18	2015-06-10 01:57:58	/u01/gg11	1101730	1.18.628	1101730	1.18.628	1

二、 抽取 trail 文件中可打印的内容分析

```
[oracle@rhel6_lhr gg11]$ cd dirdat
[oracle@rhel6_lhr dirdat]$ ll
total 4
-rw-rw-rw- 1 oracle oinstall 1320 Jun 10 01:57 pa000000
[oracle@rhel6_lhr dirdat]$ strings pa000000
uri:orcltest::u01:gg115
uri:orcltest::u01:gg116
./dirdat/pa0000007
Linux1
orcltest2
2.6.32-431.el6.x86_643
##1 SMP Sun Nov 10 22:19:54 EST 20134
x86_642
OGG12
ogg13
Oracle Database 11g Enterprise Edition Release 11.2.0.3.0 - 64bit Production
PL/SQL Release 11.2.0.3.0 - Production
CORE 11.2.0.3.0 Production
TNS for Linux: Version 11.2.0.3.0 - Production
NLSRTL Version 11.2.0.3.0 - Production
11.2.0.3.09
EORA_HR1
?Version 11.2.1.0.1 OGGCORE_11.2.1.0.1_PLATFORMS_120423.0230_FBO4
HR.T1
ogg_test
76835
1900-01-01:00:00:00
1900-01-01:00:00:00
AAASwiAAEAAAAbsAAA
11017306
1.18.628Z
[oracle@rhel6_lhr dirdat]$
```

三、 删除测试

```
[oracle@orcltest ~]$ sqlplus hr/hr@ogg1

SQL*Plus: Release 11.2.0.3.0 Production on Wed Jun 10 16:09:55 2015

Copyright (c) 1982, 2011, Oracle. All rights reserved.

Connected to:
Oracle Database 11g Enterprise Edition Release 11.2.0.3.0 - 64bit Production
With the Partitioning, OLAP, Data Mining and Real Application Testing options

SQL> delete from t1 where object_id > 1000;

74206 rows deleted.

SQL> commit;

Commit complete.

SQL> select max(object_id) from t1;

MAX(OBJECT_ID)
```

```
-----
1000
SQL> conn hr/hr@ogg2
Connected.
SQL> select max(object_id) from t1;

MAX(OBJECT_ID)
-----
1000

SQL>
```

以上的配置只针对 DML 的同步。

1. 3. 6 实验总结

本次实验内容较多，需要读者非常仔细的研读理解，若有疑问，可给我留言。

1. 4 About Me

.....

本文作者：小麦苗，只专注于数据库的技术，更注重技术的运用

ITPUB BLOG：<http://blog.itpub.net/26736162>

本文地址：<http://blog.itpub.net/26736162/viewspace-1696020/>

本文pdf版：<http://yunpan.cn/QCwUAI9bn7g7w> 提取码：af2d

QQ：642808185 若加 QQ 请注明你所正在读的文章标题

创作时间地点：2015-06-10 09:00~ 2015-06-10 19:00 于外汇交易中心

<版权所有，文章允许转载，但须以链接方式注明源地址，否则追究法律责任!>

.....

