# Oracle11gR2——RMAN备份完整实施

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软件环境：RHEL6.4 Oracle11gR2  
  
备份环境：目标数据库处于归档模式，RMAN使用了目录数据库，使用nfs让RMAN直接备份到远程机器  
  
备份策略：周末实施lv0增量备份，工作日实施lv1增量备份  
  
目标数据库（存放rman备份信息的数据库）的IP为172.26.181.102，主机名为rman-database，数据库实例名为testdb  
  
目录数据库（要备份的数据库）的IP为172.26.181.101，主机名为rman-backup，数据库实例名为catalog  
  
****0、设置nfs****  
  
配置nfs的方法查看另一篇blog  
  
http://blog.csdn.net/wang\_san\_shi/article/details/41848459  
  
注意不要忘记在目标数据库端设置开机挂载nfs，以及oracle用户对nfs目录的操作权限。  
 ****1、注册目录数据库****  
  
为了保证控制文件丢失备份仍然可用，需要创建目录来保存RMAN信息。  
  
首先使用SQLPLUS登录目录数据库，创建rman目录的表空间及用户并授权：  
  
SQL> create tablespace rmancat datafile '/u01/app/oracle/oradata/catalog/rmancat01.dbf' size 200m;  
  
Tablespace created.  
  
SQL> create user rman identified by rman default tablespace rmancat quota unlimited on rmancat;  
  
User created.  
  
SQL> grant recovery\_catalog\_owner to rman;  
  
Grant succeeded.  
  
然后我们在目标端使用RMAN同时登录目标数据库（本地）及目录数据库：  
  
[oracle@rman-database ~]$ rman target / catalog rman/rman@172.26.181.101:1521/catalog  
  
Recovery Manager: Release 11.2.0.1.0 - Production on Wed Dec 17 09:00:30 2014  
  
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connected to target database: TESTDB (DBID=2649780859)  
connected to recovery catalog database  
  
RMAN>   
  
同时登录上目标和目录数据库以后，可以创建目录并注册数据库：  
  
RMAN> create catalog;  
  
recovery catalog created  
  
RMAN> register database;  
  
database registered in recovery catalog  
starting full resync of recovery catalog  
full resync complete  
  
此时rman目录注册完毕，并且已经将控制文件中的备份信息同步到目录数据库中了。  
  
****2、设置控制文件自动备份及保留策略****  
  
将控制文件自动备份打开，那么在每次使用RMAN执行backup语句时，都会自动备份控制文件。  
  
注册完目录后，继续在rman中执行下面的语句打开控制文件自动备份：  
  
RMAN> configure controlfile autobackup on;  
  
old RMAN configuration parameters:  
CONFIGURE CONTROLFILE AUTOBACKUP OFF;  
new RMAN configuration parameters:  
CONFIGURE CONTROLFILE AUTOBACKUP ON;  
new RMAN configuration parameters are successfully stored  
starting full resync of recovery catalog  
full resync complete  
  
还要指定控制文件自动备份的路径，这里的路径/u01/backup即为nfs：  
  
RMAN> CONFIGURE CONTROLFILE AUTOBACKUP FORMAT FOR DEVICE TYPE DISK TO '/u01/backup/backupset/ctl\_%d\_%F';  
  
new RMAN configuration parameters:  
CONFIGURE CONTROLFILE AUTOBACKUP FORMAT FOR DEVICE TYPE DISK TO '/u01/backup/backupset/ctl\_%d\_%F';  
new RMAN configuration parameters are successfully stored  
starting full resync of recovery catalog  
full resync complete  
  
配置保留策略为恢复窗口14天，此策略下可以将数据库最多恢复到14天前：  
  
RMAN> configure retention policy to recovery window of 14 days;  
  
new RMAN configuration parameters:  
CONFIGURE RETENTION POLICY TO RECOVERY WINDOW OF 14 DAYS;  
new RMAN configuration parameters are successfully stored  
starting full resync of recovery catalog  
full resync complete  
  
查看是否配置成功：  
  
RMAN> show all;  
  
RMAN configuration parameters for database with db\_unique\_name TESTDB are:  
CONFIGURE RETENTION POLICY TO RECOVERY WINDOW OF 14 DAYS;  
CONFIGURE BACKUP OPTIMIZATION OFF; # default  
CONFIGURE DEFAULT DEVICE TYPE TO DISK; # default  
CONFIGURE CONTROLFILE AUTOBACKUP ON;  
CONFIGURE CONTROLFILE AUTOBACKUP FORMAT FOR DEVICE TYPE DISK TO '/u01/backup/backupset/ctl\_%d\_%F';  
CONFIGURE DEVICE TYPE DISK PARALLELISM 1 BACKUP TYPE TO BACKUPSET; # default  
CONFIGURE DATAFILE BACKUP COPIES FOR DEVICE TYPE DISK TO 1; # default  
CONFIGURE ARCHIVELOG BACKUP COPIES FOR DEVICE TYPE DISK TO 1; # default  
CONFIGURE MAXSETSIZE TO UNLIMITED; # default  
CONFIGURE ENCRYPTION FOR DATABASE OFF; # default  
CONFIGURE ENCRYPTION ALGORITHM 'AES128'; # default  
CONFIGURE COMPRESSION ALGORITHM 'BASIC' AS OF RELEASE 'DEFAULT' OPTIMIZE FOR LOAD TRUE ; # default  
CONFIGURE ARCHIVELOG DELETION POLICY TO NONE; # default  
CONFIGURE SNAPSHOT CONTROLFILE NAME TO '/u01/app/oracle/product/11.2.0/dbhome\_1/dbs/snapcf\_testdb.f'; # default  
  
可以看到控制文件自动备份已打开，且自动备份路径已设置。  
  
这里文件名中的符号含义如下：  
%d：数据库名称  
%F：一个基于DBID 唯一的名称,这个格式的形式为c-IIIIIIIIII-YYYYMMDD-QQ,其中IIIIIIIIII为该数据库的DBID，YYYYMMDD 为日期，QQ 是一个1-256 的序列  
其中%F为必选项，否则会报错，另外如果设置了其他格式例如%s%p等，在自动备份时也会报错导致无法备份。  
  
****3、打开block change tracking****  
  
因为这里用到了增量备份，为了提高备份速度，打开这个功能可以使RMAN更快地找到更改过的数据块，且实践表明开启该功能对数据库性能的影响并不明显。  
  
使用SQLPLUS登录目标数据库，执行下面的语句：  
  
SQL> alter database enable block change tracking using file '/u01/app/oracle/oradata/testdb/change\_tracking.dbf';  
  
Database altered.  
  
****4、完成备份脚本****  
  
这里的备份策略为周日执行全备份，工作日执行增量备份，这就需要两个rman脚本，另外还需要两个sh脚本来调用这两个脚本，也就是一共4个脚本。  
  
周日全备的level0.rman脚本内容如下：  
  
connect target /   
connect catalog rman/rman@172.26.181.101:1521/catalog  
run{  
    allocate channel c1 type disk;

    backup as backupset incremental level 0 database format '/u01/backup/backupset/df0\_%d\_%s\_%p\_%T' plus archivelog delete all input format '/u01/backup/backupset/arch\_%d\_%s\_%p\_%T';

    crosscheck backup;

    delete noprompt expired backup;

    release channel c1;  
    }  
  
工作日增量备份的level1.rman脚本内容如下：  
  
connect target /   
connect catalog rman/rman@172.26.181.101:1521/catalog  
run{  
    allocate channel c1 type disk;

    backup as backupset incremental level 1 database format '/u01/backup/backupset/df1\_%d\_%s\_%p\_%T' plus archivelog delete all input format '/u01/backup/backupset/arch\_%d\_%s\_%p\_%T';

    crosscheck backup;

    delete noprompt expired backup;

    release channel c1;  
    }  
  
周日执行的weekends.sh脚本内容如下:  
  
#!/bin/bash  
ORACLE\_HOME=/u01/app/oracle/product/11.2.0/dbhome\_1  
ORACLE\_SID=testdb  
PATH=$PATH:$ORACLE\_HOME/bin  
export PATH  
export ORACLE\_SID  
export ORACLE\_HOME  
rman cmdfile=/u01/backup/script/level0.rman msglog=/u01/backup/log/level0\_backup.log  
  
工作日执行的workday.sh脚本内容如下：  
  
#!/bin/bash  
ORACLE\_HOME=/u01/app/oracle/product/11.2.0/dbhome\_1  
ORACLE\_SID=testdb  
PATH=$PATH:$ORACLE\_HOME/bin  
export PATH  
export ORACLE\_SID  
export ORACLE\_HOME  
rman cmdfile=/u01/backup/script/level1.rman msglog=/u01/backup/log/level1\_backup.log  
  
****5、配置归档到远程****  
  
归档文件本身就是备份，如果这些文件因为数据库服务器的完全故障而丢失，那么将意味着自上一次备份以后的数据都会丢失，所以这里修改归档目录到nfs。  
  
但是这样的话如果nfs服务不可用将会导致数据库不可用。即多了一个故障点。  
  
使用SQLPLUS登录目标数据库，并执行下面的命令：  
  
SQL> alter system set log\_archive\_dest\_1 = "location=/u01/backup/archive" scope=both;  
  
System altered.  
  
SQL> alter system archive log current;  
  
System altered.  
  
然后可以在相应目录下就可以看到归档日志了。  
  
****6、配置crontab自动执行备份脚本****  
  
crontab配置如下：  
  
[oracle@rman-database script]$ crontab -e  
30 23 \* \* 7 /u01/backup/script/weekends.sh  
30 23 \* \* 1-6 /u01/backup/script/workday.sh  
~  
~  
  
周日晚23：00执行level0备份，周1-6每天晚上23：00执行level1增量备份。  
  
****7、检查备份****  
  
以下备份是通过修改contab中配置的时间立即完成的。  
  
RMAN> list backup;  
  
  
List of Backup Sets  
===================  
  
  
BS Key  Size       Device Type Elapsed Time Completion Time  
------- ---------- ----------- ------------ ---------------  
1619    1.01M      DISK        00:00:00     17-DEC-14        
        BP Key: 1621   Status: AVAILABLE  Compressed: NO  Tag: TAG20141217T144642  
        Piece Name: /u01/backup/backupset/arch\_TESTDB\_64\_1\_20141217  
  
  List of Archived Logs in backup set 1619  
  Thrd Seq     Low SCN    Low Time  Next SCN   Next Time  
  ---- ------- ---------- --------- ---------- ---------  
  1    31      1110399    17-DEC-14 1111912    17-DEC-14  
  1    32      1111912    17-DEC-14 1112470    17-DEC-14  
  
BS Key  Type LV Size       Device Type Elapsed Time Completion Time  
------- ---- -- ---------- ----------- ------------ ---------------  
1620    Incr 0  968.56M    DISK        00:00:06     17-DEC-14        
        BP Key: 1622   Status: AVAILABLE  Compressed: NO  Tag: TAG20141217T144643  
        Piece Name: /u01/backup/backupset/df0\_TESTDB\_65\_1\_20141217  
  List of Datafiles in backup set 1620  
  File LV Type Ckp SCN    Ckp Time  Name  
  ---- -- ---- ---------- --------- ----  
  1    0  Incr 1112488    17-DEC-14 /u01/app/oracle/oradata/testdb/system01.dbf  
  2    0  Incr 1112488    17-DEC-14 /u01/app/oracle/oradata/testdb/sysaux01.dbf  
  3    0  Incr 1112488    17-DEC-14 /u01/app/oracle/oradata/testdb/undotbs01.dbf  
  4    0  Incr 1112488    17-DEC-14 /u01/app/oracle/oradata/testdb/users01.dbf  
  
BS Key  Size       Device Type Elapsed Time Completion Time  
------- ---------- ----------- ------------ ---------------  
1688    3.50K      DISK        00:00:00     17-DEC-14        
        BP Key: 1693   Status: AVAILABLE  Compressed: NO  Tag: TAG20141217T144651  
        Piece Name: /u01/backup/backupset/arch\_TESTDB\_66\_1\_20141217  
  
  List of Archived Logs in backup set 1688  
  Thrd Seq     Low SCN    Low Time  Next SCN   Next Time  
  ---- ------- ---------- --------- ---------- ---------  
  1    33      1112470    17-DEC-14 1112496    17-DEC-14  
  
BS Key  Type LV Size       Device Type Elapsed Time Completion Time  
------- ---- -- ---------- ----------- ------------ ---------------  
1754    Full    9.70M      DISK        00:00:00     17-DEC-14        
        BP Key: 1756   Status: AVAILABLE  Compressed: NO  Tag: TAG20141217T144654  
        Piece Name: /u01/backup/backupset/ctl\_TESTDB\_c-2649780859-20141217-05  
  SPFILE Included: Modification time: 17-DEC-14  
  SPFILE db\_unique\_name: TESTDB  
  Control File Included: Ckp SCN: 1112524      Ckp time: 17-DEC-14  
  
BS Key  Size       Device Type Elapsed Time Completion Time  
------- ---------- ----------- ------------ ---------------  
2010    1.83M      DISK        00:00:00     17-DEC-14        
        BP Key: 2014   Status: AVAILABLE  Compressed: NO  Tag: TAG20141217T152004  
        Piece Name: /u01/backup/backupset/arch\_TESTDB\_68\_1\_20141217  
  
  List of Archived Logs in backup set 2010  
  Thrd Seq     Low SCN    Low Time  Next SCN   Next Time  
  ---- ------- ---------- --------- ---------- ---------  
  1    34      1112496    17-DEC-14 1114155    17-DEC-14  
  
BS Key  Type LV Size       Device Type Elapsed Time Completion Time  
------- ---- -- ---------- ----------- ------------ ---------------  
2011    Incr 1  4.17M      DISK        00:00:01     17-DEC-14        
        BP Key: 2015   Status: AVAILABLE  Compressed: NO  Tag: TAG20141217T152005  
        Piece Name: /u01/backup/backupset/df1\_TESTDB\_69\_1\_20141217  
  List of Datafiles in backup set 2011  
  File LV Type Ckp SCN    Ckp Time  Name  
  ---- -- ---- ---------- --------- ----  
  1    1  Incr 1114173    17-DEC-14 /u01/app/oracle/oradata/testdb/system01.dbf  
  2    1  Incr 1114173    17-DEC-14 /u01/app/oracle/oradata/testdb/sysaux01.dbf  
  3    1  Incr 1114173    17-DEC-14 /u01/app/oracle/oradata/testdb/undotbs01.dbf  
  4    1  Incr 1114173    17-DEC-14 /u01/app/oracle/oradata/testdb/users01.dbf  
  
BS Key  Size       Device Type Elapsed Time Completion Time  
------- ---------- ----------- ------------ ---------------  
2087    3.00K      DISK        00:00:00     17-DEC-14        
        BP Key: 2092   Status: AVAILABLE  Compressed: NO  Tag: TAG20141217T152008  
        Piece Name: /u01/backup/backupset/arch\_TESTDB\_70\_1\_20141217  
  
  List of Archived Logs in backup set 2087  
  Thrd Seq     Low SCN    Low Time  Next SCN   Next Time  
  ---- ------- ---------- --------- ---------- ---------  
  1    35      1114155    17-DEC-14 1114179    17-DEC-14  
  
BS Key  Type LV Size       Device Type Elapsed Time Completion Time  
------- ---- -- ---------- ----------- ------------ ---------------  
2160    Full    9.70M      DISK        00:00:00     17-DEC-14        
        BP Key: 2162   Status: AVAILABLE  Compressed: NO  Tag: TAG20141217T152010  
        Piece Name: /u01/backup/backupset/ctl\_TESTDB\_c-2649780859-20141217-06  
  SPFILE Included: Modification time: 17-DEC-14  
  SPFILE db\_unique\_name: TESTDB  
  Control File Included: Ckp SCN: 1114207      Ckp time: 17-DEC-14  
   
以上备份是通过修改contab中配置的时间立即完成的。  
可以看到每次备份（lv0或lv1）包含4个备份集，开始备份之前首先归档当前日志并且备份归档，然后备份数据文件，然后再一次备份归档，最后自动备份控制文件（包含参数文件）。  
 ****8、验证备份文件有效性****  
  
验证lv0备份文件有效性：  
  
RMAN> restore database validate;  
  
Starting restore at 17-DEC-14  
using channel ORA\_DISK\_1  
  
channel ORA\_DISK\_1: starting validation of datafile backup set  
channel ORA\_DISK\_1: reading from backup piece /u01/backup/backupset/df0\_TESTDB\_65\_1\_20141217  
channel ORA\_DISK\_1: piece handle=/u01/backup/backupset/df0\_TESTDB\_65\_1\_20141217 tag=TAG20141217T144643  
channel ORA\_DISK\_1: restored backup piece 1  
channel ORA\_DISK\_1: validation complete, elapsed time: 00:00:07  
Finished restore at 17-DEC-14  
  
验证lv1备份文件有效性：  
  
RMAN> validate backupset 2011;  
  
Starting validate at 17-DEC-14  
using channel ORA\_DISK\_1  
channel ORA\_DISK\_1: starting validation of datafile backup set  
channel ORA\_DISK\_1: reading from backup piece /u01/backup/backupset/df1\_TESTDB\_69\_1\_20141217  
channel ORA\_DISK\_1: piece handle=/u01/backup/backupset/df1\_TESTDB\_69\_1\_20141217 tag=TAG20141217T152005  
channel ORA\_DISK\_1: restored backup piece 1  
channel ORA\_DISK\_1: validation complete, elapsed time: 00:00:01  
Finished validate at 17-DEC-14  
  
此处指定备份集的编号。  
  
验证归档日志备份文件有效性：  
  
RMAN> restore archivelog all validate;  
  
Starting restore at 17-DEC-14  
using channel ORA\_DISK\_1  
  
channel ORA\_DISK\_1: starting validation of archived log backup set  
channel ORA\_DISK\_1: reading from backup piece /u01/backup/backupset/arch\_TESTDB\_64\_1\_20141217  
channel ORA\_DISK\_1: piece handle=/u01/backup/backupset/arch\_TESTDB\_64\_1\_20141217 tag=TAG20141217T144642  
channel ORA\_DISK\_1: restored backup piece 1  
channel ORA\_DISK\_1: validation complete, elapsed time: 00:00:01  
channel ORA\_DISK\_1: starting validation of archived log backup set  
channel ORA\_DISK\_1: reading from backup piece /u01/backup/backupset/arch\_TESTDB\_66\_1\_20141217  
channel ORA\_DISK\_1: piece handle=/u01/backup/backupset/arch\_TESTDB\_66\_1\_20141217 tag=TAG20141217T144651  
channel ORA\_DISK\_1: restored backup piece 1  
channel ORA\_DISK\_1: validation complete, elapsed time: 00:00:01  
channel ORA\_DISK\_1: starting validation of archived log backup set  
channel ORA\_DISK\_1: reading from backup piece /u01/backup/backupset/arch\_TESTDB\_68\_1\_20141217  
channel ORA\_DISK\_1: piece handle=/u01/backup/backupset/arch\_TESTDB\_68\_1\_20141217 tag=TAG20141217T152004  
channel ORA\_DISK\_1: restored backup piece 1  
channel ORA\_DISK\_1: validation complete, elapsed time: 00:00:01  
channel ORA\_DISK\_1: starting validation of archived log backup set  
channel ORA\_DISK\_1: reading from backup piece /u01/backup/backupset/arch\_TESTDB\_70\_1\_20141217  
channel ORA\_DISK\_1: piece handle=/u01/backup/backupset/arch\_TESTDB\_70\_1\_20141217 tag=TAG20141217T152008  
channel ORA\_DISK\_1: restored backup piece 1  
channel ORA\_DISK\_1: validation complete, elapsed time: 00:00:01  
Finished restore at 17-DEC-14  
  
  
****9、Windows下的脚本****  
  
周日全备的level0.rman脚本内容如下：  
  
run{  
    allocate channel c1 type disk;  
    backup as backupset incremental level 0 database format '/u01/backup/backupset/df0\_%d\_%s\_%p\_%T' plus archivelog delete all input format '/u01/backup/backupset/arch\_%d\_%s\_%p\_%T';  
    delete obsolete;  
    release channel c1;  
    }  
exit  
  
工作日增量备份的level1.rman脚本内容如下：  
  
run{  
    allocate channel c1 type disk;  
    backup as backupset incremental level 1 database format '/u01/backup/backupset/df1\_%d\_%s\_%p\_%T' plus archivelog delete all input format '/u01/backup/backupset/arch\_%d\_%s\_%p\_%T';  
    release channel c1;  
    }  
exit  
  
bat文件格式可能如下：  
  
rman target / nocatalog CMDFILE 'D:\level1.rman' LOG 'D:\rman\_backup\_%DATE:~0,4%%DATE:~5,2%%DATE:~8,2%".log'

最后将bat文件加入到计划任务即可。

另外，在windows下要使用共享驱动器的方法来远程备份，需要执行如下步骤：

需要修改监听及数据库服务的服务登录属性（打开服务管理界面，右键服务名，点击登录），为administrator，并输入密码。

脚本以及rman配置中的路径都要使用绝对路径如：\\172.19.4.4\d\dbbackup\df0\_%d\_%s\_%p\_%T，而不能使用映射后的本地盘符。