

ORACLE RMAN - RECOVERY MANAGER

**NSCC
BACKUP & RECOVERY**

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02/27/2019



Contents

Activity List	5
Creating Tablespace for Chinook Schema	5
Creating User/Schema Chinook	6
Creating tables in Chinook Schema	6
Populating tables	7
Creating an export directory and granting permissions to Chinook	8
Moving dump file between machines	9
Creating the user ExpChinook.....	9
Creating an import directory and granting permissions to ExpChinook	10
Importing Chinook schema to the empty database	11
Working with control files	12
Backing up control file	12
Backing up spfile	13
Backing up listener and tnsnames files.....	13
Working with tablespaces	13
Identifying the location of data files.....	13
Creating two new tablespaces.....	14
Dropping a tablespace	14
Working with Redo Logs.....	15
Identifying the location of Redo Log Files.....	15
Setting up Archive Log on	16
Adding a new Online Redo Group	17
Moving one member of the group to a different directory	18
Configure the Database for Recoverability - RMAN	19
Connecting to Target Database	19

Ensuring that Archive Log is on.....	19
Changing the archive destination	19
Ensuring the location of fast/flash recovery.....	19
RMAN connection	20
Configuring RMAN with control file auto-backup feature.....	20
Configuring backup optimization.....	20
Configuring retention policy for backup.....	20
Connecting to the recovery catalog database and creating a tablespace.....	20
Creating a RMAN user.....	21
Creating a catalog and registering the database	21
Ensuring RMAN repository tables.....	22
RMAN - How to Relocate/Move Oracle Datafile	23
Identifying the tablespace to be moved	23
Shutting down the tablespace to be moved.....	23
Copying datafile to new location	24
Switching back to the new copy	24
Bringing tablespace back online	24
Validations	25
Removing the file from the old location.....	25
Hot Backup - RMAN.....	26
Confirming that archive log is enabled	26
Creating a full backup	27
Simulating data movement.....	28
Incremental level 0 backup.....	29
Simulating data movement.....	30

Differential incremental backup	31
Simulating data movement.....	32
Cumulative incremental backup	33



Activity List			
Project: Creating a Logical Backup		Date: 02/27/2019	
Activity ID No.	Activity Name	Description of Work	Responsibility
1001	Creating Tablespace for Chinook Schema	<p>Ran the script orcl_cr_tblsp.sql that creates the tablespace and validates that it was created.</p> <pre> SQL> -- Creating a tablespace SQL> CREATE TABLESPACE CHINOOK_DATA 2 datafile '/u01/app/oracle/oradata/orcl/chinook_data01.dbf' 3 size 200m; Tablespace created. SQL> SQL> --Validation that tablespace was created SQL> SELECT file_name, tablespace_name 2 FROM dba_data_files 3 WHERE tablespace_name = 'CHINOOK_DATA' 4 ; FILE_NAME ----- TABLESPACE_NAME ----- /u01/app/oracle/oradata/orcl/chinook_data01.dbf CHINOOK_DATA </pre>	Luiza

	Creating User/Schema Chinook	<p>Ran the script orcl_cr_users.sql to create the user chinook that will be owner of the Chinook schema with default tablespace CHINOOK_DATA.</p> <pre> SQL> --Create users SQL> CREATE USER chinook 2 IDENTIFIED BY chinook 3 DEFAULT TABLESPACE CHINOOK_DATA 4 TEMPORARY TABLESPACE temp 5 ; User created. SQL> -- This will allocate space in the tablespace for the user and allow it to insert data SQL> ALTER USER chinook QUOTA 200M ON CHINOOK_DATA; User altered. SQL> SQL> -- Grant permissions to the user SQL> GRANT connect to chinook; Grant succeeded. </pre> <p>Full output is in the file orcl_cr_objects.lst attached.</p>	Luiza
	Creating tables in Chinook Schema	<p>Ran the script orcl_cr_tables.sql to create all tables in the default tablespace of the user chinook</p> <p>Full output is in the file orcl_cr_objects.lst attached.</p>	Luiza

	Populating tables	<div>Ran the script orcl_insert_data.sql to populate the tables.</div> <div>SQL> select table_name, num_rows from user_tables;</div> <div><table><thead><tr><th>TABLE_NAME</th><th>NUM_ROWS</th></tr></thead><tbody><tr><td>ALBUM</td><td>347</td></tr><tr><td>CUSTOMER</td><td>58</td></tr><tr><td>EMPLOYEE</td><td>8</td></tr></tbody></table></div>	TABLE_NAME	NUM_ROWS	ALBUM	347	CUSTOMER	58	EMPLOYEE	8	Luiza
TABLE_NAME	NUM_ROWS										
ALBUM	347										
CUSTOMER	58										
EMPLOYEE	8										



	<p>Creating an export directory and granting permissions to Chinook</p>	<p>I first unlocked the Chinook account and created a directory object it can access. The directory object is only a pointer to a physical directory, creating it does not actually create the physical directory on the file system of the database server.</p> <pre> SQL> conn sys as sysdba Enter password: Connected. SQL> ALTER USER chinook IDENTIFIED BY chinook ACCOUNT UNLOCK; User altered. SQL> CREATE OR REPLACE DIRECTORY exp_dump AS '/u02/exp_dump/'; Directory created. SQL> GRANT READ, WRITE ON DIRECTORY exp_dump TO chinook; Grant succeeded. </pre> <p>Ran the command <i>expdp chinook/chinook schemas=CHINOOK directory=EXP_DUMP dumpfile=dump_test.dmp logfile=expdp_chinook_test.log</i> to create a dump file in the directory created and a log file with the output.</p>	<p>Luiza</p>
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		<pre> [oracle@localhost scripts]\$ expdp chinook/chinook schemas=CHINOOK directory=EXP_DUMP du mpfile=dump_test.dmp logfile=expdp_chinook_test.log Export: Release 12.2.0.1.0 - Production on Sat Mar 2 14:29:43 2019 Copyright (c) 1982, 2017, Oracle and/or its affiliates. All rights reserved. Connected to: Oracle Database 12c Enterprise Edition Release 12.2.0.1.0 - 64bit Product ion Starting "CHINOOK"."SYS_EXPORT_SCHEMA_01": chinook/***** schemas=CHINOOK directory= EXP_DUMP dumpfile=dump_test.dmp logfile=expdp_chinook_test.log Processing object type SCHEMA_EXPORT/TABLE/TABLE DATA Processing object type SCHEMA_EXPORT/TABLE/INDEX/STATISTICS/INDEX STATISTICS Processing object type SCHEMA_EXPORT/TABLE/STATISTICS/TABLE_STATISTICS Processing object type SCHEMA_EXPORT/STATISTICS/MARKER Processing object type SCHEMA_EXPORT/PRE_SCHEMA/PROCACT_SCHEMA Processing object type SCHEMA_EXPORT/TABLE/TABLE Processing object type SCHEMA_EXPORT/TABLE/COMMENT Processing object type SCHEMA_EXPORT/TABLE/INDEX/INDEX Processing object type SCHEMA_EXPORT/TABLE/CONSTRAINT/CONSTRAINT Processing object type SCHEMA_EXPORT/TABLE/CONSTRAINT/REF CONSTRAINT . . exported "CHINOOK"."TRACK" 241.3 KB 3503 rows . . exported "CHINOOK"."INVOICELINE" 54.28 KB 2240 rows </pre>	
	Moving dump file between machines	<p>Copied the file dump_test.dmp from machine Oracle_VM05 to Oracle_VM06 using the command scp dump_test.dmp oracle@192.168.17.135:/home/oracle</p> <p>I also copied the scripts to create tablespace and to create users to VM06</p>	Luiza
	Creating the user ExpChinook	<p>I modified the script to create user, changing the user name to expchinook.</p> <pre> --Create users CREATE USER expchinook IDENTIFIED BY chinook DEFAULT TABLESPACE CHINOOK_DATA TEMPORARY TABLESPACE temp ; -- This will allocate space in the tablespace for the user and allow it to insert data ALTER USER expchinook QUOTA 200M ON CHINOOK_DATA; -- Grant permissions to the user GRANT connect to expchinook; GRANT resource to expchinook; GRANT create session TO expchinook; GRANT create table TO expchinook; </pre>	Luiza
		<p>On VM06, I started the database up and ran the scripts orcl_cr_tblsp.sql and orcl_cr_users.sql as sys.</p>	Luiza

	Creating an import directory and granting permissions to ExpChinook	<p>Like the export process, I created an OS folder to save the dump file and added its path to the database. Then, I granted read and write permissions on this directory to expchinook.</p> <pre>SQL> ALTER USER expchinook IDENTIFIED BY chinook ACCOUNT UNLOCK; User altered. SQL> SQL> CREATE OR REPLACE DIRECTORY imp_dump AS '/u01/imp_dump'; Directory created. SQL> GRANT READ, WRITE ON DIRECTORY imp_dump TO expchinook; Grant succeeded.</pre>	Luiza
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	<p>Importing Chinook schema to the empty database</p>	<p>Using impdp, I imported the tables from the dump file to the database.</p> <pre>[oracle@localhost scripts]\$ impdp expchinnook/chinnook touser=EXPCHINOOK fromuser=CHINOOK schemas=CHINOOK directory=IMP_DUMP dumpfile=dump_test.dmp logfile=impdp_expchinnook.log</pre> <p>Import: Release 12.2.0.1.0 - Production on Sun Mar 3 15:00:39 2019</p> <p>Copyright (c) 1982, 2017, Oracle and/or its affiliates. All rights reserved.</p> <p>Connected to: Oracle Database 12c Enterprise Edition Release 12.2.0.1.0 - 64bit Production</p> <p>All tables were imported:</p> <pre>Processing object type SCHEMA EXPORT/PRE_SCHEMA/PROCTACT_SCHEMA Processing object type SCHEMA EXPORT/TABLE/TABLE Processing object type SCHEMA EXPORT/TABLE/TABLE_DATA . . imported "EXPCHINOOK"."TRACK" 241.3 KB 3503 rows . . imported "EXPCHINOOK"."INVOICELINE" 54.28 KB 2240 rows . . imported "EXPCHINOOK"."INVOICE" 36.01 KB 412 rows . . imported "EXPCHINOOK"."ALBUM" 17.86 KB 347 rows . . imported "EXPCHINOOK"."CUSTOMER" 17.05 KB 59 rows . . imported "EXPCHINOOK"."ARTIST" 13.49 KB 275 rows . . imported "EXPCHINOOK"."EMPLOYEE" 12.22 KB 8 rows . . imported "EXPCHINOOK"."GENRE" 5.882 KB 25 rows . . imported "EXPCHINOOK"."PLAYLIST" 5.843 KB 18 rows . . imported "EXPCHINOOK"."MEDIATYPE" 5.617 KB 5 rows . . imported "EXPCHINOOK"."PLAYLISTTRACK" 98.76 KB 8715 rows Processing object type SCHEMA EXPORT/TABLE/CONSTRAINT/CONSTRAINT Processing object type SCHEMA EXPORT/TABLE/INDEX/STATISTICS/INDEX_STATISTICS Processing object type SCHEMA EXPORT/TABLE/CONSTRAINT/REF_CONSTRAINT Processing object type SCHEMA EXPORT/TABLE/STATISTICS/TABLE_STATISTICS Processing object type SCHEMA EXPORT/STATISTICS/MARKER</pre> <p>Querying the user_tables with the user chinook I could confirm that the tables were imported:</p>	<p>Luiza</p>
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		<pre>SQL> select table_name from user_tables;</pre> <table><thead><tr><th>TABLE_NAME</th></tr></thead><tbody><tr><td>ALBUM</td></tr><tr><td>CUSTOMER</td></tr><tr><td>EMPLOYEE</td></tr><tr><td>GENRE</td></tr><tr><td>INVOICE</td></tr><tr><td>INVOICELINE</td></tr><tr><td>MEDIATYPE</td></tr><tr><td>PLAYLIST</td></tr><tr><td>PLAYLISTTRACK</td></tr><tr><td>TRACK</td></tr><tr><td>ARTIST</td></tr></tbody></table> <pre>11 rows selected.</pre>	TABLE_NAME	ALBUM	CUSTOMER	EMPLOYEE	GENRE	INVOICE	INVOICELINE	MEDIATYPE	PLAYLIST	PLAYLISTTRACK	TRACK	ARTIST	
TABLE_NAME															
ALBUM															
CUSTOMER															
EMPLOYEE															
GENRE															
INVOICE															
INVOICELINE															
MEDIATYPE															
PLAYLIST															
PLAYLISTTRACK															
TRACK															
ARTIST															
Working with control files															
	Backing up control file	<p>Original location of the control file</p> <pre>SQL> show parameter control_files</pre> <table><thead><tr><th>NAME</th><th>TYPE</th><th>VALUE</th></tr></thead><tbody><tr><td>control_files</td><td>string</td><td>/u01/app/oracle/oradata/orcl/control01.ctl, /u01/app/oracle/recovery_area/orcl/control02.ctl</td></tr></tbody></table> <p>Saved a copy in another location</p> <pre>SQL> alter database backup controlfile to '/u02/control_bkp/control_file.bkup';</pre> <p>Database altered.</p> <p>Confirmed that the new file was in the folder:</p> <pre>[oracle@localhost scripts]\$ ls /u02/control_bkp/ grep bkup</pre> <p>control_file.bkup</p>	NAME	TYPE	VALUE	control_files	string	/u01/app/oracle/oradata/orcl/control01.ctl, /u01/app/oracle/recovery_area/orcl/control02.ctl							
NAME	TYPE	VALUE													
control_files	string	/u01/app/oracle/oradata/orcl/control01.ctl, /u01/app/oracle/recovery_area/orcl/control02.ctl													

	Backing up spfile	<p>Original location of the spfile</p> <pre>SQL> show parameter spfile</pre> <table><thead><tr><th>NAME</th><th>TYPE</th><th>VALUE</th></tr></thead><tbody><tr><td>spfile</td><td>string</td><td>/u01/app/oracle/product/12.2.0/dbhome_1/dbs/spfileorcl.ora</td></tr></tbody></table> <p>Saved a copy of the spfile in another location</p> <pre>SQL> create pfile='/u02/control_bkp/pfile_backup.ora' from spfile; File created.</pre> <p>Confirmed that the new file was in the folder:</p> <pre>[oracle@localhost scripts]\$ ls /u02/control_bkp/ grep pfile_ pfile_backup.ora</pre>	NAME	TYPE	VALUE	spfile	string	/u01/app/oracle/product/12.2.0/dbhome_1/dbs/spfileorcl.ora	
NAME	TYPE	VALUE							
spfile	string	/u01/app/oracle/product/12.2.0/dbhome_1/dbs/spfileorcl.ora							
	Backing up listener and tnsnames files	<p>Original location of the files listener.ora and tnsnames.ora</p> <pre>[oracle@localhost admin]\$ pwd /u01/app/oracle/product/12.2.0/dbhome_1/network/admin [oracle@localhost admin]\$ ls listener.ora samples shrept.lst sqlnet.ora tnsnames.ora</pre> <p>Saved a copy in another location</p> <pre>[oracle@localhost admin]\$ cp listener.ora /u02/control_bkp/ [oracle@localhost admin]\$ cp tnsnames.ora /u02/control_bkp/ [oracle@localhost admin]\$ ls /u02/control_bkp/ control01.ctl listener.ora spfileorcl.ora tnsnames.ora</pre>							
Working with tablespaces									
	Identifying the location of data files	<p>The data files associated with the tablespaces in my database are all in one location:</p> <pre>[oracle@localhost admin]\$ ls /u01/app/oracle/oradata/orcl/ chinook_data01.dbf redo02.log sysaux01.dbf temp01.dbf users01.dbf control01.ctl redo03.log system01.dbf undotbs01.dbf</pre>							

	Creating two new tablespaces	<p>Created two tablespaces called TOOLS_DATA and TOOLS_IND:</p> <pre>SQL> CREATE TABLESPACE TOOLS_DATA 2 datafile '/u01/app/oracle/oradata/orcl/tools_data01.dbf' size 50m, 3 '/u01/app/oracle/oradata/orcl/tools_data02.dbf' size 50m; Tablespace created. SQL> CREATE TABLESPACE TOOLS_IND 2 datafile '/u01/app/oracle/oradata/orcl/tools_ind01.dbf' size 50m, 3 '/u01/app/oracle/oradata/orcl/tools_ind02.dbf' size 50m; Tablespace created.</pre> <p>The data files were created in the oradata folder:</p> <pre>[oracle@localhost scripts]\$ ls /u01/app/oracle/oradata/orcl/ grep tools tools_data01.dbf tools_data02.dbf tools_ind01.dbf tools_ind02.dbf</pre>	
	Dropping a tablespace	<p>I dropped the tablespace tools_ind:</p> <pre>SQL> DROP TABLESPACE tools_ind; Tablespace dropped.</pre> <p>But the data files were not deleted:</p> <pre>[oracle@localhost scripts]\$ ls /u01/app/oracle/oradata/orcl/ grep tools tools_data01.dbf tools_data02.dbf tools_ind01.dbf tools_ind02.dbf</pre> <p>If I wanted to delete the datafiles with the tablespace, I would use the command <i>DROP TABLESPACE tools_ind INCLUDING CONTENTS AND DATAFILES</i>;</p> <p>After dropping the tablespace, I removed the datafiles from the OS:</p> <pre>[oracle@localhost orcl]\$ rm tools_ind* [oracle@localhost orcl]\$ ls chinook data01.dbf redo03.log temp01.dbf undotbs01.dbf control01.ctl sysaux01.dbf tools_data01.dbf users01.dbf redo02.log system01.dbf tools_data02.dbf</pre>	

Working with Redo Logs			
	Identifying the location of Redo Log Files	<p>The redo log files in my database are all in two locations:</p> <pre>[oracle@localhost orcl]\$ ls /u02/oraredo/12c/ redo01.log [oracle@localhost orcl]\$ pwd /u01/app/oracle/oradata/orcl [oracle@localhost orcl]\$ ls chinook_data01.dbf redo03.log temp01.dbf undotbs01.dbf control01.ctl sysaux01.dbf tools_data01.dbf users01.dbf redo02.log system01.dbf tools_data02.dbf</pre>	



	Setting up Archive Log on	<p>The archive log was disabled:</p> <pre>SQL> archive log list Database log mode No Archive Mode Automatic archival Disabled Archive destination /u02/arch_bkp Oldest online log sequence 17 Current log sequence 19</pre> <p>Then I enabled the archive log:</p> <pre>SQL> startup mount; ORACLE instance started. Total System Global Area 2466250752 bytes Fixed Size 8623688 bytes Variable Size 671091128 bytes Database Buffers 1778384896 bytes Redo Buffers 8151040 bytes Database mounted. SQL> SQL> alter database archivelog; Database altered. SQL> archive log list Database log mode Archive Mode Automatic archival Enabled Archive destination /u02/arch_bkp Oldest online log sequence 17 Next log sequence to archive 19 Current log sequence 19</pre>	
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	Adding a new Online Redo Group	<p>First, I created a new folder as root and then gave the ownership to oracle:</p> <pre>[root@localhost ~]# mkdir -p /u03/redo [root@localhost ~]# chown -R oracle:oinstall /u01 [root@localhost ~]# chown -R oracle:oinstall /u03 [root@localhost ~]# chmod -R 775 /u03</pre> <p>Then I added the new online redo group 4:</p> <pre>SQL> ALTER DATABASE add logfile group 4 ('u03/redo/redo04a.rdo','u03/redo/redo04b.rdo') SIZE 50M; 2 Database altered. SQL> select group#, member from v\$logfile where group# = 4; GROUP# ----- MEMBER ----- 4 /u03/redo/redo04a.rdo 4 /u03/redo/redo04b.rdo</pre>	
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	<p>Moving one member of the group to a different directory</p>	<p>First, I shut down the database and then moved the files in the OS:</p> <pre>[oracle@localhost scripts]\$ mv /u03/redo/redo04b.rdo /u02/oraredo/ [oracle@localhost scripts]\$ ls /u02/oraredo/ 12c redo04b.rdo [oracle@localhost scripts]\$ mv /u02/oraredo/redo04b.rdo /u02/oraredo/12c/ [oracle@localhost scripts]\$ ls /u02/oraredo/12c/ redo01.log redo04b.rdo</pre> <p>I started up mount the database and altered the pointer of the file in the database:</p> <pre>SQL> startup mount; ORACLE instance started. Total System Global Area 2466250752 bytes Fixed Size 8623688 bytes Variable Size 671091128 bytes Database Buffers 1778384896 bytes Redo Buffers 8151040 bytes Database mounted. SQL> alter database rename file '/u03/redo/redo04b.rdo' to '/u02/oraredo/12c/redo04b.rdo'; Database altered.</pre> <p>Finally, I finished starting up the database and confirmed that the member was moved to the location I wanted:</p> <pre>SQL> alter database open; Database altered. SQL> select group#, member from v\$logfile where group# = 4; GROUP# ----- MEMBER ----- 4 /u03/redo/redo04a.rdo 4 /u02/oraredo/12c/redo04b.rdo</pre>	
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Configure the Database for Recoverability - RMAN		
Connecting to Target Database	<p>My target database is on the machine Oracle_VM05.</p> <p>I connected as sysdba:</p> <pre>[oracle@localhost scripts]\$ sqlplus / as sysdba SQL*Plus: Release 12.2.0.1.0 Production on Sun Mar 3 17:31:21 2019 Copyright (c) 1982, 2016, Oracle. All rights reserved. Connected to: Oracle Database 12c Enterprise Edition Release 12.2.0.1.0 - 64bit Production</pre>	
Ensuring that Archive Log is on	<p>I queried the view v\$database to confirm that the archive log was on:</p> <pre>SQL> select log_mode from v\$database; LOG_MODE ----- ARCHIVELOG</pre>	
Changing the archive destination	<p>I changed the destination of the archive logs:</p> <pre>SQL> alter system set log_archive_dest_1='location=/u02/arch_bkp' scope=both; System altered. SQL> archive log list Database log mode Archive Mode Automatic archival Enabled Archive destination /u02/arch_bkp Oldest online log sequence 16 Next log sequence to archive 18 Current log sequence 18</pre>	
Ensuring the location of fast/flash recovery	<p>I looked at the parameter db_recovery_file_dest</p> <pre>SQL> show parameter db_recovery_file_dest NAME TYPE VALUE ----- db_recovery_file_dest string /u01/app/oracle/recovery_area db_recovery_file_dest_size big integer 8016M</pre>	

	<p>RMAN connection</p>	<p>I connected to RMAN:</p> <pre>[oracle@localhost scripts]\$ rman target /</pre> <p>Recovery Manager: Release 12.2.0.1.0 - Production on Sun Mar 3 17:40:44 2019 Copyright (c) 1982, 2017, Oracle and/or its affiliates. All rights reserved. connected to target database: ORCL (DBID=1518050376)</p>	
	<p>Configuring RMAN with control file auto-backup feature</p>	<p>This configuration will auto-backup the control file:</p> <pre>RMAN> configure controlfile autobackup on;</pre> <p>using target database control file instead of recovery catalog new RMAN configuration parameters: CONFIGURE CONTROLFILE AUTOBACKUP ON; new RMAN configuration parameters are successfully stored</p>	
	<p>Configuring backup optimization</p>	<pre>RMAN> configure backup optimization on 2> ;</pre> <p>new RMAN configuration parameters: CONFIGURE BACKUP OPTIMIZATION ON; new RMAN configuration parameters are successfully stored</p>	
	<p>Configuring retention policy for backup</p>	<pre>RMAN> configure retention policy to recovery window of 7 days;</pre> <p>new RMAN configuration parameters: CONFIGURE RETENTION POLICY TO RECOVERY WINDOW OF 7 DAYS; new RMAN configuration parameters are successfully stored</p>	
	<p>Connecting to the recovery catalog database and creating a tablespace</p>	<pre>SQL> select global_name from global_name;</pre> <pre>GLOBAL_NAME ----- ORCL</pre> <pre>SQL> create tablespace catalogtbs datafile '/u01/app/oracle/oradata/orcl/catalogtbs1.dbf' size 100M autoextend on maxsize unlimited;</pre> <p>Tablespace created.</p>	

	Creating a RMAN user	<p>I created the user rman:</p> <pre>SQL> create user rman identified by rman; User created. SQL> alter user rman default tablespace catalogtbs temporary tablespace temp; User altered. SQL> grant recovery_catalog_owner to rman; Grant succeeded. SQL> grant connect, resource to rman; Grant succeeded.</pre> <p>I also had to give quota to him in the tablespace catalogtbs:</p> <pre>ALTER USER rman QUOTA UNLIMITED ON TABLESPACE catalogtbs</pre>	
	Creating a catalog and registering the database	<p>I connect to RMAN with the rman user, then created a catalog and registered the database:</p> <pre>[oracle@localhost scripts]\$ rman target / catalog rman/rman Recovery Manager: Release 12.2.0.1.0 - Production on Tue Mar 5 13:27:18 2019 Copyright (c) 1982, 2017, Oracle and/or its affiliates. All rights reserved. connected to target database: ORCL (DBID=1518050376) connected to recovery catalog database RMAN> create catalog; recovery catalog created RMAN> register database; database registered in recovery catalog starting full resync of recovery catalog full resync complete</pre>	

	Ensuring RMAN repository tables	<p>Back on SQL Plus, I confirmed that the user rman had the repository tables created:</p> <pre>SQL> show user USER is "RMAN" SQL> select table_name from user_tables;</pre> <table><tr><th>TABLE_NAME</th></tr><tr><td>-----</td></tr><tr><td>PDBINC</td></tr><tr><td>PDB_DBINC</td></tr><tr><td>CKP</td></tr><tr><td>TS</td></tr><tr><td>TSATT</td></tr><tr><td>DF</td></tr><tr><td>SITE_DFATT</td></tr><tr><td>TF</td></tr><tr><td>SITE_TFATT</td></tr><tr><td>OFFR</td></tr><tr><td>RR</td></tr></table>	TABLE_NAME	-----	PDBINC	PDB_DBINC	CKP	TS	TSATT	DF	SITE_DFATT	TF	SITE_TFATT	OFFR	RR	
TABLE_NAME																

PDBINC																
PDB_DBINC																
CKP																
TS																
TSATT																
DF																
SITE_DFATT																
TF																
SITE_TFATT																
OFFR																
RR																



RMAN - How to Relocate/Move Oracle Datafile			
Identifying the tablespace to be moved	<p>To move the tablespace we need to know the tablespace number, using the command report schema</p> <pre>Report of database schema for database with db_unique_name ORCL List of Permanent Datafiles ===== File Size(MB) Tablespace RB segs Datafile Name ----- 1 820 SYSTEM YES /u01/app/oracle/oradata/orcl/system01.dbf 2 50 TOOLS_DATA NO /u01/app/oracle/oradata/orcl/tools_data01.dbf 3 580 SYSAUX NO /u01/app/oracle/oradata/orcl/sysaux01.dbf 4 65 UNDOTBS1 YES /u01/app/oracle/oradata/orcl/undotbs01.dbf 5 200 CHINOOK_DATA NO /u01/app/oracle/oradata/orcl/chinook_data01.dbf 7 5 USERS NO /u01/app/oracle/oradata/orcl/users01.dbf 8 50 TOOLS_DATA NO /u01/app/oracle/oradata/orcl/tools_data02.dbf 9 100 CATALOGTBS NO /u01/app/oracle/oradata/orcl/catalogtbs1.dbf List of Temporary Files ===== File Size(MB) Tablespace Maxsize(MB) Tempfile Name ----- 1 32 TEMP 32767 /u01/app/oracle/oradata/orcl/temp01.dbf</pre>		
Shutting down the tablespace to be moved	<p>I changed the tablespace TOOLS_DATA to offline to stop the read and write on the datafile using the command:</p> <pre>RMAN> SQL 'ALTER TABLESPACE TOOLS_DATA OFFLINE'; SQL 'ALTER TABLESPACE TOOLS_DATA OFFLINE'; sql statement: ALTER TABLESPACE TOOLS_DATA OFFLINE starting full resync of recovery catalog full resync complete</pre>		

	Copying datafile to new location	<p>I moved the file tools_data02.dbf to /u02. I used the datafile number 8, meeting the report schema:</p> <pre> RMAN> COPY DATAFILE 8 TO '/u02/oradata/orcl/tools_data02.dbf'; Starting backup at 07-MAR-19 allocated channel: ORA_DISK_1 channel ORA_DISK_1: SID=4 device type=DISK channel ORA_DISK_1: starting datafile copy input datafile file number=00008 name=/u01/app/oracle/oradata/orcl/tools_data02.dbf output file name=/u02/oradata/orcl/tools_data02.dbf tag=TAG20190307T111510 RECID=1 STAMP=1002280511 channel ORA_DISK_1: datafile copy complete, elapsed time: 00:00:01 Finished backup at 07-MAR-19 Starting Control File and SPFILE Autobackup at 07-MAR-19 piece handle=/u01/app/oracle/recovery_area/ORCL/autobackup/2019_03_07/o1_mf_s_1002280513_g82fdlxb_.bkp comment=NONE Finished Control File and SPFILE Autobackup at 07-MAR-19 </pre>	
	Switching back to the new copy	<p>I switched back to the new datafile copy:</p> <pre> RMAN> SWITCH DATAFILE 8 TO COPY; datafile 8 switched to datafile copy "/u02/oradata/orcl/tools_data02.dbf" starting full resync of recovery catalog full resync complete </pre>	
	Bringing tablespace back online	<p>I brought the tablespace back online using the command:</p> <pre> RMAN> SQL 'ALTER TABLESPACE TOOLS_DATA ONLINE'; starting full resync of recovery catalog full resync complete sql statement: ALTER TABLESPACE TOOLS_DATA ONLINE starting full resync of recovery catalog full resync complete </pre>	

	Validations	<p>I confirmed that the tablespace was moved correctly by looking at the report schema. The datafile name showed had the new path.</p> <pre> RMAN> report schema; Report of database schema for database with db_unique_name ORCL List of Permanent Datafiles ===== File Size(MB) Tablespace RB segs Datafile Name ----- 1 820 SYSTEM YES /u01/app/oracle/oradata/orcl/system01.dbf 2 50 TOOLS_DATA NO /u01/app/oracle/oradata/orcl/tools_data01.dbf 3 580 SYSAUX NO /u01/app/oracle/oradata/orcl/sysaux01.dbf 4 65 UNDOTBS1 YES /u01/app/oracle/oradata/orcl/undotbs01.dbf 5 200 CHINOOK_DATA NO /u01/app/oracle/oradata/orcl/chinook_data01.dbf 7 5 USERS NO /u01/app/oracle/oradata/orcl/users01.dbf 8 50 TOOLS_DATA NO /u02/oradata/orcl/tools_data02.dbf 9 100 CATALOGTBS NO /u01/app/oracle/oradata/orcl/catalogtbs1.dbf </pre> <p>I also validated that the move was succesful in SQL Plus, by querying the table dba_data_files:</p> <pre> SQL> SELECT file_name, tablespace_name, online_status FROM dba_data_files WHERE tablespace_name = 'TOOLS_DATA' ; 2 3 4 FILE_NAME ----- TABLESPACE_NAME ONLINE_ ----- /u01/app/oracle/oradata/orcl/tools_data01.dbf TOOLS_DATA ONLINE /u02/oradata/orcl/tools_data02.dbf TOOLS_DATA ONLINE </pre>	
	Removing the file from the old location	<p>After confirming that the new file was working in its new location, I removed the file from the old location:</p> <pre> RMAN> HOST 'rm /u01/app/oracle/oradata/orcl/tools_data02.dbf'; host command complete </pre>	

Hot Backup - RMAN			
	Confirming that archive log is enabled	<p>I wanted to create a full backup including the redo logs. So I confirmed that the archive log was enabled in SQL Plus:</p> <pre> SQL> archive log list Database log mode Archive Mode Automatic archival Enabled Archive destination /u02/arch_bkp Oldest online log sequence 21 Next log sequence to archive 24 Current log sequence 24 SQL> █ </pre>	



	Creating a full backup	<p>According to the schedule, on Sunday we should do a full back up. So, I moved to RMAN and executed the following command:</p> <pre>RMAN> backup database plus archivelog 2> ;</pre> <p>The output was the following:</p> <pre>Starting backup at 11-MAR-19 current log archived allocated channel: ORA_DISK_1 channel ORA_DISK_1: SID=265 device type=DISK channel ORA_DISK_1: starting archived log backup set channel ORA_DISK_1: specifying archived log(s) in backup set input archived log thread=1 sequence=11 RECID=1 STAMP=1001424910 input archived log thread=1 sequence=12 RECID=2 STAMP=1001424914 input archived log thread=1 sequence=13 RECID=3 STAMP=1001449557 input archived log thread=1 sequence=14 RECID=4 STAMP=1001765908 input archived log thread=1 sequence=15 RECID=5 STAMP=1001855111 input archived log thread=1 sequence=16 RECID=6 STAMP=1001865696 input archived log thread=1 sequence=17 RECID=7 STAMP=1001954865 input archived log thread=1 sequence=19 RECID=8 STAMP=1002112797 input archived log thread=1 sequence=20 RECID=9 STAMP=1002115679 input archived log thread=1 sequence=21 RECID=10 STAMP=1002277680 input archived log thread=1 sequence=22 RECID=11 STAMP=1002305810 input archived log thread=1 sequence=23 RECID=12 STAMP=1002626785 input archived log thread=1 sequence=24 RECID=13 STAMP=1002628948 channel ORA_DISK_1: starting piece 1 at 11-MAR-19 channel ORA_DISK_1: finished piece 1 at 11-MAR-19 piece handle=/u01/app/oracle/recovery_area/ORCL/backupset/2019_03_11/o1_mf_annnn_TAG20190311T120230_g8dy46x8_.bkp tag=TAG20190311T120230 comment=NONE channel ORA_DISK_1: backup set complete, elapsed time: 00:00:25 Finished backup at 11-MAR-19 Starting backup at 11-MAR-19 using channel ORA_DISK_1 channel ORA_DISK_1: starting full datafile backup set channel ORA_DISK_1: specifying datafile(s) in backup set input datafile file number=00001 name=/u01/app/oracle/oradata/orcl/system01.dbf input datafile file number=00003 name=/u01/app/oracle/oradata/orcl/sysaux01.dbf input datafile file number=00005 name=/u01/app/oracle/oradata/orcl/chinook_data01.dbf input datafile file number=00009 name=/u01/app/oracle/oradata/orcl/catalogtbs1.dbf input datafile file number=00004 name=/u01/app/oracle/oradata/orcl/undotbs01.dbf input datafile file number=00002 name=/u01/app/oracle/oradata/orcl/tools_data01.dbf input datafile file number=00008 name=/u02/oradata/orcl/tools_data02.dbf input datafile file number=00007 name=/u01/app/oracle/oradata/orcl/users01.dbf channel ORA_DISK_1: starting piece 1 at 11-MAR-19 channel ORA_DISK_1: finished piece 1 at 11-MAR-19 piece handle=/u01/app/oracle/recovery_area/ORCL/backupset/2019_03_11/o1_mf_nnndf_TAG20190311T120257_g8dy52pq_.bkp tag=TAG20190311T120257 comment=NONE channel ORA_DISK_1: backup set complete, elapsed time: 00:00:35 Finished backup at 11-MAR-19</pre>	
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		<pre> Starting backup at 11-MAR-19 current log archived using channel ORA_DISK_1 channel ORA_DISK_1: starting archived log backup set channel ORA_DISK_1: specifying archived log(s) in backup set input archived log thread=1 sequence=25 RECID=14 STAMP=1002629014 channel ORA_DISK_1: starting piece 1 at 11-MAR-19 channel ORA_DISK_1: finished piece 1 at 11-MAR-19 piece handle=/u01/app/oracle/recovery_area/ORCL/backupset/2019_03_11/o1_mf_annnn_TAG201 90311T120336_g8dy687o_.bkp tag=TAG20190311T120336 comment=NONE channel ORA_DISK_1: backup set complete, elapsed time: 00:00:01 Finished backup at 11-MAR-19 Starting Control File and SPFILE Autobackup at 11-MAR-19 piece handle=/u01/app/oracle/recovery_area/ORCL/autobackup/2019_03_11/o1_mf_s_100262901 9_g8dy6cs5_.bkp comment=NONE Finished Control File and SPFILE Autobackup at 11-MAR-19 </pre>	
	Simulating data movement	<p>I inserted 1 row to the table Artist:</p> <pre> SQL> INSERT INTO Artist (ArtistId, Name) VALUES (300, 'Monday Backup'); 1 row created. </pre> <p>Confirming the new line was added:</p> <pre> SQL> select * from Artist where artistid = 300; ARTISTID ----- NAME ----- 300 Monday Backup </pre>	

	Incremental level 0 backup	<p>Another way to make a full back up is creating a level 0 back up. This kind of backup allow us to do differential and cumulative backups:</p> <pre> RMAN> backup incremental level 0 database 2> ; </pre> <p>And this was the output:</p> <pre> Starting backup at 11-MAR-19 using channel ORA_DISK_1 channel ORA_DISK_1: starting incremental level 0 datafile backup set channel ORA_DISK_1: specifying datafile(s) in backup set input datafile file number=00001 name=/u01/app/oracle/oradata/orcl/system01.dbf input datafile file number=00003 name=/u01/app/oracle/oradata/orcl/sysaux01.dbf input datafile file number=00005 name=/u01/app/oracle/oradata/orcl/chinook_data01.dbf input datafile file number=00009 name=/u01/app/oracle/oradata/orcl/catalogtbs1.dbf input datafile file number=00004 name=/u01/app/oracle/oradata/orcl/undotbs01.dbf input datafile file number=00002 name=/u01/app/oracle/oradata/orcl/tools_data01.dbf input datafile file number=00008 name=/u02/oradata/orcl/tools_data02.dbf input datafile file number=00007 name=/u01/app/oracle/oradata/orcl/users01.dbf channel ORA_DISK_1: starting piece 1 at 11-MAR-19 channel ORA_DISK_1: finished piece 1 at 11-MAR-19 piece handle=/u01/app/oracle/recovery_area/ORCL/backupset/2019_03_11/o1_mf_nnnd0_TAG201 90311T130435_g8f1rmk0_.bkp tag=TAG20190311T130435 comment=NONE channel ORA_DISK_1: backup set complete, elapsed time: 00:00:15 Finished backup at 11-MAR-19 Starting Control File and SPFILE Autobackup at 11-MAR-19 piece handle=/u01/app/oracle/recovery_area/ORCL/autobackup/2019_03_11/o1_mf_s_100263269 2_g8f1s46v_.bkp comment=NONE Finished Control File and SPFILE Autobackup at 11-MAR-19 </pre>	
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	Simulating data movement	<p>I inserted another row to the table Artist:</p> <pre>SQL> INSERT INTO Artist (ArtistId, Name) VALUES (301, 'Tuesday Backup');</pre> <p>1 row created.</p> <p>Confirming the new line was added:</p> <pre>SQL> select * from Artist where artistid in (300, 301);</pre> <pre> ARTISTID ----- NAME ----- 300 Monday Backup 301 Tuesday Backup </pre>	
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	Differential incremental backup	<p>On Monday, we should do one differential incremental backup. So I used the following command to complete the task:</p> <pre> RMAN> backup incremental level 1 database; </pre> <p>And this was the output:</p> <pre> Starting backup at 11-MAR-19 using channel ORA_DISK_1 channel ORA_DISK_1: starting incremental level 1 datafile backup set channel ORA_DISK_1: specifying datafile(s) in backup set input datafile file number=00001 name=/u01/app/oracle/oradata/orcl/system01.dbf input datafile file number=00003 name=/u01/app/oracle/oradata/orcl/sysaux01.dbf input datafile file number=00005 name=/u01/app/oracle/oradata/orcl/chinook_data01.dbf input datafile file number=00009 name=/u01/app/oracle/oradata/orcl/catalogtbs1.dbf input datafile file number=00004 name=/u01/app/oracle/oradata/orcl/undotbs01.dbf input datafile file number=00002 name=/u01/app/oracle/oradata/orcl/tools_data01.dbf input datafile file number=00008 name=/u02/oradata/orcl/tools_data02.dbf input datafile file number=00007 name=/u01/app/oracle/oradata/orcl/users01.dbf channel ORA_DISK_1: starting piece 1 at 11-MAR-19 channel ORA_DISK_1: finished piece 1 at 11-MAR-19 piece handle=/u01/app/oracle/recovery_area/ORCL/backupset/2019_03_11/o1_mf_nnnd1_TAG20190311T131237_g8f27poz .bkp tag=TAG20190311T131237 comment=NONE channel ORA_DISK_1: backup set complete, elapsed time: 00:00:01 Finished backup at 11-MAR-19 Starting Control File and SPFILE Autobackup at 11-MAR-19 piece handle=/u01/app/oracle/recovery_area/ORCL/autobackup/2019_03_11/o1_mf_s_1002633160_g8f27rws .bkp comment=NONE Finished Control File and SPFILE Autobackup at 11-MAR-19 </pre> <p>This backup contain only the changes since the last level 0 backup.</p>	
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	Simulating data movement	<p>I inserted another row to the table Artist:</p> <pre>SQL> INSERT INTO Artist (ArtistId, Name) VALUES (302, 'Wednesday Backup');</pre> <p>1 row created.</p> <p>Confirming the new line was added:</p> <pre>SQL> select * from Artist where artistid in (300, 301, 302);</pre> <pre> ARTISTID ----- NAME ----- 300 Monday Backup 301 Tuesday Backup 302 Wednesday Backup </pre>	
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	Cumulative incremental backup	<p>On Wednesday, we should do one cumulative incremental backup. So I used the following command to complete the task:</p> <pre> RMAN> backup incremental level 1 cumulative database; </pre> <p>And this was the output:</p> <pre> Starting backup at 11-MAR-19 using channel ORA_DISK_1 channel ORA_DISK_1: starting incremental level 1 datafile backup set channel ORA_DISK_1: specifying datafile(s) in backup set input datafile file number=00001 name=/u01/app/oracle/oradata/orcl/system01.dbf input datafile file number=00003 name=/u01/app/oracle/oradata/orcl/sysaux01.dbf input datafile file number=00005 name=/u01/app/oracle/oradata/orcl/chinook_data01.dbf input datafile file number=00009 name=/u01/app/oracle/oradata/orcl/catalogtbs1.dbf input datafile file number=00004 name=/u01/app/oracle/oradata/orcl/undotbs01.dbf input datafile file number=00002 name=/u01/app/oracle/oradata/orcl/tools_data01.dbf input datafile file number=00008 name=/u02/oradata/orcl/tools_data02.dbf input datafile file number=00007 name=/u01/app/oracle/oradata/orcl/users01.dbf channel ORA_DISK_1: starting piece 1 at 11-MAR-19 channel ORA_DISK_1: finished piece 1 at 11-MAR-19 piece handle=/u01/app/oracle/recovery_area/ORCL/backupset/2019_03_11/o1_mf_nnnd1_TAG20190311T133117_g8f3bohc_.bkp tag=TAG20190311T133117 comment=NONE channel ORA_DISK_1: backup set complete, elapsed time: 00:00:01 Finished backup at 11-MAR-19 Starting Control File and SPFILE Autobackup at 11-MAR-19 piece handle=/u01/app/oracle/recovery_area/ORCL/autobackup/2019_03_11/o1_mf_s_1002634279_g8f3bqnf_.bkp comment=NONE Finished Control File and SPFILE Autobackup at 11-MAR-19 </pre> <p>This backup contain only the changes since the last level 0 backup.</p>	
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