

Oracle Database 12c - Recovery Manager New Features

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DISCLAIMER

- Oracle 12c has not been released yet
- Some features may not be available
- I believe Oracle has mentioned these publicly
 - They told me about them in a public forum at OOW

Attention Oracle Lawyers: Please don't sue me!



About Enkitec

- Extensive Oracle Practice - 9 years old
 - Education
 - Migration
 - Performance Reviews
 - Remote DBA Support
 - Application Express
- Enkitec Extreme Exadata Expo
 - Irving, TX
 - August 5-6
 - <http://www.enkitec.com/e4>



About Me



- Working around Oracle since 1999
- Background in systems, network, database
- 6 years at Enkitech
- Working on Exadata for 3 years
- Oracle ACE



Why Talk About RMAN?

- Everybody should use RMAN
- It can be quite interesting
- I'm a fan of cruel and unusual punishment



What's New?

- Pluggable Databases 
- Run SQL from RMAN
- Recover Table
- Cross-Platform Restore
- Active Duplicate Enhancements
- New Security Roles



Pluggable Databases

- Oracle 12c introduces the concept of containers and pluggable databases
- Pluggable databases are “virtual” databases
- Pluggable databases share memory and redo logs



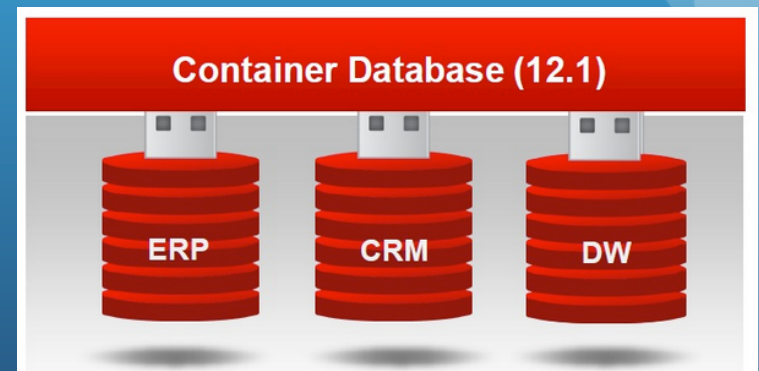
Containers vs Pluggable Databases

- Back up container databases like any “standard” database
- Afterwards, open all of your pluggable databases

```
RMAN> RUN
2> {
3>   SET UNTIL SCN 16747183;
4>   RESTORE DATABASE;
5>   RECOVER DATABASE;
6> }
RMAN> alter database open resetlogs;
RMAN> alter pluggable database all open;
```


Pluggable Database Support

- RMAN supports Pluggable Databases
- Back up entire Container Database or individual Pluggable Databases
- Container database - no changes
- PDB point in time recovery



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Pluggable Database Support

```
RMAN> report schema;  
Report of database schema for database with db_unique_name PLUGGY
```

List of Permanent Datafiles

File	Size(MB)	Tablespace	RB segs	Datafile Name
1	770	SYSTEM	***	+DG/PLUGGY/DATAFILE/FILE
3	610	SYSAUX	***	+DG/PLUGGY/DATAFILE/FILE
4	60	UNDOTBS1	***	+DG/PLUGGY/DATAFILE/FILE
5	250	PDB\$SEED:SYSTEM	***	+DG/PLUGGY/DATAFILE/FILE
6	5	USERS	***	+DG/PLUGGY/DATAFILE/FILE
7	490	PDB\$SEED:SYSAUX	***	+DG/PLUGGY/DATAFILE/FILE
8	250	PLUG1:SYSTEM	***	+DG/PLUGGY/DATAFILE/FILE
9	510	PLUG1:SYSAUX	***	+DG/PLUGGY/DATAFILE/FILE
10	5	PLUG1:USERS	***	+DG/PLUGGY/DATAFILE/FILE

List of Temporary Files


File	Size(MB)	Tablespace	Maxsize(MB)	Tempfile Name
1	521	TEMP	32767	+DG/PLUGGY/TEMPFILE/FILE
2	20	PDB\$SEED:TEMP	32767	+DG/PLUGGY/TEMPFILE/FILE
3	20	PLUG1:TEMP	32767	+DG/PLUGGY/TEMPFILE/FILE

PDB Point In Time Recovery

- Recover PDBs individually

```
RMAN> alter pluggable database ERP close;  
RMAN> RUN  
2> {  
3>     SET UNTIL SCN 1674493;  
4>     RESTORE PLUGGABLE DATABASE ERP;  
5>     RECOVER PLUGGABLE DATABASE ERP;  
6> }  
RMAN> alter pluggable database ERP open resetlogs;
```

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Running SQL From RMAN

- No More “SQL” Tags
- Previous versions didn’t support SELECT statements
- Useful within backup scripts



Running SQL From RMAN

```
RMAN> select sysdate from dual;
```

```
SYSDATE
```


```
-----
```

```
11-FEB-13
```

```
RMAN> desc dba_pdbs
```

Name	Null?	Type
-----	-----	-----
PDB_ID	NOT NULL	NUMBER
PDB_NAME	NOT NULL	VARCHAR2 (128)
DBID	NOT NULL	NUMBER
CON_UID	NOT NULL	NUMBER
GUID		RAW (16)
STATUS		VARCHAR2 (13)
CREATION_SCN	NOT NULL	NUMBER

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Recover Table

- Recover tables from backups
- Useful when you can't use flashback
- Recover tables or table partitions
- Must connect “as sysdba” or “as sysbackup”

```
RMAN> RECOVER TABLE ACOLVIN1.T  
2> UNTIL SCN 1674493  
3> AUXILIARY DESTINATION '/tmp/oracle/recover'  
4> DATAPUMP DESTINATION '/tmp/recover/dumpfiles'  
5> REMAP TABLE 'ACOLVIN1'.'T': 'T_RECOVERED';
```


Recover Table - Process

- RMAN automatically finds necessary backupsets
- Auxiliary database created with backupsets
- Data pump export file automatically created
- RMAN performs data pump import of the tables to be recovered (optional)
- RMAN cleans up after itself, deleting datapump file and temporary instance files



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The logo for Enkitema, featuring a stylized white wave or swoosh above the word "enkitec" in a lowercase, serif font.

Cross-Platform Backup/Restore

- Great for migrations
- Prior to 12.1, only supported when target is Exadata
- Allows for shorter downtime when moving across platforms



Cross-Platform Backup/Restore

- Methodology
 1. Perform backup of the source database
 2. Restore to the new target database
 3. Take periodical incremental backups and restore to target
 4. Place tablespaces in read-only mode, take final incremental backup
 5. Restore final incremental backup to target database
 6. Import tablespace metadata into target database



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RMAN Duplicate - Old School

- Each channel is assigned a datafile
 - Files assigned to channels starting with largest first
 - When a file is finished, the next largest available file is copied
- Works perfectly when all datafiles are same size
- What if we have different sized datafiles?



What Does This Mean?

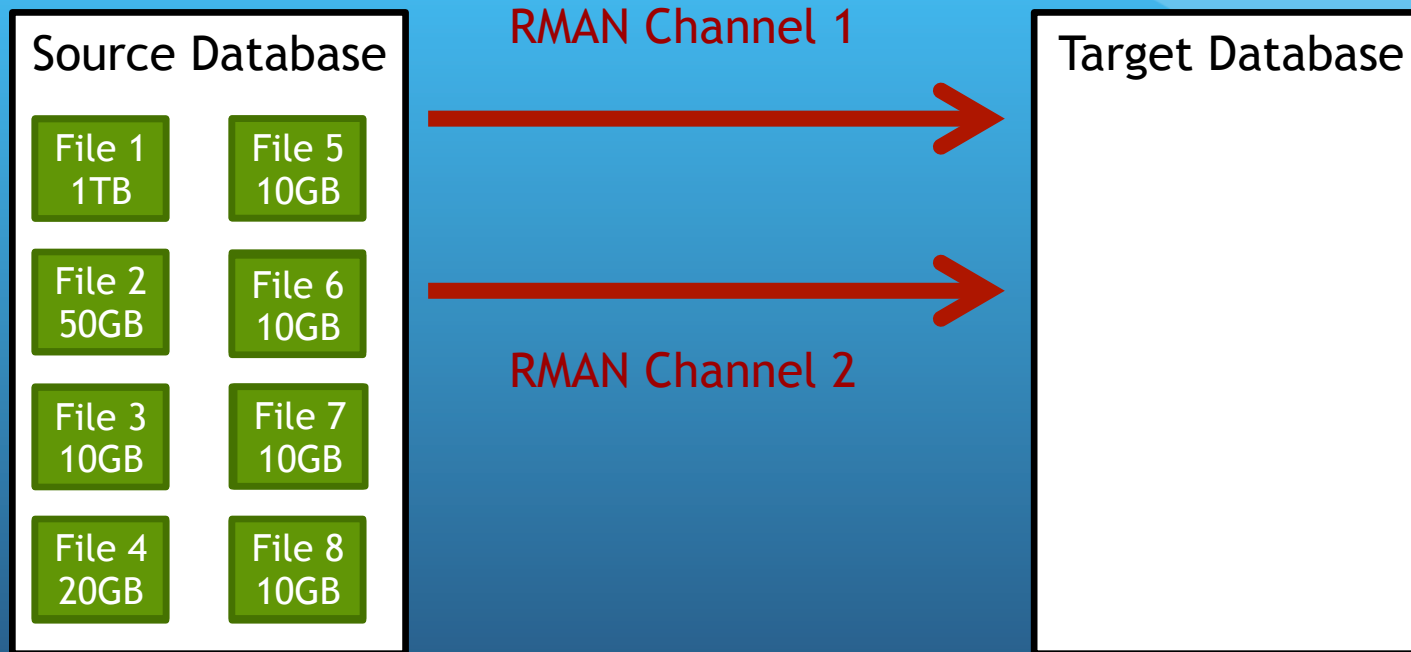
- Imagine dozens of datafiles
 - Ranging from 50GB to 9TB
- Allocate too many channels, they will sit idle
- Don't allocate enough channels, wait on largest datafiles

This is changed in 12c

- Active duplicate utilizes backupsets



RMAN Duplicate Channel Allocation



Duplicate With Backupsets

- Active duplicate defaults to use backupsets
 - This gives us all of the benefits of backupsets, with active duplicate
 - PIECE SIZE
 - COMPRESSION
- Empty space moves much faster



Duplicate With Backupsets

- Example code
- You can use multiple auxiliary channels

```
RMAN> run {  
2> allocate channel d1 device type disk;  
3> allocate channel d2 device type disk;  
4> allocate channel d3 device type disk;  
5> allocate auxiliary channel s1 device type disk;  
6> duplicate target database for standby  
7> from active database piece size 500M;  
8> }
```

Duplicate With Backupsets

- What the output looks like

```
channel s1: starting datafile backup set restore
channel s1: using network backup set from service cloudy
channel s1: specifying datafile(s) to restore from backup set
channel s1: restoring datafile 00001 to +SMITHERS/windy/datafile/
system.273.807276333
channel s1: restoring section 1 of 2
channel s1: restore complete, elapsed time: 00:00:15
channel s1: starting datafile backup set restore
channel s1: using network backup set from service cloudy
channel s1: specifying datafile(s) to restore from backup set
channel s1: restoring datafile 00001 to +SMITHERS/windy/datafile/
system.273.807276333
channel s1: restoring section 2 of 2
```

Duplicate With Backupsets

- Let's look closer
- Using a utility called dstat, we can see what's going on
- `dstat -dnyc -D xvda,xvde,xvdf,xvdg -N eth0 -C total`
- Using a utility called dstat, we can see what's going on

Duplicate Using Backupsets

--dsk/xvda----		dsk/xvde----		dsk/xvdf----		dsk/xvdg-		--net/eth0-		----total-cpu-usage----							
read	writ:	read	writ:	read	writ:	read	writ:	recv	send	usr	sys	idl	wai	hiq	siq		
0	0 :	0	35M:	0	32M:	8192B	34M	13M	289k	1	0	90	9	0	0		
0	0 :	0	36M:	0	39M:	0	36M	109M	2168k								
0	0 :	0	37M:	32k	37M:	32k	38M	116M	2299k								
0	0 :	0	38M:	0	37M:	0	37M	116M	2345k								
0	0 :	32k	21M:	96k	22M:	56k	21M	65M	1311k	0	1	97	1	0	0		
0	0 :	16k	0 :	16k	16k:	32k	16k	52B	508B	0	0	100	0	0	0		
0	0 :	16k	4096B:	32k	0 :	48k	0	11k	10k	0	0	100	0	0	0		
0	4096B:	0	46M:	32k	44M:	16k	44M	548B	743B	1	0	85	14	0	0		
0	0 :	0	44M:	0	46M:	24k	46M	532B	1220B	1	0	84	15	0	0		
0	16k:	0	26M:	0	29M:	8192B	29M	1065k	26k								
0	0 :	16k	48M:	16k	45M:	32k	42M	296B	450B								
0	0 :	0	46M:	0	46M:	0	46M	426B	759B								
0	0 :	0	43M:	0	46M:	0	49M	584B	434B	1	0	85	14	0	0		

empty datafile

non-empty datafile

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12c Includes SYSBACKUP Role

- Special role that only has backup privileges
 - For example, SYSBACKUP does not include `SELECT ANY TABLE`
- Recommended method for connecting to RMAN

A Few More Things...

- Image copy backups support section size
- Storage snapshot optimizations
- Specify that duplicated database does not open after duplication





Questions?

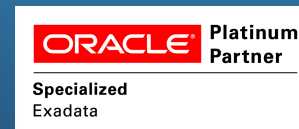
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