

Oracle Backup and Recovery (RMAN) @ Bank of America

Lakshman Lingam

DBA Team Manager

Bank of America Merrill Lynch (BAML)

Global Markets, Finance & Futures

Bank of America

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- **In the US, Bank of America serves:**
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 - 5,700 retail banking offices and about 17,800 ATMs
 - Online banking services over 30 million active customers
- **Among the world's leading wealth management companies and is a global leader in corporate and investment banking**
- **Bank of America serves clients via operation in more than 40 countries**

Data Centers

Leverage 1000s of Oracle Databases

- **Effectively manage the Oracle infrastructure leveraging a multi-tiered (0-6) strategy based on criticality of data and the Oracle Maximum Availability Architecture (MAA)**
 - All tiers utilize RMAN for Oracle database backup / recovery and many use Oracle Data Guard for business continuity
- **Backup strategy for the top data tiers includes:**
 - **Fast Recovery Area (FRA) sized for 7 day retention on disk using a weekly full (level 0), daily incremental backup (level 1) and archived logs**
 - Backup to FRA at both primary and Oracle Data Guard locations
 - **Backup of FRA to tape from the Oracle Data Guard Database**
 - Weekly tape backup maintained for 90 days
 - Monthly tape backup maintained for 7 years

Managing the Backup Infrastructure

For Oracle Databases

- Production data amounts are growing which naturally multiplies in the backup infrastructure
- Bank of America is successfully using RMAN in a two-prong approach to reducing the backup storage footprint:
 - Full and incremental Oracle database backup strategy
 - RMAN backup compression level = BASIC which is included in Oracle Database 11g Enterprise Edition
- Our RMAN storage optimization strategy reduces both disk and tape consumption

Storage Savings with RMAN

Full Backup Effective Space Savings > 7x

ORACLE Enterprise Manager
Grid Control 11g

Home Targets Deployments Alerts Compliance Jobs Reports My Oracle Support

Cluster: qm1p-cluster > Cluster Database: qmfdwp_tel.US.ML.COM > View Backup Report > Logged in As SYS

Backup Report: Job qmfdwp_tel_10_bkp

The data is retrieved from the database control file.

Search

By Job: Backup Job Go

By Date: Start Date End Date Go

Results

Input Summary	Archived Log	Control File	SPFile
Datafile Files Backed Up 1268 Distinct Files 1268 Distinct Tablespaces 47 Total Size 23.86T Oldest Checkpoint Sep 9, 2011 8:12:22 Time PM Newest Checkpoint Sep 9, 2011 Time 10:09:39 PM	Files Backed Up 41 Distinct Files 41 Total Size 99.01G Recovery Range Sep 9, 2011 8:02:43 PM - Sep 9, 2011 10:27:21 PM	Files Backed Up 2 Distinct Files 1 Total Size 479.34M Oldest Checkpoint Sep 9, 2011 Time 10:23:57 PM Newest Checkpoint Sep 9, 2011 Time 10:38:29 PM	Files Backed Up 2 Distinct Files 1 Total Size 0.00K Oldest Modification Sep 9, 2011 Time 7:47:13 PM Newest Modification Sep 9, 2011 Time 7:47:13 PM

Output Summary

Backup Set
Total Backup Sets 740
Total Size 3.10T
Oldest Backup Sep 9, 2011 8:12:21 PM
Newest Backup Sep 9, 2011 10:38:29 PM
Compression Ratio 7.721

Compressed full backup size = 3.10TB
Space savings = 7.7x

Storage Savings with RMAN ...

Archived Logs Effective Space Savings > 4x

ORACLE Enterprise Manager
Grid Control 11g

Home Targets Deployments Alerts Compliance Jobs Reports My Oracle Support

Cluster: qm1p-cluster > Cluster Database: qmfcawp_tel.US.ML.COM > View Backup Report > Logged in As SYS

Backup Report: Job qmfcawp_tel_arch_bkp

The data is retrieved from the database control file.

Search

By Job: Backup Job By Date: Start Date End Date

Results

Input Summary

Archived Log	Control File	SPFile
Files Backed Up 98	Files Backed Up 1	Files Backed Up 1
Distinct Files 98	Distinct Files 1	Distinct Files 1
Total Size 256.78G	Total Size 239.67M	Total Size 0.00K
Recovery Range Sep 9, 2011 12:02:54 PM - Sep 9, 2011 8:02:46 PM	Oldest Checkpoint Time Sep 9, 2011 8:09:02 PM	Oldest Modification Time Sep 9, 2011 7:47:13 PM
	Newest Checkpoint Time Sep 9, 2011 8:09:02 PM	Newest Modification Time Sep 9, 2011 7:47:13 PM

Output Summary

Backup Set
Total Backup Sets 50
Total Size 53.89G
Oldest Backup Sep 9, 2011 8:04:35 PM
Newest Backup Sep 9, 2011 8:09:02 PM
Compression Ratio 4.769

Compressed size = 53.89G
Space savings = 4.8x

Storage Savings with RMAN ...

Incremental Level 1 > Effective Space Savings > 50x

ORACLE Enterprise Manager
Grid Control 11g

Home Targets Deployments Alerts Compliance Jobs Reports My Ora

Cluster: gm1p-cluster > Cluster Database: gmfdwpl_tel.US.ML.COM > View Backup Report > Logged in

Backup Report: Job gmfdwpl_tel_l1_bkp
The data is retrieved from the database control file.

Search

By Job
Backup Job gmfdwpl_tel_l1_bkp.13301

By Date
Start Date End Date

Results

Input Summary

Datafile	Archived Log	Control File	SPFile
Files Backed Up 1280	Files Backed Up 134	Files Backed Up 2	Files Backed Up 2
Distinct Files 1280	Up 134	Distinct Files 1	Distinct Files 1
Distinct Tablespace 48	Distinct Files 134	Total Size 479.34M	Total Size 0.00K
Total Size 24.24T	Total Size 409.37G	Oldest Checkpoint Sep 25, 2011	Oldest Modification Sep 25, 2011
Oldest Checkpoint Sep 25, 2011	Recovery Sep 24, 2011 8:58:16 PM - Sep 25,	Time 10:08:58 AM	Time 6:50:51 AM
Time 9:35:25 AM	Range 2011 10:16:59 AM	Newest Checkpoint Sep 25, 2011	Newest Modification Sep 25, 2011
Newest Checkpoint Sep 25, 2011		Time 10:40:01 AM	Time 6:50:51 AM
Time 10:00:29 AM			

Output Summary

Backup Set	
Total Backup Sets 756	
Total Size 437.80G	
Oldest Backup Sep 25, 2011 9:35:24 AM	
Newest Backup Sep 25, 2011 10:40:01 AM	
Compression Ratio 57.622	

Compressed size = 437G
Space savings = 57.6x

Benefits of Using RMAN Optimizations

- **An Recovery Manager (RMAN) full / incremental backup strategy is integral to our data protection strategy for the Oracle database**
 - RMAN backup compression is a natural extension of our current deployment
- **Advantages of RMAN storage optimizations over non-Oracle offerings for the Oracle database include:**
 - RMAN is integrated with the Oracle database eco-system from Oracle Data Guard to Oracle Enterprise Manager (EM)
 - Storage consumption savings extend from disk to tape backup media
 - Less moving parts (single technical resource) and reduced costs (RMAN is free)

RMAN Best Practices

- Use of BCT feature for faster incremental backups.
- In RAC deployments, use of service to spread channels across RAC
- In Standby, as DB in mount mode, channel distribution to specific instance instead of service to spread channels across instances
- Use of RMAN for refreshes across environments.
- Use of RMAN to build data guards
- FRA backup to tape is by using “backup recovery area” command rather than OS backup.

THANK YOU!