ORACLE®

Colgate-Palmolive: Increased Performance with RMAN

COLGATE-PALMOLIVE COMPANY

"Our Oracle9i RMAN backups run 50% faster than previous user managed backups and tape consumption was reduced by 15%!"

---Brian Klein
DBA, Colgate Palmolive

COLGATE-PALMOLIVE COMPANY

Corporate Profile

- **$9.9 billion global company serving people in over 200 countries**

- **Leading consumer products company offering popular name brands products domestically and abroad**

- **Millions of people trust and use Colgate-Palmolive products each day**

- **Over 35,000 employees**

- **http://www.colgate.com/**

Data Protection Challenges and Objectives

- **Achieve cost savings by reducing tape media usage and personnel time of tape handling associated with backing up over 49TB of data**

- **Automate the backup and recovery processes increasing reliability and availability of databases**

- **Improve backup performance for faster more efficient backups**

Oracle Environment

- **Oracle Databases 9.2.0.4**

- **Over 90 databases totaling about 49 TB of data**

  - **Production includes 30 DB with about 16TB**

  - **Test/Development includes 60 DB with about 33TB**

- **Workload: OLTP and Data Warehouse**

- **Application: SAP**

  - **Supply Chain Management, Data Warehouse, CRM, Finance and HR**

OVERVIEW

Colgate-Palmolive architected their global operations utilizing the Oracle database as the backbone for mission critical SAP® Applications. Protecting their data is of critical importance prompting Colgate-Palmolive to recently make substantial changes in their backup infrastructure including migrating from user-managed database backups to Oracle Recovery Manager (RMAN).

By leveraging the RMAN technology, Colgate-Palmolive automated Oracle data protection achieving better performance, while reducing personnel time requirements and tape consumption.

INTRODUCTION

Colgate-Palmolive is a leading global consumer products company, tightly focused on Oral Care, Personal Care, Home Care and Pet Nutrition. Colgate sells its products in over 200 countries and territories around the world under such internationally recognized brand names as Colgate, Palmolive, Mennen, Softsoap, Irish Spring, Protex, Sorriso, Kolynos, Ajax, Axion, Soupline, Suavitel and Fab, as well as Hill's Science Diet and Hill's Prescription Diet pet foods.

Their production data center utilizes 30 Oracle Databases with 16 TB of mission critical data supporting their SAP enterprise modules including Supply Chain Management, Customer Relations Management, Finance and Human Resources. A second data center is responsible for managing over 60 test and development databases with approximately 33 TB of data. This facility provides disaster recovery protection for their production data center located 800 miles away.

Both data centers work cohesively to maintain data protection, 24x7 availability and disaster protection for over 49TB of data residing in Oracle Databases.

DATA PROTECTION STRATEGY

Colgate-Palmolive has successfully implemented a centralized backup management infrastructure using Recovery Manager (RMAN) integrated with Tivoli Storage Manager backing up to a Storage Area Network (SAN). With their implementation of RMAN, they chose to maintain a similar backup schedule as they had been previously using:

Colgate Palmolive – Centralized Backup Management

- **Online RMAN backups integrated with Tivoli TDP**
- **Media Management Layer (MML): IBM Tivoli Storage Manager, Version 5.2 with TDP module for Oracle Database**
- **IBM 3584 Library with 18 SAN connected LTO-2 tape drives**
- **Full (level 0) backups are scheduled every other day for production databases and once a week for test and development databases**
- **Backup retention period varies by class of system**
  - **Production 14 days**
  - **Development 28 days**
  - **Test 14 Days**
- **Backup tapes are vaulted off-sited daily at the production data center.**
- **In the event of disaster, vaulted tapes are returned to the production facility within 4 hours or sent to the Indiana facility within 8 hours as appropriate**

RMAN Configuration

- **FILESPERSET = 4**
- **MAXOPENFILES = 4**
- **Backup_tape_io_slaves=False**
- **Tape_asynch_io = True**
- **Backup Optimization = On**
- **Control File Record Keep Time = Retention Time**

- Production – Full tape backup every other day
- Test / Development – Weekly full tape backup

The archive logs are backed up on a time-based schedule varying by database. Some databases require archive logs to be backed up as frequently as twice per hour while an 8-hour backup interval may be sufficient for others. First backed up to a disk pool, the archive logs are then migrated to tape.

By establishing a backup and recovery standard to be used across their environment, Colgate runs one script called "RunRMAN" which then generates RMAN scripts for the target databases. Standardizing backup and recovery procedures increases manageability in a multi-database environment and decreases human errors while minimizing manual intervention.

INCREASED BACKUP EFFICIENCY WITH RMAN

The experienced DBA team at Colgate-Palmolive performed extensive RMAN testing prior to implementing RMAN in their 16 TB production environment. As part of their testing suite, they compared the backup performance using RMAN against their previous backup scripts. The results repeatedly proved that RMAN backups were more efficient than their previous user-managed backups.

The following test results comparing RMAN to user-managed backups for two of their databases are representative of their of their overall findings:

	User Managed Backup Size in TB (size of DB)	Resulting RMAN Backup Size in TB	Media Savings due to RMAN Compression*	RMAN Backup Run Time (Hr:Min)	User Managed Backup Run Time	Backup Time Savings with RMAN
1	6.1	5.5	9.8%	12:08	22:54	47.02%
2	3.6	3.3	8.3%	8:05	17:14	53.09%

With Oracle9i RMAN, backup compression is achieved since only blocks that have been used by the database are backed up, instead of all allocated blocks as with user-managed backups.

In the future, Colgate is planning to incorporate incremental backups into their data protection architecture to further reduce tape consumption.

During their analysis and testing period, RMAN consistently completed backup jobs in about 50% of the time required for comparable "User Managed" backups. While tape consumption savings varied by database, their overall savings was about 15%.

By replacing user-managed backups with RMAN, Colgate-Palmolive reduced I/O issues associated with performing backups. Backing up the database in hot backup mode generated additional redo and often caused "wait situations" in the database. A clear advantage with RMAN online backups is the elimination of hot backup mode and generation of additional redo during backups.

RMAN RESUMABLE BACKUP AND RESTORE SAVES TIME

With their previous scripted backup infrastructure, if a backup failed prior to completion, it usually had to be restarted at the beginning. With databases as large as 5TB, restarting a backup could be a huge time drain especially if it was 50% or more complete before experiencing a problem.

With the fault tolerance built into Oracle9*i* RMAN, if a backup or restore job fails before completion, RMAN resumes the job where it stopped without having to restart from the beginning of the job. The Colgate-Palmolive DBA responsible for RMAN implementation found this to be one of the many advantages achieved with RMAN.

CONFIGURING RMAN FOR OPTIMAL PERFORMANCE

The implementation plan for transition to RMAN from user-managed backups was tested and implemented at Colgate's Test and Development Data Center with over 60 Oracle Databases. As part of the RMAN testing process, Colgate-Palmolive benchmarked backup and restore times with RMAN against their previous backup methods.

They experimented with various multiplexing levels, to determine the optimal parameters for their environment. The level of multiplexing is the number of files read *simultaneously* on a *single RMAN* channel and then written to the same backup piece. Multiplexing is determined by the lesser of FILESPERSET, MAXOPENFILES, and the number of files read by a single channel. There is a tradeoff between backup and restore performance: higher multiplexing increases backup performance, but can also decrease restore performance.

They determined the best balance for their environment between backup and restore speed would be achieved by setting FILESPERSET = 4. By limiting the files per backup set to 4, they minimized the need for time-consuming tape repositions during single file or partial restore operations.

With this simple RMAN tuning exercise, they were able to achieve an over 40% increase in backup speed (over user-managed backups), while maintaining optimal restore time.

RMAN CATALOG INCREASES MANAGEABILITY

Colgate-Palmolive utilizes an RMAN catalog for increased management of their Oracle Database backup infrastructure. Having two separate physical data centers added to the complexity and required consideration of how to best manage and protect the catalog:

1. Should they employ two separate RMAN catalogs; one for each data center?

    a. With a catalog at each location, dependency on the WAN would be eliminated during restores.

b. The catalogs could be replicated to the other site for disaster recovery purposes.

2. Should they maintain a single repository at the production data center, then replicate it to the test/development and disaster recovery data center?

a. The single catalog would be available at either site in the event of a disaster.

While both are viable options, Colgate-Palmolive chose to implement a separate repository for each location and replicate it to the alternate site. Since they maintained a separate Tivoli catalog at each location, this would represent a similar strategy. As best practice recommends, they employ one RMAN repository for all of their Oracle database versions with the repository schema upgraded at the highest Oracle version used.

During the actual backup, the catalog is not connected to the target database and all backup metadata is written to the controlfile. After the backup completes, the RMAN catalog is then resynchronized with the control file. This reduces dependence on the network during the backup. During a restore, they rely on the RMAN catalog since it contains all the current and historical backup metadata based on user-defined retention policies.

CONCLUSION

Colgate Palmolive relies on Oracle Recovery Manager (RMAN) for protecting over 49TB of data residing in their 90+ Oracle databases. RMAN delivered the results Colgate-Palmolive demanded to successfully meet their service level agreements:

- Reliability and ease of use for backup and recovery
  - o Restores are substantially easier being reliably performed with the issue of one RESTORE command
  - o Corruption checking during backup and restore
  - o RMAN repository for increased manageability in a multi-database environment
- Greater backup efficiency
  - o Backup times were reduced by over 50%
  - o Reduced I/O issues associated with previous backup methods
  - o RMAN does NOT generate additional redo during the backup
- Fault tolerant with Resumeable backup and restore capability
- Tape consumption was reduced by about 15%
  - o This savings will increase substantially when RMAN incremental backups are incorporated into their backup schedule.
- Seamless integration with Tivoli Storage Manager
- Excellent value proposition; no additional cost with the Oracle database

ORACLE®