



## Trilegiant: Online RMAN Backups Protect over 8TB of Data



*RMAN incremental backups reduced tape consumption by 40%!*

*--Dinis Gomes  
DBA, Trilegiant*

### Corporate Profile: Trilegiant

- Premier membership-based provider of consumer goods
- Experienced in design and deploying customer loyalty programs
- Over 30 years of customer service with 3000+ employees
- <http://www.trilegiant.com>

### Trilegiant: Data Protection Challenges and Objectives

- Efficiently manage online backups with up to a 7-year data retention SLA
- Reduce tape consumption with incremental backups
- Reliably protect all database files required for successful data recovery while maintaining 24 x 7 availability

### Oracle Database Backup and Recovery Solution

- Oracle Databases 8.1.7.4 and 9.2.0.4
- Oracle Recovery Manager (RMAN) for Online Backups
- 50 Databases with 8 – 10 TB of data
- Media Management Software: Legato, Networker 7.1
- Platform: Solaris
- Tape Storage: SAN attached StorageTek L700 with 10 LTO-1 tape drives
- RMAN interface Used: Oracle Enterprise Manager (OEM)
- RMAN Catalog: Located in an Independent Database

## OVERVIEW

Trilegiant is the premier membership-based provider of travel, shopping, health, dental, entertainment, and consumer protection services. Through their membership club and loyalty product businesses, Trilegiant delivers high-value programs and services to their members.

Founded in 1973, Trilegiant has grown to serve more than 25 million members across America. Headquartered in Norwalk, Connecticut, Trilegiant employs over 3000 people operating in seven facilities located in six states. Trilegiant is the successor to Cendant Membership Services, Inc. and Cendant Incentives.

Oracle databases are used for mission critical data from company financials to member services. For over three years, Trilegiant has used Recovery Manager (RMAN) to protect their Oracle databases.

## INTRODUCTION

With over 8Tb of data and service level agreements requiring up to 7-year data retention, Trilegiant needed a backup and recovery strategy that was reliable and manageable. The solution had to be cost effective making efficient use of media and personnel resources, while maintaining 24 x 7 availability. For over three years, Trilegiant has successfully met their data protection objectives for the Oracle database with RMAN.

The seamless integration between RMAN and Legato Networker, Trilegiant's tape management software, provided a reliable centralized backup management strategy. Using RMAN, the DBAs at Trilegiant were able to:

- Automate database backups and restores saving valuable time resources
- Utilize incremental backups saving tape consumption
- Perform online backups meeting availability requirements
- Maintain responsibility and control of database backups

Most importantly, Recovery Manager (RMAN) provided the reliability that Trilegiant required.

## DATA PROTECTION STRATEGY

Trilegiant designed a backup and tape retention schedule based on three tiers of data/systems. Each data tier has a corresponding recovery service level agreement. The majority of their data (over 5 TB) are Production 2 systems.

**Trilegiant realized an immediate benefit with a few new RMAN Oracle 9i features:**

- **Resumable Backup and Restore** has helped meet backup windows by restarting failed backups at the point of failure not the beginning of a backup
- **CONTROLFILE AUTOBACKUP** automates protection of the control file after any backup or copy operation
- **Online dynamic re-linking of media management layer (MML)** has saved time when upgrading Legato NetWorker

Production 1 Systems	3 Year Retention Policy – (Recover to any point in time from the current date to the previous three years.)
Production 2 Systems	7 Year Retention Policy – (Recover to any point in time from the current date to the previous seven years.)
Staging Systems	30 Day Retention

Their backup schedule includes level 0, 1 and archive log backups. Depending on the day, the backup tapes are placed offsite or remain within the tape library for more immediate use.

- Level 0 backups for offsite tape storage are scheduled every Sunday.
- Level 0 backups to be retained in the tape library are scheduled every Wednesday.
- Level 1 backups are scheduled Monday, Tuesday, and Thursday-Saturday to be retained within the tape library.
- Tapes are physically moved offsite on Thursday therefore Wednesday’s Level 0 (retained in the library) helps avoid the need to recall an offsite tape.
- Archive log backups are placed in the offsite pool to meet its corresponding SLA of 3 or 7 years.

Trilegiant Backup Schedule for datafiles and archive logs

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Level 0 ➔ 3 or 7 YEAR	Level 1 ➔ DAILY	Level 1 ➔ DAILY	Level 0 ➔ DAILY	Level 1 ➔ DAILY	Level 1 ➔ DAILY	Level 1 ➔ DAILY
Archive Log ➔ 3 or 7 YEAR						

## MANAGING BACKUP METADATA

Oracle’s best practice is to create one RMAN catalog to manage all database backup information in a multi-database environment. With over 50 databases and over 8TB of data, Trilegiant implemented the RMAN catalog to centralize database backup metadata. An RMAN catalog is important in Trilegiant’s environment to maintain backup history to maintain their 3 and 7 year backup retention periods.

In their disaster recovery planning, the RMAN catalog(s) is the first database to be recovered. The catalog is protected with a level 0 daily backup. Trilegiant has a backup strategy for both the RMAN and Legato catalogs since both are needed for tape restores. Immediately following the RMAN catalog backup, the Legato catalog is backed up.

The recovery catalog database uses its control file as the primary repository maintaining backup metadata. A key advantage with RMAN starting with Oracle 9i is the CONTROLFILE AUTOBACKUP command, which automatically backs up

“RMAN has made my life much easier. It keeps track of all backup metadata and information is readily available by running reports from the RMAN Catalog”.

*Dinis Gomes, Trilegiant*

the control file. When using the control file as the backup metadata repository, an important parameter to review / set is the CONTROL FILE RECORD KEEP to insure it matches your specific requirements. By default, this parameter is set to 7 days.

## RMAN INTEGRATION WITH LEGATO

“The integration between RMAN and Legato Networker is seamless”.

*Ken Kosakoff, Trilegiant*

Per Ken Kosakoff, Sr. Systems Administrator at Trilegiant, the RMAN integration with Legato Networker is seamless. With years of experience using both RMAN and Legato, Trilegiant has tuned their environment for maximum performance. By understanding how Legato indexed RMAN backups, they were able to reduce the Legato index size for database related entries and avoid timeout errors reading the index on the media database.

By upgrading to Networker 7.1 and slightly modifying the backup scripts (as seen below), it reads through the indexes faster. When allocating channels in RMAN, they put a forward slash as the first and last character of the format string, making it mimic a UNIX file system. This increases Legato’s read performance of the index lookups Legato performs when RMAN requires a search through media index.

When RMAN passes the saveset name to Legato, the entry into the media index looks like: /HostA\_DBName\_UniqueString\_Sequence#\_1/. An actual example from a Trilegiant backup: /HostA\_RCDB\_qifo9ouk\_5999\_1/

### Trilegiant example of a script with the forward slash:

```
connect target;

run {
    allocate channel t1 type 'SBT_TAPE' parms
'ENV=(NSR_SERVER=bkup_server,NSR_DATA_VOLUME_POOL=Tape_Pool)'
format '/HostA_%d_%u_%s_%p/';
    allocate channel t2 type 'SBT_TAPE' parms
'ENV=(NSR_SERVER=bkup_server,NSR_DATA_VOLUME_POOL=Tape_Pool)'
format '/HostA_%d_%u_%s_%p/';
    allocate channel t3 type 'SBT_TAPE' parms
'ENV=(NSR_SERVER=bkup_server,NSR_DATA_VOLUME_POOL=Tape_Pool)'
format '/HostA_%d_%u_%s_%p/';
    allocate channel t4 type 'SBT_TAPE' parms
'ENV=(NSR_SERVER=bkup_server,NSR_DATA_VOLUME_POOL=Tape_Pool)'
format '/HostA_%d_%u_%s_%p/';

    backup incremental level 0 ( database filesper 8 include current controlfile );
    sql 'alter system archive log current';
    backup archivelog all delete input filesper 10;
}
```

For additional performance gains, Trilegiant eliminated synchronous I/O to the tape drives by enabling TAPE\_IO\_SLAVES and re-calculating LARGE\_POOL\_SIZE.

## CONCLUSION:

Trilegiant relies on Oracle Recovery Manager (RMAN) to protect over 8 TB of mission critical data residing in Oracle databases. First implementing RMAN 8i, they've entrusted the reliability and integrity of Oracle database backups for over three years to RMAN. With RMAN's intimate knowledge of the Oracle database and integration with Legato Networker, it is a critical component of their enterprise data protection infrastructure.

### For More Trilegiant RMAN Information

- [Trilegiant Sample Backup Script](#)

### Oracle Documentation

- [Oracle9i Recovery Manager User's Guide](#)
- [Tuning Oracle Recovery Manager](#)
- [RMAN Performance Testing at Sun Customer Performance Center: 1 TB/hr Backup & Restore](#)
- [HP & RMAN Performance Benchmarking: 3 TB/hr](#)



Trilegiant: Online RMAN Backups Protect over 8TB of Data

July 2004

Authors: Donna Cooksey, Senior Product Manager, Oracle Corporation

Dinis Gomes, DBA, Trilegiant

Ken Kosakoff, Sr. Systems Administrator, Trilegiant

Oracle Corporation  
World Headquarters  
500 Oracle Parkway  
Redwood Shores, CA 94065  
U.S.A.

Worldwide Inquiries:  
Phone: +1.650.506.7000  
Fax: +1.650.506.7200  
[www.oracle.com](http://www.oracle.com)

Oracle is a registered trademark of Oracle Corporation. Various product and service names referenced herein may be trademarks of Oracle Corporation. All other product and service names mentioned may be trademarks of their respective owners.

Copyright © 2004 Oracle Corporation  
All rights reserved.