White Paper:
Optimizing Oracle® Database Protection
Using CommVault Simpana™ Software

Sponsored by: CommVault® Systems Inc

August 7, 2008

Written By

Jerome M. Wendt
Lead Analyst, DCIG Inc

Abstract: Sustaining a healthy Oracle environment demands excellence in data management performance, rapid recovery, and simplified operations. Oracle designed its RMAN interface for these purposes, requiring that vendors of data management software understand and integrate well with RMAN. As reported by a customer and as described by its own technical experts, CommVault Simpana integration with RMAN appears to offer critical advantages in managing and recovering Oracle data for both local and remote data recovery.

Contents

Oracle's Data Protection Paradox

Providing the appropriate level of data protection for enterprise Oracle databases is becoming a corporate paradox. Oracle databases contain the data which companies need to conduct and sustain their ongoing daily operations. The criticality of this data to day-to-day business operations as well as fast access to copies of it for fast and easy recoveries make it imperative that Oracle database protection maintain a high ranking on corporate priority lists. It is identifying a cost effective solution that matches Oracle's data protection requirements with corporate expectations that becomes the paradox.

Over the years both backup software and Oracle have taken some steps to address this. Enterprise backup software introduced multiplexing to expedite Oracle database backups. Oracle at the same time added its own data protection features to improve the protection and recovery of its databases. Automatic storage management (ASM); detecting and correcting table block corruption; a recovery manager (RMAN) application programming interface (API); partitioned tables and indexes; and simple and advanced replication are just some examples of new features that Oracle added to meet business's objectives for providing affordable but effective Oracle database protection and recovery options.

Of the features included with Oracle, RMAN is becoming a pre-eminent feature that a growing number of Oracle DBAs use as their primary means to provide an optimal level of data protection and recovery for their business's Oracle databases. This growing adoption among enterprise users is resulting in new RMAN features being added to almost every release of Oracle.

The trouble that Oracle DBAs face is taking advantage of these new underlying features found in Oracle RMAN. Companies must typically dedicate an Oracle DBA to develop scripts that call and utilize these specific features within RMAN. Creating and testing RMAN scripts, scheduling their execution, troubleshooting them when problems arise, performing ongoing maintenance

and then tailoring them for different versions of Oracle are new tasks that Oracle DBAs are not always prepared or equipped to manage. In enterprise shops, it is not uncommon for companies to need to dedicate a team of Oracle DBAs to develop and update RMAN scripts for their company's specific Oracle database protection requirements.

To take advantage of Oracle RMAN's latent and new features is creating a new requirement to simplify and automate the process of RMAN script management without the need to dedicate corporate Oracle DBAs to this task. Automating this process necessitates that enterprise data protection software evolve in order provide a higher level of integration with Oracle RMAN while minimizing the need for intervention on the part of Oracle DBAs to manage these scripts.

Requirements that data protection software should now provide to expedite backup and recovery include:

- Automated creation and management of new Oracle RMAN scripts
- Continued support for tape
- Faster backups and recoveries of all size Oracle databases
- Simplified management of existing Oracle RMAN scripts
- Support new deduplicating disk appliances
- Transform Oracle DBAs from RMAN scripting experts to data protection managers
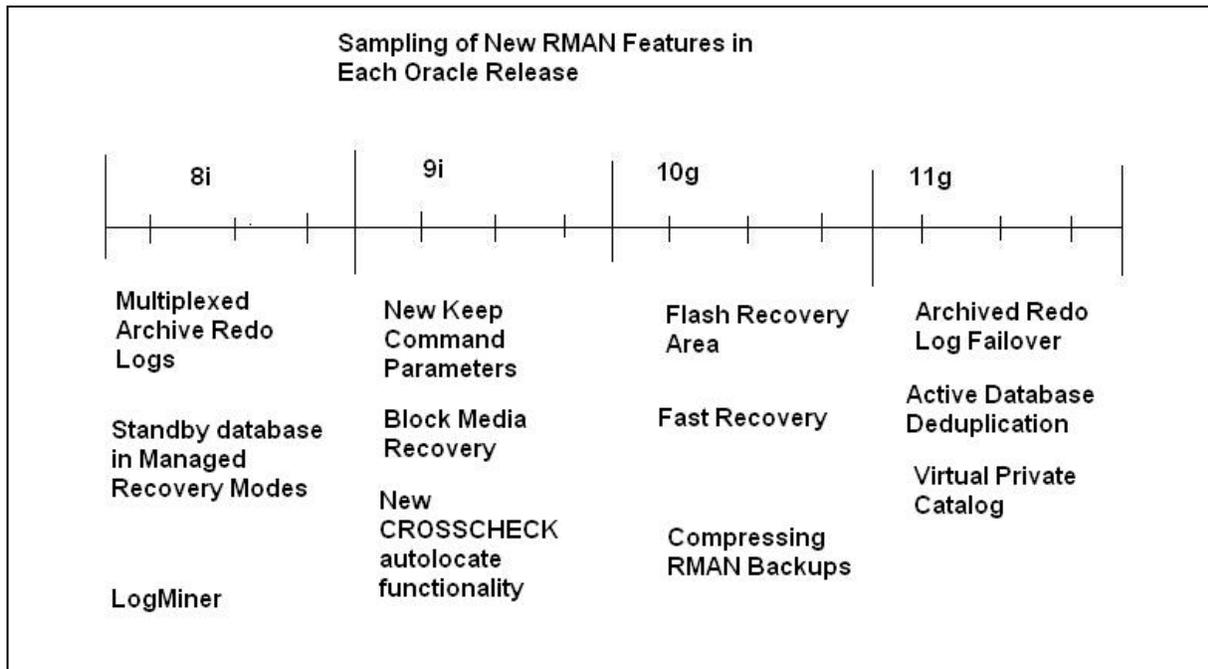
Sampling of New RMAN Features in
Each Oracle Release

8i	9i	10g	11g

Multiplexed
Archive Redo
Logs

New Keep
Command
Parameters

Flash Recovery
Area

Archived Redo
Log Failover

Active Database
Deduplication

Standby database
in Managed
Recovery Modes

Block Media
Recovery

Fast Recovery

Virtual Private
Catalog

New
CROSSCHECK
autolocate
functionality

Compressing
RMAN Backups

LogMiner

Figure 1. Timeline of New RMAN Features in Recent Oracle Releases

Automating Oracle Database Protection

New corporate requirements for a simpler, easier and more integrated method for Oracle database protection dictate that a company identifies software that helps to automate the management of its Oracle database protection. As a company considers its options, CommVault Simpana should move squarely into a company's focus as a preferred product to use in this capacity.

CommVault Simpana is already known for its support of a wide range of operating systems including Linux, Windows and the many different varieties of UNIX. It also provides tight integration with numerous applications. Its integrated 64-bit support for various Windows applications such as Microsoft Exchange, SharePoint and SQL Server is well established.

What is not so well known is CommVault Simpana's robust support for Oracle databases running on UNIX. Since many enterprise shops run Oracle databases on UNIX platforms, a company can take advantage of CommVault Simpana's existing integration with Oracle and UNIX that goes well beyond what other competitive data protection products provide.

A distinguishing feature of CommVault Simpana is its capability to automate the generation and management of Oracle Recovery Manager (RMAN) scripts. Automating this task removes many of an Oracle DBA's day-to-day burdens associated with creating and managing RMAN scripts that accompany the task of managing Oracle database backups and recoveries.

CommVault Simpana also gives a company more options when it comes to expediting Oracle database backups. A company no longer needs to use complex and propriety backup software methods for Oracle database protection or add the task of creating and managing RMAN scripts to the workload of its Oracle DBAs. By automating these tasks, a company can move beyond existing, more laborious Oracle data protection methods to the enhanced, integrated data protection and recovery options that CommVault Simpana provides.

DCIG Quick-Take:
Backup Software Multiplexing

Multiplexing is found in most enterprise backup software products and interleaves multiple backup data streams into one backup data stream to expedite the completion of Oracle backup jobs. Multiplexing or interleaving these multiple backup streams is typically done in order to stream backup data to tape drives quickly enough to avoid shoe shining (the repeated stopping and starting of a tape drive) which is caused by an insufficient or an inconsistent flow of data to the tape drive.

Multiplexing is used when the backup software is unable to use Oracle RMAN. Oracle RMAN provides much faster access to Oracle database during backups so that the backup software can stream data at a fast enough rate to the tape drive to avoid shoe shining. Using multiplexing provides a workaround since an Oracle DBAs can schedule multiple Oracle database backups to occur at the same time. Even though the backup of these individual databases runs slower than when using RMAN, by backing up multiple jobs at the same time it keeps the data flowing at a fast enough rate to avoid shoe shining on the tape drive.

However multiplexing presents a series of logistical problems for companies both in terms of managing the multiplexed backups and then recovering multiplexed data. When scheduling multiplexed backups, Oracle DBAs need to identify which backup jobs they should multiplex and how many backup jobs they should schedule to multiplex at one time. If they schedule too few backup jobs, the shoe shining problem on the tape drive can re-appear. If they schedule too many backup jobs, the tape drive cannot keep pace resulting in delayed or failed backups.

The other difficulty with multiplexing too many database backup jobs together is that it can result in large tape sets. This makes tape management more cumbersome since it requires an automated tape library large enough to handle all of the tapes. It also creates a dependency to have all of the tapes in the tape set available when the company needs to perform a recovery. These complexities associated with multiplexing have prompted more companies to switch to Oracle RMAN as their preferred method for Oracle backup and recovery.

CommVault Simpana's Data Protection Options

CommVault Simpana provides two methods for Oracle database protection:

- Multiplexing

- Oracle RMAN

CommVault Simpana supports the multiplexing of multiple Oracle backup streams but a company needs to carefully weigh the pros and cons of multiplexing to determine if this is really the right path a company should follow in its Oracle database backups.

- Multiplexing requires more time to setup, configure and manage than native backup data streams
- The complexity emerges from the need to select which Oracle backup jobs to interleave
- Multiplexed backup data takes longer to restore since data is stored in fragments and may be spread across multiple tapes
- Multiplexing should be turned off if a deduplicating disk appliance is introduced as a backup target since multiplexing negates some of the benefits of deduplication

Though multiplexing solves the immediate problem that a company may have in completing its tape backups, longer term multiplexing is an inferior solution when compared to doing backups using the more powerful, native RMAN APIs found in Oracle.

Some benefits that the Oracle RMAN APIs provide over backup software multiplexing include:

- ***RMAN can make direct calls into an Oracle database.*** Without Oracle integration, backup software is oblivious to the state of the Oracle database and provides Oracle DBAs with no assurance that the backed up Oracle database is coherent, useable or in a recoverable state. Oracle's RMAN avoids these issues since it ensures the data in the Oracle database is in a consistent, recoverable state as the data is backed up.

- ***Faster backups and restores.*** Oracle's RMAN APIs offers a number of different ways to extract and copy data from Oracle databases that are not natively available in backup software. Oracle's RMAN APIs give a company more choices as to how they wish to backup their Oracle databases and on what media format (disk or tape).

- ***Smaller sets of backup tapes.*** Multiplexing backup data streams can spread the data for an Oracle database across multiple tape drives resulting in the creation of multiple tape cartridges. To recover a specific Oracle database, all of these tapes are needed to complete the recovery. Using features natively available in Oracle RMAN, Oracle can backup a specific database much faster and store the data on fewer tape cartridges.

- ***Call upon server resources from multiple servers in an Oracle cluster.*** Backup software may be only able to use the resources from one server in an Oracle cluster when performing an Oracle database backup. Using Oracle's RMAN APIs, Oracle DBAs can configure the backup to call upon any of the available resources on any of the servers in the Oracle cluster.

Of course, to take advantage of these Oracle RMAN benefits typically requires that a company dedicate one or more Oracle DBAs to write, test and implement the necessary Oracle RMAN scripts. CommVault Simpana addresses this issue by automating the creation of the appropriate Oracle RMAN scripts that match the specific version of Oracle that CommVault Simpana will backup.

CommVault Simpana's Oracle RMAN Integration

To create these RMAN scripts, CommVault Simpana provides a GUI interface that Oracle DBAs use to select the Oracle databases that they wish to protect and the timeframe in which they plan to recover them. Once selected, CommVault Simpana generates the appropriate Oracle RMAN scripts that are based on the version of the underlying Oracle database that will be protected and the RMAN features found in that version of the Oracle database.

As part of the RMAN script generation, CommVault Simpana also generates the scripts that place the Oracle database data on the appropriate backend storage devices. The storage devices are automatically selected by CommVault Simpana based on the recovery timeframe specified by the Oracle DBA when the Oracle database protection is configured. Automatically selecting the right set of storage devices based on the recovery policies is a specific feature of CommVault Simpana that distinguishes CommVault Simpana from other enterprise backup software products.

DCIG Quick Take:
Understanding Oracle RMAN

Oracle Recovery Manager (RMAN) is a native backup tool provided with Oracle. Accessible through either a command line interface (CLI) or Oracle Enterprise Manager, RMAN can perform any of the different types of Oracle database backups (for example: cold, hot, and export) and store this backup data on either disk or tape. The main advantage that Oracle RMAN has over utilities found in backup software is that they provide Oracle DBAs more robust backup and recovery options than what backup software utilities offer. For instance, using the RMAN export utility in DIRECT PATH mode, it can access data stored in Oracle directly and provide a performance gain.

While Oracle RMAN provides these and many more options for Oracle backups and recoveries, the downside is that Oracles DBAs need to develop, manage and maintain the scripts that use these native Oracle RMAN utilities. Once developed, Oracle DBAs must then configure their backup software to call these RMAN scripts and use them in accordance with the specific physical devices (disk or tape) to which the backup data stream is sent.

The RMAN scripting task does not necessarily get easier or simpler over time. As new releases of Oracle become available, companies need to revisit and verify that their existing Oracle RMAN scripts work with the newer version of Oracle. Since it is not uncommon for companies to have multiple releases of Oracle in production, this puts an additional burden on Oracle DBAs to match the right version of the Oracle RMAN scripts with the version of the Oracle database in use. As a result, the role of some of the Oracle DBAs switches from database manager to Oracle RMAN scripting guru.

Oracle DBAs normally need to know not only what storage devices to which they need to backup the data but also need to configure the backup software to place the data on that storage device. Over time new devices may be introduced or Oracle database protection and recovery needs may change that require different storage devices as targets to store the data. This forces Oracle DBAs to reconfigure the backup software and use these alternative storage devices to meet their changing Oracle database protection and recovery requirements.

CommVault Simpana solves these fundamental problems of Oracle RMAN script generation and storage device media management by automating their management and data movement. As Oracle database backup and recovery requirements change or new storage devices are introduced, CommVault Simpana automatically updates the RMAN scripts and/or placement of the data on storage devices to ensure the Oracle database's backup and recovery objectives are satisfied.

The primary responsibility of Oracle DBAs then shifts to ensuring that updates to the data protection and recovery policies for the Oracle databases within CommVault Simpana are performed regularly. If and when they reset these policies, CommVault Simpana transparently takes care of the rest; whether this involves generating new Oracle RMAN scripts, moving the data to the appropriate storage device or both.

However CommVault was also prudent in how it designed Simpana by recognizing that most Oracle DBAs are not going to immediately abandon Oracle RMAN scripts that they have developed over the years. Oracle DBAs are appropriately conservative about adopting new technologies since they are entrusted with protecting intellectual property that is key to day-to-day operations. It is also possible that

applications exist in some customer environments that CommVault Simpana does not yet support or may not plan to support.

To address these concerns, CommVault Simpana provides Oracle DBAs with a means to call Oracle RMAN scripts that they have previously created or still need to create. This option gives Oracle DBAs the assurance that they can continue to protect their existing Oracle databases while they become acquainted and test the automated Oracle RMAN scripting features found in CommVault Simpana.

In these circumstances where Oracle DBAs call RMAN scripts external to CommVault Simpana, they are still substantial benefits they derive from using CommVault Simpana to manage their backups. In addition to its storage media device management feature, Simpana uses a 64-bit software architecture that has been shown to deliver a 50% increase in Oracle backup times in enterprise end-user production environments when measured against competitive enterprise backup software products.

Oracle DBAs Become Data Protection Managers

The level of integration that CommVault Simpana provides with Oracle RMAN combined with Simpana's native storage media management capabilities fundamentally transform Oracle DBAs from backup administrators and RMAN script writing experts to data protection managers.

Currently it is too easy for Oracle DBAs to become bogged down in the process of writing and managing Oracle RMAN scripts. Equally problematic is the task of reconfiguring backup software to manage the plethora of storage devices found in today's enterprises and optimizing the placement of Oracle data on these devices to match the recovery requirements of each Oracle database.

CommVault Simpana ameliorates this situation by automating these tasks in many environments that frees Oracle DBAs to manage the end-to-end backup and recovery processes. Since Simpana now generates the RMAN scripts and automatically manages data placement on storage devices, Oracle DBAs can turn their attention to looking at the backup and recovery process more holistically and ensure all of their Oracle databases are appropriately protected and that all Oracle database recoveries can occur flawlessly.

As part of this, Oracle DBAs may also now re-assign some tasks to backup or system administrators. These individuals can now do more of the preparatory work during database recoveries such as executing initial recovery scripts. Specific tasks that they can now perform include managing or executing specific scripts as well as verifying that the Oracle database is fully recovered and ready for production use. Once these steps are completed, Oracle DBAs can step in to complete the Oracle database recoveries since they may still need to confirm that the data is restored to the right type of disk and that the database is in a consistent, useable state.

Customer Case Study: Making the Decision to Switch

Switching data protection software product is never an easy decision to make, especially when your current data protection software is doing a satisfactory job. This was the dilemma that one large company recently faced. On a nightly basis it backed up nearly 300 UNIX servers and 126 Oracle databases and, on a weekly basis, almost 100 TBs of data, so it was in no hurry to change. But when Symantec told the company that its yearly maintenance costs for NetBackup was going to double, the company found itself in a position where it either needed to make a change in data protection software or pay a hefty price to maintain the status quo.

Aside from its concerns about the higher maintenance costs and the wholesale replacement of Symantec NetBackup, a major concern was how well any new data protection software would protect its Oracle databases. Over the years, the company's Oracle database administrators (DBAs) had developed an extensive number of RMAN scripts that NetBackup called. Leaving these Oracle databases unprotected was not an option no matter how much NetBackup's maintenance costs increased. So the company made it a requirement that any new data protection software had to automate the generation of RMAN scripts.

To determine which product was the right fit for it, the company conducted an evaluation of four enterprise backup software products: CommVault Simpana, EMC NetWorker, IBM Tivoli Storage Manager (TSM), and Symantec NetBackup. During the evaluation, it rejected IBM TSM outright as it did not work well with Oracle. EMC NetWorker was given a chance but the company found it ran like a much older version of Symantec NetBackup so it scored very low on the company's internal evaluation.

The decision then came down to Symantec NetBackup and Simpana with Simpana outscoring NetBackup by a substantial margin. The only concern the company had about Simpana was that its CommServer ran on a Windows Server host. This was a concern for two reasons. The core competencies of the company's system administrators were in UNIX and NetBackup Master Servers carry a majority of the load during backups. However the company overcame these concerns once they understood that the load of running the backup jobs was handled by Simpana's UNIX Media Agents running on their servers. Once they understood that, the company was convinced Simpana could do the job and made the switch.

The switch to Simpana went fairly smoothly as they completed the change over in 45 days installing it on over 260 servers. Now the company's Oracle DBAs are "absolutely amazed" at how easy it now is to do backups using Simpana though that does not mean everyone jumped on board day one. Some Oracle DBAs were from the old school and wanted to continue to run their existing RMAN scripts as they were skeptical of how well Simpana's automated scripting capabilities would work. However even they became believers. As they started to see the success Oracle backups occur using Simpana and how much of their time it freed up, they too eventually began to rely on Simpana.

Now that the company is on the other side of the switch, the company has seen its weekly backup success rates climb from the high 80's using Symantec NetBackup to over 99% using Simpana. These higher success rates are giving the company more time to focus on preparing for recoveries. It has found that it has lessened its dependency on its Oracle DBAs to perform recoveries as they now only need to step in when needed. They also find that restoring data at remote sites is made much easier because of Simpana's media management capabilities and how it puts data on the right media to make it faster and easier to recall.

Automating the task of data protection should free Oracle DBAs to take on more strategic responsibilities within the organization. A key role they should assume is planning and

documenting the requirements for local and remote Oracle database recoveries. This can involve documenting and understanding the different production and offsite environments to ensure they can restore their Oracle databases and then making sure the appropriate hardware, infrastructure and processes are in place to deliver on this requirement.

Orace DBAs can also become more proactive about identifying and correcting the causes of problems in current Oracle backup jobs. For instance, if an Oracle database has a corruption in any data block, the backup will fail. Though CommVault Simpana can detect, report and even correct the source of these errors in Oracle database backups, it can only do so when it is using Oracle RMAN APIs for the backups. Your Oracle now has the time to examine and permanently fix the underlying problems that are resulting in backup failures.

Optimized Oracle Database Protection

The pressure is on businesses today to optimize their Oracle database protection without putting an undue burden on their Oracle DBAs to deliver on this requirement. The combination of Oracle RMAN scripting requirements, storage media device management and the shortage of time on the part of Oracle DBAs to devote to these tasks is a challenge to which businesses are under the gun to respond and fix.

CommVault Simpana answers this business challenge by providing businesses with a new level of optimized Oracle database protection. Through CommVault Simpana's automatic generation of Oracle RMAN scripts, inherent storage media management capabilities and data recovery policy creation capabilities, matching the cost and level of data protection to a specific Oracle database is now an immediate, achievable goal. CommVault Simpana provides companies the assurance that they can immediately optimize the protection of their Oracle databases and business operations. More importantly, companies put in place a foundation that helps their Oracle DBAs and their business more easily recover data anywhere, at any place and at any time in the future.