Extreme Protection That Eliminates Data Loss for All of Your Oracle Databases

Oracle data protection redefined: Oracle's Zero Data Loss Recovery Appliance eliminates backup overhead and recovers databases to any point in time.

It would not be far-fetched to say that data is the organization today. Just consider what happens when a major system failure spawns a protracted recovery period. Business largely grinds to a halt—that's what.

Clearly the ability to quickly and completely back up and recover data in the event of a system failure or human error is among the most mission-critical requirements—for both IT and the organization. These days three prominent trends drive the imperative for an overhaul of data protection technologies and processes. They are

- Continued exponential growth of business data
- Demand for high levels of data integrity and data loss protection
- Zero tolerance of downtime for data backup in today's 24/7 business world

These drivers and the dynamics of data protection today also raise compelling questions. For example, can IT effectively back up database environments within ever-shrinking backup windows? How can IT ensure that recoveries can be performed seamlessly with as little data loss as possible? And as production cycles lengthen, how can IT handle the mounting pressure of having to back up increasingly larger data sets.

Data protection solutions today consist largely of storage-based mirroring and backup-and-recovery technologies, but there continues to be significant risk with these solutions, especially when protecting databases. Storage mirroring can potentially lead to data corruption, whereas backup-and-recovery technologies can lead to data loss when changes made since the most recent backup are either not captured or not documented. For example, let's say that data is backed up every two hours and the last backup occurred at 1 p.m. If

a failure happens at 2 p.m., then data created or updated between 1 p.m. and 2 p.m. is usually lost. Insufficient data validation and poor knowledge of database structures can also lead to data corruption and potential data loss.

Also lurking ominously in the background as another potential pitfall is liability. Statutory requirements for data fidelity and reliability are particularly stringent in the financial services and healthcare industries and are growing across the board in virtually all organizations. Even if great emphasis is placed on security, data loss resulting from poor IT backup-and-recovery processes can expose the organization to compliance and regulatory oversight.

A new approach is needed, one built with data loss prevention as the main goal. Enter Oracle's Zero Data Loss Recovery Appliance, a solution designed from the ground up to deliver optimal levels of database data protection and integrity, coupled with operational simplicity and policy-based automation for large-scale backup and recovery.

The IT-Focused Benefits of Oracle's Zero Data Loss Recovery Appliance

Oracle's Recovery Appliance takes a fresh approach to data protection, introducing new design elements that offer key benefits for Oracle databases. The Recovery Appliance is essentially an Oracle Database–optimized backup-and-recovery solution that captures real-time redo blocks from production databases to eliminate data loss and offloads backup activities from production database servers. In addition, the Recovery Appliance captures all incremental changes to the production Oracle database after an initial full backup. Tight integration with the Oracle Recovery Manager (Oracle RMAN) feature of Oracle Database enables the appliance to restore a database to any point in time the user demands. The Recovery Appliance is also "database aware", providing end-to-end data validation for the data protection lifecycle—from data creation to tape archiving. And because the Recovery Appliance is based on a highly scalable architecture, it enables businesses to provide cloud-scale protection, delivering complete, simplified protection for up to thousands of databases.

Key Advantages

• For improved data protection and fidelity, redo blocks are shipped directly from the database(s) to the Recovery Appliance, enabling all data changes to be captured in real time and zero to subsecond recovery point objectives to be achieved.

Oracle's Zero Data Loss Recovery Appliance Technology Overview

The Zero Data Loss Recovery Appliance's benefits are compelling for any enterprise with a need to protect critical Oracle databases. The differences between this database recovery appliance and other approaches to data protection are stark. The Recovery Appliance leverages a combination of existing proven technologies and new developments that eliminate data loss and improve recovery. The elimination of periods between backups when database changes are not captured is also a major benefit, and the movement to a process of frequent or constant incremental backups provided by this appliance changes the game.

Architecture

The Zero Data Loss Recovery Appliance is an Oracle engineered system that includes server, storage and network resources optimized for Oracle Database backups. The Recovery Appliance is based on a streamlined version of the highly reliable Oracle Exadata technology. At the heart of the appliance is an embedded Oracle Real Application Clusters (Oracle RAC) database, which serves as the centralized Oracle RMAN recovery catalog for all protected databases. The Recovery Appliance architecture provides mission-critical reliability and availability, with comprehensive built-in redundancy, which eliminates any single point of hardware failure, and the ability to replicate data to another appliance for protection against site failures. In addition, the appliance enables compute and storage capacity to be expanded by simple addition of storage, server and networking components, which can be done without downtime. To deliver the performance necessary for large-scale data protection, the Recovery Appliance features an extremely high-speed InfiniBand internal fabric that connects all servers and storage, plus write-back flash memory, which processes backups much faster than disk I/O. Databases supported by the Recovery Appliance range from Oracle Database 10g Release 2 through Oracle Database 12c, running on any Oracle-supported OS platform.

- The unique Zero Data Loss Recovery Appliance architecture requires that databases transmit to the appliance only the incremental changes that have occurred since the last full backup. Incremental backups can be performed with negligible effect on production database performance, in essence eliminating the need for a backup window—a huge benefit for any organization. The Recovery Appliance's continuous incremental backup capability enables backups to be performed as frequently as desired, not just daily or during selected off-peak periods. In today's real-time business climate, this change is an essential upgrade to IT operations. Moving beyond problems associated with a backup window empowers IT to deliver better database server and storage efficiency.

- In addition, the Recovery Appliance receives regularly scheduled, manual or ad hoc Oracle RMAN incremental backups from each database that is being backed up. This increment consists only of the changes relative to the previous backup. The incoming backup data is validated at the appliance to ensure that there are no physical corruptions in the Oracle Database data blocks. Data is then compressed with specialized algorithms before being written to a storage pool.

- Using the Recovery Appliance to back up all Oracle databases also simplifies and automates numerous aspects of IT operations. This includes the ability to manage all database backups from a single interface, eliminate additional deduplication solutions and back up data directly from the appliance to tape libraries. The appliance leverages the known and documented functionality of Oracle RMAN, which is used by the majority of Oracle customers. Knowledge of this single advanced recovery tool eliminates the need to cross-train IT staff on multiple recovery tools.

Organizational Benefits

By enabling a zero to subsecond recovery point, Oracle's Zero Data Loss Recovery Appliance remediates many of the drawbacks inherent in traditional backup-and-recovery approaches. These approaches often lose data and transactions from critical production Oracle databases when these changes occur during the period between backups. There are many costs associated with data loss. They include

- **Loss of revenue.** Commerce-based organizations may never recover lost transactions or lost business from an incomplete backup and recovery. For example, if an online

Eliminating Data Loss

The Recovery Appliance represents a pioneering approach to eliminating data loss. It incorporates advanced data protection capabilities that were previously available only with high-availability (HA) and disaster recovery (DR) solutions such as Oracle Data Guard, which offers comprehensive, zero-data-loss replication and disaster protection. Other backup appliances can protect only data that has already been backed up, whereas the Recovery Appliance merges backup technology with continuous data protection, for a revolutionary approach to maximizing database protection across the entire enterprise. The Recovery Appliance not only backs up data files but also captures redo blocks, which record all the changes that occur in the database. Redo blocks are sent continuously from the database the appliance is protecting. By capturing the redo blocks in real time and converting them into archived blocks backups, the Recovery Appliance is able to restore all the data since the last incremental backup.

This real-time redo capture is critical to enabling zero to sub-second data loss protection and it stands as a unique and revolutionary feature in the backup and recovery appliance industry. The ability to combine redo capture with backups is available only with Oracle's Zero Data Loss Recovery Appliance.

Incremental Backups

To perform incremental backups, the Recovery Appliance receives regularly scheduled Oracle RMAN incremental level 1 backups from each protected database. The backup consists of only the data file block changes since the previous incremental backup. The Recovery Appliance thereby enables organizations to implement an incremental forever-backup strategy that eliminates traditional backup windows. The incremental-forever process means that organizations never have to perform another full backup again. Each incremental backup results in a full virtual backup that can be used to restore the database to any point in time, essentially providing a full backup at the cost of an incremental backup.

retailer loses transaction data that has not been backed up, those sales may never be completed.

- **Cost.** It is not uncommon for organizations to reassign staff to manually reconstruct data from physical documents when there is data loss. This may require staff to reconcile information among multiple systems or sources, substantially increasing the cost of recovery.
- **Decreased customer satisfaction.** Data loss, especially when publicized, can compromise trust and prompt customers to switch suppliers.
- **Increased customer support costs.** Customers that find instances of data loss or inaccuracy in automated systems may revert to manual customer support systems for accurate information, which raises the cost of customer service.

The Recovery Appliance provides several important business benefits as well as IT improvements. Among these benefits is the ability to meet the demands for full recovery and data fidelity and mitigate common interruptions to business processes due to incomplete recovery. The Recovery Appliance eliminates all of the above costs associated with data loss, improving IT productivity and business ROI. In other words, it means business as usual—not business interrupted.

Summary

Today's business climate demands a new approach to data protection for Oracle databases that protects against data loss and prevents disruption to production cycles. The need to bridge the gap between what technologies can do and what businesses require drove the development of Oracle's Zero Data Loss Recovery Appliance. The primary benefit of this approach is the ability to eliminate data loss by capturing incremental changes and real-time redo blocks from Oracle databases. This incremental-forever approach also eliminates the backup window and its associated impact on production servers and users.

The organizational benefits include real-time data loss protection, an increase in the reliability of business information and the flexibility this innovative approach to backup and recovery provides. Perhaps most important, the Recovery Appliance is a solution tailored to meet the demands of today's always-on business world: protecting corporate data from end to end and keeping the business running.

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Avoidance of Server Overload

Organizations tend to perform backups based on IT operation schedules and database production server loads rather than on optimal data protection requirements. Relying on periods of low server utilization to schedule backups may also result in insufficient or sporadic backups.

The ability to offload backup workloads from production servers to the Recovery Appliance is a key advantage. The Recovery Appliance provides all the system resources required to perform backups, eliminating overhead on the production servers and increasing the flexibility to perform backups based on business needs and timing.

Autonomous Tape Archiving

One of the Recovery Appliance's most important hardware-focused benefits is autonomous tape archiving. The database recovery appliance integrates with, and can send backups directly to, tape hardware or the cloud. This removes backup-to-tape operational workloads from production database servers and eliminates the need for third-party media manager backup agents. Offloading tape backups to Oracle's Recovery Appliance increases efficiency and reduces costs by enabling use of tape at any time, not just during backup windows. This can also reduce the number of tape drives in use, for additional cost savings. The Recovery Appliance also offers flexible "restore anywhere" capability. Once data is backed up to tape, organizations can restore the backups from tape to any database server without the need to involve Oracle's Recovery Appliance or other appliances.

Efficient, Scalable Protection

For organizations that need to deliver centralized cloud-scale protection, the Recovery Appliance offers seamless scalability—up or out—for performance and capacity. The combination of scale-out industry-standard database servers with scale-out intelligent storage servers enables dynamic expansion of resources. It can protect petabytes of information while using compression and deduplication to increase the efficiency of the storage used for backup. Database-aware source deduplication technology ensures that the backup contains no duplicate, unused or undo blocks and captures only actual changes. These efficiencies deliver significant savings in backup storage and network usage. The ability to scale and efficiently use storage enables the Recovery Appliance to support backups from hundreds to thousands of databases.