FalconStor Software

A White Paper

Holistic and Efficient Protection for Oracle Databases with FalconStor CDP

Abstract: Successful business operations hinge on a company's ability to maintain a high level of enterprise data availability. Critical database applications such as Oracle demand advanced data storage management. In an enterprise Oracle environment, FalconStor® Continuous Data Protector™ (CDP) optimizes application and data availability as well as storage management capabilities. This white paper explains how FalconStor CDP delivers an enhanced backup, restore, and recovery regime that protects against soft and hard errors.

Data Protection Challenges in an Oracle Environment

When running a business at "Internet speed," downtime is not an option. The success of enterprises today hinges on the performance, uptime, and data availability of their customer-facing applications. Databases are the driving force and the most critical aspect of making mission-critical applications work. At the forefront of database reliability and performance, Oracle databases have become the industry standard.

Downtime of any kind—and the resulting inability to access applications and data—is unacceptable. Business continuity is paramount. Consequently, data protection schemes must provide rapid, seamless, non-disruptive backup, restoration, and recovery of these critical business assets. Due to explosive growth in the volume of data being collected and stored, and with increased governmental regulations on data retention, today's typical enterprise hosts numerous databases, multiple servers, and increasing terabytes of associated data storage capacity.

As Oracle-based applications scale, customers often find themselves with a proliferation of servers, storage, and data—at both local and remote sites—that can be difficult to administer, manage, and protect. This can affect competitiveness and the bottom line.

Common challenges and concerns include:

> Increasing backup requirements make traditional methods of backup more cumbersome and less realistic
> Hard-to-achieve recovery point objectives (RPO) and recovery time objectives (RTO) put enterprise data and business continuity at risk in the event of unplanned downtime or disaster
> Due to growth in data volumes and application servers, there is a constant need for reconfiguration of disk resources and additional storage capacity, making it difficult to dynamically manage assets
> Capacity planning and resource tuning is critical. Organizations must ensure that as an application scales, performance scales with it.
> Traditional tools and even Oracle-based tools often cannot protect from malicious hackers, accidental deletions, rolling disasters, and primary storage or backup media failures

Backup and Restore

Data protection means having a copy of data available and readily accessible at all times. From a recovery perspective, the more recent the copy, the better the RPO can be. Traditional tape backup provides a copy, but the copy is usually 12 to 24 hours old. Oracle itself permits automatic backup of control files as well as automatic backup of database log archives, individually or in groups. However, the speed and quality of data copying varies by implementation, and is largely dependent on the underlying storage solution. Many storage and data protection solutions simply force Oracle administrators to duplicate entire databases and data volumes through the use of Business Continuance Volumes (BCV). Although viable, this method pushes the boundaries of storage capacity and management efficiency.

Most traditional solutions also mandate either online (hot) or offline (cold) backup, but rarely are flexible enough to permit other methods in conjunction with these approaches. If a solution mandates online backup techniques, it likely reduces primary server and/or production environment availability by precluding effective offline data copying. If a solution mandates offline backup techniques, it likely reduces primary and production availability by precluding effective online data access. Either way, an enterprise customer depending on a traditional Oracle data protection scheme is left with few choices. The same can be said for local and remote backup capabilities.

Even with application-centric solutions such as Oracle Dataguard, it is difficult to protect an organization against data corruption or deletion. Without an advanced data protection solution, the ability to holistically and efficiently protect and recover Oracle data can be both problematic and expensive.

FalconStor Continuous Data Protector (CDP) Provides Instant Oracle Recovery

FalconStor® Continuous Data Protector™ (CDP) combines a TOTALLY Open™ architecture, advanced storage virtualization features, and intelligent storage services capabilities with an advanced application-centric toolset, to ensure that enterprise Oracle environments are reliably protected, highly available, and easily managed. Using FalconStor CDP to protect Oracle databases enables the utmost in business continuity and disaster recovery (DR) by delivering an intelligent data services-centric infrastructure across heterogeneous environments.

FalconStor CDP

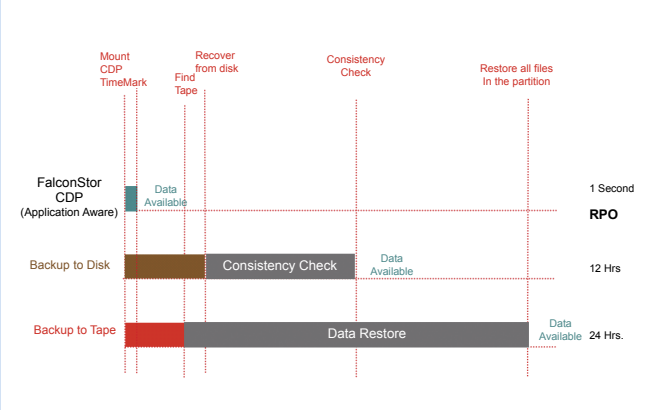
> **Simple:** Automated continuous protection
> **Efficient:** Thin Replication using FalconStor MicroScan™ sub-block replication technology
> **Reliable:** Native clustering on enterprise servers
> **Secure:** Intrinsic encryption

The FalconStor CDP solution is simple, efficient, reliable, and secure, enabling application recovery in less than 15 minutes to the last known good write. FalconStor CDP is built upon the FalconStor IPStor® software platform, which is an open, state-of-the-art storage virtualization platform that optimizes and automates data management, availability, and recovery.

Oracle databases benefit by leveraging the industry's widest range of enterprise-class storage services—including synchronous mirroring with continuous data journaling, application-aware snapshots of recovery points, transactionally consistent replication via IP for DR, near-line disk-based backup for instant point-in-time recovery, integrated data encryption, compression, and data deduplication for the most comprehensive, efficient, and cost-effective solution in the industry.

The high-speed FalconStor HyperTrac™ option works in conjunction with existing backup software to circumvent the shrinking backup window by moving all data protection off the LAN to the SAN via serverless backup, even for Tivoli Storage Manager (TSM) environments.

With FalconStor CDP, recovery is significantly faster than with other mechanisms, allowing organizations to meet stringent RTO and RPO requirements



A Comprehensive, Application-aware Solution

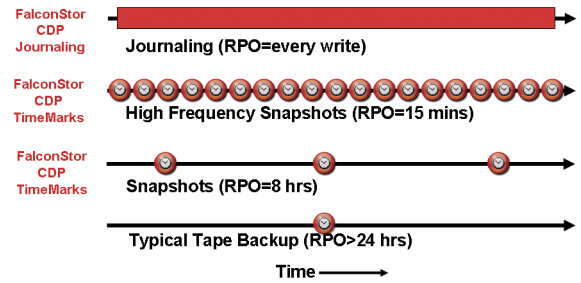
FalconStor CDP excels in high-growth and high-volume database environments requiring strict and dependable backup regimes. This is especially true for critical data gathering and serving applications such as Oracle, because FalconStor CDP is conceived, designed, and fully integrated to be application-aware.

FalconStor CDP offers end-to-end data protection, application awareness, immediate recovery from hardware, software, and network failures, proactive protection without downtime, and non-stop data availability. Whether associated with "what-if" scenario requirements, administrative errors, user errors, or basic data degradation due to outside events, the FalconStor CDP solution ensures a highly available, dependable enterprise Oracle environment. Features include:

- Point-and-click creation of 100% transactionally consistent images of Oracle databases
- Automatic, alternate-location (offsite) creation of Oracle database replicas using space-efficient FalconStor TimeView® images
- Instantly accessible, full-integrity Oracle database backups (which can be achieved online or offline, local or remote) for DR (such as in the event of a site loss and/or sudden or rolling disaster)
- Complete recovery from logical database corruption or data deletion (such as the loss of a single mission-critical Oracle database)
- Administrator-initiated restores
- Transactionally consistent encrypted and compressed Thin Replication for DR

With FalconStor CDP, Oracle administrators can back up and recover data to any point in time. The product's instant, granular rollback capability (via disk-based journaling) protects data from soft errors such as accidental deletions, corruption, or viruses. At any given point in time, an administrator can elect to roll back to a database status of minutes, hours, days, weeks, or months prior. Even individual database files or table spaces, deleted outside of Oracle supplemental data protection features, can be quickly retrieved and remain fully intact.

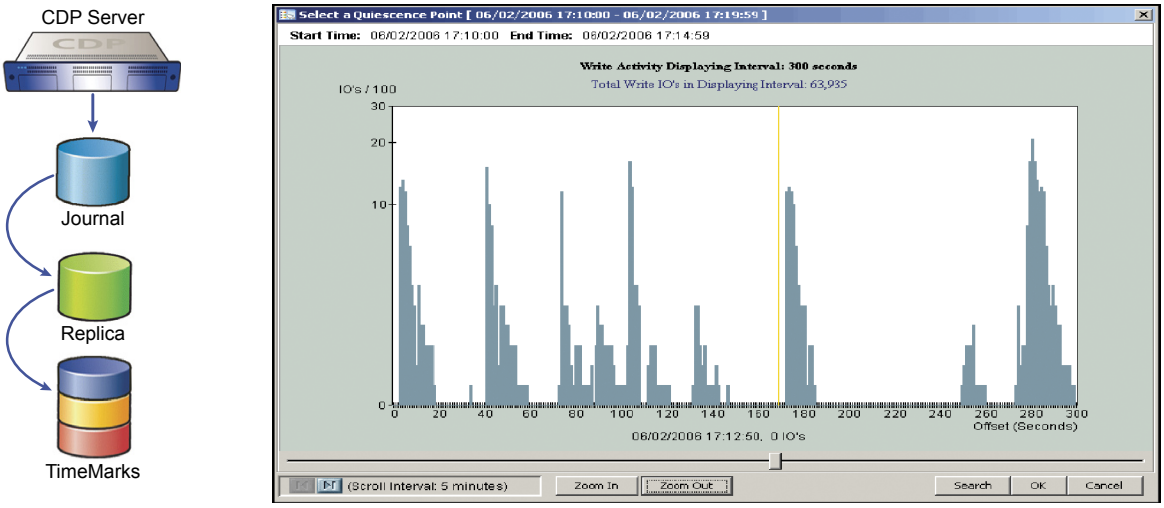
Policy-based point-in-time snapshots are taken of active databases and files with 100% data integrity. All writes between snapshots are captured for any-point-in-time recovery.



The interface for journal recovery is simple. Just select a point in time—down to the millisecond range—for the last known good write, and FalconStor CDP will recover to the primary storage or a designated alternate recovery TimeView image.

FalconStor CDP is a "true" CDP solution, meaning that every write is protected in the disk-based journal for immediate recovery to the last known good write from the application perspective. FalconStor TimeMark® snapshots require mere moments and only a fraction of the disk storage space demanded by the original application. Organizations can create up to 255 TimeMark snapshot "copies" per Oracle data volume and still use only a small amount of storage—20% of the original capacity, on average. TimeMark snapshots can be scheduled to occur by the minute, hour, day, etc., using varying changed data parameters. With FalconStor CDP, customized data protection policies can be set for different Oracle data volumes, further extending Oracle data protection optimization. Because only changed data is saved using disk-based delta snapshots, a greater volume of Oracle data can be protected using snapshot technology, and backup and restores can be accomplished without negatively impacting data integrity or availability.

By tracking Oracle database activity, FalconStor CDP lets you choose ideal recovery points



The result is an ability to store hundreds of synthetic full Oracle backups online, facilitating recovery to any point in time within the journal, or any of the other points, immediately. With FalconStor CDP, data recovery requires only a few mouse clicks, rather than the need to "restore" data, which typically involves the retrieval, loading, scanning, and copying from a slow, linear storage medium such as tape.

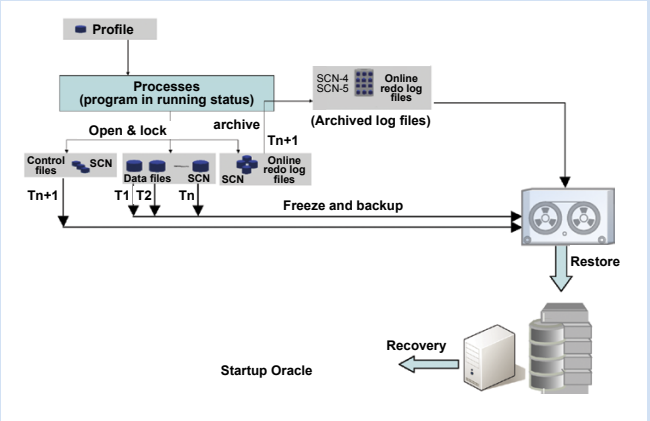
Flexibility in Backup Methodologies

The FalconStor CDP solution can be used for both hot and cold backups. In a traditional cold (offline) backup scenario, Oracle databases are shut down entirely during non-business hours, and all data, log, and control files are backed up. Upon the restart of the database, normal operations are resumed.

In a hot backup scenario, the database remains active and data remains accessible to users. The tables within the Oracle instance are placed into hot backup mode by issuing an "alter tablespace begin backup" command for all of the tablespaces within the instance. The backup is then performed, which can take hours when not using array-based BCV technology. In addition to being a lengthy process, hot backup can only give a read-consistent copy—active transactions are not logged. An organization must ensure that all redo logs archived during the backup process are also backed up. Therefore, once the backup job is completed, the instance is taken out of hot backup mode by issuing the "alter tablespace end backup" command.

FalconStor CDP enables Oracle administrators to choose a recovery point from the journal or a TimeMark snapshot. Administrators can assign and mount any TimeMark snapshot as a virtual disk—or TimeView image—to any server connected to the FalconStor CDP-managed storage network. Not only does the server then have full read-write access to the new disk; TimeView copies can subsequently be backed up or mounted for other operational uses (including proactive purposes), while the original data set is in use and unaffected.

Online backup with Oracle running



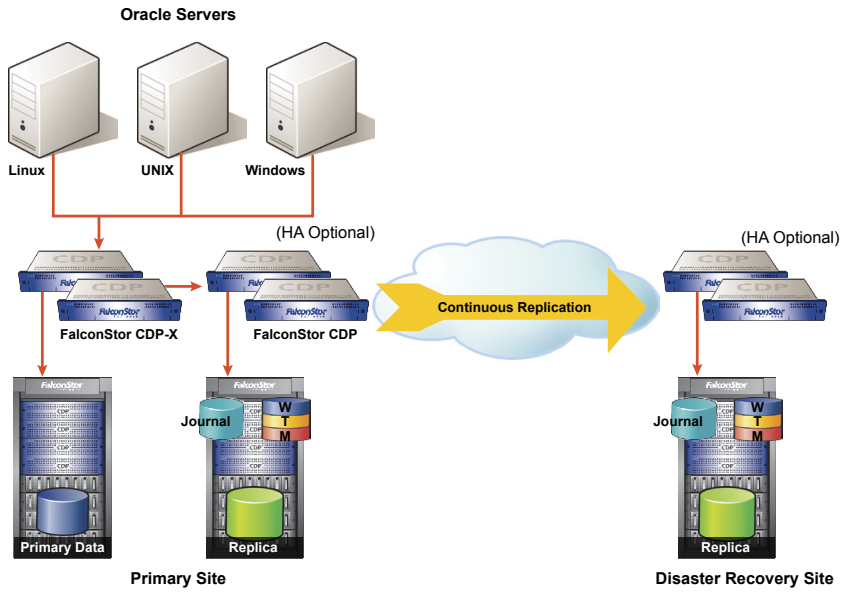
TimeView images can also be taken from replicated data copies, enabling operations (such as backup, reporting, consistency checking, or retrieval of a lost record) to be performed on a stable image in a remote location. The same functionality can be used for recovery when system reset is not an option. Furthermore, snapshot capabilities enable database modeling without affecting the production database.

FalconStor CDP is deployed as an out-of-band solution using both FalconStor CDP Connector (CDP-X) Appliances and CDP Gateway Appliances. FalconStor CDP-X performs write-splitting between the primary storage and CDP storage. All journaling, snapshots, and mirroring are performed on the out-of-band FalconStor CDP appliance so there is no impact to primary storage I/O. FalconStor CDP-X appliances are configured in pairs for high availability (HA) using active-active failover.

Summary

Successful business operations hinge on a company's ability to maintain a high level of enterprise data availability. Critical applications such as Oracle demand advanced data storage management. In an enterprise Oracle environment, FalconStor CDP optimizes application and data availability as well as storage management, delivering an enhanced backup, restore, and recovery regime that protects against soft and hard errors.

FalconStor CDP in an enterprise Oracle environment



About FalconStor

FalconStor Software, Inc. (NASDAQ: FALC), the premier provider of TOTALLY Open™ Network Storage Solutions, delivers the most comprehensive suite of products for data protection and storage virtualization. Based on the award-winning IPStor® platform, products include the industry-leading Virtual Tape Library (VTL) with Single Instance Repository (SIR) for deduplication, Continuous Data Protector™ (CDP), Network Storage Server (NSS), and Replication option for disaster recovery and remote office protection. Our solutions are available from major OEMs and solution providers and are deployed by thousands of customers worldwide, from small businesses to Fortune 1000 enterprises.

For more information, visit www.falconstor.com or contact your local FalconStor representative.

Corporate Headquarters
USA
+1 631 777 5188
sales@falconstor.com

European Headquarters
France
+33 1 39 23 95 50
infoeurope@falconstor.com

Asia-Pacific Headquarters
Taiwan
+866 4 2259 1868
infoasia@falconstor.com

FalconStor Software

ODBCDPWP080430