

COMPARING DOUBLE-TAKE® TO SQL SERVER 2005 DATA PROTECTION FEATURES

Introduction

In November 2005, Microsoft® released SQL Server 2005. There are multiple data protection features available in SQL Server 2005, however most are modifications to existing features already available in SQL Server 2000. This document provides an overview of these features with a comparison to the SQL protection solutions offered by Double Take® from Double-Take Software.

While SQL Server 2005 offers multiple options for improving database protection and recovery, none of them are designed nor intended to provide a complete disaster recovery solution. Corporate and regulatory mandates as well as customer and business service levels drive many of these requirements beyond what native SQL Server data protection options can provide.

Double-Take Software is the leading provider of disaster recovery and high availability solutions for Microsoft SQL Server and Windows® applications. Double-Take Software has the experience and expertise necessary to ensure your databases are protected from failures of most any kind, with over 80,000 licenses sold and over 20,000 protecting SQL Server databases. Double Take is the industry-leading replication and disaster recovery solution, providing enterprise-class data protection and failover services to prevent application downtime and patented transactional crash consistency for database applications like Microsoft SQL Server.

Double-Take®

Double-Take delivers complete disaster recovery and high-availability solutions for any Windows application, with a robust feature-set designed for flexibility in providing individual solutions for the needs of businesses. Double Take is application and storage independent, able to protect most any application utilizing most any type of storage, including SAN, DAS (SCSI/SATA), and NAS.

Double Take replicates the entire SQL Server instance including all metadata, logins, security, etc. All changes made to the production database instance will be replicated in real-time to the target database automatically. The target server is a replica with complete data integrity 100% of the time, ready to accept and process client requests within seconds of a production server or site failure. Double-Take data protection does not require any schema changes to applications that are generally unsupported by 3rd-party vendors, thus Double-Take can seamlessly protect your existing production environment without modification.

Double Take provides a single unified solution for all of your Windows servers and applications, supporting all SQL Server editions, including Desktop, Workgroup, Standard, and Enterprise as well as other applications you may be running such as Exchange and SharePoint. Double-Take further reduces the total cost of the database protection solution by allowing replication between servers consisting of different hardware, storage, and Windows OS versions.

Double-Take offers automatic or manual failover without having to reconfigure each client application. Failover results in the target server assuming the network identity of the primary server to continue servicing clients. This method of failover prevents having to make code changes to your applications and clients, providing a very quick transition. This rapid switch over is generally unnoticed by users and clients as they will continue to work as usual.

By protecting the entire SQL Server instance, Double-Take ensures your business will be ready for an immediate failover should an outage occur with the production server or the entire site.

What does Microsoft think about Double-Take solutions for SQL Server?

"With their deep understanding of SQL Server, Double-Take Software created a data protection solution for critical databases and applications," said Donald Petersen, Senior Product Manager for SQL Server at Microsoft. "We are also very pleased that Double-Take Software continues its commitment by adding Double-Take support for SQL Server 2005. With the ability to integrate into any SQL environment and ensure that information stored on SQL Server is continually replicated and highly available, Double-Take provides customers with an effective option to help safeguard their business assets in the event of a disaster or system failure."

Double-Take provides the enterprise-class data protection your business needs that SQL Server alone can not deliver.

- **Double-Take protects the entire SQL Server 2005 Instance**, therefore no manual configuration of logins or jobs needs to take place after a failover. Any new databases, schema changes, login or permission changes, and external files such as SQL Scripts and DTS Packages are automatically protected on the target.
- **Double-Take fully protects all editions of SQL Server 2005** without requiring any modifications to the production server regardless of edition. Implementations take only a few minutes and require no daily management.
- **Double-Take uses patented methods for crash consistent database state** allowing SQL Server to recover its' own data files at startup during failover. Data on the target server can have snapshots and tape backups performed 24/7 without any impact on the production server.
- **Double-Take provides real-time data protection** that ensures minimal to no loss of data when a failure does occur.
- **Double-Take protects SQL Server over unlimited distances**, while clusters can only stretch as far 10 miles without suffering massive losses in scalability. 80% of our 20,000 SQL Server customers replicate over a T1 or less, most of which cross state lines, continents, and oceans.
- **Double-Take doesn't require a SAN for High Availability**, which greatly reduces the cost and complexity of implementing High Availability solutions. Many Double-Take customers use direct-attached SCSI disks while others mix and match storage to reduce the probability of application downtime if their SAN backplane fails.
- **Double-Take protects all non-logged transactions**, which reduces the amount of management complexity to support database load operations during data warehouse ETL processing, security and schema changes.
- **Double-Take protects Analysis Services and other SQL Modules** that are often deployed and do not have native remote availability features. Double-Take was designed to support any application that runs on Microsoft Windows with patented data integrity features to guarantee crash consistency.

SQL Server 2005

Database Mirroring

Prior to releasing SQL Server 2005, Microsoft announced that Database Mirroring would be removed from the GA release. Microsoft plans to release Database Mirroring sometime in 2006.

Database Mirroring improves upon native log shipping by providing real-time log shipping of transactions as well as switching, or failover, of processing between servers. Database Mirroring works by sending transaction logs from the primary server (referred to as the Principal by Microsoft) to the secondary server (referred to as the Mirror), in essence speeding up the log shipping process. In the event that the principal database fails, database-level failover enables a standby database located on the Mirror to become the principal. Failover constitutes making the mirror SQL Server instance the principal and bringing it online for read and write access.

Database Mirroring can be performed either synchronously, which guarantees zero data loss but reduces the scalability of the production database; or asynchronously and includes automatic and manual failover options. Automatic failover is only possible when using synchronous mirroring and requires an additional SQL Server instance be installed as the 'witness'. The witness server is responsible for monitoring the principal and mirror and initiating failover and is used only in synchronous mode. Manual failover is required if not using a witness server, requiring administrator intervention and increased downtime. Database Mirroring offers three different operating modes:

- **High availability operating mode** - *synchronous* with a witness and automatic or manual failover capabilities.

- **High protection operating mode** - *synchronous* without a witness and only manual failover capabilities.
- **High performance operating mode** - *asynchronous* without a witness and NO automatic or manual failover capabilities. The only failover that can take place is a "forced" failover.

Limitations of Database Mirroring:

- **SQL Database Mirroring does NOT protect the entire instance.** Metadata (logins, security, schema, etc.) are not included in the mirror, only data. Additional processes must be implemented to ensure all the other necessary SQL Server components are in place on the mirror server in order for the mirror to be used as a failover server. If a failover occurs and the metadata are not in sync, problems may arise resulting in a delay in the database coming online causing additional downtime.
 - Double-Take automatically captures and replicates ALL database information and changes. The target server is ready to accept and process client requests at any time without any additional configuration.
- **SQL Agent jobs must be manually enabled** upon failover with Database Mirroring
 - Double-Take recovers the entire SQL Server instance thus preserving the SQL Agent Job configurations.
- **High Performance Operating Mode (asynchronous replication)** is only available in the more expensive Enterprise Edition of SQL Server 2005 which makes synchronous protection the only choice for other editions and limits their protection to within the same datacenter and not for disaster recovery requirements. Enterprise Edition is 4x as much as Standard Edition plus 2x the cost per user.
 - Double-Take provides asynchronous replication for all SQL Server editions without incurring the huge effort and expense of deploying the Enterprise Edition.
- **Lacks enterprise features** that limit the flexibility and adaptability of Database Mirroring to easily conform to the individual needs of businesses. These include;
 - **Data Compression** - to reduce network utilization
 - **Bandwidth Throttling** - to control the network resources used by the replication process
 - **Application Independent Protection** - to protect any Windows application
 - Double-Take is designed for enterprise-class operation in any environment, with features that allow it to be configured for optimal performance in most any environment.
 - Intelligent Data Compression - three levels of compression
 - Flexible Bandwidth Throttling - control the use of network resources to be higher or lower at different times throughout the day
 - Task Command Processing - execute application and system commands automatically from the replication process; initiate snapshots, start services, etc.
 - Server Groups - allow servers to be categorized and grouped within the GUI for ease of management
- **Automatic database failover requires synchronous mirroring** which can have a negative performance impact on production applications.
 - Double-Take uses asynchronous replication to prevent performance degradation of applications. Failover can be selected as automatic or manual for any of the replicated servers with no restrictions or special requirements.
- **Automatic failover requires an additional SQL Server instance** on a separate server, increasing the solution costs and ongoing costs of maintenance and management.
 - Double-Take does not require extra servers to monitor and initiate failover. Each target server can monitor one or more source servers.
- **The principal and mirror servers must be in the same or trusted Windows domains**
 - Double-Take supports servers in mixed domains, removing restrictions for where target servers can be maintained.

Database Log Shipping

Not new to SQL Server 2005, Log Shipping provides a method for performing transaction log backups every few minutes. These backups can then be copied and applied to a secondary server. The 'shipping' part that actually copies the logs to the secondary server is done outside the scope of SQL Server, left as an exercise to the DBA, and is typically a time consuming process to build and maintain a fault-tolerant copy process. This method does not protect against non-logged transactions or metadata - logins, schema, security, etc.

Once the database administrator (DBA) manually creates the initial copy of the primary database on the secondary server, the backups of the transaction logs can be used to update this secondary database. Unlike Database Mirroring, which is done in real-time, Log Shipping happens on a periodic basis, leaving data unprotected on the source. This could result in large amounts of lost data should a failure occur before the backup is performed and sent to the secondary server.

Log Shipping on its own does not provide any type of failover for high availability. Additional means must be used to satisfy availability needs to protect against downtime and lost productivity. Once a failure is realized by the DBA, initiating the role change to switch processing to the secondary server requires manual invocation of numerous stored procedures to recover the standby database and bring it online. Clients would then need to be manually redirected to it. The downtime results in costly lost productivity.

Limitations of Log Shipping

- **Log Shipping does NOT protect the entire SQL Server instance.** Metadata (logins, security, schema, etc.) are not included in the backup, only data. Additional processes must be implemented to ensure all the other necessary SQL Server components are in place on the secondary server. If a failover occurs and the metadata are not in sync, problems may arise resulting in a delay in the database coming online causing additional downtime.
 - Double-Take automatically captures and replicates ALL database information and changes. The target server is ready to accept and process client requests at any time without any additional configuration.
- **Log Shipping requires a manual, non-integrated process** to copy the transaction log files to secondary server. This is time-consuming exercise left to the DBA to build and maintain.
 - Double-Take is a complete solution. It captures and replicates ALL database changes and applies them to the target server in the exact order they were made to the principal database.
- **Log Shipping does not provide high availability** to protect against costly downtime. It does not detect failures or initiate any type of failover.
 - Double-Take failover can be automatic or manual, depending on ones specific needs. Recovery is within seconds, often times before users realize a failure had occurred.
- **Log Shipping is not real-time.** Data changes are copied on a periodic basis, resulting in large amounts of data at risk of loss.
 - Double-Take captures and replicates changes in real-time, as they are made, to ensure the latest updates are available on the target in the event of a failure of the primary server.
- **Log Shipping can flood the network.** It stores changes locally until the scheduled time to copy them to the secondary server, resulting in a negative impact to the production network as large amounts of data are transmitted in bulk.

Suffolk University

"For Suffolk University Business School, student learning is mission critical. We provide online services for students all over the world, from on-campus students to distance learners in Africa. Our students must have 24/7 access to course lectures, homework assignments, reading materials, chat and grades, otherwise the learning process breaks down. These vital applications all use SQL Servers, which is why SQL protection was critical for us. We chose Double-Take because it offered real-time data protection and disaster recovery that was easy to manage and reasonably priced. If a primary server goes down in Boston, we now have the capability to minimize the disruption to seconds. Double-Take provides a much needed buffer for our small IT staff."

-- Dr. Praneeth Machettira, Online Technical Director,
Suffolk University

- o Double-Take performs real-time replication, sending changes as they occur for optimal efficiency in the use of system and network resources. To further improve performance and compatibility within production networks, Double-Take allows for the scheduling of bandwidth utilization limits and compression of transmitted data.

Failover Clustering (MSCS) Support

Failover clustering provides support for the integration of SQL Server services with Microsoft Cluster Server (MSCS) for providing fault tolerance to protect against a database or other local failure. Support for MSCS is not new in SQL Server 2005. On its own, this feature does not provide any type of data or application protection.

Distance limitations inherent to MSCS prevent it from protecting against regional or even some metropolitan failures, rendering it insufficient as a disaster recovery solution.

Limitations of Failover Clustering

- **MSCS is limited to relatively short distances**, typically less than 10 miles, rendering it unable to meet disaster recovery standards.
 - o Double-Take does not have any distance limitations, allowing for protection against local, regional, metropolitan, and any other type of failure. Data can be replicated across the street, the state, the country, and even across the world.
- **Failover Clustering requires Enterprise or Datacenter Editions of Windows**, significantly increasing the cost of the solution.
 - o All Double-Take functions are certified to run under all editions of SQL Server and Windows 2000 and 2003.
- **MSCS requires certified hardware.**
 - o Double-Take supports any hardware running Windows and can replicate data and provide failover between different types of Windows servers. This helps to reduce costs and allows for older, obsolete hardware to be reallocated as disaster recovery servers, increasing ROI.
 - o For environments that are running MSCS or require the local failover benefits it can offer, Double Take is fully qualified to support these environments to provide long-distance disaster recovery protection.
 - o For enhanced protection within MSCS environments, Double-Take also produces GeoCluster®, a sister product of Double-Take that enhances MSCS configurations by eliminating the single point of failure of shared disk solutions and allows for the cluster members to be separated by much greater distances than with MSCS alone.

Tannenbaum Helpert Syracuse & Hirschtritt LLP (THS&H LLP)

"Our critical accounting information and legal documents, such as client wills and contracts, are stored on SQL Servers. If an emergency situation arose or if a server went offline, even for a few minutes, information on our clients' financials and document modifications could be lost. With our office located in Midtown Manhattan, disaster recovery is a reality we must take very seriously. For us, Double-Take is an insurance policy for our data, applications and clients - under any circumstance it safeguards our most critical business assets."

-- Matt Blydenburg, IT Director, THS&H LLP

Database Snapshots

Database Snapshots allow for disk-based recovery of lost or corrupted database records. Snapshots rely on the actual database as they are not complete database instances but rather are copies of just the data changes up to a specific point in time. Snapshots consume just a fraction of the space of the yet allow for read-only views of the entire database.

Database Snapshots are created and maintained on the same SQL Server from which they are created so they do not protect against hardware failures and complete database losses. If the database is not available due to corruption, hardware failure, etc., then the snapshots are not usable. Native SQL Server Database Snapshots are not able or intended to provide complete database or disaster recovery protection. Their value is to provide quicker recovery of deleted or corrupt database records or to undo unwanted changes to the database.

Used in conjunction with Double-Take, Database Snapshots provide very complementary functionality for a more complete solution. Double Take replicates data and databases to remote servers, maintaining a complete and exact copy of the entire database that can be used for recovery and failover. By utilizing either SQL Server Database Snapshots or the native Windows snapshot capabilities (VSS), Double Take can invoke snapshots of the replicated database on the target server. This provides read-only instances of current data as well as allows for

recovery of corrupt or deleted records. Should the production database be lost completely, the replicated copy could be immediately brought online while maintaining accessibility to the snapshots.

Limitations of Database Snapshots

- Native SQL Server Database Snapshots do not protect against loss or corruption of the entire database.
- Native SQL Server Database Snapshots do not protect against server, site, or other outages.
- Complete server recovery is still measured in hours while the server is rebuilt and data restored.
- Database Snapshots nicely compliment Double-Take replication by providing snapshots on the target for read-only database instances and recovery of individual transactions or the complete SQL Server instance.

Transactional Replication

Transactional Replication within SQL Server should not be confused with Double-Take replication.

Transactional Replication is not a new feature within SQL Server 2005 as it has been available in SQL Server 2000, providing basically the same functionality. Transactional Replication is designed to increase read-only data accessibility by distributing the primary data across multiple database servers, allowing distribution of read-only client requests to reduce the workload on the production server. Microsoft documentation is clear that Transactional Replication was never intended to be a high-availability or disaster recovery solution. It does not provide the necessary features to perform these functions adequately.

Transactional Replication does not provide any type of failover mechanism. Failover to a secondary server is a completely manual process, requiring changes to clients and applications as well as manually recovering and enabling the replicated database.

Limitations of Database Replication

- **SQL-native Transactional Replication does NOT protect the entire SQL Server instance.** Metadata (logins, security, schema, etc.) are not included in the copy process, only data. Additional processes must be implemented to ensure all the other necessary SQL Server components are in place on the secondary server.
 - Double-Take automatically captures and replicates ALL database information and changes. The target server is ready to accept and process client requests at any time without any additional configuration.
- **Lack of failover capabilities** prevents SQL-native Transactional Replication from being used as a high availability solution. The manual process required would result in substantial downtime of the database and the applications it supports and increase the burden on the administrative staff.
 - Double-Take failover can be automatic or manual, depending on ones specific needs. Recovery is within seconds, often times before users realize a failure had occurred.
- **Lack of important features limits the flexibility** and adaptability of SQL-native Transactional Replication to easily conform to the individual needs of businesses. These include;
 - Data Compression - to reduce network utilization
 - Bandwidth Throttling - to control the network resources used by the replication process
 - Application Failover - to automatically be redirected users and clients
 - Double-Take is designed for enterprise-class operation in any environment, with features that allow it to be configured for optimal performance in most any environment.
 - **Intelligent Data Compression** - three levels of compression
 - **Flexible Bandwidth Throttling** - control the use of network resources to be higher or lower at different times throughout the day
 - **Task Command Processing** - execute application and system commands automatically from the replication process; initiate snapshots, start services, etc.
 - **Server Groups** - allow servers to be categorized and grouped within the GUI for ease of management
- **Complex architecture requires multiple servers** acting in different roles, introducing points of failure into the solution.
 - Double-Take replication servers act independently of each other and do not have a single point of failure.

Summary

The newest version of SQL Server contains improved recovery features that further validate the long-standing position of Double-Take Software that ALL Windows servers need data protection that is more frequent than periodic tape backup. These enhancements can offer ways to simplify database management, but aren't capable of delivering a complete enterprise-class disaster recovery solution. Double-Take provides true disaster recovery and high availability solutions to protect the entire SQL Server instance from most any type of local or regional failure.

Closely partnered with Microsoft, Double-Take Software offers customer's leading-edge solutions to protect against most any type of failure to virtually eliminate downtime and ensure their data and applications are secure even in the most adverse situations.

Double-Take Software is a Microsoft Gold partner, whose products, including Double Take and GeoCluster, are consistently Windows logo certified to the highest standard (Windows 2000/2003 Standard/Server, Enterprise, and Datacenter). DOUBLE-TAKE SOFTWARE and Microsoft continue to have a long and healthy partnership in supporting the Microsoft Windows server platform and critical business applications like Microsoft SQL Server and Exchange.

Double-Take Software has nearly 80,000 licenses in production, with over 20,000 protecting Microsoft SQL Server. With nearly 10 years of experience in protecting Windows applications and data, Double-Take Software is the undisputed leader in protecting Microsoft environments. Double-Take can deliver a comprehensive portfolio of services to help assess, design, plan, and implement effective data availability and disaster recovery solutions. **For questions on Double-Take, including pricing and product features call toll free 888-674-9495 or send e-mail to info@doubletake.com.**

About Double-Take® Software

Headquartered in Southborough, Massachusetts, Double-Take® Software (Nasdaq: DBTK) is a leading provider of affordable software for recoverability, including continuous data replication, application availability and system state protection. Double-Take Software products and services enable customers to protect and recover business-critical data and applications such as Microsoft Exchange, SQL, and SharePoint in both physical and virtual environments. With its unparalleled partner programs, technical support, and professional services, Double-Take Software is the solution of choice for more than ten thousand customers worldwide, from SMEs to the Fortune 500. Information about Double-Take Software's products and services can be found at www.doubletake.com.

Double-Take Software Headquarters

257 Turnpike Road
 Southborough, MA 01772
 Phone: +1-800-964-0185 or +1-508-229-8483
 Fax: +1-508-229-0866

Double-Take Software Sales

8470 Allison Pointe Blvd. Suite 300
 Indianapolis, IN 46250
 Phone: +1-888-674-9495 or +1-317-598-0185
 Fax: +1-317-598-0187

Sales and Support Outside the US

saleseu@doubletake.com
supporteu@doubletake.com

EMEA Sales (except India UK and Ireland)
 +33 (0) 1 4777 0500

UK, Ireland, Australia, NZ and India Sales
 +44 (0) 1905 330800



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