



# Meeting the New Requirements for Enterprise Data Protection

## The Gap in Enterprise Data Protection

The data protection requirements of LANs and client-server systems have increased steadily as these networks have grown in importance. Mission critical applications are migrating from mainframes to client-server systems. Formerly non-critical LAN applications, like email and word processing, are now essential for day to day operations in many larger organizations. Even in environments where all mission critical applications reside on mainframes, the information is often accessed or processed with LAN-based front ends.

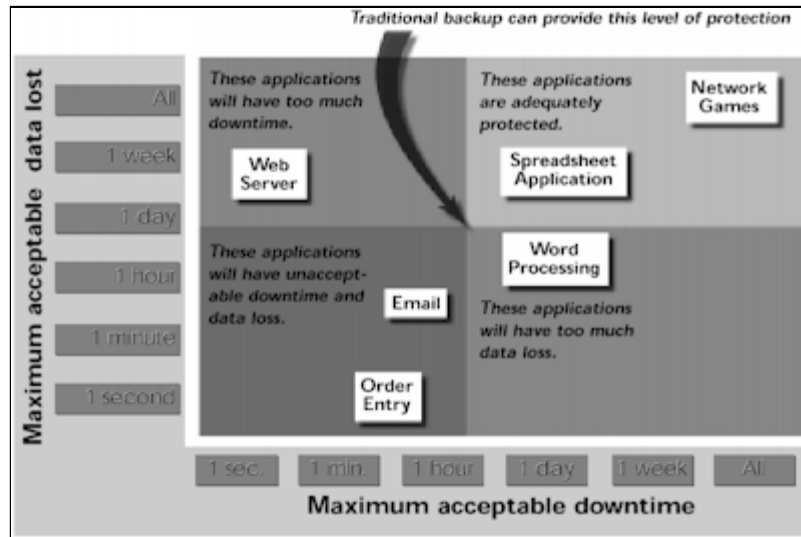
Unfortunately, the capabilities of backup systems have not kept pace with the ever increasing demands for data availability. This gap in data protection is apparent when comparing the data availability and protection requirements for many LAN-based applications with the capabilities of traditional backup approaches.

Within any organization, there are a variety of applications that have different requirements for data protection (how much data loss is acceptable) and availability (how much downtime is acceptable). Some applications, like network based games, have no data protection requirements unless your company is in the business of producing those games. Other applications, such as spreadsheets and word processing, are not mission critical in some organizations, so hours of downtime and data loss may be acceptable in some cases.

Email, while often not considered "mission critical", can severely impede an organization's ability to operate with even an hour's lost data or an hour of downtime. In many client-server systems, applications like order entry, customer support, and web servers have become mission critical, where a few minutes of downtime or a few seconds of data loss are unacceptable.

Traditional backup solutions running at most once per night, leave as much as a full day's worth of data unprotected from a server or disk crash. Equally limiting is the time required to restore a server from offline media. While significant progress has been made with high-speed backup and restore systems, most real-world server restores take hours or even days to complete. This level of data loss and downtime is no longer acceptable in today's client-server and LAN systems.

### LAN Application Vulnerability



A comparison of maximum acceptable downtime and data loss versus the capabilities of traditional backup systems.

Numerous approaches have been taken to improve data protection and availability. Fault-tolerant hardware within a server (such as disk duplexing, RAID, etc.), reduces the frequency of hardware based failures, but does not eliminate them. These duplexing systems remain vulnerable to user, operating system, and application failures, the main sources of downtime.

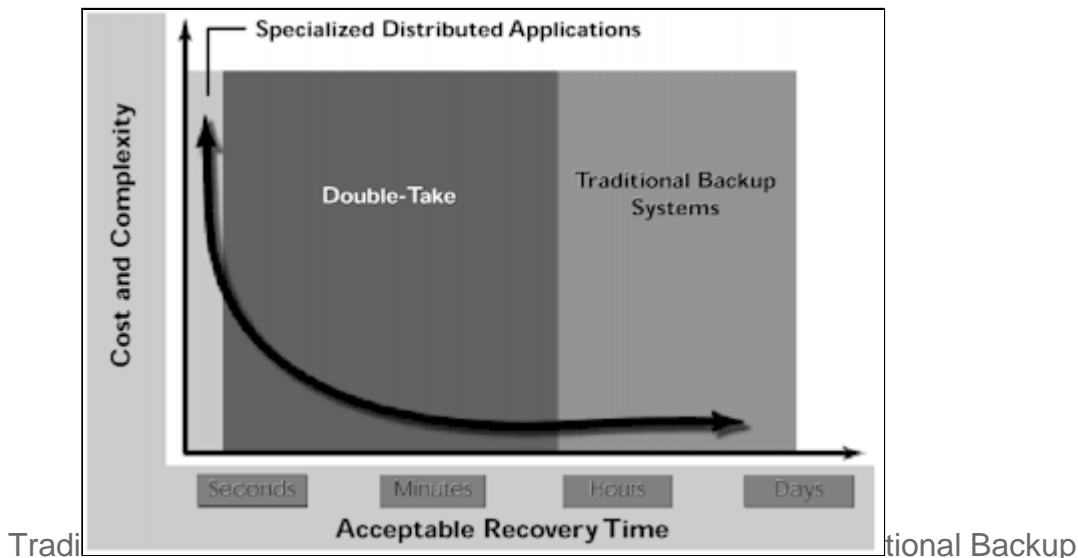
Server clustering can improve availability by providing one or more additional servers to resume processing in the event of a hardware or software failure. Unfortunately, these systems are expensive, requiring duplicated hardware and special shared disk subsystems. Also, server clusters are generally restricted to very short distances, making offsite disaster protection difficult. Shared disk clustering systems continue to have a single point of failure in the shared disk subsystem. While they can greatly improve reliability, clusters are not a complete solution.

On the high end, in both cost and complexity, specialized distributed software can fill the need for real-time, 24x7 data availability for specific applications. Oracle Parallel Server and Lotus Notes are examples of applications which can keep a business function running in the event of a server failure. Unfortunately, these systems are application specific and do not address the general issue of LAN application availability.

Double-Take bridges the gap between the capabilities of traditional backup systems and the demands of today's LAN and client-server applications. By providing economical and easily managed protection for all applications, Double-Take brings near perfect data protection and availability within reach of all network users.

By continuously maintaining an online copy of server data on another server, Double-Take reduces or eliminates data loss and limits downtime to seconds. Combined with existing backup technologies and complemented with application-specific solutions as needed, Double-Take is uniquely suited to meet the new requirements for enterprise data protection.

## The Cost/Performance Curve



Systems Double-Take dramatically reduces downtime from hours to seconds, without the cost and complexity of distributed applications.

## The New Requirements

To meet the new requirements of Enterprise Data Protection, network managers are faced with the challenge of overcoming the limitations of traditional backup technology. Managers of small LANs may only have to deal with one or two of these challenges. Managers of large LANs are confronted by most or all of the following limitations.

### Limitations in existing technology

|                                 |  |
|---------------------------------|--|
| Data Loss Due to Server Failure | Traditional backups are generally run only at night because of the extreme performance impact they have on production systems. Nightly backups leave as much as a full day's worth of data at risk in the event of a server failure.   |
| Data Loss Due to Disaster       | Many LANs are not protected against a site disaster by regular, offsite storage of backup tapes. Depending on the frequency of offsite shipments, even those LANs with regular schedules stand to lose a day's or week's worth of data in any situation where onsite data is destroyed or unavailable.   |
| Downtime Due to Server Failure  | No matter how much or how little data is unrecoverable after a server crash, there will be a significant amount of downtime before the recoverable data is accessible to users and applications. This downtime can extend from an hour or two to a day or more, depending on the backup hardware and software used, the amount of data involved, and whether recovery drills have been run to avoid confusion at restore time. |
| Downtime Due to disaster        | Most LANs and client-server systems are not covered by a formal disaster recovery plan. Without a plan, business may be disrupted for days or weeks before facilities, equipment and personnel are brought together to resume operations. Those organizations that do have a disaster recovery plan are still faced with the down-time problems associated with  |

server failure (above).

#### Open File Conflicts

In addition to the risks above, network managers are faced with the challenge of properly protecting data that is locked open by 24x7 applications. Existing solutions require closing applications, or adding special-purpose software products to allow open file backup.

#### Server Processing Burden

Backup applications on a production server, even when run at night, impose a huge burden on system resources for an extended period of time. This burden is not acceptable for many 24x7 applications.

#### Excessive Network Traffic

To alleviate the burden on production servers, many network managers have added dedicated backup servers. While this configuration is less disruptive to the production servers, it results in huge amounts of network traffic, as entire file systems are transferred over the network.

#### Excessive Cost of Management / Ownership

The limitations of traditional backup systems make the process of ensuring reliable backups time-consuming and expensive.

A solution that addresses the weaknesses of traditional backup can only be practical if it can be implemented at a reasonable price and without significantly disrupting existing systems or processes. To be effective in the real world, any potential solution must work within a number of constraints.

## Key Considerations for Potential Solutions

|                    |   |
|--------------------|---|
| Low Network Impact | Must place a minimal load on existing network resources.            |
| Low Server Impact  | Must have a minimal performance load on production servers.         |
| Scalable           | Must be able to grow as data protection needs increase.             |
| Flexible           | Must be cost effective enough for enterprise-wide deployment.       |
| Compatible         | Must handle routine network connection and bandwidth problems.      |
| Invisible          | Must be transparent to users in normal business operations.         |
| Tolerant           | Must work with existing applications, hardware, and backup systems. |
| Affordable         | Must be flexible enough to be used in a broad range of networks.    |

## The Double-Take® Solution

Double-Take is the first multi-platform product to address these considerations and overcome the limitations of traditional tape backup. Double-Take is a real-time data protection software product that creates and maintains an up-to-the-moment copy of production data on a high availability or disaster recovery server. In the event of a server failure, or even a full site disaster, data is immediately available on the backup server.

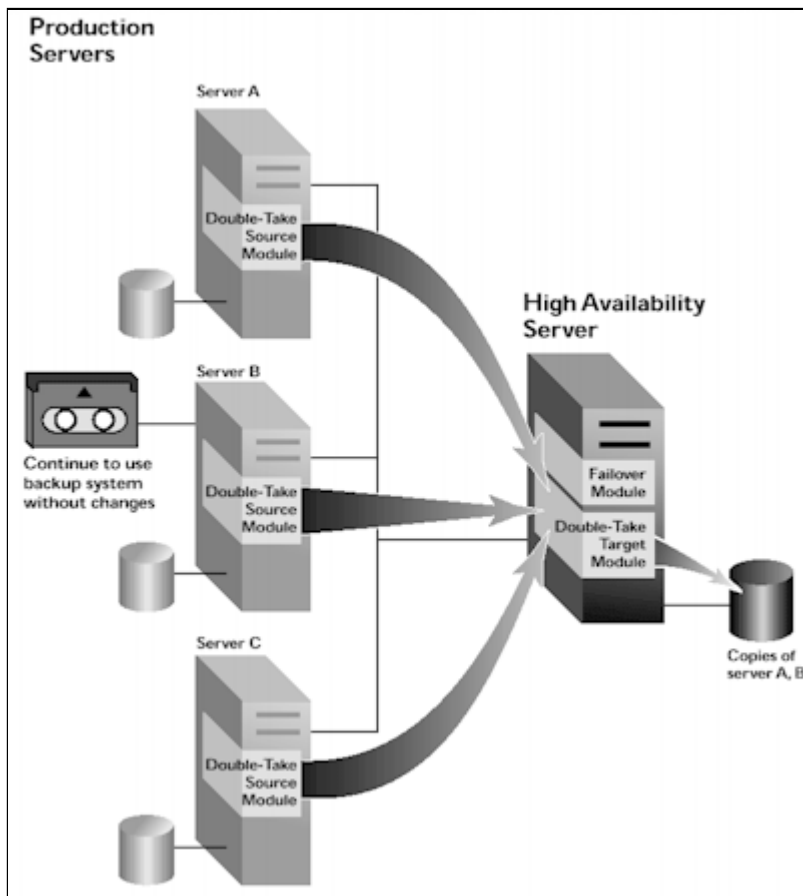
The pages that follow will show how Double-Take, used in conjunction with your existing backup system, can address the limitations of current backup technology.

| Traditional Limitations         | Key Considerations |
|---------------------------------|--------------------|
| Data Loss Due to Server Failure | Low Network Impact |
| Data Loss Due to Site Disaster  | Low Server Impact  |
| Downtime Due to Server Failure  | Scalable           |
| Downtime Due to Site Disaster   | Flexible           |
| Open File Conflicts             | Compatible         |
| Server Load                     | Invisible          |
| Network Load                    | Tolerant           |
| Cost of Management              | Affordable         |

## Provides High Availability

High availability of key data is essential to keep a business running smoothly. Traditional backup systems leave a gap in protection.

Real-time replication of data for the entire enterprise—or a selected portion—guarantees important data is not subject to the 24 hour gap possible with traditional backup schemes. Should a server crash or fail, Double-Take's high-availability (HA) features enable users to resume work with minimal loss of time and little or no loss of data.



### Traditional Limitations

|                                 |  |
|---------------------------------|--|
| Data Loss Due to Server Failure | Because Double-Take replicates data in real time, data is continuously protected. If a production server fails, the replicated copy of the data is safe on the high availability server.   |
| Downtime Due to Server Failure  | When a production server fails, there's no need to restore. Data files and applications are ready to use on the high availability server.  |
| Open File Conflicts             | Using the existing backup system, Double-Take makes it easy to get clean back-ups of open files without shutting down the application or logging users off the server. By simply adding the replicated copies (on the high availability server) to the normal backup script, open file conflicts become a thing of the past. |

### Key Considerations

|                   |  |
|-------------------|--|
| Low Server Impact | Double-Take's source module, which runs on the production server, adds a minimal load to the server's CPU. Double-Take supports queuing at the source and target servers, so the production server won't be slowed down by a busy high availability server or a congested network. Double-Take |
|-------------------|--|

features resource monitoring, in which Double-Take limits its use of system resources to avoid conflicts with other applications. Double-Take also avoids adding to the production server's disk I/O load. In normal operations, data is transferred directly to the high availability server, without causing an additional write operation on the production server's disk.

Scalable

In normal operations, the high availability server applies the updates to the replicated file systems without the overhead of writing them to a disk-based queue. This reduces the amount of disk activity on the target server, allowing it to support more production servers.

Flexible

Double-Take's communication architecture supports one-to-one, many-to-one, one-to-many, and daisy-chain server configurations. And because it works at the OS level, rather than the disk driver level, there's no need to create matching disk partitions between the source and target servers.

Compatible

Double-Take runs over existing network links. A single target server can support many source servers, spreading the cost of the high availability server over many production servers.

Affordable

Double-Take's operations are invisible to the user and to applications. It supports multiple operating systems and allows mixing and matching of OS versions.

\*Feature availability and implementation details may vary between operating systems and OS versions.

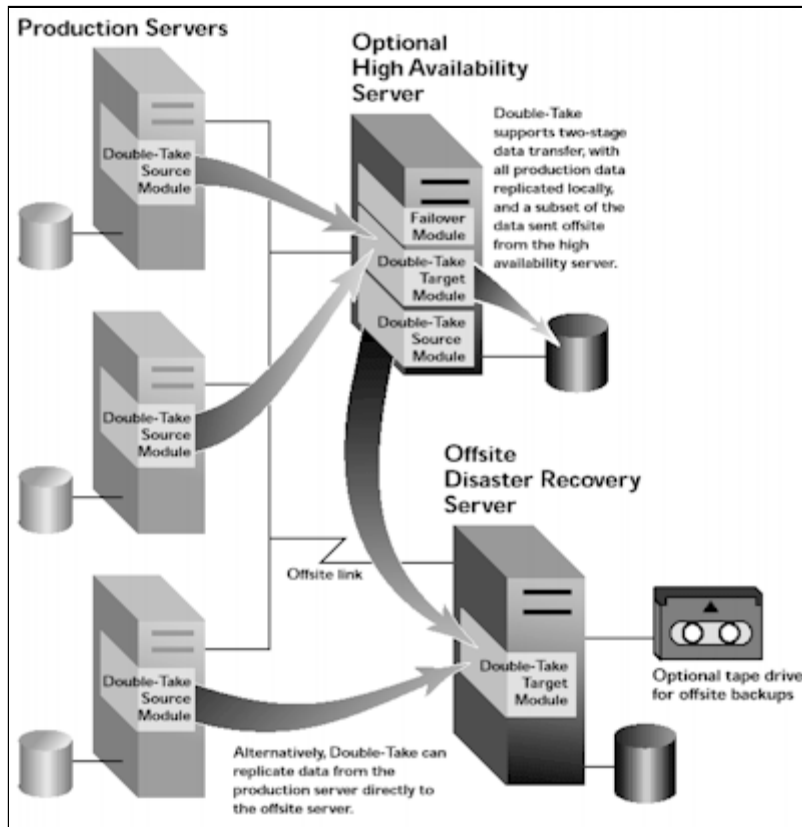
## Enables Disaster Recovery

One of the most serious gaps in data protection for an enterprise LAN is the lack of an offsite disaster recovery plan. The requirements for LAN Disaster Recovery (DR) are much the same as those for mini and mainframe environments.

- Mission critical data should be as up-to-date as is technically feasible and financially reasonable.
- The data should be available to the business at a moment's notice.
- Offsite facilities and procedures must be established to allow the business to operate after a disaster.

For years, corporations have deployed elaborate offsite data protection for their businesses to ensure business continuity, often mere minutes after a disaster disables their primary site or sites. As an integral part of any DR contingency, many of these plans include, the regular and reliable delivery of data in real time to secure offsite repositories. Typical LAN installations have either been too complex or too costly to replicate to such sites. In addition to cost, software that could efficiently and thoroughly provide real-time replication has been non-existent.

One of the keys to providing efficient data replication for LANs is the ability to select only the data that is needed to run the business in event of disaster. Even highly organized LANs typically consist of servers that hold a variety of data, from old memos to today's customer orders. The ability to select which data is replicated is key to efficiency and economy in DR preparation. In addition, replication to the off-site repository must be as "lean" as possible. For example, if only one record in a 200 MB database changes, the system should send only the changed record, and not swamp the lines with the entire 200 MB of data.



### Traditional Limitations

|                                |   |
|--------------------------------|---|
| Data Loss Due to Site Disaster | Double-Take continuously sends a copy of data updates offsite, as they happen. In many cases, updates arrive at the offsite location before the production server has even written the data to disk.  |
| Downtime Due to Site Disaster  | If the primary site becomes unavailable, the data is ready and waiting at the off-site location. This immediate availability of data, combined with an effective disaster recovery plan, allows operations to resume in minutes rather than days. |

### Key Considerations

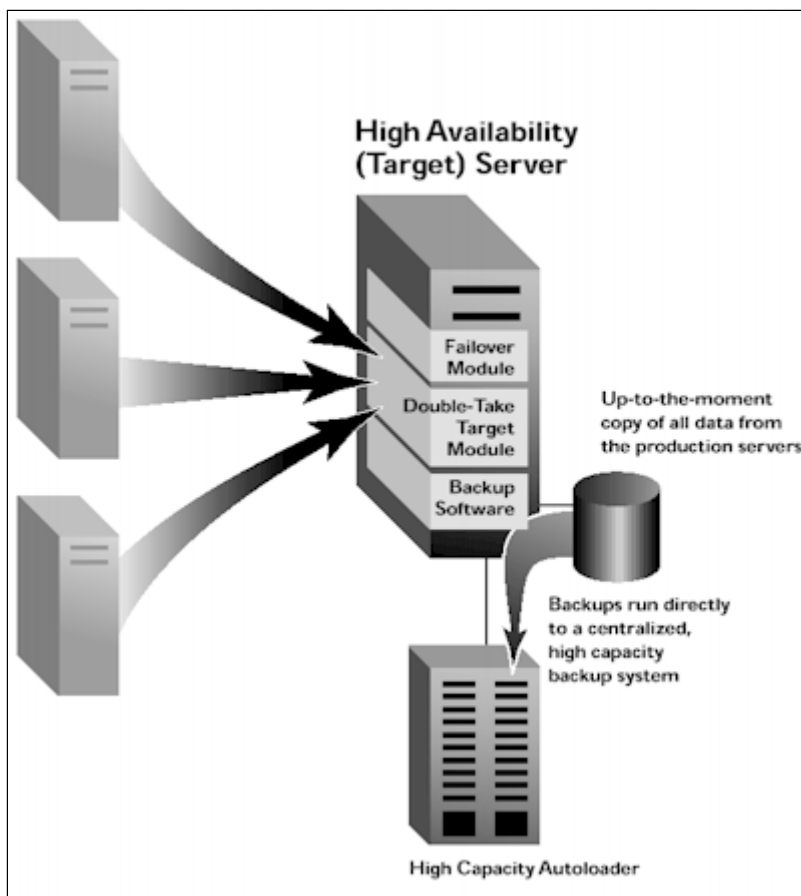
|                    |   |
|--------------------|---|
| Low Network Impact | Double-Take sends only the changed data ("file deltas"), not the whole file. For example, when a 5K record is changed in a 200 MB database, only that record is transmitted offsite.  |
| Flexible           | Double-Take can be configured to send data directly from the production servers (if local high availability is not required), or through a local high availability server. In either case, the data to be replicated can be selected down to the level of individual files. |

|                   |   |
|-------------------|---|
| <p>Tolerant</p>   | <p>Compared with local network links, wide area connections are slower, more congested, and subject to more frequent failures. Double-Take includes a specialized communication system that is designed to handle these interruptions gracefully. A busy communication link will not stop the production server, updates are queued until the link is available. Even after prolonged outages, Double-Take's incremental mirroring capability makes resynchronizing the servers fast and efficient.</p> |
| <p>Affordable</p> | <p>Sending data over wide area links can be expensive. Double-Take gives you the flexibility to select only those files or directories that are deemed mission critical (typically this is only 5-10% of total data). This makes offsite protection available to all critical applications at a fraction of the price required in disk-level mirroring applications.</p>  |

\*Feature availability and implementation details may vary between operating systems and OS versions.

## Improves Existing Backup Systems

Double-Take is compatible with virtually all existing backup solutions. Offline backup systems are still needed to provide archival protection. Double-Take can be deployed for high availability and disaster recovery without any changes to the existing backup structure. However, once Double-Take begins providing high availability services for server data, backup operations can be dramatically improved by moving the backup system(s) to the high availability server.



### Traditional Limitations

|                     |   |
|---------------------|---|
| Open File Conflicts | Files that are locked open by applications on the production servers can cause problems for traditional backup systems. Double-Take keeps the replicated copy of these files closed and available for backup. By simply backing up the replica instead of the primary copy, backup systems can run unimpeded.   |
| Server Load         | Backups running on a production server place a huge demand on system resources. When the backup system is moved to the high availability server, backups have no impact on production server performance. In addition to performing nightly full backups, network managers have the option of running incremental backups during the business day for even more complete protection.                                  |
| Network Load        | In some networks, backup systems are installed on dedicated backup servers to reduce the processing burden on production servers. Unfortunately, this approach puts huge demands on network resources, as whole file systems are transferred over the wire for periodic full backups. With a backup system running on the high availability server, backups can be run without generating additional network traffic. |
| Cost of Management  | With backup systems installed on many servers, the process of verifying proper operations becomes needlessly complex. With a centralized backup system on the high availability server (perhaps with multiple tape drives in a high capacity loader), management is simplified and cost of ownership is reduced.  |

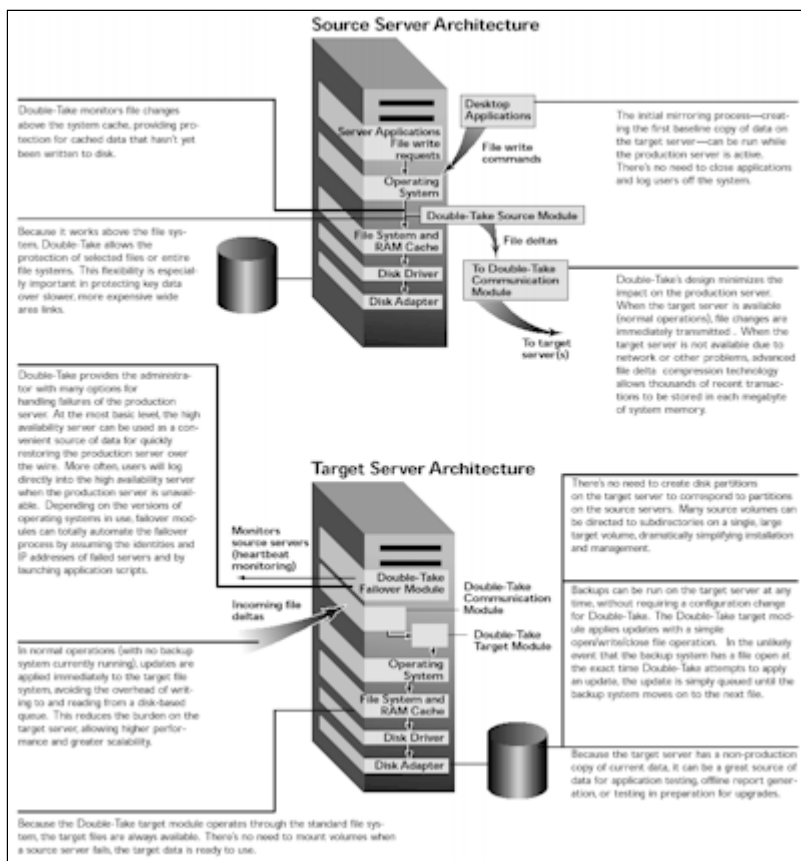
## Key Considerations

|                    |  |
|--------------------|--|
| Low Network Impact | Because the data is continuously replicated to the target server, there is no need for additional network traffic when backups are run.  |
| Low Server Impact  | Backups can be run at any time with no additional load on the production servers.  |
| Scalable           | With most modern backup software, multiple tape drives can be run in parallel for increased speed and capacity. Expanding your backup system is as simple as adding another device to the target server.   |
| Compatible         | Double-Take is compatible with virtually all backup systems. Because the replicated files are always available, backups can be run at any time with no special commands or scripts. There's no need to suspend replication or mount volumes; backups can be run with no change to Double-Take's configuration. |
| Affordable         | Centralizing the backup operations on the high availability server allows a high-speed backup device to be shared and eliminates the need to buy a smaller backup device for every server.   |

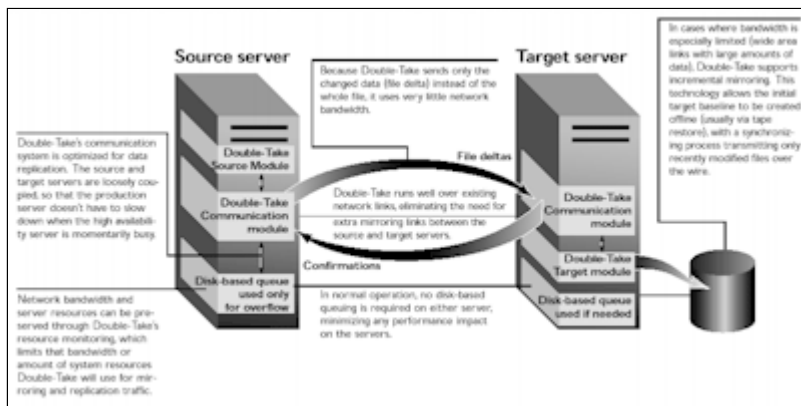
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# Double-Take Advanced Technology

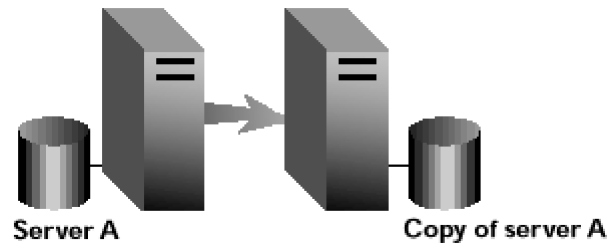
Double-Take includes more than 20 patent-pending technologies. For the technical reader, this section highlights the key aspects of Double-Take's architecture that make these solutions practical.



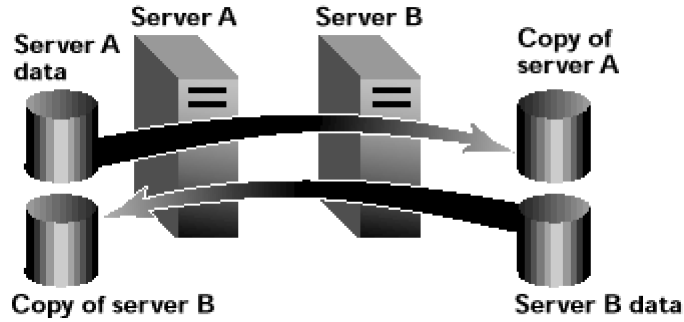
## Communication Architecture



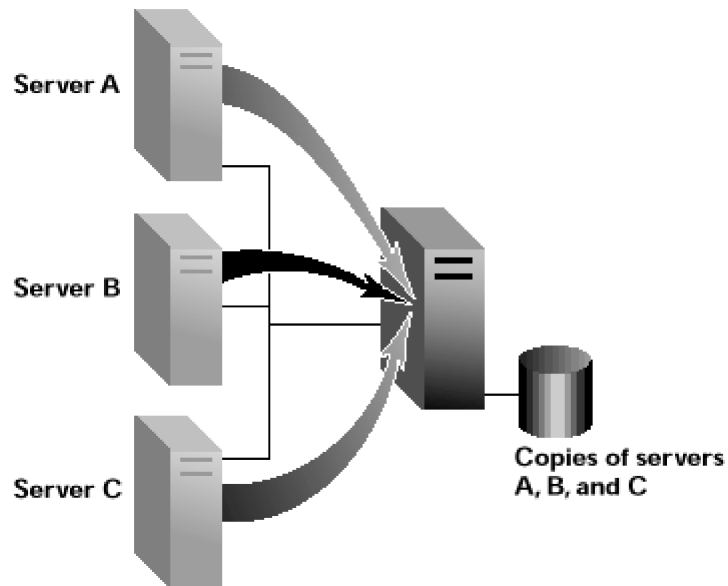
## Double-Take Configurations



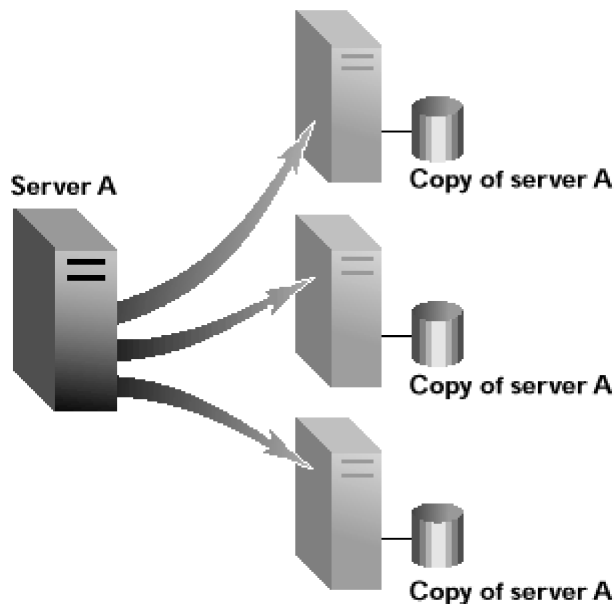
The simplest configuration has one high availability server protecting a single production server.



A pair of servers can be used to protect each other's data



Many-to-one configurations provide cost effective highavailability and disaster recovery.



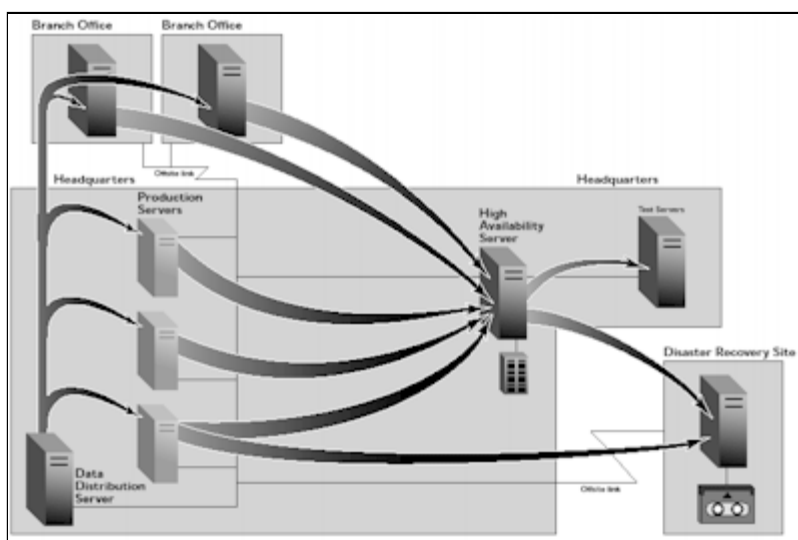
One-to-many replication can be used for data distribution.

Feature availability and implementation details may vary between operating systems and OS versions.

## Meeting the New Requirements for Enterprise Data Protection

The previous pages have shown how Double-Take can be applied to resolve many of the limitations of traditional backup technology, and how its design allows it to integrate well into existing networks. High availability, disaster recovery and centralized backup were explored as totally separate applications.

In an enterprise deployment, Double-Take is used in a combination of these roles, and other roles as well. These final pages will explore how Double-Take can be used across a full enterprise.



### Double-Take and Clustering

As clustering systems evolve, Double-Take will complement clustering in four ways:

Use a cluster as the target server, improving the availability of the target system, and extending the reliability of a clustered solution to existing servers.

Use a cluster as a source server. The target server protects against disk subsystem failure, file system corruption, and a number of other failures that can cause a cluster to become unavailable.

Use Double-Take to backup a cluster of servers. This eliminates the performance load and risk of running backups directly on your mission-critical clusters.

Use Double-Take to provide offsite disaster recovery for clusters. The best clustering technology doesn't help if the whole site is inaccessible. Real-time offsite protection is a natural extension to clustering.

### Testing, Migration and Change Management

As the reliability of server and network hardware continues to improve, other factors become the most common causes of downtime. Among the most common causes are changes to software configurations, upgrades to new applications or OS components, or other changes to applications on the network. Thorough testing is difficult and time consuming to perform with traditional backup technology.

Double-Take can simplify the process of testing in the following areas:

- Application upgrades
- Operating system upgrades
- New applications installation
- Year 2000 testing
- Any software configuration change

Creation of the test environment with traditional technologies often takes more time than the actual testing procedure. Double-Take can be used to quickly and simply create a test environment with current data, without imposing a burden on the production servers. By simply copying the relevant files and directories from the high availability server to a test server, an accurate and current test environment is created much more quickly. The time saved in this process can be invested in more thorough testing.

### Disaster Recovery Partners

Double-Take was designed to work well over the wide-area links used in disaster recovery protection. But the technology itself is only one part of the solution. NSI Software has developed [partnerships](#) with the major providers of business continuity services.

NSI Software's partners can provide the facilities, services and expertise to develop a complete and effective protection plan based on Double-Take technology. By choosing Double-Take for your high availability needs today, you ensure compatibility with these providers' services in the future.

For more information on Double-Take and our services, please call us at 888-674-9495 or 317-598-1174. Or, feel free to fill out this [online form](#).

