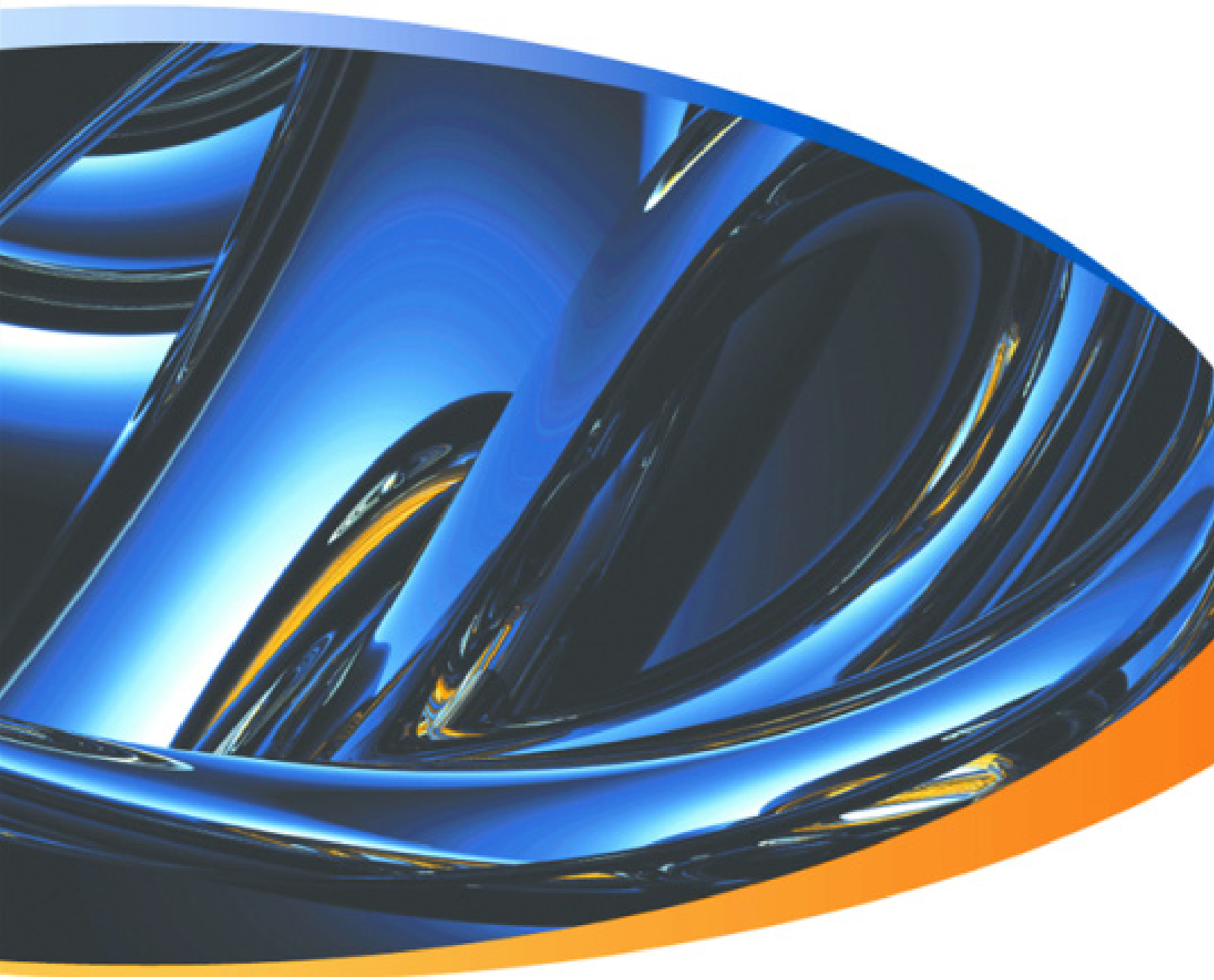
Double-Take for Linux Evaluation Guide



Double-Take, Balance, Double-Take Cargo, Double-Take Flex, Double-Take for Hyper-V, Double-Take for Linux, Double-Take Move, Double-Take ShadowCaster, Double-Take for Virtual Systems, GeoCluster, Livewire, netBoot/i, NSI, sanFly, TimeData, TimeSpring, winBoot/i, and associated logos are registered trademarks or trademarks of Double-Take Software, Inc. and/or its affiliates and subsidiaries in the United States and/or other countries. Microsoft, Hyper-V, Windows, and the Windows logo are trademarks or registered trademarks of Microsoft Corporation in the United States and/or other countries. Linux is a registered trademark of Linus Torvalds. Red Hat is a registered trademark of Red Hat, Inc. in the United States and other countries. Novell, the Novell logo, the N logo, SUSE are registered trademarks of Novell, Inc. in the United States and other countries. All other trademarks are the property of their respective companies.

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Introduction

1

Welcome to Double-Take® for Linux®! Double-Take is a real-time data replication and failover software product. Double-Take augments your existing data protection strategy by reducing downtime and data loss, and it provides these services with minimal impact on existing network and communication resources.

Double-Take allows you to specify mission-critical data that must be protected and replicates, in real-time, that data from a production server, known as the source, to a backup server, known as the target. The target server, on a local network or at a remote site, stores the copy of the critical data from the source. Double-Take monitors any changes to the critical data and sends the changes to the target server. By replicating only the file changes rather than copying an entire file, Double-Take allows you to more efficiently use resources.

- **Offsite disaster recovery services**—No business is immune from the many disasters - disk crashes, power failures, human error, natural disasters - that will inevitably stop the flow of data at one or more of your facilities. Tape-based disaster recovery can only restore data to the point of the last backup, which was most likely the prior night. Any data created since the last backup will be lost. An effective disaster recovery plan requires a comprehensive data protection plan, including Double-Take continuous data replication.

  Double-Take can be combined with your existing tape backup solution for a more comprehensive disaster recovery plan. Double-Take is a disaster recovery software based on asynchronous real-time replication and automatic failover to provide cost-effective business continuity for Microsoft® Exchange, Microsoft SQL Server®, Oracle®, virtual systems, file servers, and many other applications. Double-Take provides continuous data protection by sending an up-to-the-minute copy of the data as it is being changed to the target server. Features such as built-in bandwidth control allows data to be replicated to a remote source, far from harms way of a disaster such as hurricanes, tornadoes, and brown-outs. That same bandwidth control allows data to be restored within minutes.

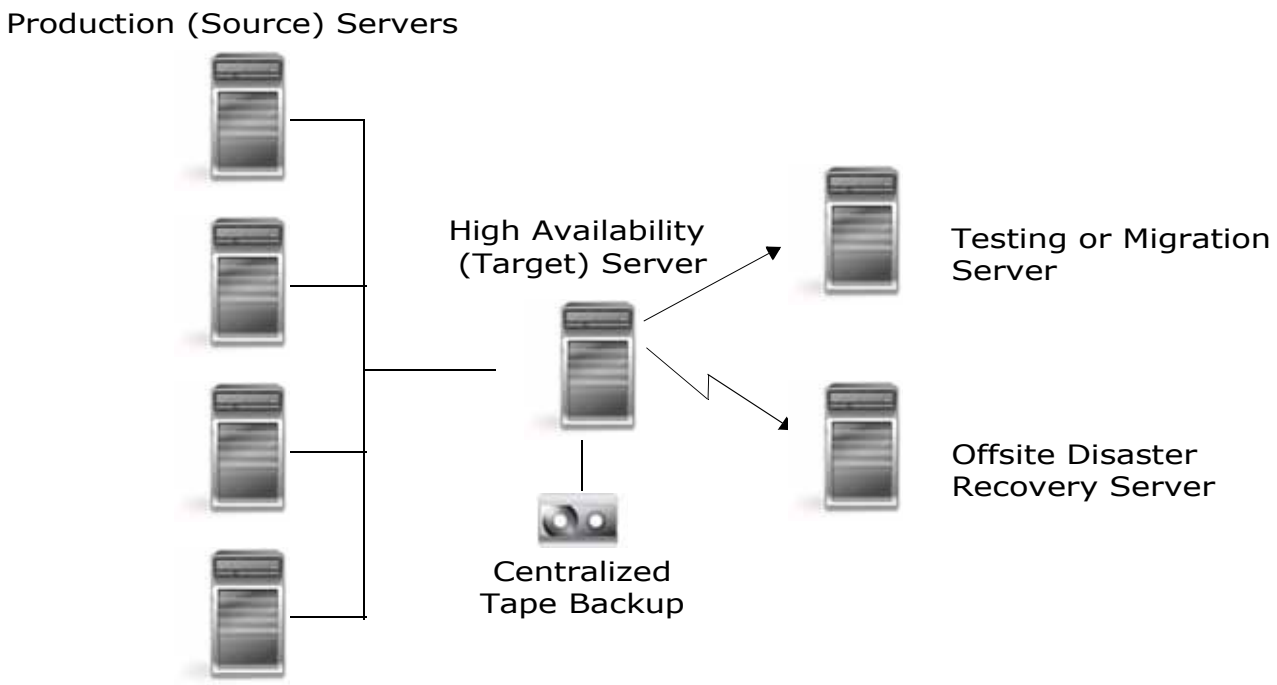
- **Local high availability services**—As businesses come to increasingly depend on continuous access to their data, ensuring that their data is available on-demand is of paramount importance. Traditional solutions, such as tape backup and hardware mirroring, are not without flaws. Tape backup poses a potential risk in that data backups must be performed when the system is idle, meaning that as much as a day's worth of data could be lost. Tape recovery time can also be below many business's recovery time objectives (and does not provide high availability).

  A more cost-effective answer to a high availability solution is asynchronous host-based replication for high availability. Support for non-proprietary hardware and storage systems means you can leverage your existing resources. You will also get real-time data protection without distance limitations, ensuring high availability for all your business-critical applications, including e-mail. Real-time data replication at the byte level, regardless of application, is a much more efficient use of computing and bandwidth resources for high availability. With Double-Take all of your applications can have cost-effective, real-time data protection and high availability.

- **Enhanced centralized backup**—The rapid growth in storage brought on by the Internet and distributed computing has placed nearly impossible demands on administrators responsible for protecting corporate data assets. The backup window has shrunk to nearly zero and tape backup systems can introduce significant overhead to a production server, seriously impacting its performance. While the importance of backups increases, the impact of periodic full system backups is obvious. Even nightly incremental backups dominate processing while they examine every file system object and then read all files that have changed in their entirety for backup. Performing this process across a network adds additional overhead as the entire process happens across the wire.

  These days permanent point in time storage and recovery, like that provided by periodic tape backup, is required. And despite the fact that Double-Take cannot provide a way to retrieve historical file versions or files that may have been previously deleted by users, Double-Take can enhance the backup process by continuously replicating critical data to centralized servers and using tape backup systems to backup the replica rather than the production servers. Using Double-Take offloads the burden of periodic tape backups from multiple production servers to a dedicated backup server and makes centralized tape backup a reality, significantly reducing management cost and improving reliability. Regardless of a file’s state on the source, on the target every file is closed and available for consistent backup at any point in time.

The following diagram is one common Double-Take configuration.



Evaluation Guide overview

In this guide, you will find the following sections.

1. **Introduction**—A brief overview of Double-Take
2. **Resources**—Resources available during your evaluation
3. **Installation**—System requirements and basic instructions for installing Double-Take
4. **Evaluation**—Step-by-step instructions for evaluating basic Double-Take functionality
5. **Conclusion**—Final words on your Double-Take evaluation

Double-Take operations

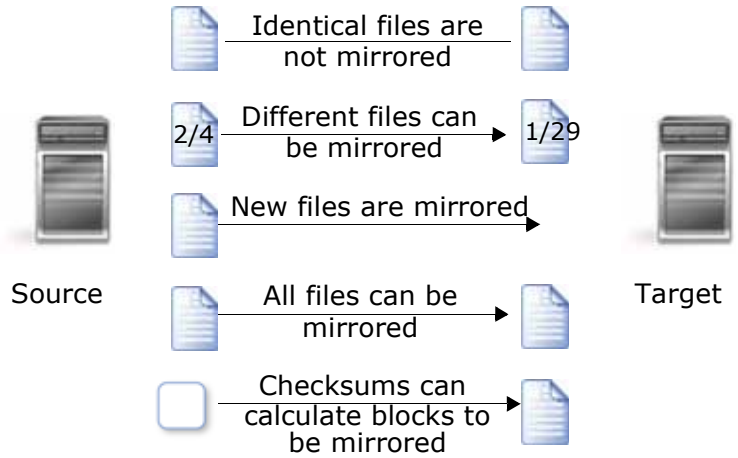
Double-Take performs four basic types of operations.

- **Mirroring**—The initial copy or subsequent resynchronization of selected data
- **Replication**—The on-going capture of byte-level file changes
- **Failure monitoring and failover**—The ability to monitor and stand-in for a server, in the event of a failure
- **Restoration**—A mirror of selected data from the target back to the source

Mirroring

Mirroring is the process of transmitting user-specified data from the source to the target so that an identical copy of data exists on the target. When Double-Take initially performs mirroring, it copies all of the selected data, including file attributes and permissions. Mirroring creates a foundation upon which Double-Take can efficiently update the target server by replicating only file changes.

If subsequent mirroring operations are necessary, Double-Take can mirror specific files or blocks of changed data within files. By mirroring only files that have changed, network administrators can expedite the mirroring of data on the source and target servers.



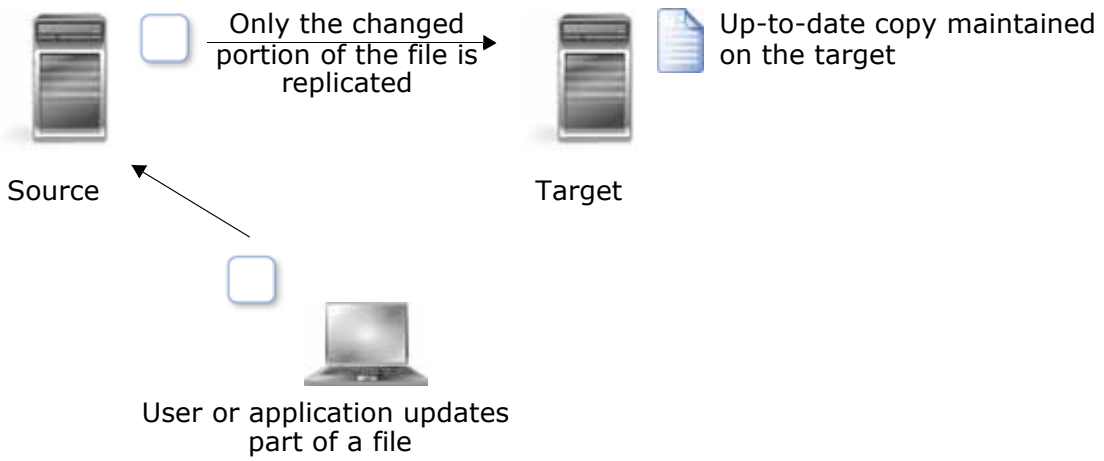
Flexible mirroring options allow you to choose which files are mirrored from the source to the target.

Mirroring has a defined end point - when all of the selected files from the source have been transmitted to the target. When a mirror is complete, the target contains a copy of the source files at that point in time.

Replication

Replication is the real-time transmission of file changes. Unlike other related technologies, which are based on a disk driver or a specific application, the Double-Take replication process operates at the file system level and is able to track file changes independently from the file's related application. In terms of network resources and time, replicating changes is a more efficient method of maintaining a real-time copy of data than copying an entire file that has changed.

After a source and target have been connected through Double-Take, file system changes from the user-defined data set are tracked. Double-Take immediately transmits these file changes to the target server. This real-time replication keeps the data on the target up-to-date with the source and provides high availability and disaster recovery with minimal data loss.



Unlike mirroring which is complete when all of the files have been transmitted to the target, replication continuously captures the changes as they are written to the source. Replication keeps the target up-to-date and synchronized with the source.

Failure monitoring and failover

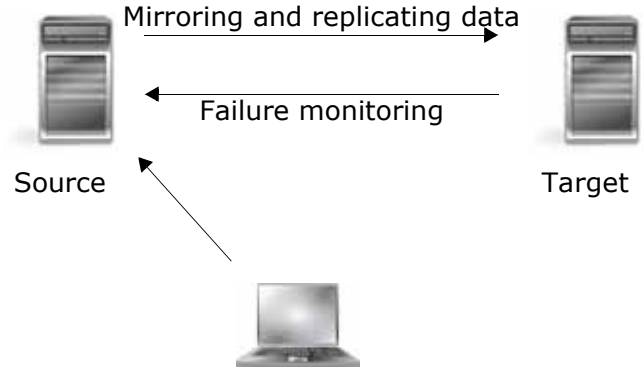
Failover is the process in which a target stands in for a failed source. As a result, user and application requests that are directed to the failed source are routed to the target.

Double-Take monitors the source status by tracking network requests and responses exchanged between the source and target. When a monitored source misses a user-defined number of requests, Double-Take assumes that the server has failed. Double-Take then prompts the network administrator to initiate failover, or, if configured, it occurs automatically.

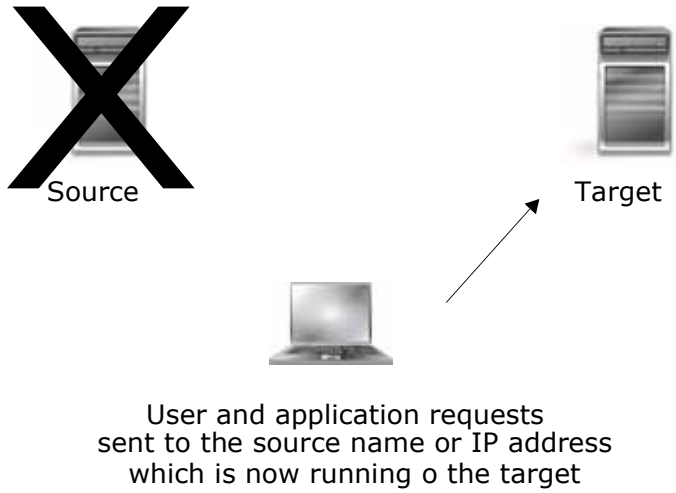
The failover target assumes the network identity of the failed source. When the target assumes the identity of the source, user and application requests destined for the source server or its IP address(es) are routed to the target.

When partnered with the Double-Take data replication capabilities, failover routes user and application requests with minimal disruption and little or no data loss. In some cases, failover may be used without data replication to ensure high availability on a server that only provides processing services, such as a web server.

Before failover occurs



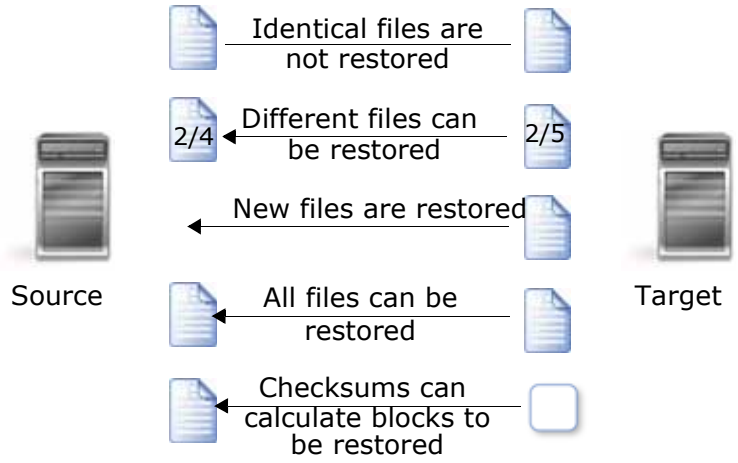
After failover occurs



Restoration

Restoration provides an easy method for copying replicated data from the target back to its original location on the source. The process only requires you to select the source, target, and the appropriate replication set. There is no need to select files or to remember where the data came from on the source since that information is maintained by Double-Take.

Restoration can be used if the source data is lost due to a disk crash or when the most up-to-date data exists on the target due to failover. At the time of a source server failure, your Double-Take target will contain the same data as your Double-Take source. If you are using the Double-Take failover capabilities, users can continue updating data on the target server while the problems on the source are resolved. Because of the continued updates on the target, when the source server is ready to come back online, the two servers will no longer contain the same data. Restoration is the process of copying the up-to-date data from the target back to the original source or a new source.



Flexible restoration options allow you to choose which files are restored from the target to the source.

When a restoration is complete, the source and target are again synchronized.

Resources

2

You have many resources available to you when using Double-Take.

- **Operating System and application documentation**—Make sure that you have complete documentation for your operating system and your applications.
- **Double-Take documentation**—The complete set of Double-Take documentation includes the manuals listed below. Each manual is available in the \DblTake\docs directory on the product CD and in the root of the installation directory you selected during the installation. The manuals are in Adobe® Acrobat® PDF format. If needed, you can install the free Adobe Acrobat Reader® by downloading the latest version from the Adobe web site at www.adobe.com.
  - *Double-Take for Linux User's Guide*—This guide is a complete how-to guide with detailed steps for installing and using Double-Take. This guide also contains a complete list of Double-Take messages, alerts, and statistics. The file name of this manual is User's Guide.pdf.
  - *Double-Take for Linux Scripting Guide*—This guide is a scripting manual for those users who want to use DTCL (Double-Take Command Language). The file name of this manual is Scripting Guide.pdf.
  - *Double-Take for Linux Evaluation Guide*—This guide is for those users who are evaluating Double-Take. It walks through specific steps allowing you to become familiar with the Double-Take core technology first hand. The file name of this manual is Evaluation Guide.pdf.
- **Double-Take Online Help**—The online help can be accessed by pressing the F1 key, clicking the **Help** button on screens where it is available, or selecting **Help**, **Help Topics**.
- **Readme**—Double-Take includes a readme file which contains any last-minute information. This file is called readme.html and is located in the \DblTake\docs directory of the product CD and in the root of the installation directory you selected during the installation.
- **Application Notes**—Double-Take Software tests many of the popular applications on the market today and the results of these testing procedures are written up into formal Application Notes that describe how Double-Take should be configured to work correctly with certain applications. For a complete list of Application Notes, see the Double-Take Software Support web site at support.doubletake.com.

If you need assistance during your evaluation, you can contact Technical Support. All basic configurations outlined in the guides will be supported through Technical Support, while assistance and support for advanced configurations will be referred to a Pre-Sales Systems Engineer or to Professional Services. For a complete list of technical support contact information, including phone numbers and e-mail addresses, visit the support page of the Double-Take Software web site at www.doubletake.com/support/.

Double-Take Setup

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Your Double-Take setup consists of two tasks: determining that your source and target meet the system requirements of this evaluation and performing the Double-Take installation.

NOTE: When evaluating Double-Take, you should install and evaluate it in a test environment. Do not use your actual production servers because you will be forcing a failure during the evaluation.

System requirements

Verify that each machine that will be used as a source or target meets the following system requirements.

- **Operating System**—Make sure your servers meets the operating system requirements outlined in the following table.

Physical Servers and Guest Operating Systems	Kernel Version	Kernel Type	File System	Platforms
• Red Hat® Enterprise Linux 4.5 through 4.7 for 32-bit architecture • CentOS 4 Updates 5-7 for 32-bit architecture	2.6.9.x.x	• Default • SMP • HugeMem	• Ext2 • Ext3	• VMware® • Microsoft Virtual Server • Xen® • Virtual Iron®
• Red Hat Enterprise Linux 4.5 through 4.7 for 64-bit architecture • CentOS 4 Updates 5-7 for 64-bit architecture		• Default • SMP • LargeSMP		
• Red Hat Enterprise Linux 5.0 through 5.2 for 32-bit architecture • CentOS 5 GA-Update 2 for 32-bit architecture	2.6.18.x.x	• Default (SMP) • Xen • PAE		
• Red Hat Enterprise Linux 5.0 through 5.2 for 64-bit architecture • CentOS 5 GA-Update 2 for 64-bit architecture		• Default (SMP) • Xen		
SUSE Linux Enterprise Server 10.2 for 32-bit architecture	2.6.16.x.x	• Default • SMP • BigSMP • Xen • XenPAE	• Ext2 • Ext3 • ReiserFS	• VMware® • Microsoft Virtual Server • Xen® • Virtual Iron®
SUSE Linux Enterprise Server 10.2 for 64-bit architecture		• Default • SMP • Xen		

- **System Memory**—At a minimum, you should have 512 MB of memory on each server. Ideally, you should have 1 GB.

- **Disk Usage**—The amount of disk space required for the Double-Take program files is approximately 45 MB. About 5 MB will be located on your `/(root)` partition, and the remainder will be on your `/usr` partition. You will need to verify that you have additional disk space for Double-Take queuing, logging, and so on. Additionally, on a target server, you need sufficient disk space to store the replicated data from all connected sources, allowing additional space for growth.
- **Protocols**—TCP/IP
- **Name resolution**—Your servers must have name resolution using hosts files entries, DNS, and/or DHCP. For details on configuring name resolution by any of these methods, see your Linux documentation or online Linux resources.

Installing or upgrading Double-Take for Linux

Use these instructions if you are installing or upgrading Double-Take.

1. Determine the installation package that is appropriate for your operating system.

   The versionnumbers in the installation file name will vary and will correspond to the version of Double-Take you are installing. If you are uncertain about the architecture of your machine, you can use the uname -m command to determine it.

2. Once you have determined the appropriate installation package to use, you can install the software from the UI or from the command line.
   - **UI installation**—Double-click the .rpm file from the UI and confirm the installation or upgrade.
   - **Command line installation**—Use the following steps to install from a command line.
     a. Go to a shell prompt by launching a terminal application from your UI or logging in via the Linux virtual console.
     b. If you are not already, become the superuser ("root") by typing su -.
     c. If you are installing from a CD, mount the file ISO 9660 or UDF file system.
     d. To run the installation use rpm -i with the installation file name to install the software or rpm -U with the installation file name to upgrade the software.

   A successful installation returns you to the shell prompt. If you receive an error message during the installation, you will need to reinstall the software. If you are unable to resolve the error, contact technical support.

3. After you have installed the software, you need to configure your installation prior to using Double-Take. Run the following command from the shell prompt.

   DTSetup

   NOTE: Do not run DTSetup using the sudo command. Use a real root shell to launch DTSetup instead, either by logging in as root on the console or by using the login session of a non-privileged user to run su - to start a root shell.

4. The first time you run DTSetup after an installation or upgrade, you will be prompted to review the Double-Take Software license agreement. Review the agreement and accept the terms of agreement by typing yes. You cannot use Double-Take without agreeing to the licensing terms.
5. When the DTSetup menu appears, at a minimum you must specify an activation code, configure replication, and start the daemon. You may also desire to modify the security group configuration. During the install, root is automatically added to the main Double-Take security group. If you want to add other users or remove root, you should modify the security group configuration as well. For details on all of the DTSetup menu options, see the *User's Guide*.

Installing or Upgrading the Double-Take Client for Windows

Use the instructions to install the Double-Take clients on a Microsoft Windows® machine. Your Windows version can be Windows 2003, Windows XP Service Pack 2 or later, or Windows Vista on 32-bit or 64-bit platforms.

1. Close any open applications.
2. Start the installation program using the appropriate instructions, depending on your media source.
   - **CD**—Load the Double-Take CD into the local CD-ROM drive. If auto-run is enabled, the installation program will start automatically. To manually start the program, select Start, Run and specify <cd_drive>:\autorun.exe. Select to install Double-Take for Windows.
   - **Web download**—Launch the .exe file that you downloaded from the web. When prompted, unzip the files and launch the installation.
3. When the Double-Take installation program begins, the Welcome screen is displayed. Click **Next** to continue.
4. Review and accept the Double-Take license agreement to continue with the installation program. Click **Next** to continue.
5. Select the folder where you would like to install the Double-Take clients and click **Next** to continue.
6. When you are ready to begin copying the files, click **Install**.
7. After the files have completed copying, click **Finish** to exit the installation program.

Evaluating Double-Take

4

Double-Take configuration consists of creating a replication set, which defines the data on the source machine that is to be protected, and then connecting that replication set to a target machine. These two steps, creation and connection of the replication set, are the backbone of the Double-Take processes. From there you can also use Double-Take's failover, failback, and restoration processes for a high availability solution.

The evaluation consists of the following tasks.

1. ***Checking your configuration*** on page 4-2
2. ***Establishing a connection*** on page 4-2
3. ***Monitoring the activity and completion of the initial mirror*** on page 4-3
4. ***Changing data to cause replication*** on page 4-4
5. ***Verifying the data changes on the target*** on page 4-5
6. ***Testing your target data*** on page 4-7
7. ***Configuring failover*** on page 4-8
8. ***Simulating a failure*** on page 4-10
9. ***Simulating data changes after failover*** on page 4-10
10. ***Initiating failback*** on page 4-11
11. ***Restoring your data*** on page 4-13

Checking your configuration

Before starting your evaluation, make sure you have Double-Take installed on the source and target. You should have at least 1 GB of data for testing. If you are going to be protecting application data, make sure the application is pre-installed on the target, but the application is not running. If the application is running on the target, the files will be held open and Double-Take will not be able to write to the files. The application should not be running because, in the event of a failure, the application can be started on the target and the files can then be accessed.

Establishing a connection

1. Start the Double-Take Management Console by selecting **Start**, **Programs**, **Double-Take**, **Management Console**.
2. Click **Make a connection** from the right pane of the Management Console. If that quick launch screen is no longer visible, select **Tools**, **Connection Wizard**.

   NOTE: If the Double-Take Servers root is highlighted in the left pane of the Management Console, the **Connection Wizard** menu option will not be available. To access the menu, expand the server tree in the left pane, and highlight a server in the tree.

3. The Connection Wizard opens to the Welcome screen. Review this screen and click **Next** to continue.

   NOTE: At any time while using the Connection Wizard, click **Back** to return to previous screens and review your selections.

4. If you highlighted a source in the Management Console, the source will already be selected. If it is not, select the Double-Take source. This is the server that you want to protect. Click **Next** to continue.

   NOTE: Double-Take will automatically attempt to log on to the selected source using the identification of the user logged on to the local machine. If the logon is not successful, the Logon dialog box will appear prompting for your security identification. When logging in, the user name, password, and domain are limited to 100 characters.

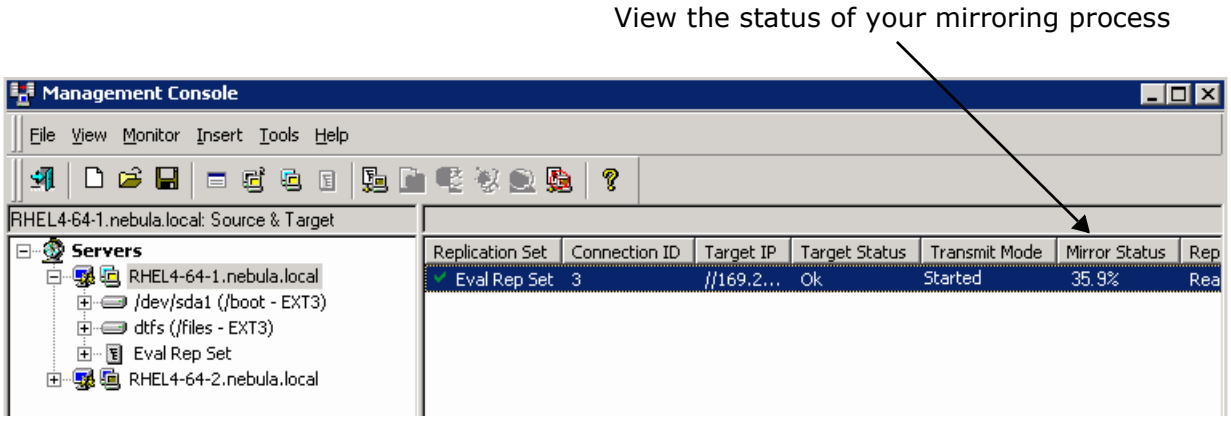
5. If you highlighted a target in the Management Console, the target will already be selected. If it is not, select the Double-Take target. This is your backup server that will protect the source. Click **Next** to continue.

   NOTE: Double-Take will automatically attempt to log on to the selected target using the identification of the user logged on to the local machine. If the logon is not successful, the Logon dialog box will appear prompting for your security identification. When logging in, the user name, password, and domain are limited to 100 characters.

6. On the next screen, verify **Create a new replication set with this name** is selected.
7. Enter the replication set name, and click **Next** to continue.
8. A tree display appears identifying the volumes and directories available on your source. Mark the check box of the volumes and/or directories you want to protect. Click **Next** to continue.
9. There are two pre-defined locations to store the source data on the target, or you can select a custom location. For this evalution, select the option **Send all data to the same path on the target**. This option keeps the directory structure on the source and target identical. For example, /var/data is transmitted to /var/data. Click **Next** to continue.
10. Review your selections on the summary screen. You do not need to set any advanced options for this evaluation, so click **Finish**. The Connection Wizard will close, the connection will be established, and mirroring and replication will begin.
11. You will be prompted to save your newly created replication set. Click **Yes** to save it.

Monitoring the activity and completion of the initial mirror

View your new connection in the Management Console by highlighting the source on the left pane. The connection will appear on the right pane. Use the horizontal scroll bar at the bottom of the right pane to view the various status columns. Pay attention to the **Mirror Status** column which shows the status of the mirroring operation. During the mirroring process, you will see a percentage of the mirror that has been completed. When the **Mirror Status** changes to **Idle**, there is no mirroring activity, meaning your initial mirror has completed.



To view specific mirroring statistics that may be of interest, use the horizontal scroll bar at the bottom of the right pane of the Management Console window to view the various columns.

- **Sent (Bytes)**—The total number of mirror and replication bytes that have been sent during this connection.
- **Sent Mirror (Bytes)**—The total number of mirror bytes only that have been sent during this connection.
- **Skipped Mirror (Bytes)**—The total number of bytes that have been skipped when performing a difference or checksum mirror. These bytes are skipped because the data is the same on the source and target machines.
- **Remaining Mirror (Bytes)**—The total number of mirror bytes only that remain to be sent to the target.

For complete details on all of the statistics, see the Double-Take *User's Guide*.

After your mirror is complete, look at your target and you will see the replicated data stored in the location you specified. Now you are ready to continue with the evaluation.

Changing data to cause replication

In order to test replication, you need to change the data on your source. This includes modifying existing files, creating new files, deleting files, and changing permissions and attributes.

1. On the source, browse through the directories and files contained in your replication set.
2. Select four files from your source and record the file information specified in the following table.

File Name	Attribute to Record
File 1_____	Date_____ Time _____
File 2_____	Date_____ Time _____
File 3_____	File size _____
File 4_____	File size _____

3. On your source, view the contents of one of your files from the table above. Make notes here of the file contents, if necessary.

_____

_____

_____

_____

_____

_____

4. On your target, locate the four files that you have noted above from your source. They match the files on the soruce.
5. Also on your target, view the contents of the file on the source that you viewed. It matches the file on your source.
6. If your Management Console is closed, open it.
7. Highlight your source in the left pane.
8. Locate the **Replication Status** and **Sent (Bytes)** columns in the right pane.
9. Tile your Management Console so that you can see it while still having access to your desktop.
10. On your source, edit the file that you viewed above. Save your changes, and watch the Management Console statistics as the file change causes replication to occur. .
11. Modify the other three files so that the date, time, and/or size is updated, and again watch the Management Console statistics as the file changes cause replication to occur. While Double-Take is actively replicating, the status will be **Replicating**. When there is no replication activity, the status is **Ready**.
12. Use the horizontal scroll bars to display additional replication statistics.
    - **Sent (Bytes)**—The total number of mirror and replication bytes that have been sent during this connection
    - **Queued Replication (Bytes)**—The total number of replication bytes that remain in the source queue
    - **Sent Replication (Bytes)**—The total number of replication bytes that have been sent during this connection
    - **Last File Touched**—Identifies the last file that Double-Take transmitted to the target

For complete details on all of the statistics, see the Double-Take *User's Guide*.

NOTE:	Many user applications typically save an entire file even though only a portion of the file may have changed. Therefore, the replication statistics will show the entire file being transmitted, not just the changed data. To confirm that replication only transmits the changed segments of files, you must use an application, such as a database application, or a command, such as the echo command, to save only the changed portions of a file.

You may notice your **Replication Status** toggle between **Replicating** and **Ready** as it continues processing the file changes, when your **Replication Status** stays at **Ready**, Double-Take is waiting for additional changes to transmit. After replication is complete, you are ready to continue with the evaluation.

Verifying the data changes on the target

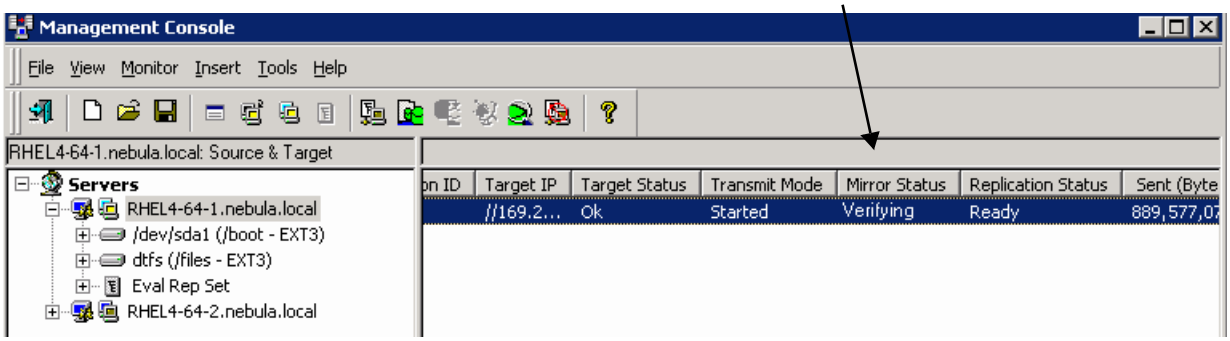
Now that you have modified some of the files, you want to be sure that the file modifications were applied correctly.

NOTE:	Because of the way the Windows Cache Manager handles memory, machines that are doing minimal or light processing, as you are in this evaluation, may have file operations that remain in the cache until additional operations flush them out. This may make Double-Take files on the target appear as if they are not synchronized. When the Windows Cache Manager releases the operations in the cache on the source, the files will be updated on the target. To make sure this does not impact your testing, flush the cache by copying a couple of files from one directory to another and then deleting them.

1. Browse your source and target. Compare the directory structures and the total number of files.
2. Look again at the four files you modified earlier. Verify manually that the changes you made have been applied to the target copy of the file.
3. Right-click the connection on the right pane of the Management Console and select **Verify**. You will see two choices on the Start Verification dialog box.
   - **Verify only**—This option performs the verification process by comparing the date, time and size of each file and generates a verification report identifying the files that are not synchronized.
   - **Remirror data to the target automatically**—This options performs the verification process by the comparison method specified, generates a verification report, and then remirrors those files from the source to the target that are not synchronized.
4. Select **Verify only** and click **OK**.

   Just like when you were monitoring the mirror and replication processes, you can monitor the verification process. Notice that the **Mirror Status** column changes to **Verifying** while the verification process occurs. When the verification is complete, Double-Take will have created a log file for you to review.

View the status of your verification process



5. Wait until your **Mirror Status** has returned to **Idle** and then open the file DTVerify.log located in the Double-Take installation directory on your source. You will see that all of the files are reported as the same.

```
Completion Time:  2/7/08 17:04:38:271766
Elapsed Time:  121.689167 seconds

Total Directories Compared:    15128
Total Directories Missing:     0
Total Files Compared:          7282567
Total Files Missing:           0
Total Files Different:         0
Total Files Encrypted:         0
Total Bytes Skipped:           3874343685920
Total Bytes Compared:          3874343685920
Total Bytes Missing:           0
Total Bytes Different:         0


----- END OF VERIFICATION -----
```

6. Modify one of your files on the target and repeat the verification process, but this time, select **Remirror data to the target automatically**.

NOTE: Since your target file is newer, make sure that **Only if the source's date is newer than the target's** is not selected.

7. Look at the file on the target that you modified and confirm that your changes are gone. The source version has overwritten the file on the target.

Testing your target data

At this point in your evaluation, you have completed a disaster recovery scenario. You may want to test your target data. The type of testing you will need to perform will depend on the type of data you are protecting.

- **User data**—If you are protecting user files, you can use the associated application to open the files on the target. Open one or more of the files to test the integrity of the data. Do not save the file after you have opened it, because that will update the copy of the data on the target, which you do not want to do at this point in the evaluation.
- **Application data**—If you are protecting application data, for example a database application, you will need to use that application to test the integrity of the data and the files. Use the following instructions to test application data on the target.

1. In order to test the application data on the target, you will need to start the application on the target. But Double-Take requires applications to be in a standby mode in order to update files on the target. In order to meet both of those requirements, you will need to pause the target. When you pause the target, the source begins to queue the data changes that are occurring. This will give you an opportunity to start the services on the target, test the data, stop the services, and then resume the target. Make sure your mirror is **Idle** and then pause the target by right-clicking the connection in the Management Console and selecting **Pause Target**.
2. Once the target is paused, you can start the application services on the target. Test the application data by using clients to connect to the application. For this evaluation, the clients will need to be configured to access the application from the target. In a real-world scenario, if failover has occurred, the target would be standing in for the source and the clients would still be accessing the application from the source.
3. After you have completed your testing, stop the application services on the target.
4. After the application services on the target have been stopped, you can resume your taget through the Management Console by right-clicking the connection and selecting **Resume Target**.
5. While you were testing the application on the target, the application files were updated on the target, thus your source and target are no longer synchronized. You will need to perform a manual remirror to resynchronize the files on the source and targer. Right-click the connection and select **Mirroring**, **Start**. Select a **Difference Mirror**. Make sure that **Only send data if source's date is newer than the target's date** is not selected. Since your target files are actuallly newer than the source (because of the testing you performed), you do want the newer files on the target to be overwritten by the files from the source. Click **OK** to begin the mirror.

When the mirror is complete, your source and target will again be synchronized and you can continue with your evaluation.

Configuring failover

If you are interested in continuing your evaluation to test high availability, use the remaining instructions in this chapter to configure failover, simulate a failure, and perform failback and a restoration.

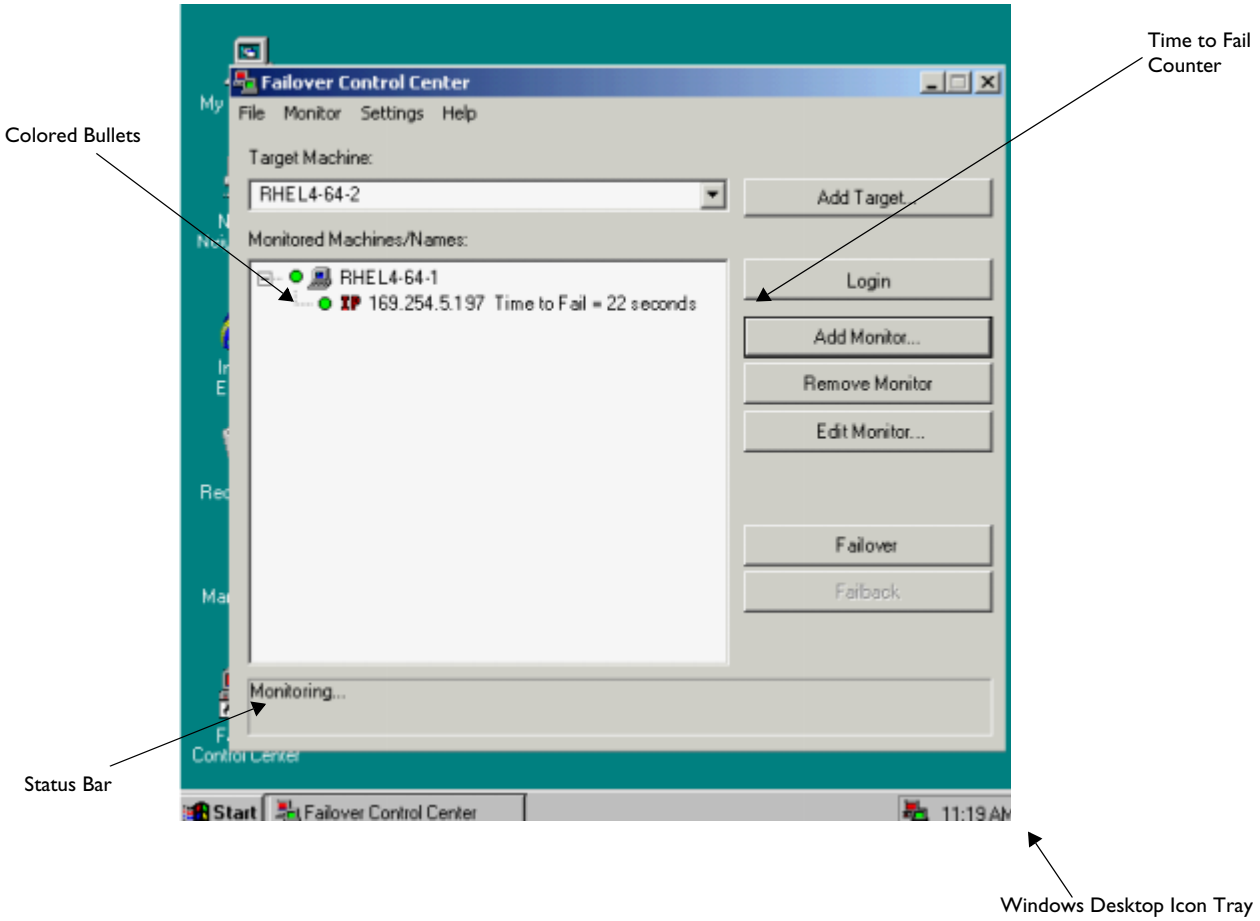
1. The Failover Control Center can be started from within the Management Console or from the Windows desktop.
   - From the Management Console, select **Tools**, **Failover Control Center**.
   - From the Windows desktop, select **Start**, **Programs**, **Double-Take**, **Failover Control Center**.
2. Select a failover target from the **Target Machine** list box.
3. Click **Login** to login to the selected target.
4. Select a source machine to monitor by clicking **Add Monitor**. The Insert Source Machine dialog box appears in front of the Monitor Settings dialog box.
5. Type in your source machine name and click **OK**. The Monitor Settings dialog box appears. This is where you set your monitoring configuration.
6. Select the source to be monitored by marking the check box to the left of the source server name in the **Names to Monitor** tree.

At this point, in terms of your evaluation, your failover configuration is complete because you will be using the default settings for the remaining options. But while you are viewing the Monitor Settings dialog box, notice the configuration options available to you.

Monitoring failover

Since it can be essential to quickly know the status of failover, Double-Take offers various methods for monitoring the state of failover. When the Failover Control Center is running, you will see four visual indicators:

- The Failover Control Center Time to Fail counter
- The Failover Control Center status bar located at the bottom of the window
- The Failover Control Center colored bullets to the left of each IP address and source machine
- The Windows desktop icon tray containing a failover icon



NOTE: You can minimize the Failover Control Center and, although it will not appear in your Windows taskbar, it will still be active and the failover icon will still appear in the desktop icon tray.

The Failover Control Center does not have to be running for failover to occur.

For more information on the visual indicators, see the *User's Guide*.

Simulating a failure

To fully evaluate failover, you need to simulate a failure. The Failover Control Center does not have to be running in order for failover to occur, but for the purpose of this evaluation, make sure that it is running so that you can see each step of the process.

1. Ping the source's IP address from a client machine.
2. Ping the source's machine name from a client machine.
3. Disconnect the network cable(s) on the source. Notice immediately, that the Failover Control Center Time to Fail counter decreases and never resets. You will see the icons change to yellow and eventually to red.
4. You will be prompted to determine how to apply the data in queue on the target. Select **Apply Data in Target Queues Then Failover**. Once the icons are red and the **Failed Over** message is displayed, failover has occurred.

> **NOTE:** The Windows Event Viewer on the target provides details on the actual steps that have occurred during failover.

5. Ping the source's IP address from a client machine.
6. Ping the source's machine name from a client machine.

As you can see, the target has taken on the identity of the source. Application and user requests destined for the source are routed directly to the target. The impact on your end users is minimal.

Simulating data changes after failover

While your source is failed over to your target, end users continue to work without interruption and the data on the target will be updated. To fully evaluate the next step, restoration, simulate the changes that the end users would have made on the target while the source was unavailable.

1. Identify the file that you edited earlier on the source.
2. Locate that same file on the target and make edits to it. Save the changes.
3. Modify the other three files from earlier, but this time make the modifications on the target copy of the file. Save the changes.

If desired, you can also test the target data as you did earlier. See ***Testing your target data*** on page 4-7. You can test user data using the associated application, and you can save the changes if desired. If you want to test application data, start the application services on the target, and test the application data by using clients to connect to the application. Because the source is now failed over, you will not need to worry about pausing the target, taking a snapshot, or configuring clients to access the application from the target. The clients will continue to access the source, which is now being handled by the target machine.

Initiating failback

When failover occurs, a source machine has failed. The steps below must be completed in order to complete failback without IP address or name conflicts.

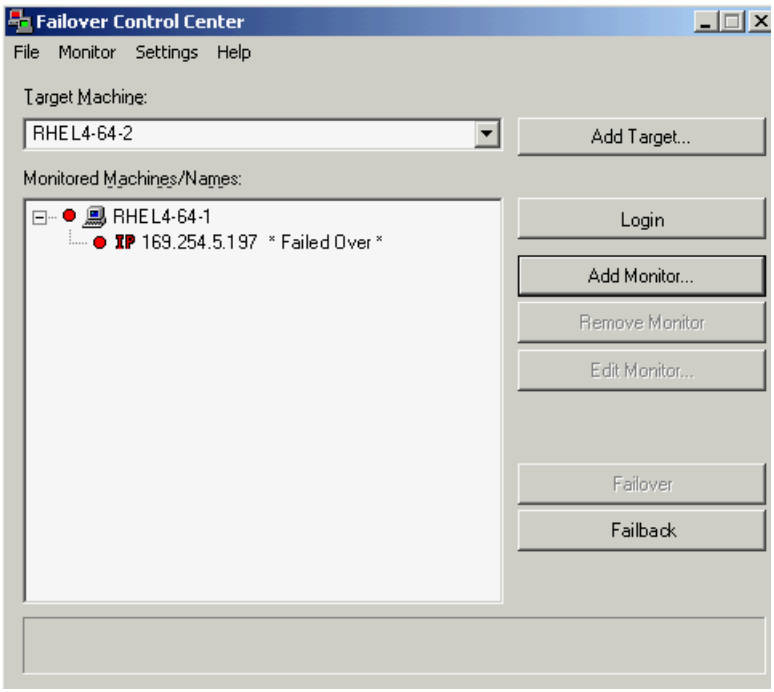
1. Verify that your source machine is not connected to the network. If it is, disconnect it.
2. Resolve the source machine problem that caused the failure.

WARNING:	Do not connect the source machine to the network at this time.

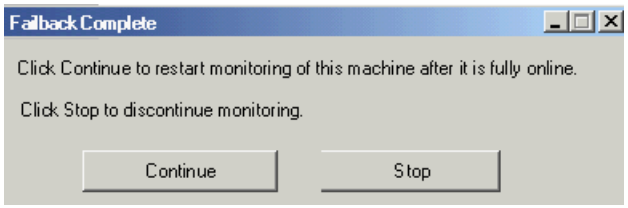
3. In the Failover Control Center, select the source machine that is currently standing in for the failed source.

NOTE:	If your target machine has been replaced during failover because of the configuration you selected (perform failover by replacing target identity with source), do not select your target from the Target Machine list. Since the target has been replaced by the source, it no longer exists and the Failover Control Center will retry for several minutes (possibly up to five minutes), until it finally fails in locating the target. After a replace failover, select your source machine in the Target Machine list, which will be monitoring itself in a failed over state, and perform failback. After failback, the target will be available again.

4. Select the failed source and click Failback. If you specified a pre-failback script in your failover configuration, that script will be executed at this time.



5. You will be prompted to determine if you want to continue monitoring the source. Bring the source online and select Continue or Stop to indicate if you want to continue monitoring the source.



After you have selected whether or not to continue monitoring the source machine, the source post-failback script, if configured, will be started.

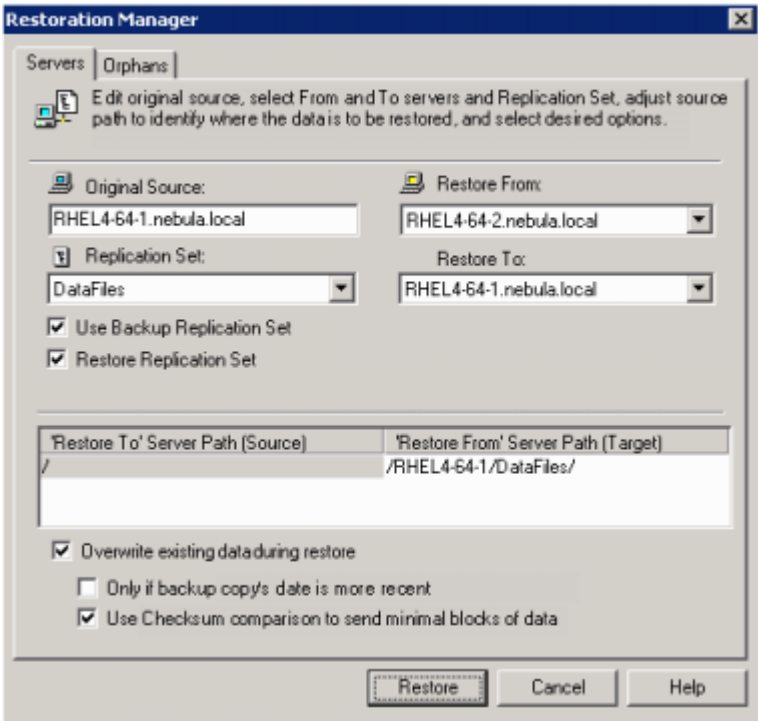
NOTE:	At this time, the source machine must be online and Double-Take must be running to ensure that the source post-failback script can be started. If the source has not completed its boot process, the command to start the script may be lost and the script will not be initiated.

Failback is now complete. If you need to restore newer files from the target to the source, see ***Restoration*** on page 14-1.

Restoring your data

The Management Console provides an easy method for restoring replicated data from the target back to the original source or to a new source server. You are only required to input the original source, the target, and the name of the replication set you want to restore. Double-Take handles the rest, including selecting the files in the replication set and restoring them to the correct location.

1. From the Management Console, select **Tools**, **Restoration Manager**.



2. Identify the **Original Source** machine. This is your source machine where the data originally resided.
3. Select the **Restore From** machine. This is the target machine where the copy of the data is stored.
4. **Replication Set** contains the replication set information stored on the target machine (the machine in **Restore From**). If no replication sets are available, the list will be blank. Select the replication set that corresponds to the data that you need to restore.
5. Select the **Restore To** machine. This is the machine where the copy of the data will be sent.
6. The **Restore To** and **Restore From** paths will automatically be populated when the replication set is selected. The restore to path is the directory that is the common parent directory for all of the directories in the replication set. If the replication set crosses volumes, then there will be a separate path for each volume. The restore from path is the path on the target server where the replicated files are located.
7. Use the default settings for the remaining restoration options.
8. Click **Restore** to begin the restoration.

Conclusion

5

After you have evaluated the benefits of powerful data protection software from Double-Take Software, you can explore other ways to enhance and optimize your enterprise solution. Engage Double-Take Software Professional Services and Training to help you realize your full potential. Double-Take Software Professional Services extends the impact of its award-winning data replication products, Double-Take and GeoCluster®, by delivering a comprehensive portfolio of services that help you assess, design, plan, and implement effective data availability and disaster recovery solutions. These solutions help you avoid costly data loss and downtime.

If you have questions on Double-Take, including pricing and product features, call the Double-Take Software toll free number, 888-674-9495, or send e-mail to info@doubletake.com.