

WASABI SYSTEMS INC.

Using Wasabi Storage Builder® 1500i with Microsoft® Windows® Tape Backup Utility

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Font Conventions

This manual uses the following highlighting conventions:

- **Boldface** indicates graphical user interface (GUI) controls such as the names of menus and fields, the text found within the fields, or drop box entries and selections. It is also used to highlight terms in the glossary.
- **Bold Helvetica** indicates buttons.
- *Italics* indicates book titles and emphasized words.
- Courier font indicates code samples:
`syslog`
- Blue text indicates complete Internet addresses (URLs):
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Configuration Instructions

Wasabi Storage Builder® for iSCSI is a fast, powerful, and cost-effective iSCSI storage area network (SAN) solution. Built on Wasabi's industry-proven storage systems and software technologies, Storage Builder for iSCSI delivers top-notch features and performance at a price that's hard to beat.

This application note provides a technical overview of how to use Wasabi Storage Builder 1500i for iSCSI (Storage Builder) as a disk-based backup solution with Microsoft Windows Tape Backup Utility (TBU), also known as NT Backup, on Microsoft Windows 2003 Small Business Server (Windows 2003) with Microsoft Exchange 2003. We recommend using this application note in combination with a comprehensive backup plan to create a reliable backup strategy for your organization.

Problem Definition

Backing up data is one of the most important activities for any organization. The loss of data to any organization can greatly impact the productivity and more importantly, the financial stability of an organization. In combination with an effective backup plan, disk-based backup over iSCSI is a valuable tool to quickly and efficiently protect an organization's data.

Disk-based backup refers to the process of creating a backup of current data on one or more hard disks. This allows for much faster data access compared to creating backups only on tape.

This data can then be later archived on tape for long term storage. Disk-based backup provides a number of cost benefits when used by itself or in combination with tape. The following table describes the benefits of disk-based backup.

Benefit	Description
Backup Consolidation	By reducing the need to have many tapes, all backups can be consolidated onto a single machine. Hard drives are less likely to be misplaced than tape and keeping a large collection of tapes takes up a lot of space.
High Performance	Data backup and restore operations can be achieved much faster with disk than with tape. This is very important as the increasing volume of data is resulting in much longer back windows. Disk-based backup also allows you to restore single files without having to index through the entire tape, resulting in a much faster restore time.
High Reliability	In combination with hardware or software RAID, loss of a drive doesn't invalidate the backup sequence. Some experts estimate that 25% to 50% of tape backups do not restore 100% of the data that was backed up to tape due to corrupted data.
Durable Medium	Hard drives last longer, data can be rewritten more often and the media is isolated from environmental conditions such as dust.
No Multiplexing of Tapes	Having to manually swap out tapes can be time consuming.

Table 1: Benefits of Disk-based Backup

Storage Builder leverages all the benefits of traditional disk-based backup with many additional advantages. In combination with an iSCSI initiator, iSCSI disk-based backup creates a versatile disk-based storage platform that is accessible from over any IP based Storage Area Network (SAN).

Disk-based backup via iSCSI requires both an iSCSI target such as Storage Builder and an iSCSI initiator. An iSCSI initiator could be compared to a traditional hard drive controller (SCSI), while an iSCSI target could be considered the enclosure for the hard drives and the iSCSI nodes are the hard drives. Basically, an iSCSI initiator uses the iSCSI protocol to communicate with an iSCSI target just as a traditional hard drive controller uses SCSI to communicate with SCSI drives.

Figure 1 shows the comparison between traditional disk-based backups and disk-based backups over iSCSI.

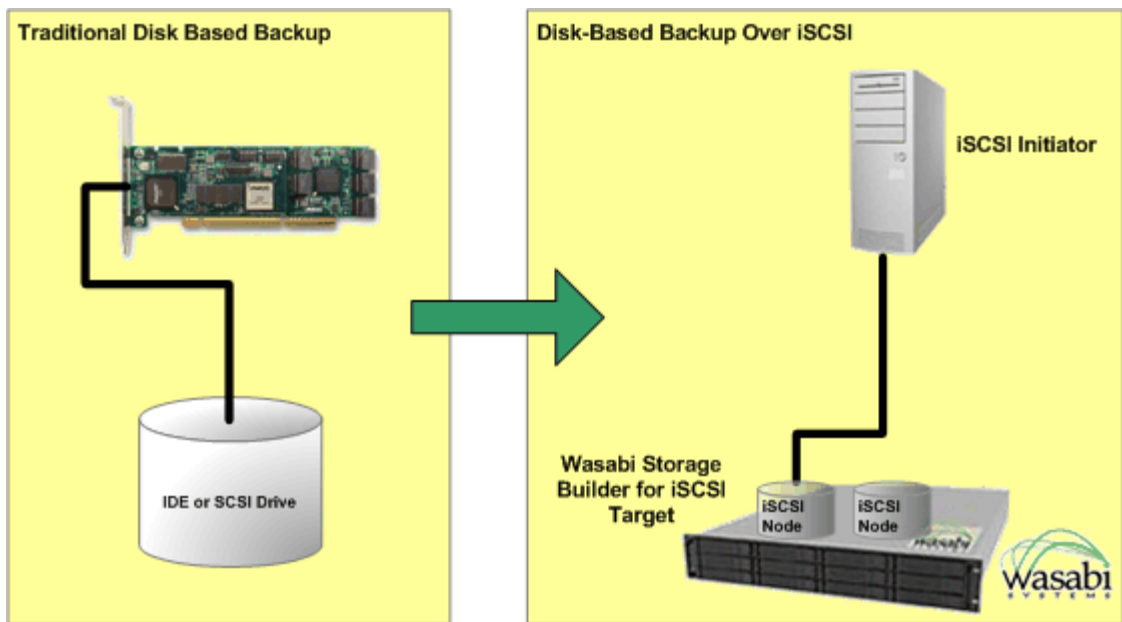


Figure 1: Comparison of Disk-Based Backup to Disk-Based Backup over iSCSI

Even though disk-based backups over iSCSI involve the same fundamental process as traditional disk-based backups, disk-based backups over iSCSI have many additional benefits. Some benefits of using Storage Builder with Microsoft's TBU include:

- Exceptional scalability – Additional Storage Builder iSCSI targets can be added to the network at anytime without requiring to reboot a network or server.
- Centralized management – From beginning to end, a Storage Builder iSCSI target can be managed through a single web browser.
- Centralized storage – A Storage Builder iSCSI target provides centralized and off-site storage over traditional Ethernet.

Storage Builder provides exceptional scalability for multiple operating systems over traditional Gigabit Ethernet. When additional storage is required that exceeds the physical limitations of an existing iSCSI target, additional iSCSI targets can be quickly added to the network. Once the additional iSCSI targets are brought online, the iSCSI initiators can be configured to use the additional iSCSI disk-based storage without having to take the initiators for upgrades. Scalability is vital to any business critical environment and is a key feature of the Storage Builder solution.

A Storage Builder iSCSI target can be completely managed from a single web browser. From creation of the RAID array to provisioning of an iSCSI node for use with an initiator, everything can be managed from a central location. With Storage Builder, a two Terabyte (2048 Gigabytes) iSCSI node can be provisioned and available for use in less than 10 minutes. This includes the time to boot the iSCSI target, provision the RAID array, create access credentials, initialize nodes and connect the initiator into the target.

Data can be backed up from Solaris, BSD, Linux, Macintosh and Windows based systems to a single Storage Builder for iSCSI target. Any storage server that has an iSCSI initiator installed can connect into the iSCSI target over traditional Gigabit Ethernet.

Storage Builder supports creating multiple iSCSI nodes with different file systems so that data from machines running different operating systems can be backed up to the same iSCSI target. This results in fewer dedicated back up machines and therefore lower acquisition and maintenance costs.

In addition, Storage Builder allows simultaneous read and write access from multiple machines so that all backups can be done within the same window. Once a node is provisioned on the iSCSI target, the storage server can connect into the iSCSI nodes and create a file system for the native operating system. In combination with a disaster recovery plan, a Storage Builder iSCSI target can be placed within any IP based network. For instance, one iSCSI target could be within the same building, while another iSCSI target is stored at a remote facility for disaster recovery. Both of the iSCSI targets would be visible to the iSCSI initiators as hard drives. Having remotely accessible storage can provide additional time savings by automating offsite backups without the need to transport tapes. With traditional disk-based backups, this is not an option.

Figure 2 demonstrates the flexibility of using multiple operating systems on a LAN and multiple iSCSI targets within a SAN in order to provide storage for multiple storage server platforms. Storage Builder provides the ideal centralized iSCSI storage solution for any organization. Wasabi Storage Builder for iSCSI is the ideal solution for an iSCSI disk-based backup solution.

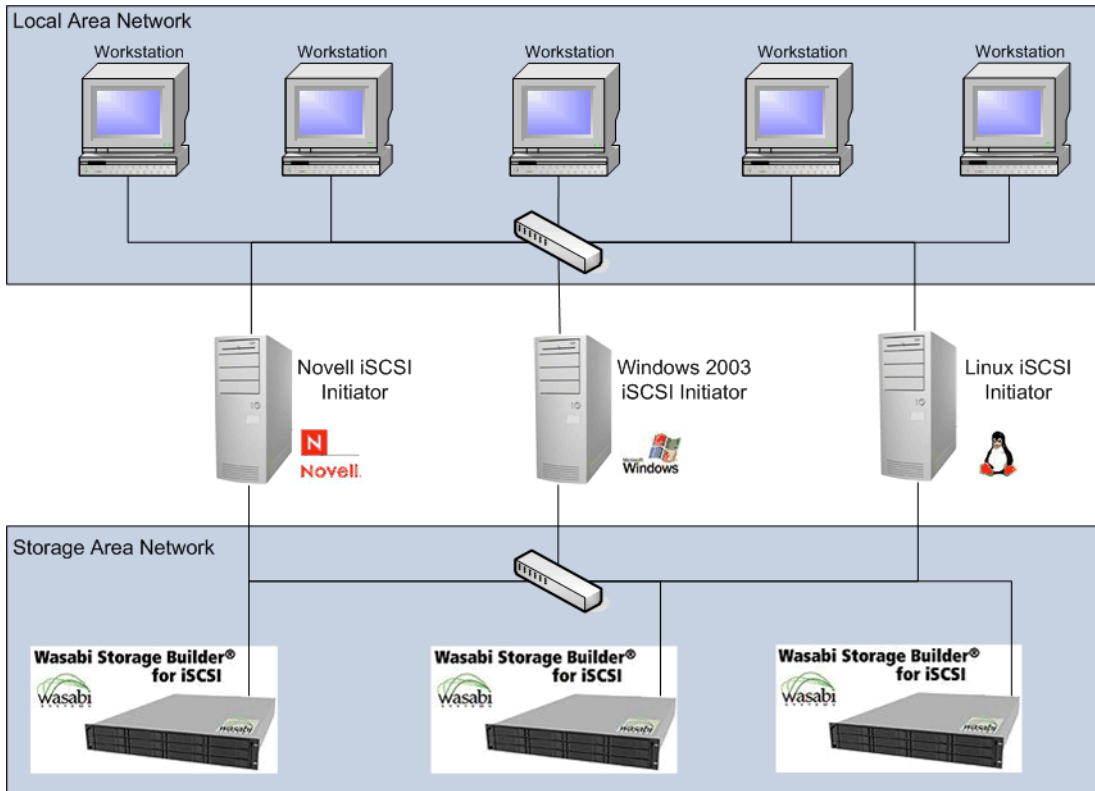


Figure 2: Conceptual LAN and SAN Usage Model over Gigabit Ethernet

Prerequisites

The following prerequisites are required in order to implement Storage Builder and TBU in a typical small to medium business (SMB) environment.

Before configuring TBU to work with Storage Builder, the following four steps should be completed:

- Develop a comprehensive backup strategy that meets your specific requirements,
- Install and configure Windows 2003 server,
- Install and configure Storage Builder iSCSI Target, and finally,
- Install the Microsoft iSCSI Initiator v2.0 on the Windows 2003 server.

In this application note, we will focus on configuring TBU to work with Storage Builder as an iSCSI disk-based backup solution. Storage Builder configuration details can be found at <http://support.wasabisystems.com> under the Downloads section.

Develop a Backup Strategy

First, great care should be taken to implement a backup strategy that meets your organization's needs. There are many things to consider including backup frequency, size and types. There are many books and online references to assist with creating an effective backup strategy.

Install and Configure Windows 2003

Next, Microsoft Windows 2003 Small Business Server with Microsoft Exchange 2003 must be installed on a compatible platform. Be sure to also install Service Pack 1 (SP1). We are using the latest service pack as of November 1, 2005, as available from the Microsoft Windows Update service. The details of our example configuration are shown in Table 2.

Feature	Configuration
Operating System	Windows 2003 Small Business Server SP1
Mail Server	Microsoft Exchange 2003 (included with Small Business Server)
Processor	Single 2.8 Ghz Xeon
Hard Drive	Western Digital 80 GB IDE Drive
IP Address	192.168.11.1

Table 2: Windows 2003 Server Configuration

Install and Configure the Storage Builder iSCSI Target

After installing Windows 2003 Server, setup and configure the Storage Builder iSCSI target. Installation and configuration details for Storage Builder are included in the *Wasabi Storage Builder 1500i User's Manual* and the *Wasabi Storage Builder Quick Start Guide*. Both manuals can be downloaded from the Wasabi Systems support website at <http://support.wasabisystems.com>. For this application note, the configuration of the Storage Builder iSCSI target is shown in Table 3.

Configure the Storage Builder iSCSI target with two Nodes. In order to centralize all of our backups, one node is configured for backing up Windows data and one for Linux data. Once this is done, you can format the Windows node for an NTFS file system and format the Linux node for an EXT3 file system. In this example, we will only use the Windows node to back up the Windows 2003 server.

Feature	Configuration
Number of Hard Drives	12
Size of the Hard Drives	250 GB
Total Raw Storage	Approximately 3000 GB
RAID Controller	3ware 8506-12
RAID Configuration	Windows Node: RAID 5 with Hot Spare with 8 Drives Linux Node: RAID 5 with 3 drives Hot Spare: Single drive
Volume Unit Size	Windows Node: ~1700 GB Linux Node: ~500 GB
Volume Group Size	Windows Node: ~1700 GB Linux Node: ~500 GB
Node Size	Windows Node: ~1700 GB Linux Node: ~500 GB
iSCSI Credentials	CHAP
Portal	1 Portal on Ethernet Port 0
IP Address of Ethernet Port 0	192.168.11.22

Table 3: Sample Storage Builder iSCSI Target Configuration

Install the Microsoft iSCSI Initiator v2.0

Now download and install the Microsoft iSCSI Initiator v2.0 onto the server. The latest Microsoft iSCSI Initiator can be downloaded from Microsoft at <http://www.microsoft.com/downloads/>. After installing the iSCSI Initiator, connect the Windows 2003 iSCSI Initiator to the Storage Builder iSCSI Node. Figure 3 shows the completed SAN with the Storage Builder iSCSI Target and Windows 2003 Server.

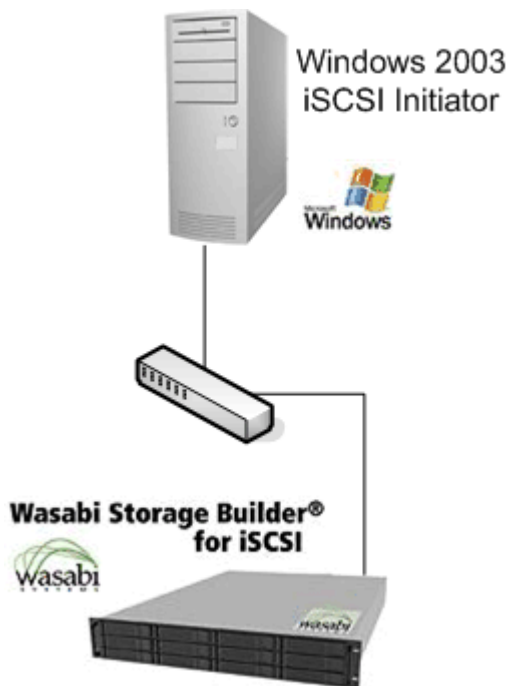


Figure 3: SAN Disk-Based iSCSI Backup with Microsoft TBU

Figure 4 shows the configuration screen of the Windows Node on the Wasabi Storage Builder iSCSI target. Note that the iSCSI credentials were set to CHAP in this configuration. We highly recommend implementing CHAP authentication for optimal data security. This feature is turned on in our example here. Additional information about CHAP authentication can be referenced within the *Wasabi Storage Builder 1500i User's Manual*.

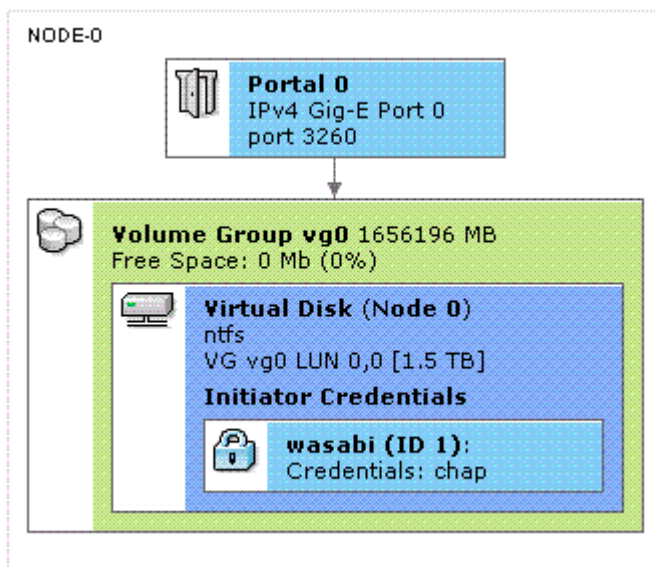


Figure 4: iSCSI Node Configuration

Using Microsoft Windows Tape Backup

This section describes the configuration, backup, and restore processes required when using disk-based backup with Wasabi Storage Builder for iSCSI and TBU on a Windows 2003 Server.

Configuring the iSCSI Node for Storing Data

First, format the iSCSI Node to allow Windows 2003 Server to create a file system on the Wasabi Storage Builder iSCSI Target. Before proceeding, make sure that the Windows 2003 Server is connected to the iSCSI Target with the Microsoft iSCSI version 2.0 iSCSI Initiator. Next, run Computer Management in order to format the iSCSI Node (**Start→Control Panel→Administrative Tools→Computer Management**). Within **Computer Management**, click on the plus sign next to **Storage** and double click **Disk Management** as shown in Figure 5.

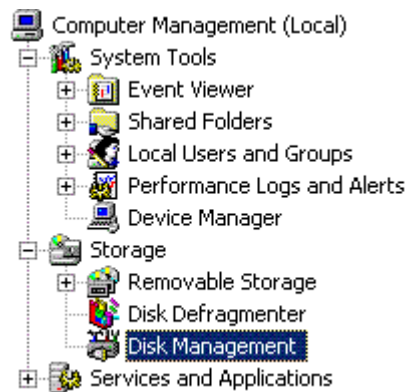


Figure 5: Disk Management

If this is the first time initializing the drive a wizard will automatically appear to initialize the drive. Navigate through each of the options while leaving the default settings. After clicking **Finish** the hard drive will be initialized. The iSCSI node should look similar to the image shown in Figure 6.



Figure 6: Basic Initialized Disk

In this example, we use the entire iSCSI node for our backup. The size of the iSCSI node will vary based on the size of the node allocated on to the iSCSI node.

Next, format the iSCSI node in order to store our backups to disk. To format the newly initialized disk, right click on the newly initialized disk and select **New Partition...**, shown circled in red in Figure 7.

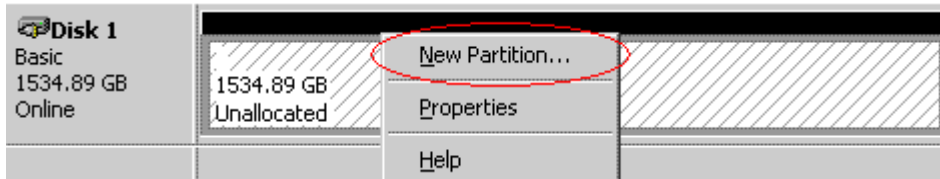


Figure 7: Creating a New Partition

The **New Partition Wizard** appears. As you step through the wizard you will create a Primary 976.55GB NTFS Drive E partition and label the partition iSCSI Backup. The drive letter of the partition and the disk label chosen for the partition can vary based on the Windows 2003 system configuration. In this example, we have opted not to do a Quick Format by leaving that option unchecked. When the wizard completes, the iSCSI node will be fully formatted. A full format is important to verifying the integrity of our iSCSI node as a new NTFS disk.

After clicking **Finish** on the **New Partition Wizard**, the disk begins to format. The time it takes to format the iSCSI partition depends on a number of factors including network speed between the Windows 2003 Server and the Initiator and the size of the iSCSI node. Figure 8 shows an example screen shot of an iSCSI node being formatted.

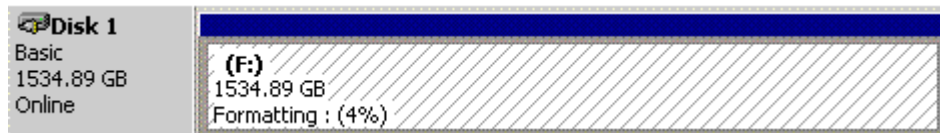


Figure 8: Formatting the Initialized iSCSI Node

It is important to wait for the iSCSI Node to finish formatting before the Node can be used for backups. Next, configure TBU to use the newly formatted iSCSI Node to store the backups.

Backing Up to an iSCSI Node

Ensure that the iSCSI node has finished formatting. Figure 9 shows an example iSCSI node that has finished being formatted and is ready for disk-based backup using TBU.

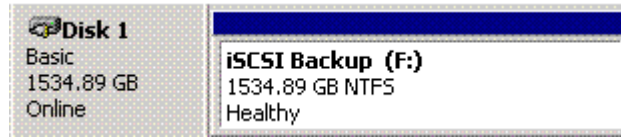


Figure 9: Formatted iSCSI Node

Notice that the Basic disk is Online, Healthy, and the drive letter F has been assigned to the iSCSI Node.

Step 1: Starting TBU

First, launch TBU for the by selecting **Start→All Programs→Accessories→Systems Tools→Backup**. If this is the first time running TBU on this system, a Backup Wizard will appear. If the Backup or Restore Wizard does not appear, then proceed to “Step 2: Configuring TBU for Backup” on page 13. Bypass this wizard and select the Advanced Mode by clicking on the underlined text **Advanced Mode** as circled in red in Figure 10.

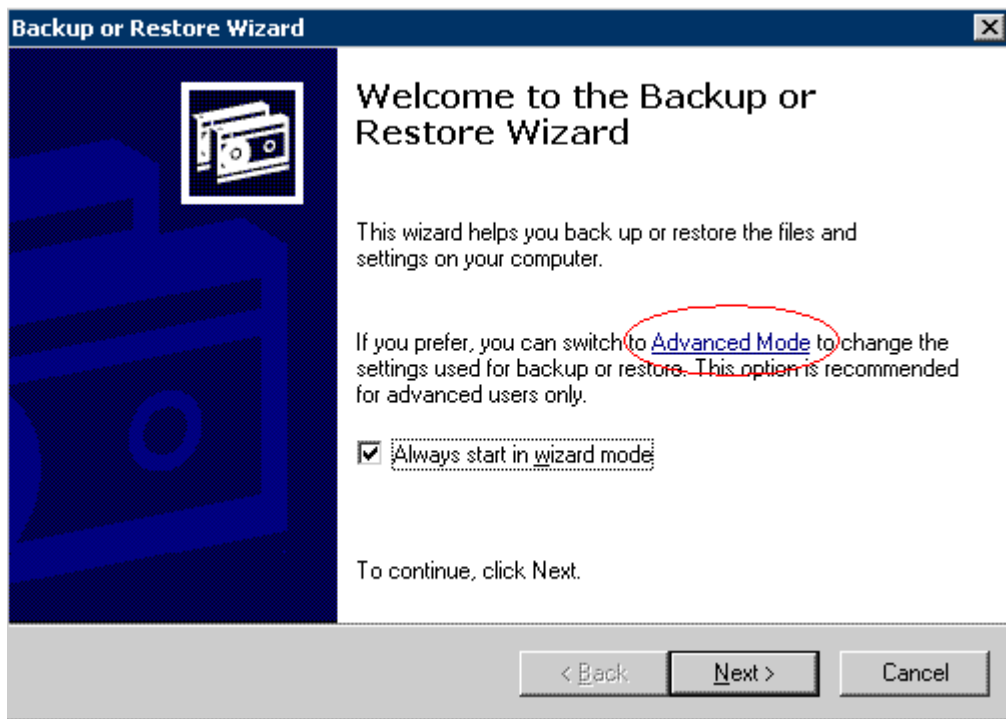


Figure 10: Choosing Advanced Mode

Step 2: Configuring TBU for Backup

Figure 11 shows the default Welcome page displayed when entering Advanced Mode within NT Backup. Click the **Backup** tab to begin configuring TBU.

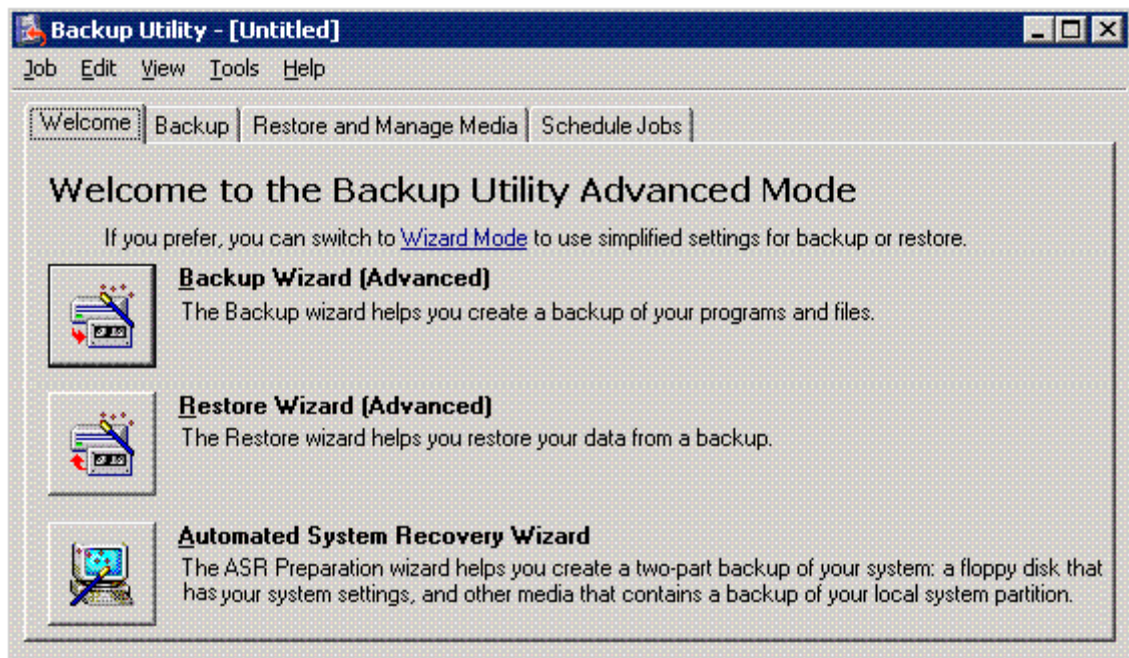


Figure 11: TBU Advanced Mode Welcome Page

First, launch TBU for the first time by selecting:

Start→All Programs→Accessories →Systems Tools→Backup.

Within the **Backup** tab, select the files you would like to backup. In this example, we backup the C Drive, D Drive, and System State. Microsoft Exchange Server 2003 is installed on our Windows 2003 Server, so we expand the **Microsoft Exchange Server** and select the **Microsoft Information Store** to backup the Exchange database.

Next, set the Backup destination field to **File**. Depending on the environment, one or more options may be available. Since you are writing your backups to an iSCSI node, the data needs to be stored in a File format.

Finally, click the **Browse...** button at the bottom of the page to select the location of where you want to store the backup data.

In this example, Figure 12 shows the configuration options that have been selected.

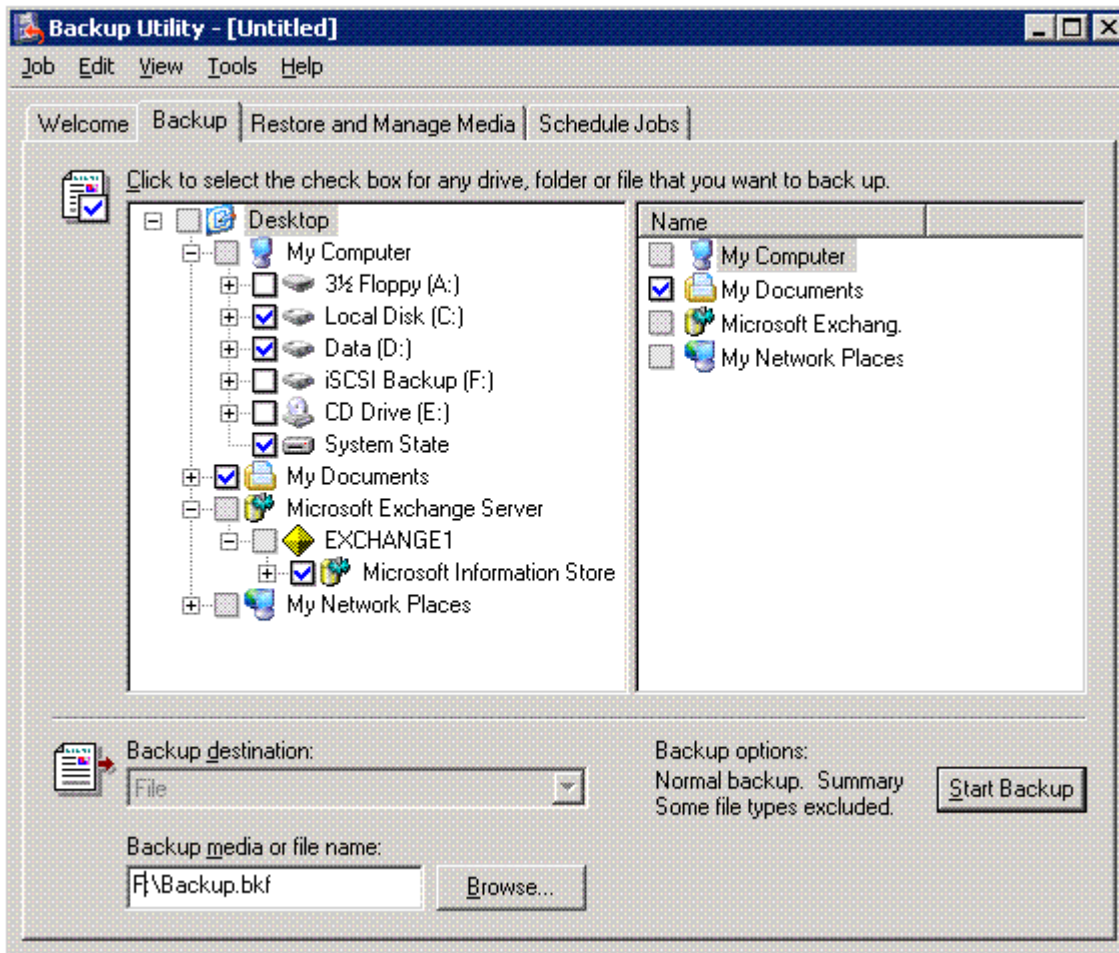


Figure 12: Final Backup Configuration

After specifying the location of the iSCSI node, click the **Start Backup** button to begin the backup process. Another window will appear with the option to **Append** this backup to the media or to **Replace** the data on the media with this backup. In this example, we select to **Append** this backup to the media, and accept the default settings.

Next, click the **Start Backup** button to start the backup. The backup process will initialize and begin copying the data to a single file labeled Backup.bkf on the formatted iSCSI node. Just as with formatting the iSCSI node, the time to backup the data depends on a number of factors including the quantity of data.

This concludes the process of configuring Microsoft's TBU to backup to an iSCSI node.

Step 3: Restoring from an iSCSI Node

Now, we will describe how to restore one or more files from an iSCSI node. The process of restoring data from an iSCSI node is just as straightforward as backing up to an iSCSI node. After opening TBU and entering Advanced Mode, select the **Restore and Manage Media** tab as shown in Figure 13.

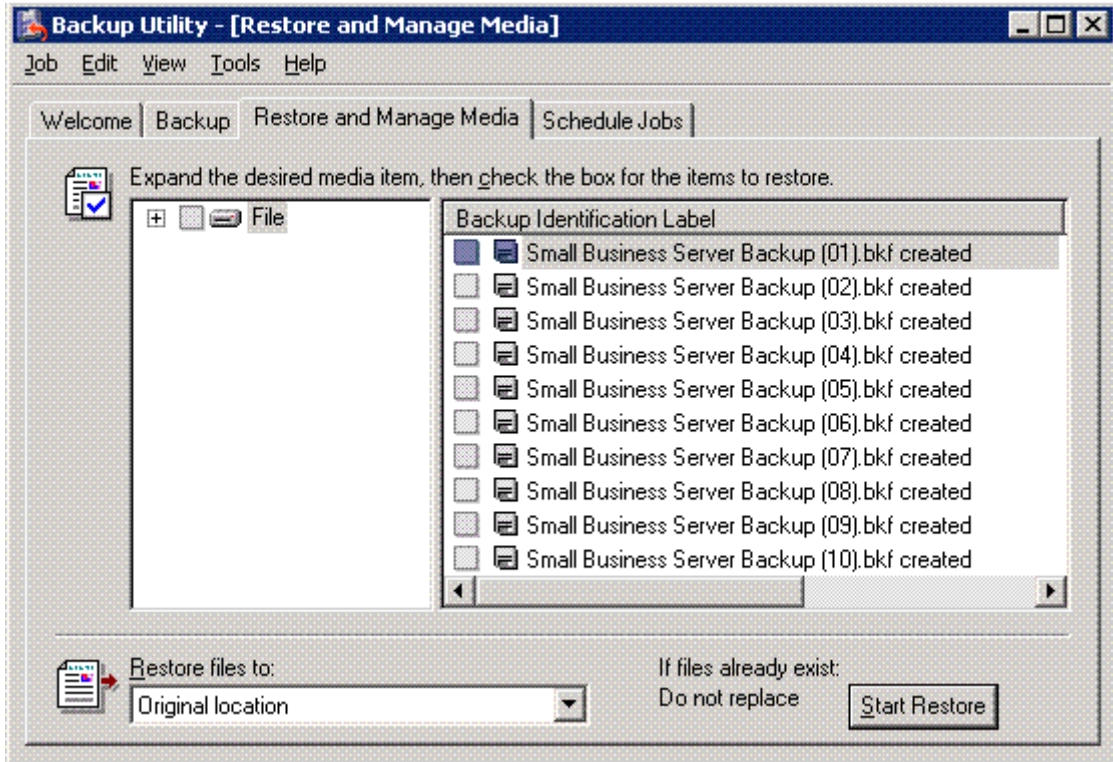


Figure 13: Restore and Manage Media within TBU

If you are restoring content that was not previously backed up on this system, you will need to restore the catalog file before being able to restore the data from the backup file on the iSCSI node. The catalog file indexes the data within each backup for locating the files to restore later. Not having the catalog already stored within TBU is generally caused by restoring data on a new or alternate server than the system that originally backed up the content. Please reference the TBU help for information on restoring a catalog from an existing backup.

In this example, after running a couple weeks worth of backups to our iSCSI node, we have decided to restore the D:\Client Apps folder from the backup file labeled November 3, 2005 at 11:00 PM from our F Drive iSCSI node. Within our existing catalog, we click the plus (+) sign next to **File**, click the plus sign next to the backup archive **Small Business Server Backup (06).bkf created 11/3/2005 at 11:00 PM**, and then select the **Client Apps** folder. Figure 14 shows the folder **Client Apps** selected. The subfolders and content within the **Client Apps** folder is automatically selected to be restored.

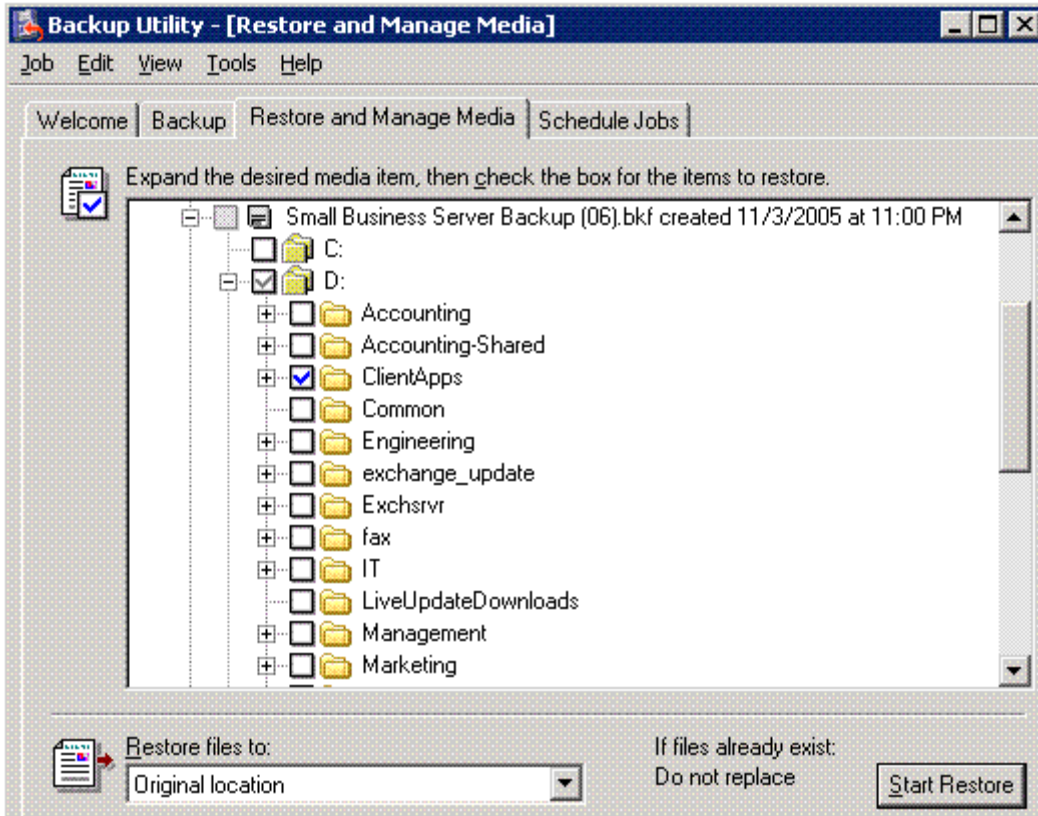


Figure 14: Select the Folders to Restore

Next, select the **Restore files to location** and set this to Original location. Choosing this option will overwrite the original Client Apps folder. Other options are available including Alternate location and Single folder. In this example, we have chosen **Original location**. To start the restore process, click on the **Start Restore** button.

A dialog box appears as shown in Figure 15, which will allow you to change some Advanced settings. Keep the defaults and click **OK** to start the restore process.

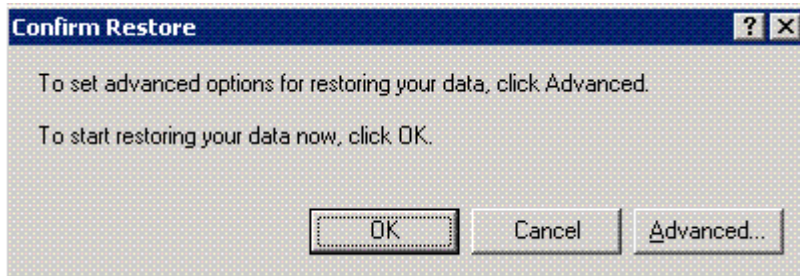


Figure 15: TBU Confirm Restore

When the restore is completed, a message will appear that indicates that all of your files were successfully restored as shown in Figure 16.

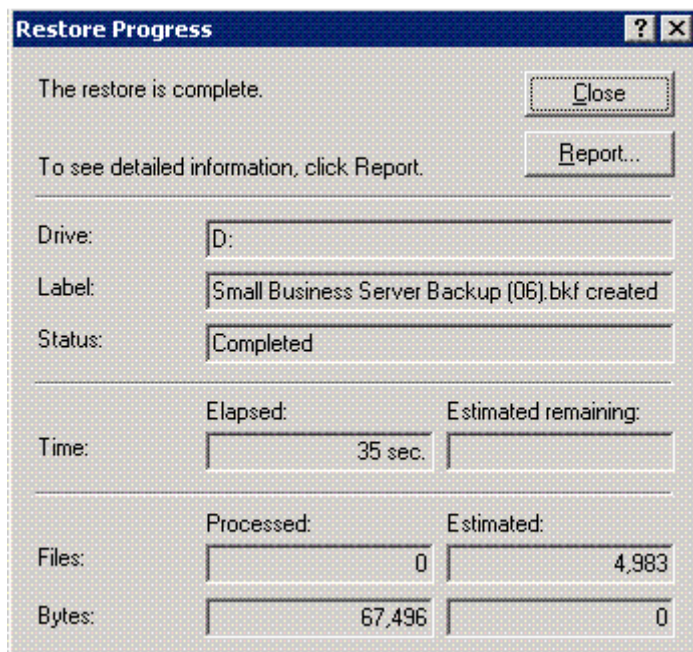


Figure 16: Restore Complete

Conclusion

Wasabi Storage Builder provides an easily configurable and reliable disk-based backup solution for nearly any environment. In combination with TBU, a fast and easy to manage disk-based backup can be setup within very little effort. For more information about Wasabi Storage Builder for iSCSI, please visit <http://www.wasabisystems.com>.

A



Glossary

iSCSI

Acronym for Internet SCSI. A transport protocol for the SCSI command protocol that uses TCP/IP.

iSCSI Initiator

A SCSI initiator that implements the iSCSI transport protocol.

iSCSI Node

A target device instance that is presented by an iSCSI target to an iSCSI initiator.

iSCSI Portal

A network address and port number used for iSCSI communication

iSCSI Target

A SCSI target that implements the iSCSI transport protocol.

NAS

Acronym for Network-Attached Storage. A server that is dedicated exclusively to file sharing.

RAID

Acronym for Redundant Array of Independent Disks. A family of methods that employ two or more disk drives in combination for fault tolerance and performance.

RAID Level 1

A RAID method that uses two disk drives to store two copies of each block of data. This is the least space-efficient RAID level, but provides the best performance in the event of a disk failure. Also known as RAID 1 or mirroring. A

variant of RAID level 1, known as N-way mirroring, can use more than two disk drives to store additional copies of the data.

RAID Level 4

A RAID method that uses three or more disk drives and stripes data across $n-1$ disks and stores redundancy (parity) information on the n th disk. A RAID level 4 array has the capacity of $n-1$ disks. In the event of a data disk failure, the redundancy information stored on the parity disk is used to reconstruct the missing data blocks. Also known as RAID 4.

RAID Level 5

A RAID method that uses three or more disk drives and stripes data and stores redundancy (parity) information across all disks; the location of the parity blocks rotate for each stripe (row). A RAID level 5 array has the capacity of $n-1$ disks. In the event of a disk failure, the redundancy information for a given stripe is used to reconstruct the missing data blocks. Also known as RAID 5.

RAID Level 10

A RAID method that combines RAID level 1 (mirroring) and RAID level 0 (striping) to create a redundant array. It uses two or more RAID level 1 arrays and stripes data across them in a RAID level 0 method in order to increase performance. A RAID level 10 array requires at least four physical disk drives and always uses an even number of disks. It has the capacity of $n/2$ disks. Also known as RAID 10.

RAID Level 50

A hybrid RAID method that combines parity RAID techniques with data striping. A RAID 50 array is an array with information striped (RAID 0) across two RAID 5 arrays.

SAN

Acronym for Storage Area Network. A high-speed network of shared storage devices. A storage device is a machine that contains storage media and whose sole purpose is the storage and retrieval of data, such as a disk array.

SCSI

Acronym for Small Computer System Interface. A standard architecture and command protocol that enables computer systems and peripherals to communicate with each other. SCSI also refers to a parallel interface standard used to connect computer systems and peripherals together.

SCSI Initiator

An entity (usually a computer system) that sends (initiates) a SCSI command transaction.

B



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