



IBM Software Group – IBM Tivoli Training

IBM Tivoli Storage Manager 5.3

Image Backups



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Updated September 6, 2006

Objectives

Upon completion of this module, you will be able to:

- Explain the difference between incremental, selective, and image backups
- Compare static and dynamic image backups
- Explain logical volume image backups
- View the files of an image backup
- Use the Logical Volume Snapshot Agent (LVSA) for image backup on Windows 2003®

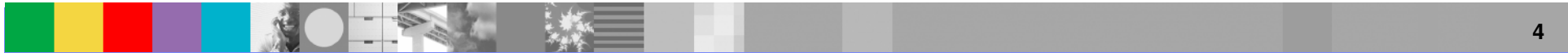


Agenda

- Backup Overview
- File and Image Backups
- Static and Snapshot Image Backups
- Logical Volume Image Backups
- Viewing Image File Backups
- Using the Logical Volume Snapshot Agent
- Best Practices
- Additional Resources

Section 1

Backup Overview



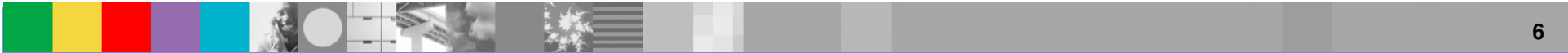
Backup Defined

Backup, in IBM Tivoli Storage Manager terms, means creating an additional copy of a data object to be used for recovery.

A data object can be a file, a user-defined data object such as a database table, or an entire file system (image).

Section 2

File and Image Backups



Backup Types

Of the three backup types to be covered, two work on files (incremental and selective), while the other works on images (image).



File Backups

- **Incremental** – Automated backup of only files that have changed since the last backup. This backup is usually run on a schedule.
- **Selective** – Backup of files that are selected by the user, regardless of whether the files have changed since the last backup. This allows users to protect a subset of their data independent of the normal incremental backup process.

Image Backups

This is a full volume backup that allows backup of an entire file system or raw volume as a single object. One key difference from the file backups is that single files or directories cannot be restored, only the entire image.

IBM Tivoli Storage Manager enables you to back up a file system or raw logical volume as a single object from your client machine. The Tivoli Storage Manager client accomplishes this by dynamically loading an image plug-in utility that sends the object to the server using the IBM Tivoli Storage Manager API. This capability is currently available for the AIX®, HP-UX®, Solaris®, Linux, and Windows® clients and can be used on a logical volume whether or not there is an associated file system.

Logical volume backup has the advantages of improved backup and restore speeds. It also conserves server resources because the entire backup is treated as a single object and individual files are not processed during backup or restore.

Similar to the standard incremental and selective backup filtering options, you can include specific logical volumes and assign a management class to image objects. In addition, you may exclude file systems or a raw device from being backed up by specifying it in the client include/exclude list.

Image Backup Benefits

An image backup provides the following benefits:

- Provides a quicker backup and restore than a file-by-file backup, as there is no overhead involved in creating individual files.
- Conserves resources on the server during backups, because only one entry is required for the image.
- Provides a point-in-time picture of your file system, which is useful if your enterprise needs to recall that information.
- Restores a corrupt file system or raw logical volume, restoring data to the same state it was when the last logical volume backup was performed.

Section 3

Static and Dynamic Image Backups



Comparing Static and Dynamic Image Backups

There are two types of image backups: static and dynamic. These are also known as offline and online. Which type of image backup is used depends on the state of the files contained in the image to be backed up.

Static Image Backups

If the image is taken offline (remounted read-only) while the backup is performed, then a static backup is used. After the backup is complete the image is remounted read-write.

Ensure that no other application is using the volume when you run a static image backup. To ensure a consistent image during backup processing, the client will unmount and remount the volume as read-only, so that no other applications can write to it. If the volume is in use when the client attempts to unmount, the backup will fail.

Dynamic Image Backups

If the files contained in the image are to be backed up while available to applications, then the dynamic backup is used. In this case, the image is backed up without remounting it read-only. This type of backup is also known as a fuzzy backup.

A dynamic backup means that the files or directories were in one state when the backup started, but in another state by the time the backup finished. As a result, the backup copy may represent an inconsistent state for the files or directories. This may result in files that are could be useless for applications, such as databases, because a restore would yield inconsistent databases. In this case, you should consider using IBM Tivoli Storage Manager for the databases module that is designed to provide consistent online backup of databases.

Therefore dynamic backups should be used with caution and only for those cases where the restore of a dynamic backup will result in usable files or directories.



Comparing Static and Dynamic Image Backups

There are two ways to implement each image backup type using the command line, either through a switch or a management class.

Static

```
dsmc backup image <drive> -imagetype=static
```

OR

```
dsmc backup image <drive> (along with)  
include.image <drive> mgmtclass imagetype=static
```

Dynamic

```
dsmc backup image <drive> -imagetype=dynamic
```

OR

```
dsmc backup image <drive> (along with)  
include.image <drive> mgmtclass imagetype=dynamic
```



Section 4

Logical Volume Image Backups



Logical Volume Image Backups Defined

Some applications can create files and then open these files in such a way as to deny access to all other processes. These files are known as locked files.

An application may open a file in this way to avoid other applications or users from reading or accessing the file, but it has the side effect of preventing backup products from reading the file for backup.

Backing up an image that contains locked files is called a snapshot image backup because a copy of the file frozen in a moment of time (snapshot) is backed up.

Snapshot image backups are a type of dynamic backup.



How Locked Files Are Handled

The Tivoli Storage Manager client provides a feature, often referred to as Open File Support (OFS), which enables files that are locked by other applications to be backed up. OFS is implemented using a Logical Volume Snapshot Agent (LVSA). The LVSA can take a snapshot of the volume while it is online.

Implementation of LVSA depends on the operating system.

LVSA in Windows

IBM Tivoli Storage Manager for Windows version 5.1 introduced a Logical Volume Snapshot Agent (TSMLVSA.SYS) to enable online image backups for Windows 2000/XP®.

The Version 5.3.2 Windows Client added Windows 2003® support for the LVSA. This file is a Windows Driver Model (WDM) device driver and is loaded as an upper filter for each local volume on the machine. By activating this agent on a Windows 2000/2003/XP® machine, online image backups can be performed on any logical volume (partition) basis.

The LVSA allows the backup to be made from a point-in-time copy that matches the file system at the time the snapshot is taken. Subsequent changes to the file system are not included in the backup. Optionally, only occupied blocks can be copied. If the snapshot option is used (rather than static), then any blocks that change during the backup process are first kept unaltered in an original block file. In this way the client sends a consistent image of the volume as it was at the start of the snapshot process to the Tivoli Storage Manager server.



Windows System Files, Objects, and State

Open File Support should not be used to back up locked Windows system files, such as system objects (Windows 2000® and Windows XP®) and system state and system services (Windows Server 2003®).

IBM Tivoli Storage Manager supports the Microsoft® Volume Shadowcopy Service (VSS). IBM Tivoli Storage Manager uses VSS to back up all system state components as a single object. This provides a consistent point-in-time snapshot of the system state. You can back up all system service components (the default) or individual components.

System state components include:

- ▶ Active Directory (domain controller only)
- ▶ System Volume
- ▶ Certificate Server database
- ▶ COM+ database
- ▶ Windows Registry
- ▶ System and boot files

LVSA in UNIX and NetWare

On the UNIX and NetWare platforms, an LVSA is not provided with the Tivoli Storage Manager client. However, the client does include facilities to integrate with an external snapshot provider.

Differences between Locked and Open Files

These locked files are not the same as files that are open or are in use. It is important to understand that IBM Tivoli Storage Manager, running without the OFS feature, can back up open or in-use files, including files that are open for reading or writing, files that are changing during backup, executable and DLL files that are running, log files that are being appended to, and so on.

Dynamic image backup is the default mode when LVSA is installed, static image backup being the default when it is not installed.

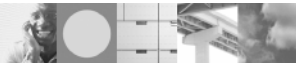


Online Image Backup Process on Windows

- If in use, LVSA waits for a period of time for the volume to become not in use.
- If still in use, LVSA then retries for up to a set amount of times for the volume to become idle.
- If successful, image backup starts. If not successful, image backup fails.
- During image backup, if any files change, the blocks of data before they are changed are copied to the *original block file*.
- At the finish of image backup, the *original block file* is backed up to TSM along with the image backup data.

Section 5

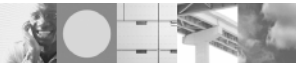
Viewing Image File Backups



Viewing Image File Backups

Use the Backup-Archive GUI to view the contents of an image file backup.

To see details on the image, such as the image size, stored size, file system type, and assigned management class, select **View > File Details**.



Section 6

Using the Logical Volume Snapshot Agent

Installing and Configuring the LVSA

To install or configure the LVSA on Windows 2003®, perform the following steps:

1. Select **Utilities > Setup Wizard** from the IBM Tivoli Storage Manager GUI main window. The *Client Configuration Wizard* panel appears.
2. Select **Help me configure Online Image Support** and click the **Next** button. The *TSM Online Image Support Wizard* panel appears.
3. Select the task you want to perform. You can install the LVSA, update a previously installed LVSA, or remove a previously installed LVSA from your system.



LVSA and Open File Support

The OFS feature can be selected at installation time or installed later using the Tivoli Storage Manager client GUI setup wizard. By default, the OFS feature is not installed. The installation program and the setup wizard will perform all the steps necessary to install, set up, and enable the OFS feature so that the next backup or archive operation will attempt to take advantage of the open file support. You can also use the installation program or setup wizard to update or remove the OFS feature. The installation or removal of this feature will require a machine reboot.

If there are any problems with a backup using the OFS feature on a volume an error will be logged in the **dsmerror.log**. The backup will then fail over to the normal non-OFS mode of backup which is the same traditional backup mode as if the OFS feature was not enabled for that volume. Severe LVSA errors will also be logged in the Windows event log.



Configuring the LVSA to Enable Open File Support

To install or configure open file support:

1. Select **Utilities > Setup Wizard** from the IBM Tivoli Storage Manager GUI main window. The *Client Configuration Wizard* panel appears.
2. Select **Help me configure Open File Support** and click the **Next** button. The *TSM Open File Support Wizard* panel appears.
3. Select the task you want to perform.



Section 7

Additional Resources



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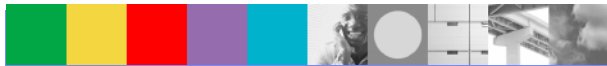
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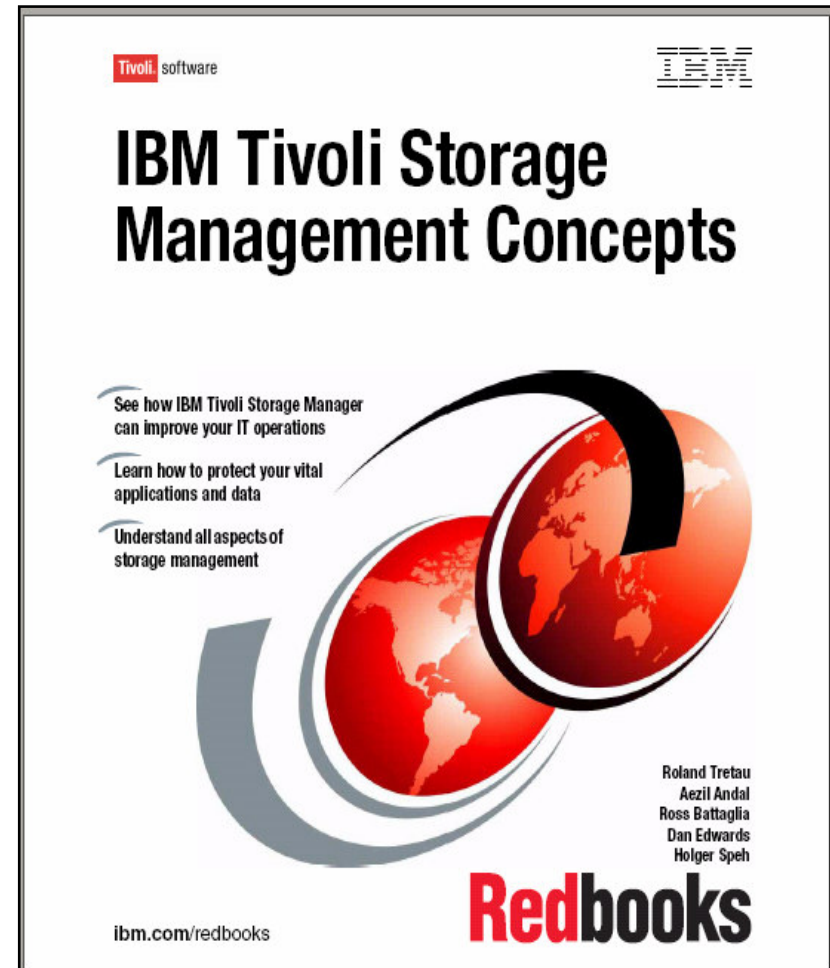
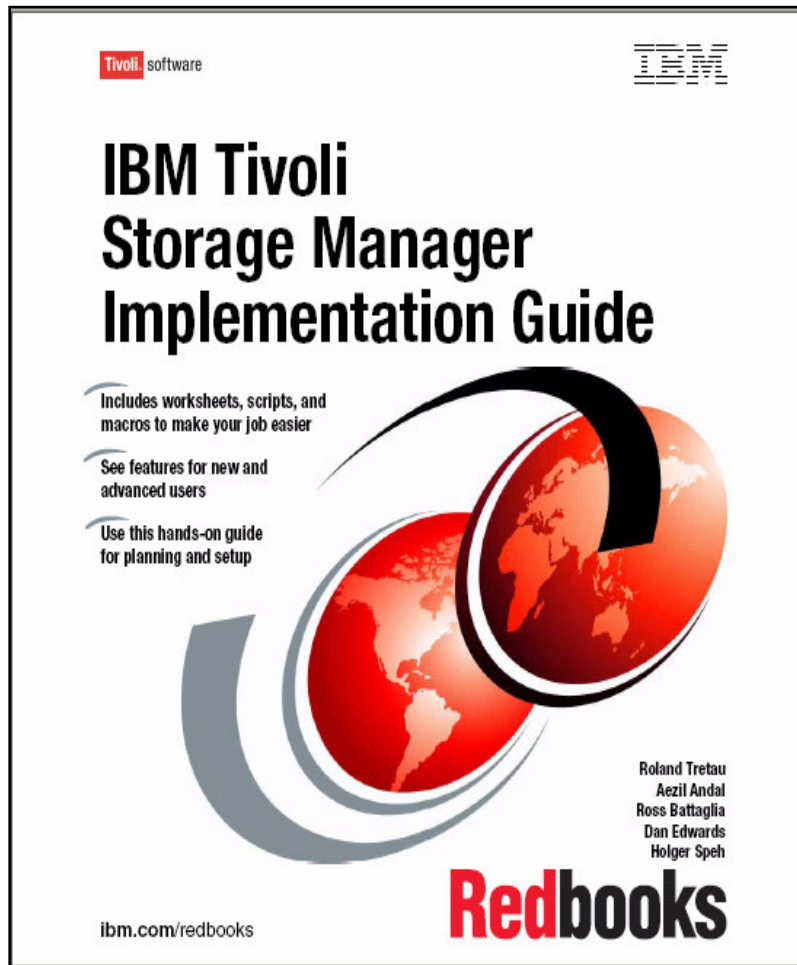
Suggested Reading

- README files
- Product documentation
- Redbooks



IBM Redbooks

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