



IBM Tivoli Training Tivoli Storage Manager 5.5

*Preventing backup failures by ensuring
space is allocated*

Tivoli. software



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Slide 1

Welcome to the IBM Education Assistant training for IBM Tivoli Storage Manager version 5.5. This module covers the prevention of backup failures by ensuring there is available storage pool space and scratch tapes allocated.

Objectives

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

- Add storage pool volumes
- Define space triggers
- Explain the use of scratch tapes

Slide 2 **Objectives**

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Add storage pool volumes.

Define space triggers.

Explain the use of scratch tapes.

Preventing backup failures

ANS1311E ANS1329S ANR0522W

Server out of data storage space during backup

- Data reduction; only back up necessary files
- Automate storage pool management (expiration, reclamation, and migration)
- Allocate additional space to the storage pool
- Allocate more scratch tapes

Slide 3 Preventing Backup Failures

Common error messages seen for backup failures, are ANS1311E, ANS1329S, and ANR0522W. These are for Server out of data storage space during backup.

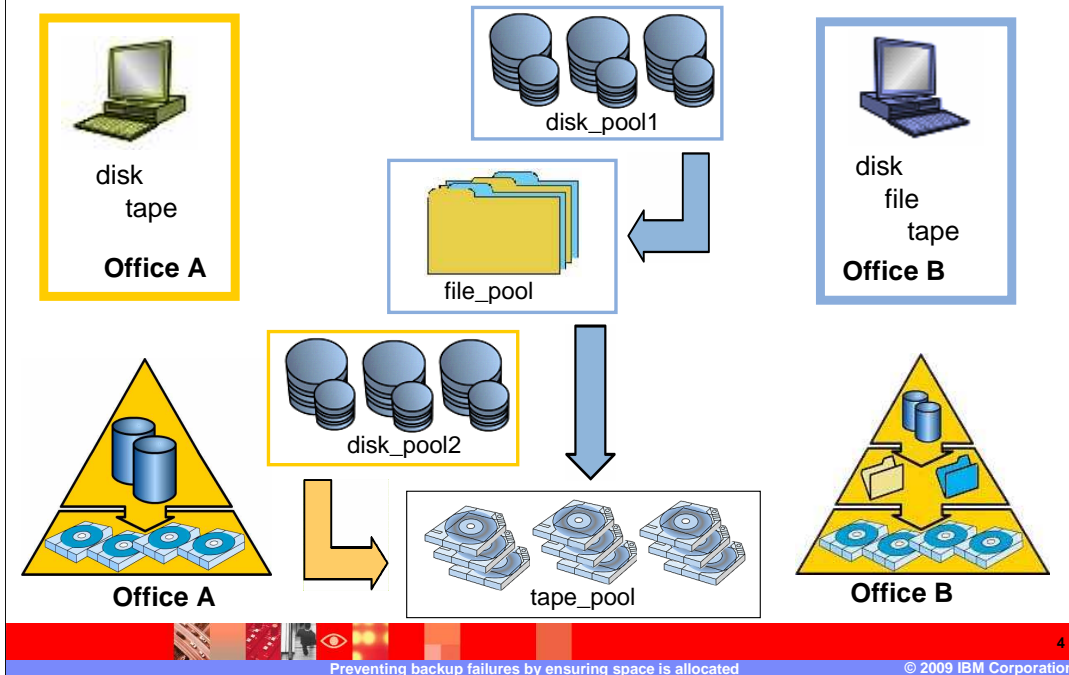
Various issues such as lack of storage pool space, lack of tapes, hardware problems or configuration problems can cause these messages .

To prevent the Server out of data storage space errors, consider the following actions:

- Data reduction; only back up necessary files
- Automate storage pool management such as expiration, migration, and reclamation
- Allocate additional space to the storage pool
- Allocate more scratch tapes

This IBM Education Assistant module covers the prevention of backup failures by ensuring there is available space with the automation of storage pool maintenance tasks.

Storage destination



Preventing backup failures by ensuring space is allocated

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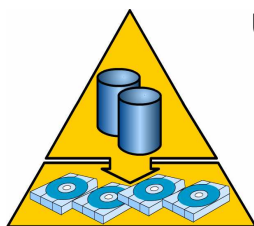
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Slide 4 Storage Destination

A storage destination identifies the storage pool where client data is sent when it is backed up, archived, or migrated. It is specified in the backup and archive copy group definitions that are included in the management class, which is part of policy management.

Data placement is also influenced by storage pool settings that may restrict read/write access and limit the size of files placed in the storage pool.

Creating or defining storage pools



Use the following command to define a storage pool:

```
DEFine STGpool poolname devclass
```

For example:

```
DEFine STGpool lastinchain devclass=tape
```

Create a storage pool from the Administration Center:

1. Click **Storage Devices** in the **Tivoli Storage Manager tree**.
2. In the **Servers** table, select a server.
3. Click **Select Action**, select **View Storage Pools**.
4. In the storage pools portlet for the server, click **Select Action**, select **Create a Storage Pool**.

Slide 5 Creating or Defining Storage Pools

Use the following command to define a storage pool:

```
DEFine STGpool poolname devclass
```

For example: DEFine STGpool lastinchain devclass=tape

You will note we are using the shortcut, DEF for define and STGpool for storage pool.

To create a storage pool from the Administration Center:

Click Storage Devices in the Tivoli Storage Manager tree.

In the Servers table, select a server.

Click Select Action and select View Storage Pools.

In the storage pools portlet for the server, click Select Action and select Create a Storage Pool.

During installation, Tivoli Storage Manager provides predefined random access storage pools:

- BACKUPOOL: A storage destination for user files that are backed up to the server.
- ARCHIVEPOOL: A storage destination for user files that are archived to the server.
- SPACEMGPOOL: A storage destination for files migrated from user nodes.
- DISKPOOL: Only for Windows® systems.
- FILPOOL1: A default storage pool of device class FILEDEV1 created as a default Next Storage Pool for both ARCHIVEPOOL and BACKUPOOL when you install a minimum configuration on Windows only.

Parameters for defining a copy storage pool

- *pool_name* (Required)
- *device_class_name* (Required)
- POoltype (Required)
- DESCription
- ACCess
- COLlocate
- MAXSCRatch (Required)
- REUsedelay



Command shortcuts are shown in upper case.

Refer to the *Administrative Reference Guide* for your platform for more details.

Slide 6 Parameters for Defining a Copy Storage Pool

pool_name, a required parameter, specifies the name of the storage pool to be defined. The name must be unique, and the maximum length is 30 characters.

device_class_name, a required parameter, specifies the name of the sequential access device class to which this copy storage pool is assigned. You can specify any device class except DISK.

POoltype=Copy, a required parameter, specifies that you want to define a copy storage pool.

DESCription specifies a description of the copy storage pool. This parameter is optional. The maximum length of the description is 255 characters. Enclose the description in quotation marks if it contains any blank characters.

ACCess specifies how client nodes and server processes (such as reclamation) can access files in the copy storage pool. This parameter is optional. The default value is READWRITE. Possible values are: readwrite, readonly, and unavailable.

COLlocate specifies whether the server attempts to keep data belonging to a single client node, group of client nodes, or client file space stored on as few volumes as possible. This parameter is optional. The default value is NO Possible values are: No, Group, Node, and Filespace.

REClaim specifies when the server reclaims a volume, based on the percentage of reclaimable space on a volume. Reclamation makes the fragmented space on volumes usable again by moving any remaining unexpired files from one volume to another volume, thus making the original volume available for reuse. This parameter is optional. You can specify an integer from 1 to 100. The default value is 100, which means that reclamation is not performed.

MAXSCRatch, a required parameter, specifies the maximum number of scratch volumes that the server can request for this storage pool. You can specify an integer from 0 to 100,000,000. By allowing the server to request scratch volumes as needed, you avoid having to define each volume to be used.

REUsedelay specifies the number of days that must elapse after all files are deleted from a volume before the volume can be rewritten or returned to the scratch pool. This parameter is optional. You can specify an integer from 0 to 9999. The default value is 0, which means that a volume can be rewritten or returned to the scratch pool as soon as all the files are deleted from the volume.

Using the define storage pool command

- Define a primary storage pool, **stg1**.
- Use the disk device class.
- Limit the maximum file size to 8 MB.
- Store any files larger than 8 MB in the next storage pool in the chain, **stg2**.
- Set the high migration threshold to 70 percent, and the low migration threshold to 30 percent.

```
define stgpool stg1 disk description="primary disk  
storage pool" maxsize=8m highmig=70 lowmig=30  
nextstgpool=stg2
```

Slide 7 Using the Define Storage Pool Command

In this example, define a storage pool with the following requirements:

It is a primary storage pool named stg1.

Use the disk device class.

Limit the maximum file size to 8 MB.

Store any files larger than 8 MB in the next storage pool in the chain named stg2.

Set the high migration threshold to 70 percent, and the low migration threshold to 30 percent.

The command is: **define stgpool stg1 disk description="primary disk storage pool" maxsize=8m highmig=70 lowmig=30 nextstgpool=stg2**

Using the define storage pool command, continued

- Define a copy storage pool, tapepool4.
- Use the DC480 device class.
- Allow up to 25 scratch volumes for this pool.
- Delay the reuse of volumes for 45 days.

```
define stgpool tapepool4 dc480 pooltype=copy  
maxscratch=25 reusedelay=45
```

Slide 8 Using the Define Storage Pool Command, continued

In this example, define a storage pool with the following requirements:

Define a copy storage pool named tapepool4.

Use the DC480 device class.

Allow up to 25 scratch volumes for this pool.

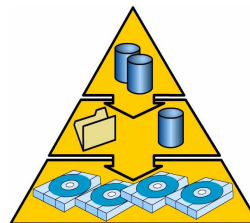
Delay the reuse of volumes for 45 days.

The command is: **define stgpool tapepool4 dc480 pooltype=copy maxscratch=25 reusedelay=45**

Creating or defining storage pool volumes

Command to define storage pool volumes:

```
DEFine VOLume poolname volname
```



Create volumes in a storage pool from the Administration Center:

1. Click **Storage Devices** in the **Tivoli Storage Manager tree**.
2. In the **Servers** table, select a server.
3. Click **Select Action**, select **View Storage Pools**.
4. In the storage pools portlet for the server, click a storage pool name.
5. In the properties notebook for the storage pool, click the **Volumes** tab.
6. In the **volumes** table, click **Select Action**, select **Add Volume**.

Slide 9 Creating or Defining Storage Pool Volumes

Use the define volume command to assign a random or sequential access volume to be used for storage within an existing storage pool. You can define a volume to either a primary storage pool or a copy storage pool.

You must define each volume to be used in a storage pool unless you allow scratch volumes for the storage pool. Before issuing this command for a random access volume, you must allocate and format the volume by using Tivoli Storage Manager define volume command with the FORMATSIZE parameter.

For sequential access storage pools with a device type other than FILE or SERVER, you must prepare volumes for use. When the server accesses a sequential access volume, it checks the volume name in the header to ensure that the correct volume is being accessed.

To create volumes in a storage pool from the Administration Center:

Click Storage Devices in the Tivoli Storage Manager tree.

In the Servers table, select a server.

Click Select Action and select View Storage Pools.

In the storage pools portlet for the server, click a storage pool name.

In the properties notebook for the storage pool, click the Volumes tab.

In the volumes table, click Select Action and select Add Volume.

Parameters for the define volume command

- *pool_name* (Required)
- *volume_name* (Required)
- ACCess
- LOfcation
- Formatsize
- Numberofvolumes
- Wait



Command shortcuts are shown in upper case.

Refer to the *Administrative Reference Guide* for your platform for more details.

Slide 10 Parameters for the Define Volume Command

pool_name, a required parameter, specifies the name of the storage pool to which the volume is assigned.

volume_name, a required parameter, specifies the name of the storage pool volume to be defined. If you specify a number greater than 1 for the NUMBEROFVOLUMES parameter, the volume name is used as a prefix to generate multiple volume names. The volume name that you specify depends on the type of device that the storage pool uses.

ACCess specifies how client nodes and server processes (such as migration) can access files in the storage pool volume. This parameter is optional. The default value is READWRITE. Possible values are: Readwrite, readonly, unavailable, and offsite.

LOcation specifies the location of the volume. This parameter is optional. It can be specified only for volumes in sequential access storage pools. The location information can be a maximum length of 255 characters. Enclose the location in quotation marks if it contains any blank characters.

Formatsize specifies the size of the random access volume or FILE volume that is created and formatted in one step. The value is specified in megabytes. This parameter is required if any of the following conditions are true:

A single FILE or DISK volume is specified, which is to be created and formatted in one step.

The value for the NUMBEROFVOLUMES parameter is greater than 1, and DISK volumes are being created.

The value of the NUMBEROFVOLUMES parameter is greater than 1, and the value of the FORMATSIZE parameter is less than or equal to the MAXCAPACITY parameter of the DEFINE DEVCLASS command.

Numberofvolumes specifies the number of volumes that are created and formatted in one step. This parameter applies only to storage pools with DISK- or FILE-type device classes. This parameter is optional. The default is 1. If you specify a value greater than 1, you must also specify a value for the FORMATSIZE parameter. Specify a number from 1 to 256.

Wait specifies whether volume creation and formatting operation is performed in the foreground or background. This parameter is optional. It is ignored unless you also specify the FORMATSIZE parameter. No Specifies that a volume creation and formatting operation is performed in the background. This is the default when you also specify a format size. Yes Specifies that a volume creation and formatting operation is performed in the foreground.

Using the define volume command

- Create a new volume of 200 MB in the disk storage pool, bupool.
- The volume name is d:\tivoli\tsm\bu_vol2.dsm.

```
define volume bupool d:\tivoli\tsm\bu_vol2.dsm
  formatsize=200
```

Slide 11 Using the Define Volume Command

In this example, define a storage pool volume with the following requirements:

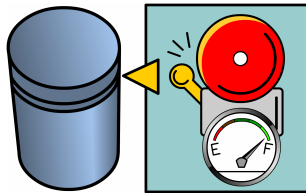
Create a new volume of 200 MB in the disk storage pool named bupool.

The volume name is d:\tivoli\tsm\bu_vol2.dsm.

The command is: **define volume bupool d:\tivoli\tsm\bu_vol2.dsm formatsize=200**

Prevent out of data storage space with storage pool space trigger

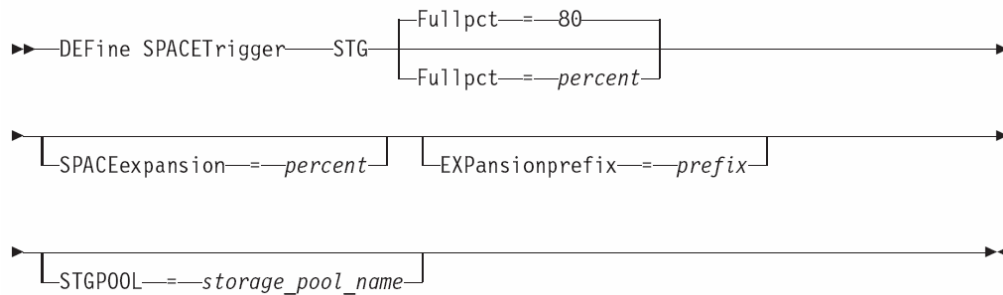
Space triggers determine when and how the server prepares additional space when predetermined thresholds have been exceeded in storage pools that use FILE and DISK device classes.



Slide 12 Prevent Out of Data Storage Space with Storage Pool Space Trigger

Space triggers determine when and how the server prepares additional space when predetermined thresholds have been exceeded in storage pools that use FILE and DISK device classes.

Define spacetrigger



Excerpt from: IBM Tivoli Storage Manager for Windows Version 5.5: Administrator's Reference

Example: Define a space trigger to increase storage pool space in cypool6 40 percent

```
define spacetrigger stg spaceexpansion=40 stgpool=cypool6
```

Slide 13 Define Spacetrigger

This is the command to define a storage pool space trigger.

For example: Define a space trigger to increase storage pool space in cypool6 40 percent

The command is `define spacetrigger stg spaceexpansion=40 stgpool=cypool6`

Define Spacetrigger Parameters

STG specifies a storage pool space trigger.

Fullpct specifies the utilization percentage of the storage pool.

SPACExpansion is used with sequential-access FILE-type storage pools. This parameter is used in determining the number of additional volumes that are created in the storage pool. Volumes are created using the MAXCAPACITY value from the storage pool's device class. For random-access DISK storage pools, the space trigger creates a single volume using the EXPANSIONPREFIX.

EXPansionprefix specifies the prefix that the server uses to create new storage pool files. This parameter is optional and applies only to random-access DISK device classes. The default prefix is the server installation path.

STGPOOL specifies the storage pool associated with this space trigger. This parameter is optional for storage pool space triggers.

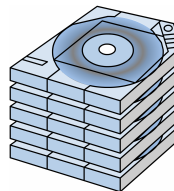
Space trigger functions and storage pool space calculations take into account the space remaining in each directory. An inaccurate calculation could result in a failure to expand the space available in a storage pool. Failure to expand space in a storage pool is one of the conditions that can cause a trigger to become disabled.

To prevent possible problems and ensure an accurate calculation, you associate each directory with a separate file system. If a trigger becomes disabled because the space in a storage pool could not be expanded, you can re-enable the trigger by specifying the following command: `update spacetrigger stg`.

Difference between scratch and private volumes

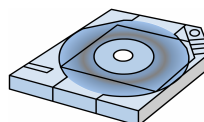
SCRATCH VOLUMES:

- Are empty or contain no valid data.
- Change status to PRIVATE when data is written to them.
- Can be used to satisfy any request to mount a scratch volume.



PRIVATE VOLUMES:

- May contain valid data.
- Are used or owned by an application.
- Can only be used to satisfy a request to mount the specified volume.



Slide 14 The Difference between Scratch and Private Volumes

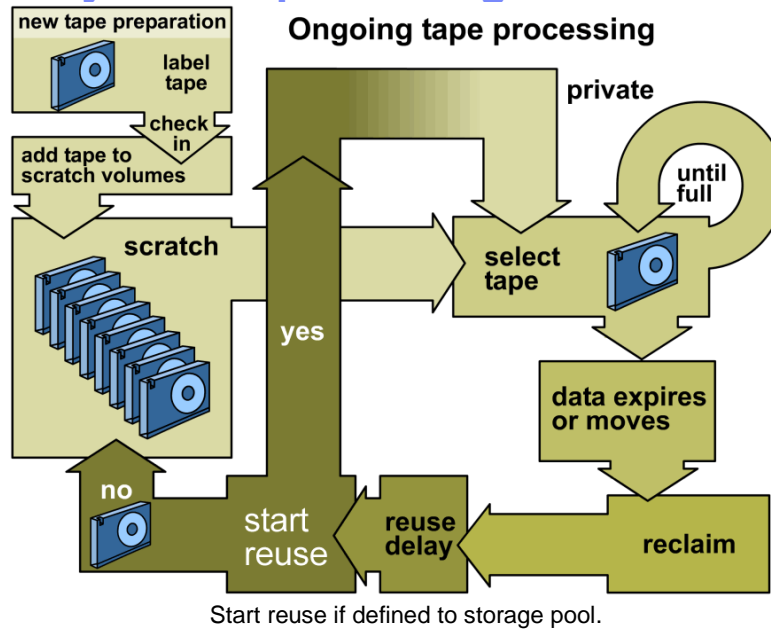
Tivoli Storage Manager classifies its volumes into two categories: private and scratch.

A private volume is a labeled volume that is in use or owned by an application and may contain valid data. You must define each private volume, and it can only be used to satisfy a request to mount that volume by name. Private volumes do not return to scratch when they become empty.

A scratch volume is a labeled volume that is empty or contains no valid data and can be used to satisfy any request to mount a scratch volume. When data is written to a scratch volume, its status is changed to private.

You can change the status of volumes by issuing the update libvolume command. The command allows you to assign a private status to a scratch volume or to assign a scratch status to a private volume. The private volumes must be administrator-defined volumes with either no data or invalid data. They cannot be partially written volumes containing active data. Volume statistics are lost when volume statuses are modified.

The life cycle of tape cartridges



Slide 15 The life cycle of tape cartridges

Tapes must first be labeled and then added to the inventory of tapes available to Tivoli Storage Manager. Tapes may be checked into IBM Tivoli Storage Manager as either scratch or private. Tapes that are part of the scratch pool are eligible to be selected for use.

Once a tape is selected, data remains on the tape until it has expired or moved. The tape can then be reclaimed and returned to the scratch pool.

In the graphic here, the new tape is added at the top left. It is labeled, checked in, and added to the scratch pool. Upon request for a scratch tape, it is selected, it becomes a private volume, and used until it is full. Then the data expires or is moved and reclamation takes place. After the reuse delay, the tape becomes available for reuse.

Training roadmap for *IBM Tivoli Storage Manager*

http://www.ibm.com/software/tivoli/education/edu_prd.html



Slide 16 Training Roadmap for *IBM Tivoli Storage Manager*

If you go to www.ibm.com/software/tivoli/education/edu_prd.html this will take you to the training page, where you can access the training list for Tivoli Storage Manager version 5.5.

Summary

You should now be able to:

- Add storage pool volumes.
- Define space triggers.
- Explain the use of scratch tapes.

Slide 17 **Summary**

You should now be able to:

Add storage pool volumes.

Define space triggers.

Explain the use of scratch tapes.

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This concludes the IBM Education Assistant training for IBM Tivoli Storage Manager version 5.5, the prevention of backup failures by ensuring there is available storage pool space and scratch tapes allocated.