BackBox® E4.11 VTC Scripting Option

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Introduction

The VTC Scripting Option manual documents how to set up and operate Windows scripts and how to save and restore the disk files containing images of virtual tape volumes.

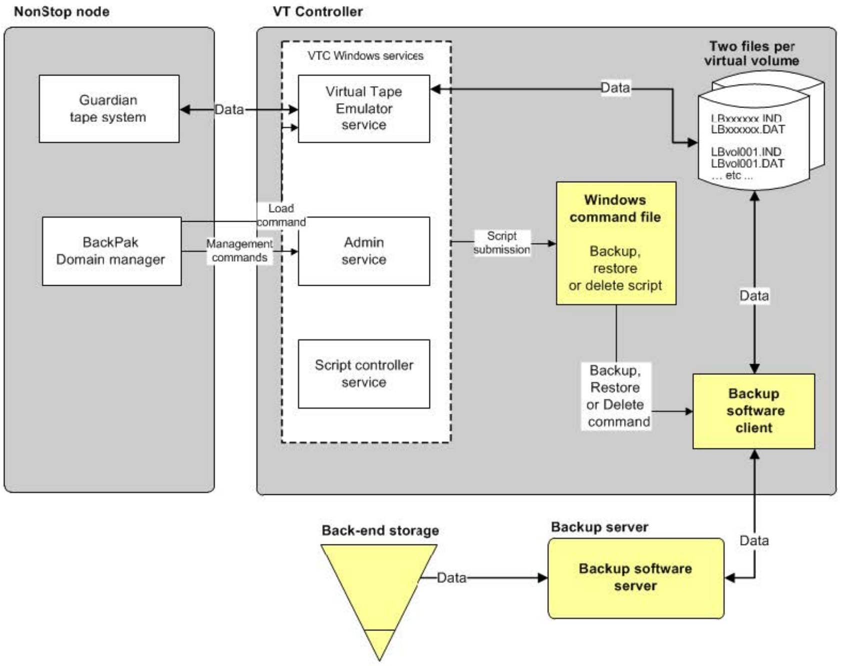
Scripting functionality is installed by the standard BackPak packages, but must be enabled by an option in the BackPak license key before being configured.

The following BackPak manuals can be of help when working on Windows scripts:

BackBox User Manual - Product presentation, reference and guidelines for configuring and operating BackBox subsystems.

BackPak Messages Manual and Troubleshooting - A guide for troubleshooting, with a list of EMS error messages generated by the BackPak products.

Scripts in VTCs



Scripts are available for the Data Store type "WINDISK" for which the VTC Tape Emulator stores two MS-Windows disk files per virtual volume:

- A small index file containing metadata (file name *.IND).
- A variable length data file, whose size is based on the current content of the volume (file name *.DAT).

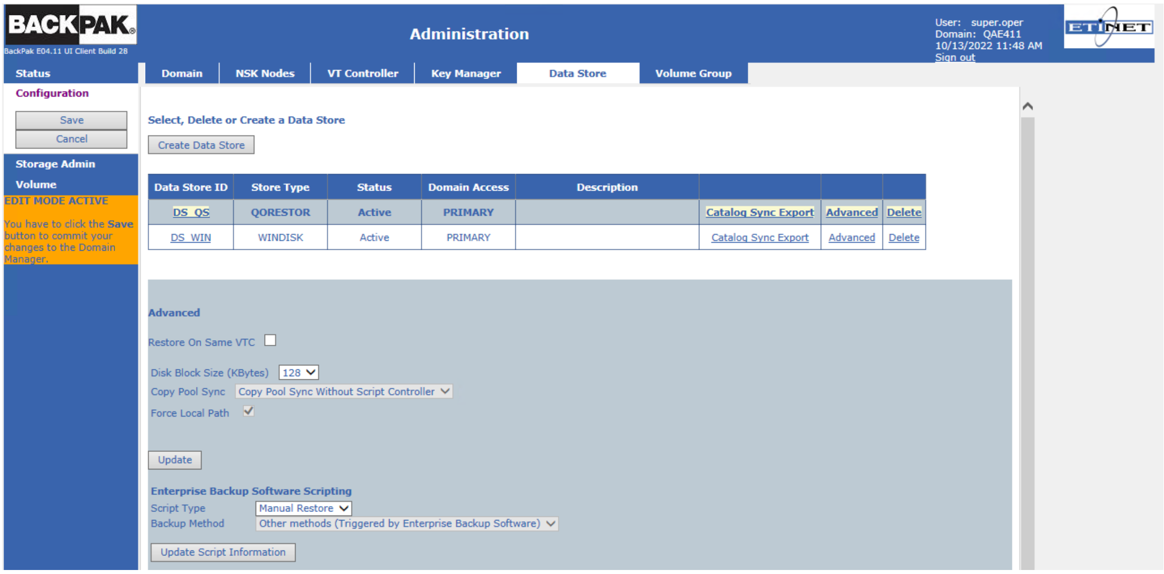
Scripts send virtual volumes to a back-end Enterprise backup infrastructure in order to:

- Retain additional copies of virtual volumes for safety.
- Free-up the online storage, moving the virtual volumes to a cheaper storage for long term archiving.

Scripts move back and forth between the above-mentioned two files, from the MS-Windows file system to the back-end storage, by any means implemented by MS-Windows command scripts.

A script could move disk files to a remote NAS server by a simple Windows command "copy *source-file*, *target-file*", but in most production environments, the MS-Windows files are saved by the Windows command line client of an Enterprise backup infrastructure.

Scripts are configured in the BackPak UI in the Data Store advanced configuration. Depending on the type of the script you're using, you can choose no scripts or up to four scripts, with optional user parameters. The available options for scripting are**: No script**, **Generic**, **TSM**, and **Manual Restore**.



User: super.oper
Domain: QAE411
10/13/2022 11:48 AM
Sign out

EDIT MODE ACTIVE

You have to click the **Save** button to commit your changes to the Domain Manager.

Select, Delete or Create a Data Store

Data Store ID	Store Type	Status	Domain Access	Description			
DS_QS	QORESTOR	Active	PRIMARY		Catalog Sync Export	Advanced	Delete
DS_WIN	WINDISK	Active	PRIMARY		Catalog Sync Export	Advanced	Delete

Advanced

Restore On Same VTC ☐

Disk Block Size (KBytes) 128

Copy Pool Sync Copy Pool Sync Without Script Controller

Force Local Path ☑

Enterprise Backup Software Scripting

Script Type Manual Restore

Backup Method Other methods (Triggered by Enterprise Backup Software)

When selecting Generic scripting type, you will have the choice to select the script you want to execute for a specific event.

- **Backup script**: Executed to copy the two disk files of a virtual volume to a back-end Backup infrastructure. If the Copy Pool Sync option is enabled, this script is not available.
- **Restore script**: Executed to restore the disk files of a virtual volume.
- **Delete script**: Executed to delete the copies of a virtual volume in the back-end Backup infrastructure
- **Post-Restore script**: This script is obsolete but still available for compatibility. It is replaced by the macro BB023_DEL_BACKEDUP and the Volume group configuration of "Delete Backed-up Files".

If the TSM scripting type is selected, the options are: BackPak Backup Script or Other Methods (Triggered by Enterprise Backup software).

If BackPak Backup Script is selected, the available options are Archive with the delete files option, which allows a selection between two TSM scripts: Archive and immediate delete or Archive with reset of the Archive Bit (if this option is selected for the current data store).

If the Copy Pool Sync option is enabled, selection of the Backup Method is not possible.

Last scripting type available - Manual Restore - does not allow configuration of any script.

⚠ If an Enterprise Backup infrastructure has no available command line to write a restore script, a pseudo restore script is required to coordinate the operations, to reply to a mount request.

Script Execution Case Scenarios

Event	Needed Action	Executed VTC Script
A NonStop backup completes.	The volume in two Windows disk files must be backed-up.	**Backup script.** Triggered at volume unload. **Unavailable if Copy Pool Sync option is activated.**
In the BackPak UI: - Storage Admin page, ("backup all non-backed-up files"), - or Volume page for a single volume ("Run script").	The volume in two Windows disk files must be backed-up. (if a previous backup failed)	**Backup script.** **Unavailable if Copy Pool Sync option is activated.**
The daily batch OBB017 executes the macro BB023_DEL_BACKEDUP.	Delete backed-up disk files after the time configured in the Volume group.	Usually no script. **Restore script** only for StoreOnce.
The volume mount is requested for a NonStop restore, and the two Windows files are not found.	Restore the Windows disk files.	**Restore script.**
The daily batch OBB017 executes the macro BB017_FREE_EXPIRED.	Delete the backups of the disk files for the volumes that became SCRATCH in DSM/TC or TMF.	**Delete script.** The VTC runs the Delete script after deleting the disk files.
In the BackPak GUI: delete a virtual volume.	Delete the backups of the disk files.	**Delete script.** The VTC runs the Delete script after deleting the disk files.

First two events are replaced by the following, if the Copy Pool Sync option is licensed and activated.

Event	Needed Action	Execution
A NonStop backup completes.	Synchronization of the Storage pool with a copy pool.	A command is generated to the CopySync program to carry out the syncing of a volume.
In the BackPak GUI: - Storage Admin page, ("Copied all non-copied files"), - or Volume page for a single volume ("Copy to Copy pool").	Synchronization of a volume or multiple volume is not done.	A command is generated to the CopySync program to carry out the syncing of a volume.

Enabling or Not Enabling the Script Controller

There are two processing modes for the scripts.

1. The first mode corresponds to a simpler setup, where there is one execution of the script for each virtual volume.
2. The second set is used when scripts are managed by the Script Controller. In this case, the first level of scripts just forward backup or restore requests to the VTC Script Controller. These requests are then queued and managed by the Script Controller. When a batch is submitted by the Script Controller, a distinct sub-script is executed to process a variable number of volumes, whose file names are received in a file list.

In both cases, the first level of scripts looks identical, and they are identified in the Data Store advanced configuration page. User parameters can also be defined and their value set in the same page.

The Script Controller is described in the last chapter of this manual. It is a batch sub-system used for two reasons:

- Retries: When the user wants another layer of error recovery on top of whatever retries the Enterprise Backup clients implement. By default, the Script controller will retry for 24 hours, with a delay of 5 minutes before a retry.
- Serialization: A VTC typically implements several virtual tape drives and might trigger several concurrent scripts. The number of concurrent script executions might be limited by the Enterprise Backup software, or just because the Enterprise Backup client accesses directly a sequential media, such as a physical tape library, and the number of drives in the tape library is very limited. The Script Controller queues the backup or restore requests, consolidates similar requests together, and submits them in a configured number of queues and threads per queue.

Overview of Script Implementation

Scripts are implemented by these activities presented in this section.

- Planning the storage management
- Installing the Enterprise Backup client
- Location and security of the script files
- Writing scripts or revising the Distributed Samples, possibly using the Distributed Utilities
- Testing them manually, outside the BackBox automation
- Configuring the scripts in the Data store

Planning the Storage Management

Backup of Windows Files

The Windows disk files containing virtual tape volumes can be backed-up in two ways:

- The Enterprise Backup controls the whole processing and initiates a regular backup, typically according a daily schedule. It is recommended to make an incremental backup. In the BackPak configuration, no backup script is specified (but restore script and delete script are specified). This backup is called “pull backup”.
- To save a tape virtual volume each time it is re-written, a backup script is configured in BackBox and is executed by the VTC immediately after the tape volume is unloaded by the host. This backup called “push backup”.

Backups executed at each unload work better when:

It is possible to give the archive a logical name that is independent of the actual Windows path, for example the archive might be named by the concatenation of Data Store name and the volume label.

By removing the path name from the identification of backup objects to restore, extreme situations will be easier to manage; for example, if the BackBox virtual volume catalog has been lost and no backup is available.

The enterprise backup server allows stacking archives from several sessions on the same physical media.

Global “pull backups” can be used to:

- Set up familiar Enterprise Backups and operate the backups.
- Stack several virtual volumes on the same sequential media.
- Control the Enterprise Backup resources (physical tape drives) by the team managing the Enterprise Backup.

- Note that part of the operational management of the Enterprise Backup can also be reached through scripts, by enabling the optional BackPak Script controller that batches and serializes the execution of scripts.

Single “push backups” by scripts can be used to:

- Save a volume immediately after it has been written.
- Differentiate between the storage services, by different backup parameters set in the different BackPak Data stores and Volume groups.

Deletion of Files in the Online Storage

When the Volume group is linked to DSM/TC or TMF, the image of virtual tape is not materialized in Windows files; an empty volume will be created “on the fly” when the volume is requested for a new backup.

Windows files can be deleted:

- To remove the files corresponding to SCRATCH tape volumes.
- To free-up the disk space from files that have been archived.

The deletion of SCRATCH volumes is executed by the macro BB017_FREE_EXPIRED.

The deletion of backed up files can be done:

- Just after the backup of a virtual volume, in the backup script or by the global daily backup. Some backup software allows safe archive/delete combined operations.
- A few days after the virtual volumes were written, or accessed for a restore, to allow for fast retrieval of recent volumes or for volumes mounted repeatedly for multiple restore attempts.

This last deletion after a delay is enabled on the Volume Group configuration page. The delete is triggered by the macro BB023_DEL_BACKEDUP and must be scheduled in NetBatch.

The Archive Bit of the backed-up Windows files must be reset by the Enterprise Backup to allow deletion.

Deletion of Back-End Archives and Reuse of Physical Media

The Enterprise Backup should be configured for infinite retention of the archives – or backups. A BackBox delete script is used to delete the expired stored virtual volume saved in the Enterprise Backup. This way, the expiration of a NonStop tape volume in DSM/TC or TMF or QTOS is automatically propagated not only to the online storage in the data Store, but also to the archives in the Enterprise Backup.

This automation requires an Enterprise Backup command that deletes the archives of only two Windows files, passed by BackBox to the Delete script.

Some Enterprise Backup allow to attach a free identifier to a backup session.

For example, the backup script saves the two .DAT and .IND files of a volume label VOL123 and associates them with a 'session name' VOL123; then the delete script can remove the two file backups by deleting or expiring all archives associated with the 'session name' VOL123.

When it is not possible to automatically forward the actual expiration of each virtual volume in a DSM/TC or TMF, two other means could be used to set a predefined expiration to the archives.

1. Some predefined expirations are configured in the Enterprise Backup; they are associated with specific Windows directory names themselves and are configured in different Data stores and different Volume groups. Thus the DSM/TC pool will contain specific Windows directories and be indirectly retained in the Enterprise Backup.
2. A parameter to the Enterprise Backup executed in the backup script specifies the retention or a storage management class. This retention must be set in the backup script according to the available Windows parameters provided to the script, such as the Volume group name or the Volume class.

Windows Files Restore

When the NonStop requires a virtual volume and the disk files have been archived and deleted, the missing Windows disk files are then automatically restored by executing the restore script.

In case of an extremely high volume restore running several concurrent NonStop restores reading in the Enterprise Backup from sequential media, the restore and backup the process must be carefully planned.

The restore script, as well as the other scripts, must be implemented in such a way that any VTC configured as a route to the Data Store, can execute it.

Installing the Enterprise Backup Client

Any Enterprise Backup Client uses normally a backup software client to install in all VTCs that are routed to the Data Store to configure with Scripts.

The software must:

- Be able to save and restore files named by UNC (\\svr\share\dir…\file.ext).
- Provide a command line interface to use in Windows scripts.

It is highly preferable that the software is also able to:

- Reset the Archive Bit in the file system when the file has been saved.
- Restore in a different VTC from the VTC that held the original file and that is different from the VTC that executed the Backup script – if any.

Location and Security of the Script Files

The script files must be present on the same local disk location, in all VTCs that are routed to the Data Store to configure with scripts.

The distributed sample scripts are installed in:

C:\ProgramData\ETINET\VTC\Script.

These can be used as a starting point and copied to the location where they will be updated and executed.

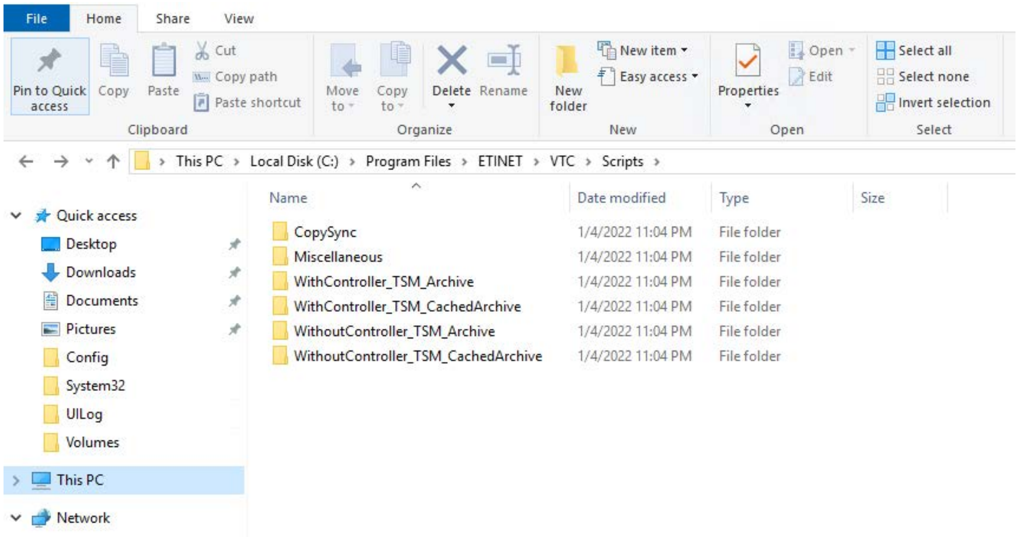
For "TSM" or for "WinFile" (simple COPY file command) the sample can be used without any modification. In this case, the Data Store can be configured to directly run the samples in:

C:\ProgramData\ETINET\VTC\Script

The directory containing the scripts must be authorized in full to access all Windows accounts that will execute the scripts. This includes the account configured to access the storage in the Data Store UI page. The VTC executes a Windows login with this account to run the script.

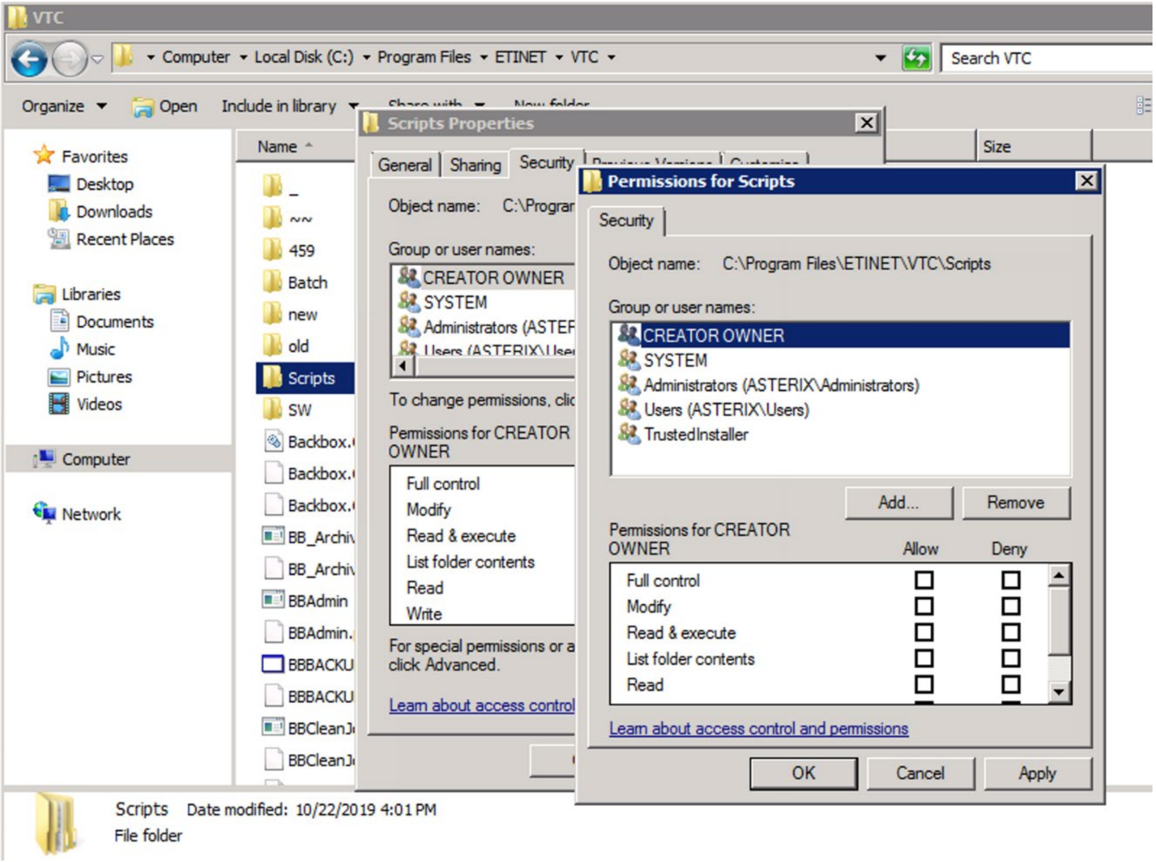
Users with access to Data Store UI page have default read/write permissions to the VTC Script folder: C:\ProgramData\ETINET\VTC\Script

⚠ For local administrator (group) users, the script is customized in such a way that allows running the script under the folder c:\program files\etinet\vtc\script with default permissions "READ, LIST and EXECUTE". To make sure the local admin users have access to the script, check the Windows-based script folder permissions.



This PC > Local Disk (C:) > Program Files > ETINET > VTC > Scripts >

Name	Date modified	Type	Size
CopySync	1/4/2022 11:04 PM	File folder	
Miscellaneous	1/4/2022 11:04 PM	File folder	
WithController_TSM_Archive	1/4/2022 11:04 PM	File folder	
WithController_TSM_CachedArchive	1/4/2022 11:04 PM	File folder	
WithoutController_TSM_Archive	1/4/2022 11:04 PM	File folder	
WithoutController_TSM_CachedArchive	1/4/2022 11:04 PM	File folder	



Object name: C:\Program Files\ETINET\VTC\Scripts

Group or user names:

- CREATOR OWNER
- SYSTEM
- Administrators (ASTERIX\Administrators)
- Users (ASTERIX\Users)
- TrustedInstaller

Permissions for CREATOR OWNER	Allow	Deny
Full control	□	□
Modify	□	□
Read & execute	□	□
List folder contents	□	□
Read	□	□

Description	For local administrator (group) users - different from the ones defined for BackBox/VTC - , the script is customized in such a way that allows running the script under the folder **c:\Program Files\etinet\vtc\script** with default permissions “READ, LIST and EXECUTE”.
Script Location	C:\Program Files\etinet\vtc\script
Script Reports	C:\ProgramData\ETINET\VTC\Script Need **READ** and **WRITE** permissions
Permissions to the custom user	The custom script running under **c:\Program Files\etinet\vtc\script** has default permissions **Read, List&Execute**
Grant permissions to the regular user	1. Locate the Scripts folder on **C:** under **VTC** folder. 2. Right-click on the folder. Go to **Properties**>**Security** 3. Select the user (local admin user) group. 4. Check **Read&Execute** (or the permissions you want to grant to the user) checkbox in the Permissions panel to assign the respective permission to the user/group. ⚠ For version prior to 4.09, add the **Write** permission.

Specifications

Usage	**For local administrator created Users/Groups.**
Behavior	The custom script script under folder c:\Program Files\etinet\vtc\script with default permissions “READ, LIST and EXECUTE”
Variations (regular user)	For BackBox/VTC created users - via BackBox UI - refer to the regular procedure described in the VTC Scripting Option guide, section **Location and Security of the Script Files.**
Variations - Versions prior to 4.09	Warning For version prior to 4.09, add the **Write** permission to the procedure on granting permissions to the user(s).

Distributed Samples

Sample scripts are provided in the BackBox installation directory -

C:\Program Files\ETINET\Virtual Tape Controller\Script

Simple examples are provided for common enterprise backup software.

Basic Script Sample

The following example illustrates a very primitive backup script using the VERITAS NetBackup’s command line.

The VERITAS server name is specified by a user configuration parameter NETB_SERVER set in the VTC domain configuration.

The policy name is built with the Volume Group name of the volume being processed (BBOX_VOLGROUP).

The two file names to backup are specified by %1 and %2.

```
cd \scripting
bpbackup  –p BBOX%BBOX_VOLGROUP%
     -s INCR
                -S %NETB_SERVER%
     -w 01:00:00
     –k "BACKBOX archive"
     %1 %2
```

TSM Scripts

For Tivoli Storage Manager (IBM TSM), the scripts are more elaborate. Four script sets are presented in distinct directories combining two options:

- With or without the BackBox Script Controller.
- Archive with immediate deletion of the Windows files with chache of archived files on disk with the resetting of the Archive Bit by the BackBox tool.

Script\TSM\WithController_TSM_Archive\*.*

Script\TSM\WithController_TSM_CachedArchive\*.*

Script\TSM\WithoutController_TSM_Archive\*.*

Script\TSM\WithoutController_TSM_CachedArchive *.*

The file: Script\TSM\dsm.opt is a sample TSM client configuration file.

Manual_Restore.cmd

A special script - Manual_Retsore.cmd - is also distributed for cases where the Enterprise Backup has no command line. The backup is completely operated by the backup server, according its own schedule.

The special script **Manual_Restore.cmd** is distributed for the following purposes:

- Notify the operator of the original name of the files to manually restore, and in which server and directory the VTC expects the files be restored.
- Wait for the files to be actually restored, before the VTC reads them to present the tape volume to the host.

Distributed Utilities

BBOXLOG, BB_ArchiveBit and WAITFILE are distributed Windows programs that can be used in user–written BackBox scripts. When a script is started, the MS-Windows PATH variable is increased with the VTC program directory to make these utilities available.

BBOXLOG – Logs a Message in NonStop EMS

BBOXLOG sends a message to the EMS subsystem of a NonStop node.

BBOXLOG can be run in scripts triggered by the BackBox software used in a stand-alone Windows script. BBOXLOG must run in a Windows server hosting a BackBox, as it communicates with a BackPak Domain Manager.

Syntax:

```
SET BBOX_NSK_NODE=<\node-name>
SET BBOX_DOMAIN=<domain-name>
BBOXLOG event-number “message text” [param-1 [param-2] … ]
```

BBOX_NSK_NODE and BBOX_DOMAIN set the message destination.

These environment variables are already set with appropriate values when run in scripts triggered by BackBox.

Event-number is the generated EMS event number.
It must be in the range 8000 to 8999.

“Message text” is the generated EMS event message text.
Text with a syntax similar to the format in the C function sprintf().

[Param-1 [Param-2] ….] are the parameters for sprintf(). Parameter values being strings in the command line, the parameter conversion type must be only %s in the “Message text” - ultimately it must be %%s.

Notes:

- The target EMS collector name is specified in the BackPak Domain configuration.
- When sprintf() parameters are specified in the “Message text”, the % character must be doubled.
- Example:bboxlog 8001 "Restoring files for tape volume %%s" %BBOX_VOLUME%
- When BBOXLOG is executed outside the BackBox environment, the Windows PATH must be updated to include the BackBox installation directory.
  SET PATH %PATH%; C:\Program Files\ETINET\BackBox Virtual Tape Emulation

BB_ArchiveBit – Reset the Windows File Archive Bit

This program is used at the end of backup scripts archiving Windows files to a IBM Spectrum Protect™ Tivoli Storage Manager - TSM).

It queries the TSM server to verify the files that have been archived by a previous “dsmc archive” command, that are actually known by the TSM server.

If the archives are known by the TSM server, the Archive Bit is reset in the Windows file system, allowing later “Delete Backed-up files” functionality enabled in the Volume groups.

Prerequisites:

- The regular TSM environment variables DSM_DIR, DSM_CONFIG and DSM_LOG must be available in the process context.
- The TSM login is assumed to be automated by the DSM.OPT option PASSWORDACCESS GENERATE.

Syntax:

BB_ArchiveBit file-pattern1 [file-pattern2] …

or

BB_ArchiveBit –l filelist-file1 [file-file2] …

Notes

- BB_ArchiveBit is included in these two sets of distributed scripts:
  Script\TSM\WithController_TSM_CachedArchive\*.*

```
Script\TSM\WithoutController_TSM_CachedArchive \*.*
```

- File-pattern1 file-pattern2 etc … are the patterns of the files to process. Supported wildcards: * and ?
- Filelist-file1 filelist-file2 etc … are the names of files containing the list of files to process.
- BB_ArchiveBit does not query TSM for backup objects, only archive objects.

WAITFILE – Waits for the Creation of a Disk File

WAITFILE waits for the creation of a Windows file and its availability. It does so *by* looping while trying to open the file with exclusive access, and sets the Windows Errorlevel when ending, possible values are:

Errorlevel 0: the file is available.

Errorlevel 14: there is an error in parameters.

Errorlevel 40: timeout, the file does not exist or is not available within the allocated time.

Other values may be set by the Windows command line interpreter for severe errors.

Syntax:

```
WAITFILE file-name [maximum-number-of-seconds]
```

File-name is the name of the Windows file to wait for.

Maximum-number-of-seconds is the maximum number of seconds WAITFILE will wait. Default value is 0 seconds, preventing WAITFILE from waiting if the file does not exist or is not available.

Testing the Scripts Manually

It is recommended to first test scripts manually on a VTC in a Remote Desktop session, at the Windows command prompt, and without involvement of the BackBox software.

The parameters passed by the VTC can be manually set in a test script,– using the detailed description of script parameters in this manual.

Sample:

```
SET BBOX_VOLUME=LBVOL123
SET BBOX_SCRIPT_DIR=c:\script\
SET BBOX_FILE_IND=\\MTLBBLAB1\BPAK\WIN1\LBVOL123.ind
SET BBOX_FILE_DAT=\\MTLBBLAB1\BPAK\WIN1\LBVOL123.dat
…/…
BACKUP.CMD  \\MTLBBLAB1\BPAK\WIN1\LBVOL123.ind ^
                  \\MTLBBLAB1\BPAK\WIN1\LBVOL123.dat
```

Configuring the Scripts in the BackPak Domain

The scripts are configured by the BackPak UI, Configuration, Data Store, Advanced.

When a scripting option is present in the license key, the Advanced Data Store configuration makes it possible to:

- Identify the back-end Enterprise Backup software.
- Specify the location of the scripts in the VTC's, where all scripts are optional. It is possible to specify only a restore script.
- Specify user MS-Windows environmental parameters for the scripts

Guidelines

Cross System Restores

The restore script, as well as the other scripts, must be implemented in such a way that any VTC configured as a route to the Data Store can execute it.

Extremely Large Jobs through Concurrent NonStop Drives

If there is the possibility of processing an extremely large job running several concurrent NonStop backups or restores and accessing sequential media in the Enterprise Backup, the process must be planned carefully.

In the Enterprise Backup, there might be both limited concurrent availability of tape drives and contention on the unshareable sequential media.

Before efficiently migrating to tape, the backup process is usually solved by a Backup Enterprise firstly writing on disk.

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For backup it is possible to write in parallel on several back-end media. Restoring is more difficult, as the reading of a NonStop volume requires a very specific Backup Enterprise media. All other NonStop restores needing the same back-end unshareable media, will have to wait for the restore script of the first NonStop restore to complete, before their own script receives the required media and begins executing.

The above noted issues can become more complex because the number of NonStop virtual drives are usually more numerous than the number of tape drives in the Enterprise Backup.

In both cases, the BackBox Script Controller can help by serializing the execution of scripts.

The backup problem is generally solved by firstly staging on disk inside the Enterprise Backup.

The restore is more difficult to solve, one solution would be to massively restore the images of "all needed volumes" requiring a very large disk space. This does not take into consideration the difficulty to identify "all volumes".

Tight control and organization of the Enterprise Backup storage pool is required. The content of back-end media must be planned – including the expiration process.

Specific extensions have been developed for the TSM in the Script Controller. Essentially, they query the TSM server to know the back-end media needed for a NonStop volume, then sort the execution of restore scripts by back-end media.

Archive Bit

Amongst other disk file properties, the Windows file system maintains an Archive Bit, and BackBox expects that this Archive Bit is reset by the backup script or by the Enterprise backup software.

When the Archive Bit is not reset:

- In the BackBox UI, the Storage Admin page cannot display the number of files that are not backed up yet, and the “Backup all non-backed up files” will back up all Windows files.
- The “Delete backed-up files” (disk staging) cannot be used efficiently.

As a workaround to current special conditions of HPE StoreOnce, the successful file archiving is not notified by an Archive Bit reset or by a file deletion; the Script Controller cannot be used.

Archive-Bit with a TSM Enterprise Backup

In the TSM for which Archive is recommended over Backup, the BackBox utility BB_ArchiveBit verifies the successful Archive in the server and then resets the Archive Bit at the end of the backup script.

No Archive-Bit in StoreOnce NAS

To free up the online storage and only keep the offline copy, the “Delete backed-up files” processing is based on the Archive Bit reset by the backup software.

Special conditions make it such that the Archive Bit is not currently supported by the HPE StoreOnce. For this storage type, the current method to verify a file that has been backed-up, is to restore it.

When a VTC executes BB023_DEL_BACKEDUP (“Delete backed-up files”) for a Data store configured as “StoreOnce NAS”, it will restore the file with the regular restore script, to a temporary storage, when a file becomes a candidate for removal from the online storage. If the restored file looks identical to its original, both are deleted.

Directing to Different Storage Services

If there is a need for directing different NonStop backups to different kinds of storage services inside the Enterprise Backup software, it can be done several different ways.

The natural parameter in NonStop OBEY files is using different DSM/TC pools, with each pool being associated with a different BackBox Volume Group.

Two Windows named parameters, depending on the Volume group, are available in the scripts:

%BBOX_VOLGROUP%

This contains the Volume Group ID, which can never be modified.

%BBOX_VOLUME_CLASS%

This contains the Volume Class parameter configured in the Volume Groups, with several Volume groups capable of specifying the same Volume Class. The Volume Class can be updated at any time in order to provide a different value for the next execution of scripts.

Recommendations for the Enterprise Backup Software

Exclude the Virtual Volumes from the Regular Server Backup

The regular backup of the VTC Windows server, such as the backup of Windows programs, must exclude the BackBox virtual volumes:

- The need for backup retention and replication are different.
- The scheduling and automation are different.
- The size of Windows files is different.

These two kinds of backups, regular Windows backup and virtual volumes backups, are configured and operated totally independently.

Client Name in the Enterprise Backup Software

It is recommended to define dedicated, specific client name(s) in the Backup software. A client name per NonStop system, or small group of NonStop systems, usually allows the Enterprise Backup software to manage data differently.

Dedicated client name(s) will isolate the BackBox virtual volumes from the other general Windows files in the VTC servers.

In most Enterprise Backup software, this is a simple way to allow several VTC servers accessing the backup of the same volumes.

TSM specific recommendations below, can be browsed to derive specific recommendations and configuration procedure for other Enterprise Backup software.

TSM Specific Recommendations and Configuration Procedure

For the TSM, be sure to install the TSM Backup command line client “dsmc” which will be retrieved by the scripts.

The TSM Administrative client command line “dsmadmc”, along with an Administrative client name authorized for queries only, has two potential usages:

- For massive concurrent restores directly accessing TSM sequential media, the TSM Administrative client can be programmatically used by the BackBox Script Controller to optimize the restores scripts, thereby grouping scripts accessing the same TSM physical media.
- The NonStop operator who manages the NonStop backups gets some autonomy, for example, to query the available TSM storage space and the state of specific virtual volumes.

***

One of these for distributed sets of scripts is suggested.

Script\TSM\WithController_TSM_CachedArchive\*.*

Script\TSM\WithoutController_TSM_CachedArchive *.*

Script\TSM\WithController_TSM_Archive\*.*

Script\TSM\WithoutController_TSM_Archive *.*

In the "cached" versions with, the archived file versions are kept on disk for a limited period, configured by the “Deleted Backed Up files” parameters in the Volume groups.

In the versions without "cached" the TSM immediately deletes a file that has been successfully archived.

In the "WithController" versions, the BackBox Script controller is enabled for retries and batching. This is recommended for setups where a sequential media is directly accessed by backups or restores, such as LAN-FREE setups, and especially when extremely large volumes, concurrent backups or restore, are executed.

In the version “WithoutController”, simple scripts are executed. This is recommended for simplicity in setups that access only TSM disk pools, or marginally run concurrent backups or restores.

***

The scripts save the files in “Archives” objects, rather than “Backups” objects. Archives are more appropriate as the backup multiple versions of an object do not make sense with virtual volumes.

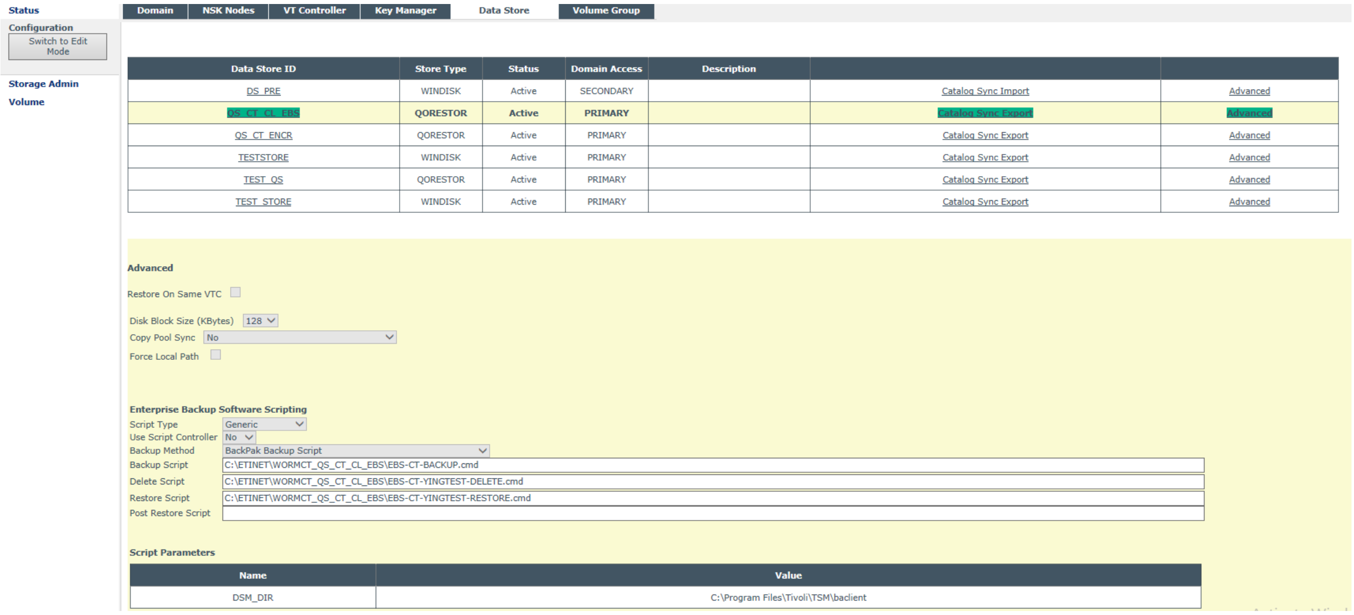
The TSM Management Class must be configured for the Archive Copy Group, and the retention should be infinite – as the BackBox “delete script” will delete the Archive when the corresponding virtual volume has expired in DSM/TC, or in other NonStop catalogs supported for the Auto-Scratch which are enabled in the Volume Group.

For non-cataloged volumes or unsupported tape catalogs, the infinite retention will not keep more than the last version of each virtual volume.

Not using an infinite retention in the TSM, brings up the possibility of potentially mismatched retentions between the TSM and the NonStop. For example, a NonStop operator might not be aware of a maximum retention in the TSM, and expect that the retention specified in a backup OBEY file, will be considered in the TSM.

***

To avoid unnecessary script modification, and to have more accurate configurations, enter the value of the three Windows variables required by the TSM (DSM_DIR, DSM_CONFIG, DSM_LOG) “Script Parameters” in the BackPak UI, Data Store Advanced properties page, where the script names are also entered.



Data Store ID	Store Type	Status	Domain Access	Description		
DS_PRE	WINDISK	Active	SECONDARY		Catalog Sync Import	Advanced
QS_CT_CL_EBS	QORESTOR	Active	PRIMARY		Catalog Sync Export	Advanced
QS_CT_ENCR	QORESTOR	Active	PRIMARY		Catalog Sync Export	Advanced
TESTSTORE	WINDISK	Active	PRIMARY		Catalog Sync Export	Advanced
TEST_QS	QORESTOR	Active	PRIMARY		Catalog Sync Export	Advanced
TEST_STORE	WINDISK	Active	PRIMARY		Catalog Sync Export	Advanced

Advanced

Restore On Same VTC □

Disk Block Size (KBytes) 128
Copy Pool Sync No
Force Local Path □

Enterprise Backup Software Scripting

Script Type Generic
Use Script Controller No
Backup Method BackPak Backup Script
Backup Script C:\ETINET\WORMCT_QS_CT_CL_EBS\EBS-CT-BACKUP.cmd
Delete Script C:\ETINET\WORMCT_QS_CT_CL_EBS\EBS-CT-YINGTEST-DELETE.cmd
Restore Script C:\ETINET\WORMCT_QS_CT_CL_EBS\EBS-CT-YINGTEST-RESTORE.cmd
Post Restore Script

Script Parameters

Name	Value
DSM_DIR	C:\Program Files\Tivoli\TSM\baclient

The distributed DSM.OPT should be taken as a sample and should be copied in all VTC to the same location as the scripts; then it must be customized VTC by VTC.

```
commmethod     tcpip
tcpport        1500
TCPServeraddress tsmdev

PASSWORDACCESS GENERATE
NODE        VTC85
ASNODENAME   NSK_BACKBOX

DOMAIN C:

LANGUAGE AMENG
Resetarchiveattribute yes
Errorlogretention  90

TXNBYTELIMIT       2097152

TCPBUFFSIZE        32
TCPWINDOWSIZE    63
```

In this DSM.OPT, three options must be updated or added:

- ASNODENAME: This is the common client name owning the backups in TSM, it is a “proxy node” (also named “target node”), and there must be a unique value given for all VTC routes to the Data Store.
- NODENAME: Is the “login node” that must be distinct for each VTC server, but which must also be allowed to access the data of the proxy node.
- DOMAIN: Tells the scope of the backup of the whole server – where BackBox virtual volumes must be excluded.

A proxy node NSK_BACKBOX can be configured through a TSM administrator client by commands similar to:

```
register node VTC85 password85
register node VTC86 password86
register node NSK_BACKBOX passwordnsk
grant proxynode target=NSK_BACKBOX agent=VTC85,VTC86
```

To complete the isolation between the regular server backups and the non-BackBox backups, include the DOMAIN keyword in the DSM.OPT of these regular backups to explicitly list the local disks for the regular server backups. It excludes both the disks used by BackBox to store virtual volumes and also the BackBox files from the scope of an INCREMENTAL command applied to the whole server.

DOMAIN should be set in all DSM.OPT files in the server, which is the one installed by TSM in C:\Program Files\Tivoli\TSM\baclient, and the DSM.OPT file(s) for BackBox scripts.

***

Directing to different TSM Management Classes and different storage services:

If there is a need to send to various TSM Management Classes depending on the DSM/TC POOL specified in NonStop backup OBEY files, the setup must be completed.

The distributed backup scripts contain the syntax to set up an explicit TSM Management Class if the Windows variable %BBOX_TSM_MC% is set. Set it by one of the three following ways:

1. Update the backup.cmd script to insert at the beginning:
   SET BBOX_TSM_MC=%BBOX_VOLUME_CLASS% (suggested and preferred course of action).
2. Update the backup.cmd script to insert at the beginning:
   SET BBOX_TSM_MC=%BBOX_VOLGROUP% .
3. Add this BBOX_TSM_MC in the Script Parameters of the Data Store configuration - Advanced properties page.

***

Customize and run the distributed setup_for_test.cmd to test and finalize the TSM client installation:

1. Enter in “setup_for_test.cmd” the values for three TSM Windows environment variables (DSM_CONFIG. DSM_DIR and DSM_LOG.) that were added as “Script Parameters” in the BackBox Data Store Advanced configuration.

   “setup_for_test.cmd” content:

   ```
   set DSM_DIR=C:\Program Files\Tivoli\TSM\baclient
   set DSM_CONFIG=C:\BPAK\script\dsm.opt
   set DSM_LOG=c:\BPAK\script
   set PATH=%PATH%;%DSM_DIR%
   dsmc
   ```

2. Run “setup_for_test.cmd” once to:

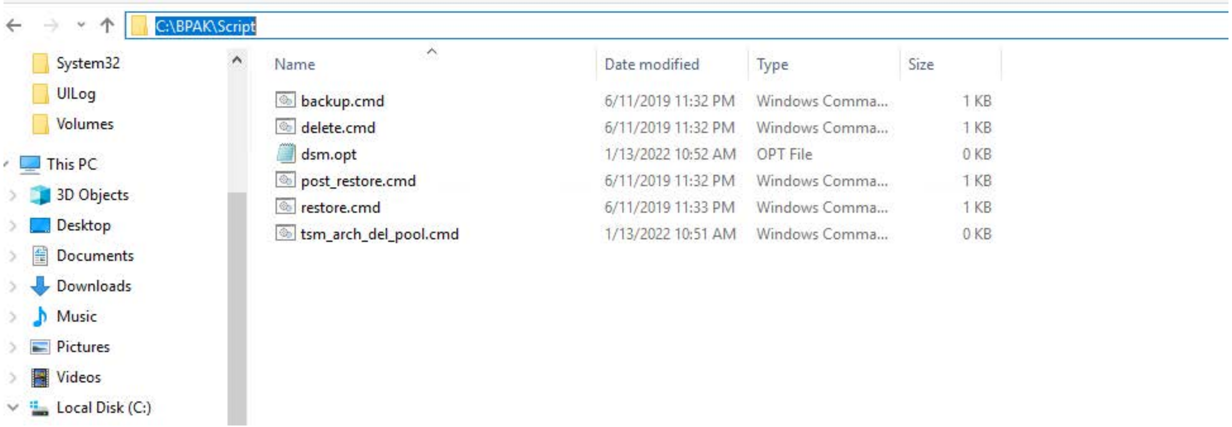
   - Enter the node password when prompted. The password will then be encrypted and stored in the Windows registry and automatically managed by the TSM (because of PASSWORDACCESS GENERATE in DSM.OPT)

   - Archive a small Windows file to ensure the TSM storage is available.

   Sample run:

   ```
   C:\BPAK\script>setup_for_test
   C:\BPAK\script>set DSM_DIR=C:\Program Files\Tivoli\TSM\baclient
   C:\BPAK\script>set DSM_CONFIG=C:\BPAK\script\dsm.opt
   C:\BPAK\script>set DSM_LOG=c:\BPAK\script
   C:\BPAK\script>dsmc
   IBM Tivoli Storage Manager
   Command Line Backup-Archive Client Interface
     Client Version 6, Release 1, Level 5.2
     Client date/time: 11/22/2022 11:17:17
   Node Name: VTC85
   Please enter your user id <VTC85>:

   Please enter password for user id "VTC85": ******

   Session established with server TSMDEV_SERVER1: Windows
     Server Version 5, Release 3, Level 5.2
     Server date/time: 11/22/2020 11:18:14  Last access: 11/22/2022
   11:18:14
   Accessing as node: NSK_BACKBOX
   tsm> archive  delete.cmd
   Archive function invoked.

   Directory-->            0 \\nsk_backbox\c$\BPAK [Sent]
   Directory-->            0 \\nsk_backbox\c$\BPAK\script [Sent]
   Normal File-->      1,004 \\nsk_backbox\c$\BPAK\script\delete.cmd [Sent]

   Archive processing of '\\nsk_backbox\c$\BPAK\script\delete.cmd' finished without failure.

   Total number of objects inspected:        3
   Total number of objects archived:         3
   ```

```
Total number of objects updated:        0
Total number of objects rebound:        0
Total number of objects deleted:        0
Total number of objects expired:        0
Total number of objects failed:         0
Total number of bytes transferred:    1.75 KB
Data transfer time:                   0.00 sec
Network data transfer rate:           0.00 KB/sec
Aggregate data transfer rate:         1.65 KB/sec
Objects compressed by:                0%
Elapsed processing time:           00:00:01
tsm> quit

C:\BPAK\script>
```



C:\BPAK\Script

Name	Date modified	Type	Size
backup.cmd	6/11/2019 11:32 PM	Windows Comma...	1 KB
delete.cmd	6/11/2019 11:32 PM	Windows Comma...	1 KB
dsm.opt	1/13/2022 10:52 AM	OPT File	0 KB
post_restore.cmd	6/11/2019 11:32 PM	Windows Comma...	1 KB
restore.cmd	6/11/2019 11:33 PM	Windows Comma...	1 KB
tsm_arch_del_pool.cmd	1/13/2022 10:51 AM	Windows Comma...	0 KB

Tips for TSM Scripts

"A required NT privilege is not held".

This message is issued by the TSM Windows client executed in backup or restore scripts, when:

- A path on a remote file server is configured in the disk pool of a Windows File Data Store.
- And the account configured to access the remote file server doesn't have the permission to "Manage auditing and security log".

The account running the TSM client must have the rights as noted below. For exact reference, refer to the IBM Tivoli Storage Manager documentation.

- Backup files and directories.
- Restore files and directories.

- Manage auditing and security logs.

The right "Manage auditing and security logs" is often missing. To add it:

- Log into the Windows box acting as a file server for BackBox.
- Administrative Tools.
- Local Security Policy.
- Security Settings.
- Local Policies.
- User Rights assignment.

Find the policy "Manage auditing and security log", and add the account under this policy.

Then restart the file server once all tasks have been completed.

Testing the Completion of the Command Line Client (dsmc)

The client command line DSMC can set the Windows error level to a non-zero value as soon as an error occurs, and even internal retries allow for a successful completion of the command. Network failures are sample of errors that are ‘solved’ by retries and which set a non-zero error level.

The BackBox VTC tests the script return code, and does not use any script if the result of the error level is not zero.

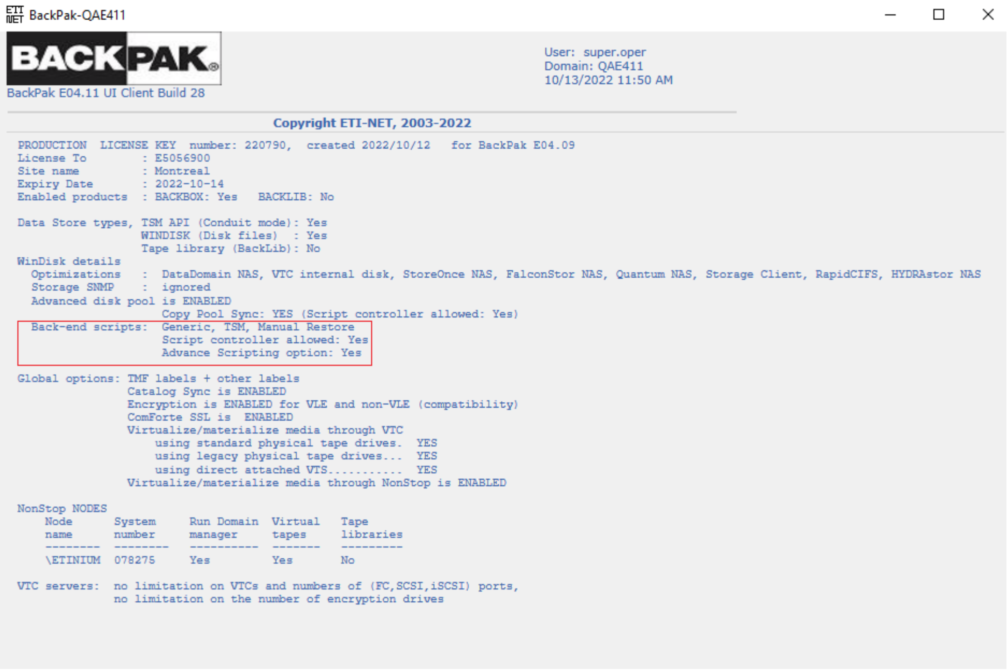
The line “SET ERRORLEVEL 0” as a last script line disables the verification of the return-code.

The actual success of a script is evaluated by its result on the file system: a file to restore is present, a file to archive has been deleted by the TSM – delete files option, or the Archive Bit has been reset by the program BB_ArchiveBit.

Script Settings in the BackPak UI

License Option Verification

In the **Configuration** > **Domain page** > **License Details** link, the scripting for some back-end Enterprise Backup must be enabled.



BackPak E04.11 UI Client Build 28

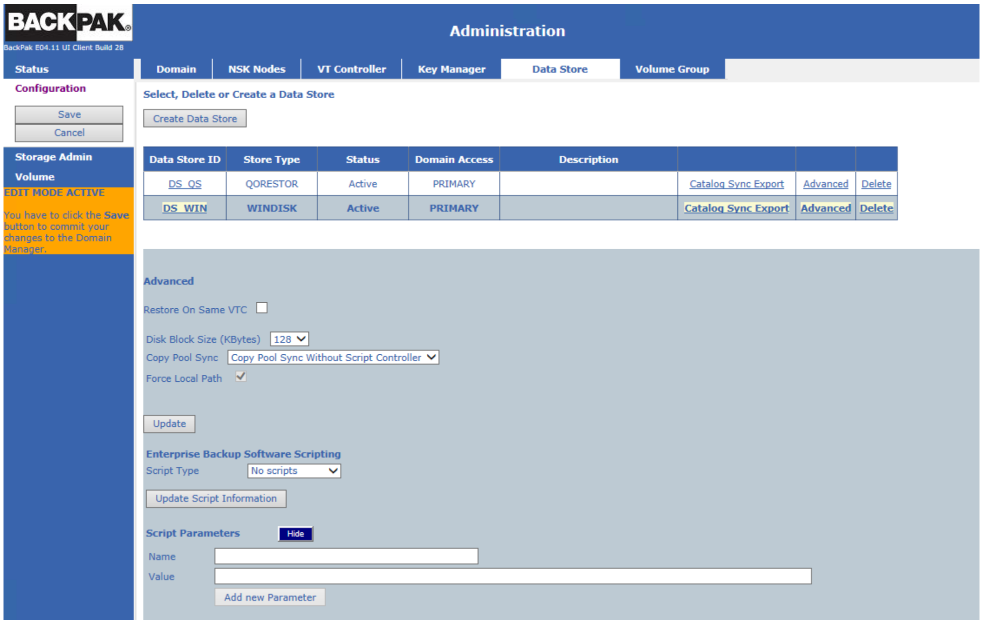
User: super.oper
Domain: QAE411
10/13/2022 11:50 AM

Copyright ETI-NET, 2003-2022

```
PRODUCTION  LICENSE KEY  number: 220790,  created 2022/10/12   for BackPak E04.09
License To          : E5056900
Site name           : Montreal
Expiry Date         : 2022-10-14
Enabled products    : BACKBOX: Yes   BACKLIB: No

Data Store types, TSM API (Conduit mode): Yes
                  WINDISK (Disk files)  : Yes
                  Tape library (BackLib): No
WinDisk details
  Optimizations   :  DataDomain NAS, VTC internal disk, StoreOnce NAS, FalconStor NAS, Quantum NAS, Storage Client, RapidCIFS, HYDRAstor NAS
  Storage SNMP    :  ignored
  Advanced disk pool is ENABLED
                     Copy Pool Sync: YES (Script controller allowed: Yes)
  Back-end scripts:  Generic, TSM, Manual Restore
                     Script controller allowed: Yes
                     Advance Scripting option: Yes

Global options: TMF labels + other labels
                Catalog Sync is ENABLED
                Encryption is ENABLED for VLE and non-VLE (compatibility)
                ComForte SSL is  ENABLED
                Virtualize/materialize media through VTC
                    using standard physical tape drives.  YES
                    using legacy physical tape drives...  YES
                    using direct attached VTS...........  YES
                Virtualize/materialize media through NonStop is ENABLED

NonStop NODES
    Node      System     Run Domain  Virtual   Tape
    name      number     manager     tapes     libraries
    --------  --------   ----------  -------   ---------
    \ETINIUM  078275     Yes         Yes       No

VTC servers:  no limitation on VTCs and numbers of (FC,SCSI,iSCSI) ports,
              no limitation on the number of encryption drives
```

Data Store Configuration in the Domain

The initial advanced page of the Data Store configuration is as below, with the **Copy Pool Sync** option licensed.



EDIT MODE ACTIVE

You have to click the **Save** button to commit your changes to the Domain Manager.

Select, Delete or Create a Data Store

Data Store ID	Store Type	Status	Domain Access	Description			
DS_QS	QORESTOR	Active	PRIMARY		Catalog Sync Export	Advanced	Delete
DS_WIN	WINDISK	Active	PRIMARY		Catalog Sync Export	Advanced	Delete

Advanced

Restore On Same VTC □

Disk Block Size (KBytes) 128

Copy Pool Sync Copy Pool Sync Without Script Controller

Force Local Path ☑

Enterprise Backup Software Scripting

Script Type No scripts

Script Parameters

Name

Value

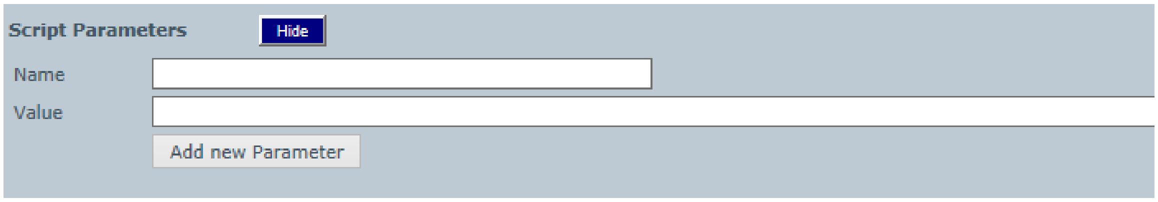
Scripting Section

The Scripting sections differ according to the Scripting type selected. Scripting types are Generic, TSM and Manual Restore.

Scripts, which are optional, are used to specify a Windows command file~~s~~ to be executed following specific tape events. When a file name is specified, whenever possible, it must be fully qualified and it must be copied in each VTC in the same location.

The scripting section also includes a Script Parameters list of users and predefined Windows environmental parameters that will be passed to the scripts (according to the scripting type selected). These parameters are passed as Windows environment variables to the shell executing the script, in addition to the parameters generated by the VTC to identify the files to process in the script. To add a parameter simply click the add button when in edit mode and enter the required information.

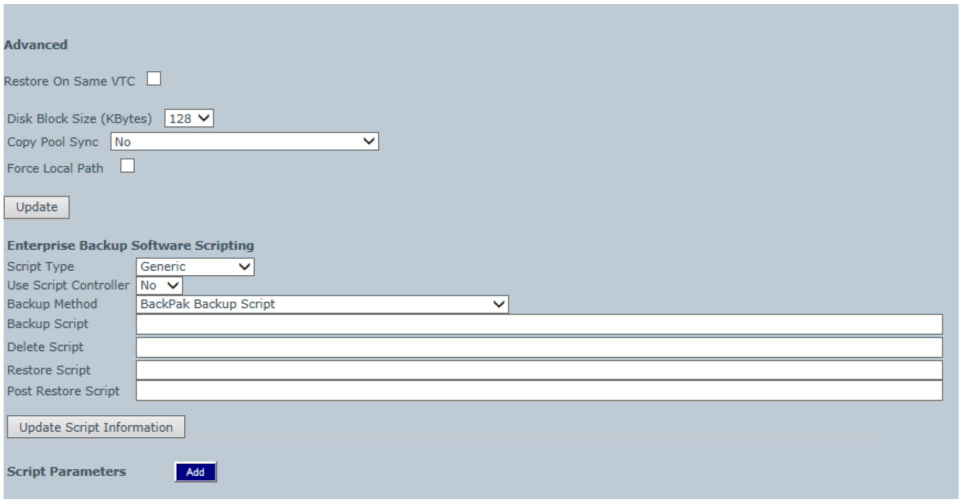
The following is a description of the Scripting section by Scripting type:



Name: Name of the parameter. Do not specify the % sign around the name.

Value: Value of the parameter.

Scripting Type Generic



Advanced

Restore On Same VTC □

Disk Block Size (KBytes) 128

Copy Pool Sync No

Force Local Path □

Enterprise Backup Software Scripting

Script Type Generic

Use Script Controller No

Backup Method BackPak Backup Script

Backup Script

Delete Script

Restore Script

Post Restore Script

Use Script Controller: Yes or No, enable or not, the use of the script controller.

Backup Method: BackPak Backup Script or Other Methods. Not available if Copy Pool Sync option is active.

Backup Script: Command file to be executed after a volume unload. Available only when the backup method is BackPak Backup Script. Not available if Copy Pool Sync option is active.

Restore Script: Command file to be executed at a volume load, when a virtual media cannot be found on the Data Store.

Delete Script: Command file to be executed after a volume is deleted.

Post Restore Script: Command file to be executed after a volume, requiring the RESTORE script and mounted for input (USE IN) has been unloaded. This obsolete script is still available for compatibility.

Script Submission Through the UI

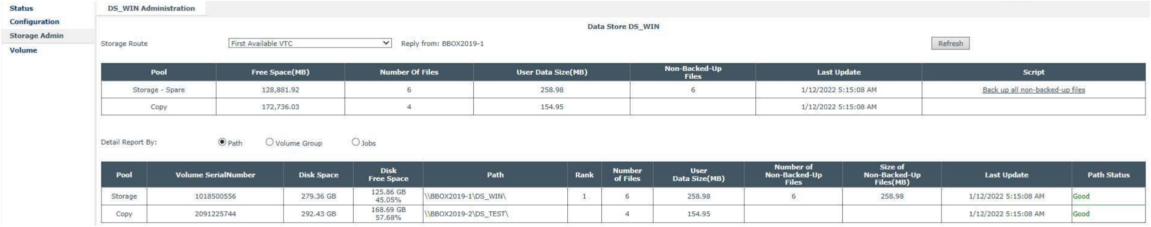
Scripts are triggered automatically by the VTC Emulator.

Following some possible error conditions, it might be necessary to manually re-submit the backup script. This can be done as follows:

- For a whole Data Store on the Storage Admin page.
- For a single virtual tape volume on the Volume Detail page.

Please take note that the following section only applies when the Copy Pool Sync Option is not selected for the Data Store.

Storage Admin



Data Store DS_WIN

Storage Route: First Available VTC   Reply from: BBOX2019-1

Pool	Free Space(MB)	Number Of Files	User Data Size(MB)	Non-Backed-Up Files	Last Update	Script
Storage - Spare	128,881.92	6	258.98	6	1/12/2022 5:15:08 AM	Back up all non-backed-up files
Copy	172,736.03	4	154.95		1/12/2022 5:15:08 AM	

Detail Report By: ● Path ○ Volume Group ○ Jobs

Pool	Volume SerialNumber	Disk Space	Disk Free Space	Path	Rank	Number of Files	User Data Size(MB)	Number of Non-Backed-Up Files	Size of Non-Backed-Up Files(MB)	Last Update	Path Status
Storage	1018500556	279.36 GB	125.86 GB 45.05%	\\BBOX2019-1\DS_WIN\	1	6	258.98	6	258.98	1/12/2022 5:15:08 AM	Good
Copy	2091225744	292.43 GB	168.69 GB 57.68%	\\BBOX2019-2\DS_TEST\		4	154.95			1/12/2022 5:15:08 AM	Good

Note About StoreOnce NAS:

This functionality is available only for file systems that support the file attribute "Archive Bit".

StoreOnce NAS does not support it currently, and the two elements below are not present on this page when the Data Store is configured for StoreOnce.

Submission of the script for a single volume is possible for StoreOnce. To back up an entire Data Store containing large volumes, use the tools provided by the back-end Enterprise Backup software.

Non-Backed-Up Files

The presence of non-backed-up files shows if the submission of the backup script should be considered.

Backup all Non-Backed Up Files

The backup script is normally automated and if enabled, the script controller will automatically retry failed backups. Files marked as not backed up are usually either still being backed up or in the script controller input queue.

This link is for manually re-submitting the backup scripts that have failed for reasons unrelated to the software such as in the case of communication or power failures.

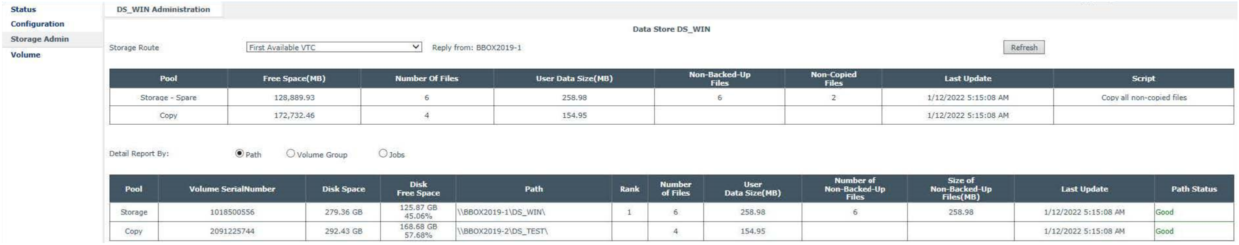
Note: The Script controller (the script contains the BBBACKUP command) contains its own retry mechanism; in this case, the manual retry is required only after the controller stops retrying, such as after a VTC reboot.

When the “Storage Route” is set for a specific VTC, the scripts will be submitted only to this VTC.

When the “Storage Route” is set for “1st available VTC” the scripts will be distributed dependent on preferences according to the volume information available in the domain:

- First, the VTC which contains the Windows files of the volume will be preferred. The VTC is assumed to contain the volume if the last known file location has a UNC syntax, such as \\svr1\share1, and the server name part is equal to the VTC TCP/IP address or to the last known VTC hostname.
- Second, the VTC who has written the Windows files is preferred.
- If the preferred VTC is not reachable by TCP/IP, does not contain the backup script, or is not able to submit the script, another route will be tried.

When the Copy Pool Sync option is enabled, you will see the following:



Data Store DS_WIN

Storage Route: First Available VTC   Reply from: BBOX2019-1

Pool	Free Space(MB)	Number Of Files	User Data Size(MB)	Non-Backed-Up Files	Non-Copied Files	Last Update	Script
Storage - Spare	128,889.93	6	258.98	6	2	1/12/2022 5:15:08 AM	Copy all non-copied files
Copy	172,732.46	4	154.95			1/12/2022 5:15:08 AM	

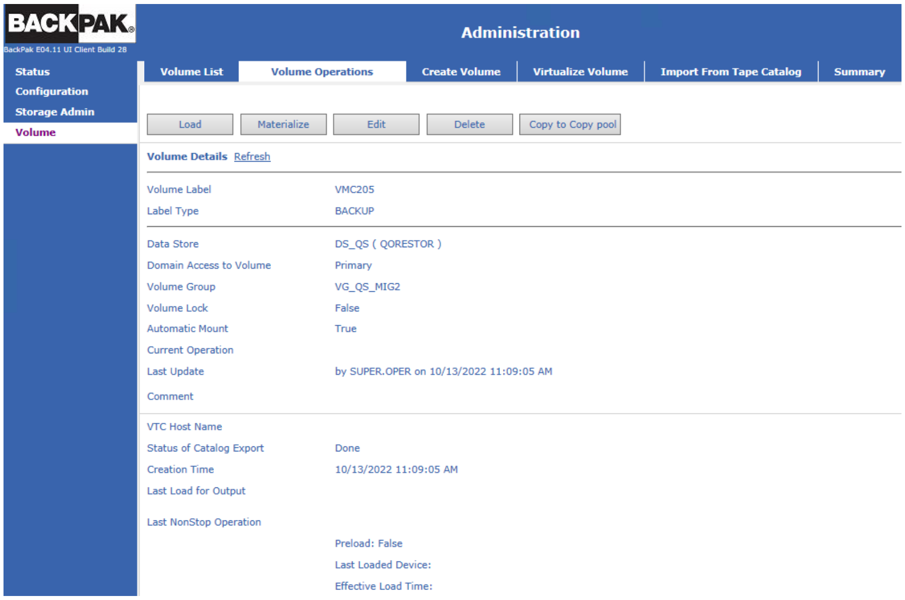
Detail Report By: ● Path ○ Volume Group ○ Jobs

Pool	Volume SerialNumber	Disk Space	Disk Free Space	Path	Rank	Number of Files	User Data Size(MB)	Number of Non-Backed-Up Files	Size of Non-Backed-Up Files(MB)	Last Update	Path Status
Storage	1018500556	279.36 GB	125.87 GB 45.06%	\\BBOX2019-1\DS_WIN\	1	6	258.98	6	258.98	1/12/2022 5:15:08 AM	Good
Copy	2091225744	292.43 GB	168.68 GB 57.68%	\\BBOX2019-2\DS_TEST\		4	154.95			1/12/2022 5:15:08 AM	Good

Non-Copied Files: Number of files that have not been copied to the copy pool by the CopySync program.

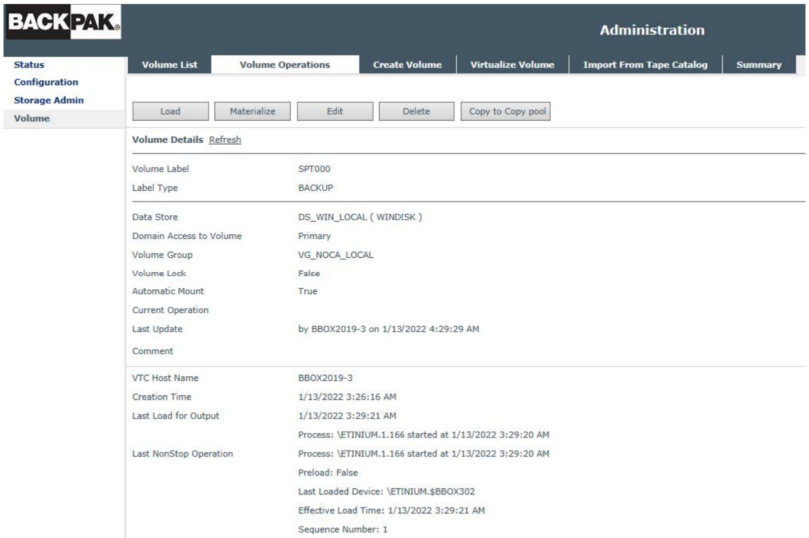
Copy all Non-Copied Files: Will submit all non-copied files to be copied by the CopySync program.

Volume Detail



Volume Label	VMC205
Label Type	BACKUP
Data Store	DS_QS (QORESTOR)
Domain Access to Volume	Primary
Volume Group	VG_QS_MIG2
Volume Lock	False
Automatic Mount	True
Current Operation	
Last Update	by SUPER.OPER on 10/13/2022 11:09:05 AM
Comment	
VTC Host Name	
Status of Catalog Export	Done
Creation Time	10/13/2022 11:09:05 AM
Last Load for Output	
Last NonStop Operation	
	Preload: False
	Last Loaded Device:
	Effective Load Time:

The script will be executed in the VTC who as written the virtual volume, i.e. **VTC Host Name**, until this VTC is not reachable by IP – then the 1st available VTC will execute the script. When **Copy Pool Sync** option is enabled, the **Copy to Copy Pool** button will replace the Run Backup Script Button, and will submit the current volume to the CopySync program to be copied to the copy pool (if needed).



Volume Label	SPT000
Label Type	BACKUP
Data Store	DS_WIN_LOCAL (WINDISK)
Domain Access to Volume	Primary
Volume Group	VG_NOCA_LOCAL
Volume Lock	False
Automatic Mount	True
Current Operation	
Last Update	by BBOX2019-3 on 1/13/2022 4:29:29 AM
Comment	
VTC Host Name	BBOX2019-3
Creation Time	1/13/2022 3:26:16 AM
Last Load for Output	1/13/2022 3:29:21 AM
	Process: \ETINIUM.1.166 started at 1/13/2022 3:29:20 AM
Last NonStop Operation	Process: \ETINIUM.1.166 started at 1/13/2022 3:29:20 AM
	Preload: False
	Last Loaded Device: \ETINIUM.$BBOX302
	Effective Load Time: 1/13/2022 3:29:21 AM
	Sequence Number: 1

Name of the Original Backed-Up Files

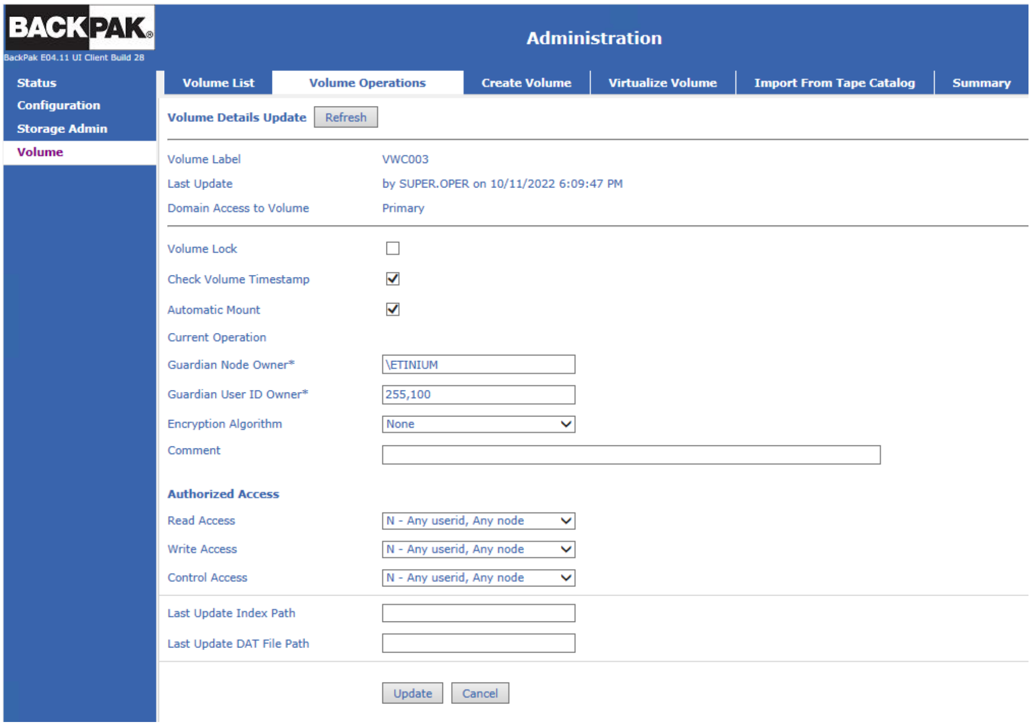
When a restore command is sent to the Enterprise Backup software, two files locations are specified:

- The original fully qualified filename that was backed-up.
  This name is recorded in the BackPak VOLUME file on the NonStop. BackPak assumes the file is not moved before being backed-up.
- The disk location where the file must be restored.
  This new location can be different because Data Store was configured in different file servers over time, or because of the load balancing of the VTC, when there is a choice of several paths.

In certain circumstances, for example, such as if the BackPak VOLUME file has been lost and there is no backup, the original file names will be lost.

If restoring from the Enterprise Backup is still to be executed by the script for a very small number of volumes, it is possible to update the original file name on the Volume Detail page, using the **Edit** button.

In the screenshot below, the fields **Last Update Index Path** and **Last Update DAT File Path** are only used to specify the original file names in the restore script. If necessary, the fields can be updated.



Volume Details Update

Volume Label	VWC003
Last Update	by SUPER.OPER on 10/11/2022 6:09:47 PM
Domain Access to Volume	Primary
Volume Lock	□
Check Volume Timestamp	☑
Automatic Mount	☑
Current Operation	
Guardian Node Owner*	\ETINIUM
Guardian User ID Owner*	255,100
Encryption Algorithm	None
Comment	

Authorized Access

Read Access	N - Any userid, Any node
Write Access	N - Any userid, Any node
Control Access	N - Any userid, Any node
Last Update Index Path	
Last Update DAT File Path	

Detailed Description

Backup Script

After a virtual volume mounted for output is unloaded, the backup script is executed. This script typically archives the two disk files representing a virtual volume.

Preliminary Cleanup

Before archiving a new virtual volume, the script must first delete previous archives of the same volume, providing the enterprise backup software allows the deletion of archives at the file level. Multiple archives of the same volume consume storage, but depending on the backup software used, may also be the cause of various issues at restore time, which may include, for example:

Script interrupted for unexpected prompt to choose the archive versions.

Repeated restore of all available archives of the same volume image.

If no operational problem has occurred during the previous execution of a specific volume, there should be a single previous archive of the ".DAT" and ".IND". If the enterprise backup software does not automatically overwrite an archive with a newer version, then it should be deleted using the environment variables %BBOX_PREV_PATH%%BBOX_VOLUME%.*.

In the very rare cases where the files ".DAT" and ".IND" were not written in the same path, an additional cleanup should be done for %BBOX_PREV_DATA_PATH%%BBOX_VOLUME%.* archives. This additional cleanup is useful if the Volume Group is configured for Auto-Scratch, and when cleaning up all files, even if there was a severe operational problem during the previous backup of the volume.

It is recommended to also delete existing archives from the same path as the new volume %1 and %2 positional parameters.

Positional Parameters

The Backup script receives two positional parameters with the name of the disk files to backup or archive:

- %1 contains the fully qualified file name of the index (file type .IND). %BBOX_FILE_IND%
- %2 contains the fully qualified file name of the data (file type .DAT). %BBOX_FILE_DAT%

Restore Script

When a virtual volume is loaded and either one or both of the two disk files representing the volume are missing, the restore script is executed. When the two files are missing, a single script execution can restore both files. The emulator waits for the script completion to complete the volume load.

Positional Parameters

In addition to the named parameters set in the Windows process context the Restore script receives either two or five positional parameters to pass on the original file name(s) and the new name(s) to the restored volumes.

If a single file – either the index file or the data file – must be restored, the script receives two parameters:

- %1 contains the fully qualified original file name that is missing.
- %2 contains the fully qualified target file name (might be equal to %1).

If both index file (file type .IND) and data file (file type .DAT) are to be restored, the script receives the 5 following parameters:

- %1 contains the fully qualified original index file name (type .IND).
- %2 contains the fully qualified target index file name (type .IND).
- %3 contains the fully qualified original data file name (type .DAT).
- %4 contains the fully qualified target data file name (type .DAT).
- %5 contains a fully qualified file name pattern for both files.

If the script receives 5 parameters but processes only the parameters %1 and %2, the script will be retrieved with 2 parameters to restore the 2nd file.

The content of the positional parameters is also available in the following named parameters:

%1 value is in	%BBOX_ORIG_FILE_IND%
%2 value is in	%BBOX_DEST_FILE_IND%
%3 value is in	%BBOX_ORIG_FILE_DAT%
%4 value is in	%BBOX_DEST_FILE_DAT%
%5 value is in	%BBOX_ORIG_FILE_PATTERN%

Note: The Archive Bit of files restored by the restore script for a NonStop restore operation, is reset by the VTC emulator.

Execution Control

The emulator uses the restored files only if the return code of the restore script is 0.

Post-Restore Script

The main purpose of this script, deleting backed-up files, is obsolete. This functionality is better handled by the macro BB023_DEL_BACKEDUP (see OBB017 OBEY file), controlled by the "Delete backed-up files" parameters in the Volume groups.

This script is still kept for compatibility purposes.

This script is called up at unload time, only when the Restore script has been executed to satisfy the load request for a NonStop application requesting a tape volume for input.

The user might choose to enable this script to systematically delete restored files at unload time.

In addition to the named parameters set in the Windows process context, the Restore script receives these two named parameters, which can contain the restored Windows disk files:

%BBOX_RESTORED_IND%
%BBOX_RESTORED_DAT%

If the variable is not null, the file named in the variable is restored at load time, is not modified, and can be deleted.

Delete Script

The delete script is executed when a virtual volume is deleted using the BackBox User Interface.

The two Windows disk files, if they exist, are deleted by the VTC and the script should be written to free up resources in the Enterprise backup software used to archive the Windows files.

Positional Parameters

In addition to the named parameters set in the Windows process context, the Delete script receives two positional parameters set with the name of the disk files of the virtual volume to be deleted.

- %1 contains the fully qualified file name of the index (file type .IND).
- %2 contains the fully qualified file name of the data (file type .DAT).

The content of the positional parameters is also available in the parameters named:

%BBOX_FILE_IND%
%BBOX_FILE_DAT%

The recommended cleanup of the Data Store configuration is achieved by deleting all of the potential archives saved from any path.

For this purpose, the name of all paths configured in the Data Store is passed in two Windows variables: %BBOX_CONF_PATH_NUMBER% and %BBOX_CONF_PATH<n>%. This maximum cleanup might consume several minutes depending on the startup time of the backup software and the number of paths to clean.

Script Variables and Controls

The BackBox software does not monitor the outcome of the script execution, except in reporting the return code of each script execution to the Guardian EMS sub-system.

However, when running the restore script, the restored files are used only if the script completes with a zero return-code.

Note that some enterprise backup software, including the TSM, returns a non-zero completion code even when the backup or restore completed successfully. In these cases, the script might end by SET ERRORLEVEL=0 but the user should set ways to ensure the proper backup execution.

The Guardian tape application will consider the execution successful if the virtual volume was written to the Data Store. If a backup script fails to archive a virtual volume it is critical that the script reports the error. The EMS message #3171 is issued in addition to other messages reporting an error in a script execution.

The output of the script execution is located in the Windows ProgramData directory, in a distinct sub-directory per Data Store. The name of the output file is built with:

- The name of the initiator script (Windows service):

  VTC – Emulator service
  ADMIN – Administrative service
  SCRIPTCTLR – Script controller service

- The file name of the script.
- A sequence number assigned up to 1000 in a round-robin fashion.
- The **.log** suffix.

The round robin assignment of the sequence number provides an automatic purge in each script Log directory.

File Name Syntax in Script Parameters

The fully qualified names of files to process are passed to the scripts.

In positional parameters (%1, %2 etc..), the file name is enclosed by double-quotes when it contains a space; no double-quotes when no space.

In named parameters (%BBOX_DEST_FILE_DAT%...), the file name is never enclosed by double-quotes.

Pre-defined Named Parameters

In addition to the positional parameters, the following variables are passed to the executing scripts:

Script Named Parameters

Parameter Name	Content
%BBOX_BACKUP_HOST%	Host name of the VTC that executed the last volume write, or the last backup script. For volumes written or backed up previously, a default value is extracted from %BBOX_FILE_IND% Available to : All scripts.
%BBOX_CONF_PATH_NUMBER%	Number of configured paths in the Data Store. Available to : All scripts.
%BBOX_CONF_PATH<n>%	Configured paths, <n> varying from 1 to %BBOX_CONF_PATH_NUMBER% Available to : All scripts.

%BBOX_COMPRESSION%	Compression algorithm used Possible values: NONE ZLIB MINILZO
%BBOX_DATA_SIZE%	Number of bytes received from the NSK (uncompressed). Currently displayed in the BackBox UI as "Size", "Write byte count", or "User Data Size". The size includes the tape headers and trailers (less than 1 K). Variable is always set with zero value. When the original value is not available (in a restore from a RESTRICTED Data Store), the value used is the maximum volume size configured in the Volume Group converted to bytes.
%BBOX_DEST_FILE_DAT%	Fully qualified target data file name (type .DAT). Restore script.
%BBOX_DEST_FILE_IND%	Fully qualified target index file name (type .IND). Restore script.
%BBOX_DOMAIN%	Domain name. Available to : All scripts.
%BBOX_FILE_DAT%	Fully qualified file name of the data (file type .DAT). Backup and Delete scripts.
%BBOX_FILE_IND%	Fully qualified file name of the index (file type .IND). Backup and Delete scripts.
%BBOX_LABEL_TYPE%	Label type. ANSI, BACKUP, TMF, or NL Available to : All scripts.

%BBOX_NEW_DIR%	Contains the fully qualified directory name of the file to restore. Same value as at the beginning of %2 parameter of the restore script. Restore script.
%BBOX_NSK_NODE%	Contains the name of the NonStop node where the current tape device is attached. Backup, Restore and Post-restore scripts only.
%BBOX_ORIG_FILE_DAT%	Contains the fully qualified data file name to restore, used when it was backed up. Same value as the %2 parameter of the restore script. Restore script.
%BBOX_ORIG_FILE_IND%	Contains the fully qualified index file name to restore, used when it was backed up. Redundant with the %3 parameter of the restore script. Restore script.
%BBOX_ORIG_FILE_SVR<n>%	Name of the server in the path of the file named in the <n> positional parameter. If the file name of the 1st positional parameter is \\BBOX2\SHARE1\LB123456.IND, the %BBOX_ORIG_FILE_SRV1% parameter will contain BBOX2. If the file name of the 3rd positional parameter is C:\DATASTORE1\LB123456.DAT, the %BBOX_ORIG_FILE_SRV3% parameter will contain the name of the local system. Restore script.
%BBOX_PREV_PATH%	Path of the virtual volume files before the current operation for IND and DAT files, or only for the IND file. Backup script.
%BBOX_PREV_DATA_PATH%	Path of the virtual volume files before the current operation for the DAT file. Available if the volume was written by BackBox V3.10 and above. Backup script.

%BBOX_PREV_UNLOAD%	Unload time of last time the volume was written; format: yyy-mm-ddThh:mn:ss.0000000Shh:mn . GMT time up to S position T is always the letter 'T' sub-second value is always '0000000' 'S:hh:mn' gives the signed difference with GMT, ex: US Eastern time will have '-05:00'. Example: 2022-10-12T14:31:35.0000000-05:00 . Available if the volume was written by BackBox V2.03 and above. Used by Script controller to sort restore script requests by backup time.
%BBOX_STORAGE_SIZE%	Number of bytes written to the storage (possibly compressed). Currently displayed in the Web UI as "Storage Size". The size includes the BackBox packaging (block headers etc…) with the data possibly compressed. Variable is always set with a zero value. When the original value is not available, the value used is equal to BBOX_DATA_SIZE.
%BBOX_TMF_TYPE%	ONLINE DUMP or AUDIT DUMP. Available to : All scripts.
%BBOX_VOLUME%	Label prefix and volume label. Label prefix is LB for labeled volumes, NL for unlabeled volumes. Example: A backup volume 123456 is labeled LB123456. Available to : All scripts.
%BBOX_VOLUME_CLASS%	Current volume class for the volume. Available to : All scripts.
%BBOX_VOLGROUP%	Name of the current VTC Volume Group. Available to : All scripts.

In addition, the Data Store configuration allows the specification of up to 10 user-defined parameters. The name and value are entered for each parameter. For a user-defined parameter SERVER with value SRV1, the keyword %SERVER% will contain SRV1 at the script execution time.

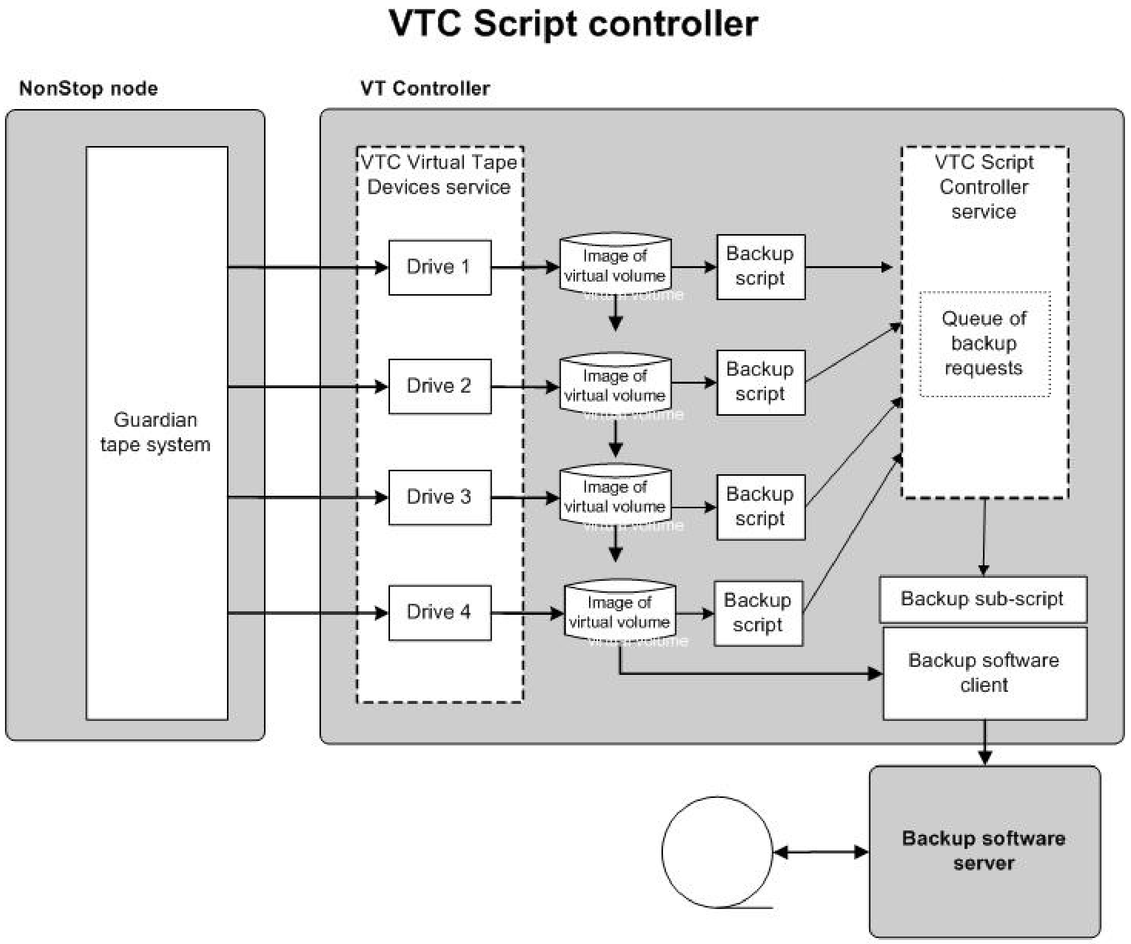
Script Controller

The Script Controller is an optional tool used to manage Windows backup and restore scripts initiated by the VTC.

The Script Controller is a mini batch subsystem that manages a queue of script requests inside a VTC, to:

- Group the backup or restore of several files in the same script execution.
- Control the maximum number of scripts running concurrently.
- Provide retries at the file level when a script is not successful.
- Alter the sequence of execution of restore scripts. They were originally backed-up, in order to be able to retrieve files in the same sequence.

The goal is to minimize the tape repositioning when backed-up files are stored on sequential physical media.



Target environments where numerous scripts are submitted, and where the back-end Enterprise Backup server saves BackBox Windows files on physical sequential media.

The retry mechanism does not rely on return codes to detect errors, but checks the actual result of a restore or backup by accessing the Windows file after the script execution:

A file was successfully restored if the file is available.

A file was successfully saved if the file's Archive Bit (the Windows file system attribute) was reset, or if the file is no longer present. The file is assumed to have been archived in the latter case.

The VTC emulator is not aware of the usage of the script controller, but does communicate requests to the usual script using Windows parameters.

To enable the script controller, the user must either update the regular scripts or create a backup and restore script:

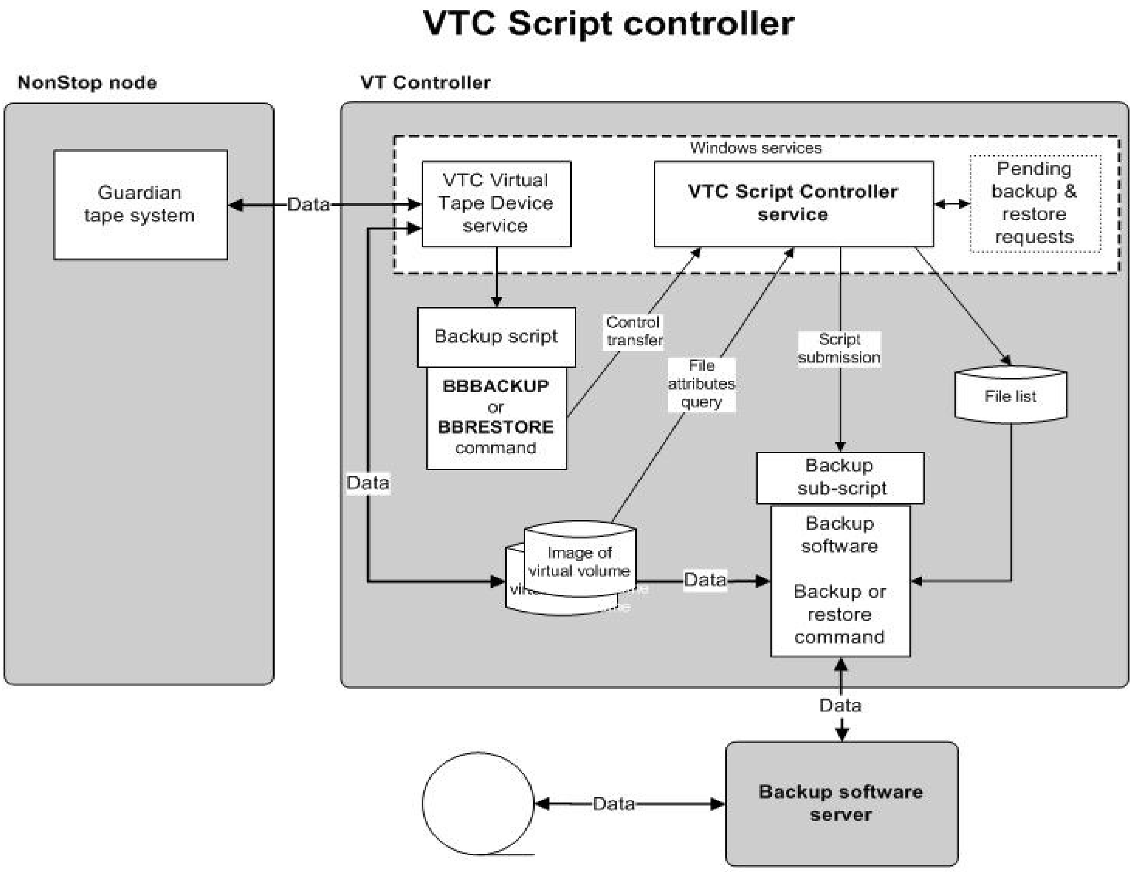
Update the regular scripts:

- Update the backup script, replacing the Enterprise Backup client command by a BBBACKUP command.
- Update the restore script, replacing the Enterprise Backup client command by a BBRESTORE command.

Create a backup and a restore sub-script:

- The subscript will be started by the script manager.
- The subscript runs the Enterprise Backup client; it uses a temporary file (%BBOX_FILELIST%) that contains the name of files to be processed.
- ***Requirement:*** The execution of backup sub-script must either delete the archived file, or reset the Archive Bit of the file in the Windows file-system.
  Most Enterprise Backup software is able to do this, but does sometimes requires a configuration to reset the Archive Bit in the files to achieve a successful back-up.

Processing Summary



BBBACKUP/BBRESTORE forwards the backup/restore request, one request per file, and usually two requests per virtual volume: one for the *.DAT file, another for the *.IND file.

The script controller queues the list of backup/restore requests in memory, and processes them according to the parameters passed along by the commands BBBACKUP or BBRESTORE.

Requests made in different queue names are processed concurrently. Several concurrent threads can be processed in the same queue name by setting the parameter BBOX_SCRIPT_MAX_THREADS.

When the script controller initiates a specific job and submits a subscript, it gathers requests for files with the same script context.

It builds a temporary file that contains a line per file to process. The name of this temporary file is given to the subscript by the variable %BBOX_FILELIST%.

The temporary file can be used as “file list” and referred to by an Enterprise Backup command in the subscript.

When the parameter BBOX_GENERATED_LINE is present, the temporary file contains an Enterprise Backup command per file to process. This file is to be used as the standard input of the Enterprise Backup client in the subscript.

When the subscript ends, the script manager accesses all the files processed in the subscript. The file existence and Archive Bit setting indicate whether or not the file was processed correctly. Files not processed correctly are kept in queue on a file-per-file basis for subsequent retry.

The script controller sends messages to the NonStop EMS to report execution of subscripts, statistics, and retry status.

The script controller runs automatically as a Windows service that is started by either the BBBACKUP or BBRESTORE programs, unless the service is disabled in the Windows Services.

All parameters specific to the Script Controller are provided as parameters of the BBBACKUP or BBRESTORE command. The value of global parameters is set by the last startup of BBBACKUP/BBESTORE.

Sample of Backup script (File-list version):

```
SET BBOX_SCRIPT_MAX_RETRY=6

SET BBOX_SCRIPT_RETRY_DELAY=5

SET BBOX_SCRIPT_TEMP_DIR= C:\Bbox\script\temp

BBBACKUP  QUEUE_1  C:\Bbox\script\tsm_archive.cmd
```

Corresponding subscript C:\Bbox\script\tsm_archive.cmd:

```
DSMC ARCHIVE –DELETEFILES  -FILELIST=%BBOX_FILELIST%
```

Sample of Backup script (standard-input-file version):

```
SET BBOX_SCRIPT_MAX_RETRY=6

SET BBOX_SCRIPT_RETRY_DELAY=5

SET BBOX_SCRIPT_TEMP_DIR= C:\Bbox\script\temp

SET BBOX_GENERATED_LINE=retrieve -replace=all #file# %BBOX_NEW_DIR%


BBRESTORE  QUEUE_2  C:\Bbox\script\tsm_restore.cmd
```

Corresponding subscript "C:\Bbox\script\tsm_restore.cmd":

```
DSMC MACRO %BBOX_FILELIST% <%BBOX_SCRIPT_DIR%\abort_reply.txt
```

BBBACKUP

BBBACKUP sends the backup request to the controller and waits for the BBOX_SCRIPT_TIMEOUT parameter, for completion of the backup subscript.

When the timeout is reached, BBBACKUP issues an EMS message, even though the backup request is still being processed by the Script Controller.

The Script Controller will process the backup requests on a FIFO basis for each queue.

Syntax:

```
SET BBOX_SCRIPT_TIMEOUT=<number-of-seconds>
SET BBOX_SUBSCRIPT_TIMEOUT=<number-of-seconds>
SET BBOX_SCRIPT_MAX_RETRY=<number-of-retries>
SET BBOX_SCRIPT_RETRY_DELAY=<number-of-minutes>
SET BBOX_SCRIPT_TEMP_DIR=<directory-for-temporary-files>
SET BBOX_SCRIPT_MAX_THREADS=<number-of-concurrent-executors>
SET BBOX_BACKUP_SIZE=<number-of-MB>
SET BBOX_GENERATED_LINE=<Enterprise Backup command>
BBBACKUP <queue-name> <sub-script-file-name>
```

Example:

```
SET BBOX_SCRIPT_MAX_RETRY=6
SET BBOX_SCRIPT_RETRY_DELAY=5
SET BBOX_SCRIPT_TEMP_DIR=C:\BBOX_B2PHASE2\script\temp
SET BBOX_SCRIPT_MAX_THREADS=1
BBBACKUP.exe MyQueue C:\BBOX\script\sub_backup.cmd
```

Parameters:

BBOX_SCRIPT_TIMEOUT

Number of seconds.

After this interval, BBBACKUP stops waiting for the completion of the backup and returns the control to the VTC Emulator. All values here are express in seconds.

Default value is 86400 (24 hours)

BBOX_SUBSCRIPT_TIMEOUT

Number of seconds.

The Script Controller will cancel a sub-script that lasts more than this time.

Default value is 86400 (24 hours).

BBOX_SCRIPT_MAX_RETRY

Maximum number of times the Script Controller retries the backup of each file.

Default value is 0.

BBOX_SCRIPT_RETRY_DELAY

Number of minutes.

Artificial time delay between a failure and a retry.

Default value is 10.

BBOX_SCRIPT_TEMP_DIR

Windows directory used to create temporary files.

Default value is current directory.

BBOX_SCRIPT_MAX_THREADS

Number of concurrent threads per queue.

Default value is 1.

BBOX_BACKUP_SIZE

Number of MBs.

Maximum total size of Windows files to process in a single subscript execution. The goal is only to avoid extraordinarily long script executions.

Default value is 102400 (28 hours).

BBOX_GENERATED_LINE

Pattern for the Enterprise Backup command line to back up a file.

Use #file# as a placeholder in the command pattern for the name of the file to backup.

Windows variables set by the VTC for the regular backup script are available, e.g. %BBOX_DOMAIN%.

Windows parameters that vary for each virtual volume must be not used, e.g. %BBOX_VOLUME%.

Default value is #file#, to produces a file-list.

<queue-name>

User defined queue name.

No default value.

<sub-script-file-name>

subscript name to be started by the Script Controller.

No default value.

BBRESTORE

BBRESTORE sends the restore request to the controller and waits for to the timeout. The restore sub-script completes after the timeout is over.

In a given queue, the Script Controller will process the requests in FIFO sequence, until the parameter BBOX_SCRIPT_SORT_MAX_DELAY number-of-minutes are specified. This parameter ensures that the files are restored in the same sequence that they were backed up in, in order to minimize repositioning on the physical media.

Restoring the files in the sequence they were backed-up in can be very inefficient for unrelated and concurrent restore requests. For this reason, the request sort order is limited by the “BBOX_SCRIPT_SORT_MAX_DELAY number-of-minutes”. Only recent requests initiated during the specified value of this parameter, will be sorted by backup time.

If the variables % BBOX_SCRIPT_BK_SOFTWARE% are set, the controller will query the Enterprise Backup server to know the label of the physical media containing the backup of files.

The controller will then adjust the sequence of restores to minimize the media unload/reloads. If several threads are configured, each thread will be specially configured so that it is possible to achieve restore from a specific media label.

To check the success of a restore, the Script Controller does not test the return code of the sub-script; it rather checks that the Windows files have been created.

Syntax:

```
SET BBOX_SCRIPT_TIMEOUT=<number-of-seconds>
SET BBOX_SUBSCRIPT_TIMEOUT=<number-of-seconds>
SET BBOX_SCRIPT_BK_SOFTWARE=TSM
SET BBOX_SCRIPT_BK_SOFTWARE_USER=<user-id>
SET BBOX_SCRIPT_BK_SOFTWARE_PSWD=<password>
SET BBOX_SCRIPT_MAX_RETRY=<number-of-retries>
SET BBOX_SCRIPT_RETRY_DELAY=<number-of-minutes>
SET BBOX_SCRIPT_TEMP_DIR=<directory-for-temporary-files>
SET BBOX_TSM_CURLY_BRACKETS  {ON|OFF}
SET BBOX_SCRIPT_MAX_THREADS=<number-of-concurrent-executors>
SET BBOX_SCRIPT_SORT_MAX_DELAY number-of-minutes
SET BBOX_GENERATED_LINE=<Enterprise Backup command>
BBRESTORE <queue-name>  <sub-script-file-name>
```

Example:

```
SET BBOX_SCRIPT_TIMEOUT=36000
SET BBOX_SCRIPT_MAX_RETRY=6
SET BBOX_SCRIPT_RETRY_DELAY=5
SET BBOX_SCRIPT_TEMP_DIR=C:\BBOX\script\temp
SET BBOX_SCRIPT_MAX_THREADS=1
BBRESTORE MyQueue C:\BBOX\script\sub_restore.cmd
```

Parameters:

BBOX_SCRIPT_BK_SOFTWARE

Software identifier.

Type of Enterprise backup software run by the sub-script. Used for querying the backup server and optimizing the restore.

No default value. Should be set to TSM or omitted.

BBOX_SCRIPT_BK_SOFTWARE_USER

Client user-id used to login to the Enterprise Backup server.

No default value.

BBOX_SCRIPT_BK_SOFTWARE_ PSWD

Password used to login to the Enterprise Backup server.

No default value.

BBOX_SCRIPT_TIMEOUT

Number of seconds.

After this time interval, BBBACKUP stops waiting for the completion of the backup and returns the control to the VTC Emulator.

Default value is 86400 (=24 hours).

BBOX_SUBSCRIPT_TIMEOUT

Number of seconds.

The Script Controller will cancel a sub-script that lasts more than this amount time.

Default value is 86400 seconds (= 24 hours)

BBOX_SCRIPT_MAX_RETRY

Maximum number of times the script controller retries the backup of each file.

Default value is 0.

BBOX_SCRIPT_RETRY_DELAY

Number of minutes

Artificial delay waited between a failure and a retry.

Default value is 10 seconds.

BBOX_SCRIPT_TEMP_DIR

Windows directory used to create temporary files.

Default value is current directory.

BBOX_SCRIPT_MAX_THREADS

Number of concurrent threads per queue

Default value is 1 second.

BBOX_BACKUP_SIZE

Number of MBs.

Maximum total size of Windows files to process in a single sub-script execution. The goal is only to avoid extraordinary long script executions.

Default value is 102400 seconds.

BBOX_SCRIPT_SORT_MAX_DELAY

Number of minutes.

The controller will alter the execution sequence of requests still waiting in queue and initiated recently, i.e. initiated in the last specified number of minutes.

Default value is 0 minutes.

BBOX_TSM_CURLY_BRACKETS ON | OFF

This is for special cases where the TSM needs clues to interpret the original backed up or archived file name, in order to identify the original node and file space. Without curly brackets, the TSM symptom is "archive / backup not found". The presence of curly brackets is not an inconvenience, even if they are not needed.

This parameter should be used as a second choice solution when several archives / backups are present in the TSM server, but not retrieved by the regular TSM dsmc command. Contacting IBM support is recommended, in order to avoid using this parameter as much as possible.

Sample TSM command without BBOX_TSM_CURLY_BRACKETS:

```
retrieve -PRESERVEPATH=none -replace=all
   "\\192.168.15.85\SHARE1\WITH BLANK\LBVTW001.IND"
   "\\192.168.15.79\SHARE2\WITH BLANK\\"
```

TSM command modified by BBOX_TSM_CURLY_BRACKETS ON:

```
retrieve -PRESERVEPATH=none -replace=all
   "{\\192.168.15.85\SHARE1}\WITH BLANK\LBVTW001.IND"
   "\\192.168.15.79\SHARE2\WITH BLANK\\"
```

Default value is OFF.

BBOX_GENERATED_LINE

Command pattern for the Enterprise Backup command line client, to restore a file.

Use #file# as a placeholder in the command pattern, for the name of the file to restore.

Windows variables set by the VTC for the regular restore script are available (%BBOX_DOMAIN%, %BBOX_NEW_DIR%).

Windows parameters that vary for each virtual volume, must be not used (%BBOX_VOLUME%).

Default value is #file#, to produce a file-list.

<queue-name>

User defined queue name.

No default value.

<sub-script-file-name>

subscript name to be started by the Script Controller.

No default value.