StarWind iSCSI SAN Software: Implementation of Enhanced Data Protection Using StarWind Continuous Data Protection
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Guide

Introduction

StarWind enables you to create snapshots of the iSCSI volumes. Snapshot volumes are point-in-time copies of primary Snapshot and Continuous Data Protection (CDP) device storage volumes. When creating snapshot volumes, the primary volumes continue to be available for production operations, while the snapshot volumes are used for offline operations such as backup, reporting, testing, and more. This results in improved backup operations, data reporting, application testing and many other day-to-day operations.

A full backup of a large data set may take a long time to complete. On high-availability (HA) systems, there may be writes to that data while it is being backed up. This prevents the backup from being accurate and introduces a version skew that may result in data corruption. To avoid downtime, high-availability systems may instead perform the backup with a snapshot — a read-only copy of the data set frozen at a point in time — and allow applications to continue writing to their data.

Snapshots can also be used to create frequent and regular copies to protect against data loss caused by software errors, user errors and viruses. If one of these events occur, data recovery is accelerated though rapid restore from disk-based snapshots, avoiding the need for lengthy tape restore. Shortening the time between snapshots, volume creation helps reduce the recovery point objective, and also decreases the chance for data loss.
This document provides step-by-step instructions on how to enhance data protection using StarWind snapshots.

Figure 1. Snapshot enables on-disk backup for instant file recovery
Snapshot and CDP device overview

Snapshot and CDP device is the StarWind Software Inc. StarWind device type that enables you to create and manage iSCSI volumes with snapshot functionality. Snapshot and CDP support the following features:

- Continuous data protection (CDP);
- Optimal usage of disk space by allocating space only for data that has been changed;
- Snapshots support;
- Volume cloning and creating of child images.

Operation modes

The Snapshot and CDP plug-in can operate in one of the following modes:

- **Growing Image (Thin Provisioning)** creates a basic volume that allocates as much disk space that is required for storing data. The Growing Image volumes use a single journal for all sessions. This mode is suitable for creating large disks with efficient usage of physical disk space, but only supports manual snapshot creation.

- **Snapshot and CDP (Continuous Data Protection)** adds automatic backup to the basic functionality of Growing Image (Thin Provisioning). Snapshot and CDP uses a new journal for each session and creates a new snapshot according to the time period specified in the Period field. This mode works well for automating your snapshots and backups. Manual snapshots are also supported.

- **Auto-Restored Snapshot**. When this value is set as the Operation Mode, all changes written to the Snapshot and CDP device during an initiator session are discarded at the end of that session. As a result, when the next session is created, it accesses a “blank” Snapshot and CDP device.

- **Read-Only image**. In this mode Snapshot and CDP images cannot be modified thereby providing read-only access to all initiators.
Configuring StarWind

Launch the StarWind console selecting Start -> All Programs -> StarWind Software -> StarWind -> StarWind. After the console is launched its icon appears in the system tray. Double click the icon with the left mouse button or single click it with the right and select Start Management pop-up menu item. From the StarWind Servers tree please select the server you want to connect to. Press the right mouse button over the desired host and select the Connect popup menu item. You will be prompted to enter the login and password. Default ones are: root, starwind. You can always change them later. Press Add Target button to continue.

In the Wizard that appears, specify a target name. The name must be a unique name by which the device will be declared to the iSCSI initiators connecting to StarWind over an IP network.

Press the Next button to continue.
Select **Snapshot and CDP device**.

Press the **Next** button to continue.
Select **Create new virtual disk** to create a new virtual hard disk.

Press the **Next** button to continue.
If you have decided to create a new virtual disk, specify the location and the name of the virtual disk you wish to be created. Also you have to provide the virtual disk size in megabytes. Check any additional parameters of the virtual disk you wish to create. Please refer to the online help for details regarding those additional parameters.

Press the **Next** button to continue.
Snapshot and CDP device has some extra parameters. Please refer to the online help for details regarding those additional parameters (Operation mode, Allow multiple connections (clustering), and Asynchronous mode). Set Auto snapshot creation period and Number of stored snapshot values.

Press the Next button to continue.
Check the device parameters are correct. Press the Back button should any changes be required.

Press the Next button to continue.
A summary of the created device is displayed on the last wizard page (see image below).

Press the **Finish** button to close the wizard.
Configuring iSCSI client

Connecting the target

Launch the Microsoft iSCSI Software Initiator application Start->All Programs->Microsoft iSCSI Initiator-> Microsoft iSCSI Initiator. Switch to the Discovery tab.

Click **Add** in the Target Portals group.
In the **Add Target Portal** dialog, type the **IP address** of the computer with **StarWind** installed and the port number assigned to **StarWind** (default: 3260).

Press the **OK** button to continue.
Switch to the **Targets** tab. Select the target name from the list (if no targets are listed, press the **Refresh** button).

Press the **Log On...** button.
In the **Log On to Target** dialog, you can optionally enable the **Automatically restore this connection when the system boots** checkbox.

Press the **OK** button.
If the logon is successful, the iSCSI device will show a status of **Connected**. It may take a few seconds for the device to appear in Windows.
Preparing connected device

When a StarWind disk is ready, it appears as a new disk device on the initiator host. Before a new disk can be used, you have to initialize and format it. Launch the **Computer Management** console.

Select **Disk Management**.
If the new iSCSI disk is not initialized yet, the **Initialize and Convert Disk Wizard** will appear (on Windows 2000 systems the Write Disk Signature Wizard will appear). If the disk has already been initialized, the Wizard does not appear. Follow the instructions on the wizard to initialize the disk.

Press the **Next** button and follow the wizard instructions to initialize the disk.
The initialization is completed.

Press the Finish button to close the wizard.
After the initialization is completed, click at unallocated space with the right mouse button and select **New Partition**. Follow the instructions of the wizard to create an **NTFS** partition. Use the default Windows settings.
Creating Snapshots

Click the **Snapshot and CDP** device with the right mouse button.

Select **Create Snapshot** popup menu item.
**Instant file recovery**

Recovering files from on-disk backup is quick and easy. There are a few ways in which a user can **restore files on a StarWind Disk**. The first option is to restore individual files selectively. Another option is to **revert the whole StarWind Disk** to a previous snapshot. Restoring a file from a previous snapshot is used in cases when the number of files to be restored is small. The other, a more drastic, approach is suitable for cases when a large number of files or the whole volume needs to be restored.
Restoring individual files

Select the Add Target menu item to continue.
In the Wizard that appears, specify a target name. The name must be a unique name by which the device will be declared to the iSCSI initiators connecting to StarWind over an IP network.

Press the Next button to continue.
Select **Snapshot and CDP device**.

Press the **Next** button to continue.
Select **Mount existing virtual disk** option.

Press the **Next** button to continue.
The **Snapshot and CDP device parameters** dialog appears. Specify the snapshot, which you have created before. Specify device parameters.

Press the **Next** button to continue.
Check the device parameters are correct. Press the Back button should any changes be required.

Press the Next button to continue.
A summary of the created device is displayed on the last wizard page (see image below).

Press the **Finish** button to close the wizard.
Connecting the device

Launch the Microsoft iSCSI Software Initiator application Start->All Programs->Microsoft iSCSI Initiator-> Microsoft iSCSI Initiator.
Switch to the Targets tab. Select the target name from the list (if no targets are listed, press the Refresh button).

Press the Log On... button.
The **Log On to Target** dialog appears.

![Log On to Target dialog](image)

Press the **OK** button to continue.
If the logon is successful, the iSCSI device will show a status of **Connected**. It may take a few seconds for the device to appear in Windows.
At this point, the snapshot appears on the initiator machine as another local disk device. If the new disk device doesn’t have the volumes mounted with a drive letter, use **Disk Management** to assign it a drive letter.

The new drive should now appear in **Windows Explorer**. From here, copy the necessary files from the snapshot drive and paste them into the original drive. The files are now restored to the condition before the snapshot.

For cleaning up disconnect the target from the initiator, then return to the **StarWind** machine and remove the appropriate target.
Restoring StarWind disk

In such cases as a virus attack that cause data corruption on the StarWind Disk, reverting the whole StarWind Disk is the best option. This section describes how to roll back a StarWind Disk to a previous snapshot. Snapshot can be used to create a new Snapshot and CDP image. In this case all data stored in the snapshot will be shared with the new Snapshot and CDP image, but any changes of the new volume will be stored separately.
Restoring StarWind disk by Creating linked clone

Select the **Add Target** menu item to continue.

In the Wizard that appears, specify a target name. The name must be a unique name by which the device will be declared to the iSCSI initiators connecting to StarWind over an IP network.

![Add Target Wizard](image)

Press the **Next** button to continue.
Select **Snapshot and CDP device**

Press the **Next** button to continue.
If **Create linked clone** option is selected, a snapshot can be used to create a new **Snapshot and CDP** virtual disk. In this case all data stored in the snapshot will be shared with the new **Snapshot and CDP** virtual disk, but any changes of the new volume will be stored separately.

Press the **Next** button to continue.
Specify all of the necessary parameters: existing snapshot name, new virtual disk name and directory where journals are created.

Press the **Next** button to continue.
Select the device operation mode and any other relevant options. Refer to the online help for details regarding additional parameters.

Press the **Next** button to continue.
Check the device parameters are correct. Press the **Back** button should any changes be required.

Press the **Next** button to continue.
A summary of the created device is displayed on the last wizard page (see image below).

Press the **Finish** button to close the wizard.
Disconnect

Launch the **Microsoft iSCSI Software Initiator** application. Switch to the **Targets** tab. Select a target you would like to disconnect.

Press the **Details** button.
In the dialog that appears click the Log Off button.

Press the OK button to continue.

The status of the target becomes inactive (disconnected). Optionally you can remove disk target. To do that launch the StarWind Console. Press the right mouse button over it and select the Remove Target item from the popup menu.
Connect

Launch the Microsoft iSCSI Software Initiator application. Switch to the Targets tab. Select the target name from the list (if no targets are listed, press the Refresh button).

Press the Log On... button.
In the **Log On to Target** dialog, you can optionally enable the **Automatically restore this connection when the system boots** checkbox.

Press the **OK** button.
If the logon is successful, the iSCSI device will show a status of **Connected**. It may take a few seconds for the device to appear in Windows.
Launch the **Computer Management** console.
Restoring StarWind disk by Creating full clone

If it is necessary to create a new or copy an existing device in order to get a fast compressed image. Then changes to data from all journals will be copied into a new volume and the old one may be completely deleted. Launch the StarWind Console. Select Add Target menu item to continue. Select the Add Target menu item to continue. In the Wizard that appears, specify a target name. The name must be a unique name by which the device will be declared to the iSCSI initiators connecting to StarWind over an IP network.

Press the Next button to continue.
Select **Snapshot and CDP device**

Press the **Next** button to continue.
Select **Create full clone** option.

Press the **Next** button to continue.
Specify the existing snapshot name and the new virtual disk name.

Press the **Next** button to continue.
Specify the **Snapshot and CDP** device operation mode and any optional device parameters.

Press the **Next** button to continue.
Check the device parameters are correct. Press the Back button should any changes be required.

Press the Next button to continue.
A summary of the created device is displayed on the last wizard page (see image below).

![Add Target Wizard](image)

Press the **Finish** button to close the wizard.
Disconnect

Launch the **Microsoft iSCSI Software Initiator** application. Switch to the **Targets** tab. Select a target you would like to disconnect.

Press the **Details** button.
In the dialog that appears click the **Log Off** button.

Press the **OK** button to continue.

The status of the target becomes inactive (disconnected).
Optionally you can remove disk target. To do that launch the **StarWind Console**. Press the right mouse button over it and select the **Remove Target** item from the popup menu.
Connect

Launch the **Microsoft iSCSI Software Initiator** application **Start->All Programs->Microsoft iSCSI Initiator-> Microsoft iSCSI Initiator**.

Switch to the **Targets** tab. Select the target name from the list (if no targets are listed, press the **Refresh** button).

![iSCSI Initiator Properties](image)

Press the **Log On...** button.
In the **Log On to Target** dialog, you can optionally enable the **Automatically restore this connection when the system boots** checkbox.

Press the **OK** button.
If the logon is successful, the iSCSI device will show a status of **Connected**. It may take a few seconds for the device to appear in Windows.
Launch the **Computer Management** console.
Now all the files for the previous volume may be deleted.

**Warning:** a user should realize the risk of accidental removal of the necessary files in this version and should create a backup before emptying.

A reminder of file types and their definitions:

*.ibv – the volume header;
*.ibvm – the sectors map of the volumes (session)
*.ibvd – the file that contains the changes list;
*.ibvss – the snapshot header. A snapshot uses a single sectors map and several journals
VSS module

Microsoft Volume Shadow Copy Service (VSS) provides the backup infrastructure for the Windows operating systems, as well as a mechanism for creating consistent point-in-time (PIT) copies of volumes known as shadow copies or snapshots.

These snapshots are images of the data as it looks at a particular instance in time. By maintaining these timely images of data, users and administrators can quickly recover individual files or whole volumes directly from disk as they appeared at the time the snapshot was taken; similar to restore from tape but much faster. VSS operates at the block level of the file system.

Snapshots have two primary purposes: they allow the creation of consistent backups of a volume while, ensuring that the contents cannot change while the backup is being made, and they avoid problems with file locking. By creating a read-only copy of the volume, backup programs are able to access every file without interfering with other programs writing to those same files.

The VSS provider is one of the parts of a Microsoft VSS solution. It is a component that creates and maintains the shadow copies. StarWind Software VSS Support module consists of two parts: StarWindVSSService and VSS StarWind SW Provider. In order to create consistent snapshots the VSS Support module should be installed on the initiator-side computer.
Install **VSS Support module** on the client-side computer. Choose the right installation binary depending on your OS type `StarWindVSS.exe` or `StarWindVSS.x64.exe`.

Press the **Next** button to continue.
Read and accept the agreement.

Press the **Next** button to start the installation.

After the installation has been completed and the **Snapshot and CDP** target has been connected, you gain the ability to create consistent snapshots.
Please follow the instructions below to create a snapshot.
In the StarWind Console press the right mouse button over the Snapshot and CDP device and select the Create Snapshot... item.

You can find more information about recovery in the Instant File Recovery section.
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