

FREQUENTLY ASKED QUESTIONS

FAQ PSM/SAK

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What is PSM?

Persistent Storage Manager (PSM) creates multiple point-in-time Persistent True Images (PTI) of any data volumes residing on the NAS. All Persistent True Images survive system power loss or a planned or unplanned re-boot. Each instance of PSM seamlessly handles 250 concurrent images of up to 255 independent volumes. Any image can be easily accessed the same as any other active volume. CDP's PSM supports multiple backups on-line for users to retrieve their own files or to reboot to a "pre-disaster" image. This eliminates cumbersome, time-consuming, and potentially unreliable hardware, while providing cost savings in hardware, software, and support manpower. Snapshots can be accessed via the volume's directory "volume:\snapshots\snapshots.x" Furthermore, by creating a network share to these individual snapshots, network users can access files and directory using standard O/S tools such as Windows Explorer.

What is a QFE?

QFE, Quick Fix Engineering, is intended to provide immediate fixes to our OEMs for issues requiring immediate attention. Since there are many different PSM versions in the fields, it is very important to apply the appropriate QFE. Failure to do this will result in version mismatch and lost data. The QFE fixes are eventually rolled into the next major PSM builds.

What is PSM's Service Pack?

Occasionally, CDP will release a Service Pack for PSM. It is provided to address many known issues as well as add other important functionalities. OEMs are encouraged to provide this update to their existing customers. Before requesting support, OEMs are first required to verify they have upgraded to the latest Service Pack.

How is a PSM customer incident reported?

CDP does not directly contact end-users. All customer incidents must be reported through the OEMs. When a problem is encountered, the OEM should duplicate the problem prior to calling CDP. The following is required for a support call:

- PSM Version and environment (OS version, SAK version, etc...)

- CPU Configuration (Processor, RAM, etc)

- Storage Configuration (Capacity, Raid (Hardware/Software 0, 1, 5), SCSI, Fiber Channel, IDE, etc)

- Any other driver level applications installed

- Problem description

- Steps to reproduce

- System Event Log

- If a BSOD issue, we will need a core dump

Calls can be reported to CDP via 800-613-6288 during business hours (8:00am – 6:00pm) or email support@cdp.com

Does PSM scale well with large Terabyte volumes?

PSM can accommodate very large volume size. PSM supports the PSM granule sizes of 64K, 128K and 256K with 64K as the default size. This will allow for the PSM cache file to be 1TB, 2TB, and 4TB respectively. The larger the cache file size, the larger the volume size can be supported. The script GRANSIZE.VBS, available in the directory "c:\winnt\system32\serverappliance", is provided to OEM for setup - By increasing the granule size, PSM can be better suited to support very large terabyte systems.

How much memory is required to run PSM?

The number of snapshots has no affect on PSM memory requirement. The number of volumes does.

Generally, using a 15% cache size, PSM will require 72Megabytes of memory per Terabyte of storage in addition to the normal system memory requirements.

For example:

- 50GB requires 3.6MB
- 100GB requires 7.2MB
- 500GB requires 36MB

In the cluster fail-over environment where new volumes dynamically come online, PSM will need to allocate more memory to handle these new volumes.

If for any reason PSM cannot allocate this memory during a volume mount, the volume will not be mounted and an error message “Out of memory” will be produced.

What is the maximum number of snapshots per volume?

Up to 250, configurable by the user. When the maximum number is reached and an additional snapshot creation is requested, PSM will delete the oldest and lowest priority snapshot to create room and allow the creation. However, when the max number is set to “1” and an additional snapshot creation is requested, PSM will refuse the request and returns with an error.

What is the maximum number of snapshots per machine?

Currently, 250 concurrent snapshots. For a cluster environment where a fail-to node can end up “owning” all the fail-from snapshots, this limitation is increased to 500.

What happens when the PSM cache file reaches its deletion threshold but is not yet full?

PSM will start deleting the oldest and lowest priority snapshots one at a time until the cache file falls below the threshold limit.

What happens when the PSM cache file is full?

When the PSM cache file is full, PSM can no longer protect its snapshots when write I/Os occur because there is no more room in the cache file to cache the disk data. PSM will allow the writes to go directly to disk. However, since snapshots are no longer protected, they are automatically deleted.

Appropriate event log messages will be seen. Also, a benign system event log error “a driver below this one has failed in some way”.

To prevent from reaching this stage, CDP recommends that the user select the appropriate cache file size depending on the number of snapshots and the data traffic of the system. Thresholds should also be set to alert the user well in advanced.

Changing the cache file size requires that snapshots on that volume must first be deleted.

A special case where snapshots that are marked “Always Keep”, they are protected even when the cache file fills up. All writes to the real volume are denied with a “disk full” message.

What is the deletion logic used in PSM?

At 90% cache full threshold, PSM will automatically delete the oldest and lowest priority snapshot. It will continue to do this until the cache full percentage falls below the 90% mark or when one snapshot remains.

Note that Always Keep snapshots are special case. They are not deleted in this logic.

When will a snapshot be deleted?

A snapshot is deleted only under these 3 scenarios:

1. The user manually asked PSM to delete a snapshot.
2. If a new snapshot request is initiated on a machine that reached the snapshot count limitation, the oldest snapshot will be deleted leaving room for the new snapshot.
3. If the cache file is full, all snapshots will be deleted. If there are Always Keep snapshots present, PSM will not delete them.

What is “Images to Save” (AKA “Num-To-Keep”)?

The creation of snapshots can be scheduled via a schedule task. When creating a PTI schedule, this field can be specified set to indicate the total number of snapshots to be retained by this specific schedule. For instance, if a schedule task is created to take a snapshot every day, over the period of a week, the system will have the total of seven snapshots created and retained by the schedule task. If the “Images to Save” is set at 1, then only one snapshot will be retained.

Does PSM support Dynamic NTFS volume?

Yes. If a re-extended volume containing old snapshots of the pre-extended volume and the snapshot is reverted to the previous point-in-time, the re-extended area of the disk will be unusable. To reclaim this space, run the included utility

"reextend.exe" after reverting from a True Image of the pre-extended volume. Use this utility by typing "reextend -?" This utility is available in the directory "c:\winnt\system32\serverappliance"

Should I increase the Cluster Pending Default Timeout value?

Yes. Cluster service's normal behavior for a volume that can no longer be accessible is to fail-over to another node. During an image revert operation PSM must disable the target volume. By disabling the volume, Cluster service assumes that the volume has failed and proceeds with a fail-over while PSM is reverting the image. Therefore, you may want to increase the Cluster's default Pending Timeout value to a number comfortable to your specific system. During a PSM revert operation under the Cluster environment, if the volume times out and is made unavailable, the revert operation could not finish and data on the original volume will be incomplete. In some cases, the volume could no longer boot. However, at this point, re-issuing the PSM revert operation and allow it to finish will get the volume back to its previous state. The following shows the possible eventlog messages that you may see relating to this issue:

"Persistent Storage Manager recovery encountered error 3221226026 inserting key (20A0C7:FB) into dictionary. "

"X:\snapshot\snapshot.0 is not accessible. The disk structure is corrupted and unreadable."

If this occurs, increase cluster timeout to twice the default.

During a RAID rebuild process, should I issue a PSM Revert operation?

When the RAID system is rebuilding the volume, and the user manually issues a PSM Revert operation, the RAID rebuild would severely slow down the Revert operation. It would then trigger the cluster to timeout, aborting the PSM Revert in the process prematurely. In this scenario, the original volume could:

No longer come back on-line OR

Come back on-line but receive a NTFS error of "The file system structure on the disk is corrupt and unusable. Please run the chkdsk utility on the volume xxxx" or an Application Popup error of "Corrupt File: The file or directory \snapshots\snapshot.xxx is corrupt and unreadable. Please run the chkdsk utility."

Prevent this by not starting a PSM Revert operation in the middle of a RAID array rebuild.

The default Cluster Timeout value can also be increased.

In the scenario where the volume would no longer come on-line, re-starting the PSM Revert operation of the volume will restore and allow the volume to come back on-line.

Can the page file size be dynamically changed?

If the page file resides on a PSM-able volume, its initial size must be set equal to the maximum size. This setting is located in the Virtual Memory settings under System Properties.

If the page file must be enlarged, delete all snapshots on this volume prior to changing the page file size.

Can I revert a snapshot to a system boot volume?

During a revert operation, PSM cannot control catastrophic failures such as power loss or hardware errors. In this scenario, the system drive will be in an incomplete state. If the system cannot boot, revert can cannot continue. For this reason, PSM revert is disabled for system volumes.

For data volumes, if revert was interrupted for any reason, it will continue automatically on the next reboot.

CDP provides, as an option, Disaster Recovery product component to specifically solve this issue. Please contact CDP for more information.

Why can't NFS or AppleTalk clients access the snapshots?

Microsoft confirmed that the Microsoft's NFS Services for UNIX does not support volume mount points. The NFS clients will not be able to access data on volumes mounted using a volume mount point. Since Persistent True Images for a volume are mounted as directory junctions (AKA mount points), and even though they are shared using NFS, the NFS clients will not be able to access the Persistent True Image data.

Please refer to Microsoft's Release Notes for Microsoft Server Appliance Kit dated June 2001.

Is PSM Compatible with Windows 2000 Defrag?

PSM is fully compatible with the Windows 2000 system file defrag utility. On drives upon which True Images are not installed or are not active, the defrag utility runs without interruption. If PTIs are active the drive is automatically marked as unavailable for defragmentation. In operation, the utility works as designed – providing defrag on volumes where it is allowed and omitting drives with active images. There is no user intervention required. This is consistent with the defragmentation handling of system and special files and is officially supported by the Microsoft defrag API.

Excessive fragmentation may prevent creating the first PTI or resizing the cache file.

In this rare situation, delete all snapshots, defrag the volume, and start taking snapshots again.

What is Microsoft's Terminal Service Issue with PSM?

Using Terminal Service to access the Cluster Node running PSM could result in an error of "490 – Element Not Found." When a cluster resource fails over to the fail-to Node, the Terminal Service session on the fail-to Node will not automatically refresh and display all the new resources. The user must restart the Terminal Service session to view the new resources. If Terminal Service session is not restarted and continued on with any PSM operation, the user may experience an error of "490 - Element Not Found."

Related Terminal Services issues along with the Terminal Services Application Compatibility Notes can be found at the following Microsoft web site: <http://www.microsoft.com/windows2000/techinfo/administration/terminal/tsapcompat.asp>
The workaround for now is to restart the Terminal Service session.

Why don't PSM Schedules fail-over with their volumes?

Schedules for snapshots do not fail over with volumes. Create duplicate schedules on all nodes.

How can I tell PSM to ignore a volume?

You can exclude a volume from PSM by modifying its Excluded List parameter. Currently this is done through the registry field "d_ExcludedDrives" located at:

```
"HKEY_LOCAL_MACHINE\SYSTEM\Service\Psmans5\persistent"
```

Append the list of excluded drives in the following format: "a:\,b:\," using comma "," as the delimiter.

Can I temporarily stop the PSM Service?

Do not stop the PSM Service. It is a user-mode PSM component that works in conjunction with the PSM kernel-mode driver. If this service stopped, memory leaks will occur within PSM.

There is no method to temporarily stop PSM. If PSM were stopped, PSM would no longer be able to protect it's snapshots when write I/Os occur and hence the snapshots would be corrupted.

If you must stop PSM from filtering I/Os, delete all the snapshots on all drives and all PSM scheduled tasks.

Can I upgrade PSM using MSI within the SAK?

If PSM was originally installed using MSI (within the SAK's Maintenance Update or within the command line), PSM cannot be updated using the same methods. The update process would not function correctly and no error messages are reported.

Updating PSM is possible via the following two methods:

1. Using the same PSM MSI installation from the command line

OR

2. Using the PSM via SAK with a "batch" CAB (not MSI CAB) file

If re-installing PSM is required, PSM must first be uninstalled before proceeding with the normal PSM installation via the SAK. By uninstalling, however, existing snapshots would be deleted.

How do I completely uninstall PSM?

Step 1: Log on to the PSM server as Administrator

1. Login to the Server Appliance Kit browser screen
2. Select Disk tab
3. Select Persistent Storage Manager tab
4. Select Schedules link
5. Delete all schedule tasks

Step 2: Remove all network shares associated with PSM images

1. Right click on My Computer
2. Select Manage
3. Open System Tools
4. Open Shared Folders
5. Open Shares
6. Remove all network shares associated with PSM Images

Step 3: Delete all PSM images by performing these steps

1. Login to the Server Appliance Kit browser screen
2. Select Disk tab
3. Select Persistent Storage Manager tab
4. Select Persistent Image link
5. Check and delete all images

Step 4: Uninstall PSM Application by performing these steps. If PSM was installed via an MSI script method or via the SAK Software Update CAB file, then perform the following steps:

1. Click on Settings Menu
2. Click on Control Panel
3. Click on Add/Remove Programs
4. Select "Persistent Storage Manager"
5. Click Remove

Step 5: Delete all PSM cache files and cache directories. The following steps must be performed for each volume. Assuming "x" is the drive letter of each volume, perform:

1. Open up a Shell Command Prompt on the PSM server
2. `cacls "x:\Persistent Storage Manager State" /g Everyone:f`
3. `attrib "x:\Persistent Storage Manager State" -r -h -s`
4. `cacls "x:\Persistent Storage Manager State*.psm" /g Everyone:f`
5. `attrib "x:\Persistent Storage Manager State*.psm" -r -h -s`
6. `del x:\Persistent Storage Manager State*.psm`
7. `rmdir "x:\Persistent Storage Manager State"`

Step 6: Reboot

How can I repair PSM?

If PSM's original program files were overwritten for any reasons, there is no method to repair the files without losing snapshots. You must first uninstall PSM as described above and fully reinstall it. All existing snapshot images will be lost. If you would like to save these images, manually copy these images to a different disk prior to reinstalling PSM.

When Reinstalling the O/S, will my snapshot images persist?

When you rebuild the machine with a fresh O/S, your existing snapshots on the separate data drives are lost because the relevant PSM information in the previous registry is gone.

You must restore your PSM registry information to its prior known good state and reboot.

A method to restore your registry information is via Microsoft Windows 2000 Resource Kit's REGREST.EXE program. This method can only be used if you had first backed up your opened registry hive files by the Resource Kit's REGBACK.EXE program prior to rebuilding the boot volume and the separate data drives were left intact

How do Backup programs work with Snapshots?

Backup and Restore programs are not trivial applications. As such they require effort to set up and use effectively. Given the nature of these products, data protection, it is critical that any backup and recovery plan be thoroughly tested before use on a live system.

The best solution is to use a backup program that is PSM aware and has been certified for operation with PSM. This is especially true for open file options, system agents, and disaster recovery. These tips are geared toward special case or emergency actions rather than day to day data protection and recovery.

These tips are no substitute for the instructions and assistance of the backup software vendor and the advice of an experienced system administrator. These are general guidelines which may, or may not, apply to your installation or backup program. Due to the wide variety of system configurations, software systems, and hardware options we can

not make any guarantees or provide any warranty as to the effectiveness of these tips. We have made every effort to ensure the accuracy of this information but cannot guarantee it will work for you.

First and foremost, test the backup and restore system before counting on it for data protection. Second, work with your backup product vendor to ensure the application is being used as designed. Finally, enlist the assistance of an experienced system administrator.

Volume Backup

Creating a backup of the base disk data (NOT including snapshot) requires the following steps:

Turn OFF archive bit reset (use simple copy mode). Running with the archive bit enabled will cause every file in the backup to be updated. This will generate huge amounts of useless cache data.

Don't use incremental backup (it will write huge amounts of meta data). Incremental backups use the archive attribute to record the backup state of files. Like the previous entry, this creates useless cache data.

Turn OFF junction point traversal. The SNAPSHOT directory is a pseudo directory. Similar to a network share directory on another machine, it doesn't actually exist as a specific data set. The SNAPSHOT directory contains numerous copies of all the files on the system and is "self-referential". It cannot be backed up (an INDIVIDUAL snapshot can be backed up as explained later).

Follow the vendor's recommendation for open file and agent applications. These options may or may not work depending on their implementation. Agents that maintain their own cache files may overflow the PSM cache file and should not be enabled if any snapshots are active.

Select the entire volume for backup, then de-select the SNAPSHOT directory, and de-select all files like *.OTM or *.PSM. The SNAPSHOT directory is a junction point and cannot be backed up (see the previous entry). The OTM and PSM files are used by Persistent Storage Manager to index and record cache data. These files can not be restored and should not be backed up.

Execute the backup. If possible verify the backup files and review the backup log to ensure the data was correctly recorded.

Snapshot Backup

Creating a backup of a single snapshot (not ALL the snapshots) requires the following steps:

Turn OFF archive bit reset (use simple copy mode). Running with the archive bit enabled will attempt an update of every file in the backup. This will create an error on Version 1 snapshots and will generate huge amounts of useless cache data under Version 2.

Don't use incremental backup (it will attempt to write huge amounts of meta data). Incremental backups use the archive attribute to record the backup state of files. Like the previous entry, this creates useless cache data.

Turn ON junction point traversal. The SNAPSHOT directory is a pseudo directory. Similar to a network share directory on another machine, it doesn't actually exist as a physical collection of files. The SNAPSHOT directory contains numerous copies of all the files on the system and is "self-referential". The backup application will need to access the SNAPSHOT directory in order to access a SINGLE selected snapshot.

Disable all open file and agent applications. These options are only needed for live data backup. The snapshot is an image of the data as it existed at some point in the past. Agent software may damage the live data set if it confuses the snapshot and live data.

Select a SINGLE snapshot folder (NOT the SNAPSHOT root folder -- one of the entries UNDER the root folder). Then de-select the SNAPSHOT directory within that folder, and de-select all files like *.OTM or *.PSM within that folder. The secondary SNAPSHOT directory is a junction point and can not be backed up (see the previous entry). The OTM and PSM files are used by Persistent Storage Manager to index and record cache data. These files can not be restored and should not be backed up.

Execute the backup. If possible verify the backup files and review the backup log to ensure the data was correctly recorded.

Volume Restore

Restoring a backup of the base disk data (created from a volume backup) requires the following steps.

Delete all active snapshots. It may be possible to maintain snapshots during a full volume restore, but it isn't likely.

Select the entire volume for restore, then de-select the SNAPSHOT directory, and de-select all files like *.OTM or *.PSM. The SNAPSHOT directory is a junction point and can not be restored (see the previous entry). The OTM and PSM files are used by Persistent Storage Manager to index and record cache data. These files can not be restored.

On completion of the Volume Restore reboot the system.

Snapshot Volume Restore

Restoring a snapshot image to the base volume is almost exactly the same as Volume Restore.

Again, delete all current snapshots and select all the files and folders in the saved snapshot directory as in the previous step.

You must select the files and folders within the saved snapshot -- selecting the "snapshot" will restore it with an extra level of subdirectory. In this situation we are restoring to the root directory.

Instruct the restore program to restore the backup files to the root directory (rather than the SNAPSHOT directory). The restore application should provide a restore destination dialogue or redirect dialogue.

Restoring a snapshot image to a data volume will usually work well. Restoration to the system volume may be more difficult. The restored snapshot will restore the individual files as would be expected, but will not perform any special actions to restore the registry settings or volume meta-data.

Snapshot Folder Restore

Restoring a snapshot image to a folder is similar to a Volume Restore.

Again, you will probably need to delete all current snapshots and select all the files and folders in the saved snapshot directory as in the previous step. If the snapshot image being restored is small, or if only a portion of the backup files are selected for restore, it may be possible to keep the existing snapshots.

Select all the needed files and folders within the saved snapshot.

Instruct the restore program to restore the backup files to a new subdirectory (not the SNAPSHOT directory). The restore application should provide a restore destination dialogue or redirect dialogue.

Restoring a partial snapshot image to a folder will usually work well. The key elements are to avoid trying to restore to the SNAPSHOT directory (won't work) and to select a subset of files from the saved snapshot backup. The snapshot backup may contain ALL the data files on the volume at the time the snapshot was created. Restoring it in its entirety would require as much storage as the original data.

Can I share snapshots so users can access deleted files protected by PSM?

Yes. When PSM is protecting volumes, it is also protecting the individual files. So it is possible to access a snapshot and drag and drop old and/or deleted files to the live volume again without restoring the complete snapshot (volume).

Simply go into Explorer, open up the snapshot folder, Right Click on the snapshot you want to create a share on, Select the Sharing tab, and go through normal Windows sharing commands for the users you want.

Can I have my cache file reside on a different volume?

No. The cache file resides on the volume you want to protect.

Can I change the size of the cache file?

Yes. If you want to increase or decrease the size of the cache file, delete all existing snapshots, then select the new size.

Is PSM compatible with Veritas Open File Option?

Yes. Since Veritas' licenses CDP's Open Transaction Manager for their OFO option, PSM is compatible. Running OTM and PSM on the same machine together takes up very little overhead (less than 10%).

How does PSM's Retention Weight work?

The administrator can prioritize snapshots from Lowest to Highest. When the number of snapshots reaches the limit, PSM's deletion logic will free up room in the cache file by deleting the oldest, least prioritized snapshot. Snapshots can also be flagged as Always Keep – meaning they will not be deleted as part of our deletion logic.