

# hp StorageWorks

## Migrating from SWVR and Deploying Persistent Storage Manager with HP StorageWorks NAS

First Edition (March 2003)

Part Number: 331944-001

This document provides installation and migration procedures for deploying Persistent Storage Manager in an HP StorageWorks NAS b2000 architecture, steps to install Persistent Storage Manager on a NAS b2000, b3000 and e7000, and a migration path from a SANworks Virtual Replicator solution.

© 2003 Hewlett-Packard Company

Hewlett-Packard Company makes no warranty of any kind with regard to this material, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Hewlett-Packard shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.

This document contains proprietary information, which is protected by copyright. No part of this document may be photocopied, reproduced, or translated into another language without the prior written consent of Hewlett-Packard. The information contained in this document is subject to change without notice.

Compaq Computer Corporation is a wholly-owned subsidiary of Hewlett-Packard Company.

Adobe® and Acrobat® are trademarks of Adobe Systems Incorporated.

Intel® and Celeron® are U.S. registered trademarks of Intel Corporation.

Intel® and Itanium® are trademarks or registered trademarks of Intel Corporation in the U.S. and other countries and are used under license.

Intel® Itanium™ Processor Family is a trademark in the U.S. and other countries and is used under license.

Microsoft®, MS-DOS®, MS Windows®, Windows®, and Windows NT® are U.S. registered trademarks of Microsoft Corporation.

Oracle® is a registered U.S. trademark of Oracle Corporation, Redwood City, California.

UNIX® is a registered trademark of The Open Group.

Hewlett-Packard Company shall not be liable for technical or editorial errors or omissions contained herein. The information is provided "as is" without warranty of any kind and is subject to change without notice. The warranties for Hewlett-Packard Company products are set forth in the express limited warranty statements for such products. Nothing herein should be construed as constituting an additional warranty.

Migrating from SWVR and Deploying Persistent Storage  
Manager with HP StorageWorks NAS  
First Edition (March 2003)  
Part Number: 331944-001

# Summary

PSM (Persistent Storage Manager) delivers Live Primary Data Protection by creating hundreds of point-in-time Persistent True Images or snapshots of the data volume. PSM snapshots look just like the volume at the time of creation and are kept on the active volume to facilitate the immediate return of individual files, groups of files, folders or complete volumes. Once PSM is installed, it is tightly integrated into the Server Appliance Kit and is accessible through the web management interface on all HP StorageWorks NAS products.

PSM Features:

- Instant Data Protection from Online Snapshots
- 250 concurrent snapshots, 63 volumes per snapshot
- Snapshot Attributes: Read only, Read write, and Always keep
- Automatic creation; deletion based on weighting system
- Direct access to data from within apps or Windows Explorer
- Supports up to 10 TB of storage per node

This document details the procedures required to migrate from SWVR to PSM. The NAS b2000, b3000, and e7000 will be covered in this white paper.

This paper also provides a migration path for the NAS b2000 in the following scenarios:

- Factory image with no production data
- NAS b2000 with production data

A migration path for the NAS b3000 in the following scenarios:

- Standalone architecture with a factory image and no production data
- Standalone architecture with production data
- Clustered architecture with a factory image and no production data
- Clustered architecture with production data

A migration path for the NAS e7000 in the following scenarios:

- Standalone architecture with a factory image and no production data
- Standalone architecture with production data
- Clustered architecture with a factory image and no production data
- Clustered architecture with production data

## **Migrating a NAS b2000 with a Factory Image and No Production Data**

### **Uninstalling SWVR**

1. Select **START>SETTINGS>CONTROL PANEL**.
2. Select **ADD/REMOVE PROGRAMS**.
3. Select **Compaq SANworks Virtual Replicator** and select **REMOVE**. Select **YES** when prompted with the question:  

Are you sure you want to remove SANworks Virtual Replicator?
4. When the wizard is complete, select **YES** to restart the server.

## Installing PSM

HP recommends that you defrag all drives before PSM is installed. Once PSM is installed and snapshots are created, it will not be possible to defrag a drive without deleting the snapshots associated with that drive.

- Order the CD kit from [www.hp.com](http://www.hp.com).
- Or to install PSM, download the SoftPAQ SP21903.exe from the support website:  
<http://h71025.www7.hp.com/support/home/index.asp>.  
Extract this file to a temporary directory on the HP StorageWorks NAS System. Double-click the file *InstallPSM.vbe* to perform a full installation of PSM. This installation will automatically reboot the system.

## Managing PSM

Once PSM has been installed it can be managed through the web user interface. For more information on PSM please refer to “PSM Administrative Overview” and Appendix A.

# Migrating a NAS b2000 with Production Data

This section covers a migration from SWVR on a NAS b2000 with production data. It will be necessary to migrate all data from drives that have been configured with SANworks Virtual Replicator. There are three recommended options for data migration:



**Caution:** It is required that a full backup is performed and verified before any migration process occurs.

---

- Backup and restore to a new physical disk created through Microsoft Disk Management.
- Disk copy to a new physical disk created through Microsoft Disk Management.
  - HP recommends that file copy application is used that can maintain file permissions and ACLs.
- Replicate all data to a new physical disk created through Microsoft Disk Management with NAS data copy.
  - It is possible to replicate data through NAS Data Copy from a SWVR volume to a physical disk on the same node.

---

**Note:** Once SWVR has been removed all data contained within SWVR volumes will be inaccessible. Migrate all data before uninstalling SWVR.

---

Once all data has been migrated it is necessary to delete all SWVR resources. To delete SWVR resources:

1. Select **START>PROGRAMS>Compaq SANworks Virtual Replicator Snapshot Manager**.
2. Delete all snapshots.
3. Delete all virtual disks.
4. Delete all pools.
5. Close Snapshot Manager.

## Uninstalling SWVR

1. Select **START>SETTINGS>CONTROL PANEL**.
2. Select **ADD/REMOVE PROGRAMS**.
3. Select Compaq SANworks Virtual Replicator and select **REMOVE**.
4. Select **YES** when prompted with the question:  
Are you sure you want to remove SANworks Virtual Replicator?
5. When the wizard is complete, select **YES** to restart the server.

## Installing PSM

HP recommends that you defrag all drives before PSM is installed. Once PSM is installed and snapshots are created it will not be possible to defrag a drive without deleting the snapshots associated with that drive.

- Order the CD kit from [www.hp.com](http://www.hp.com).
- Or to install PSM, download the SoftPAQ *SP21903.exe* from the support website:  
<http://h71025.www7.hp.com/support/home/index.asp>.  
Extract this file to a temporary directory on the HP StorageWorks NAS System. Double-click the file *InstallPSM.vbe* to perform a full installation of PSM. . This installation will automatically reboot the system.

## Managing PSM

Once PSM has been installed it can be managed through the web user interface. For more information on PSM, please refer to “PSM Administrative Overview” and Appendix A.

# Migrating a NAS b3000 with a Factory Image and No Production Data

This section covers migrating a NAS b3000 with a factory image and no production data. It is assumed that the NAS b3000 has just completed the quick restore process and there is no production data. This procedure is for stand alone architectures. Please see the section entitled "Migrating a NAS b3000 Cluster with a Factory Image and No Production Data" for cluster architectures.

## Uninstalling SWVR

1. Select **START>SETTINGS>CONTROL PANEL**.
2. Select **ADD/REMOVE PROGRAMS**.
3. Select Compaq SANworks Virtual Replicator and select **REMOVE**.
4. Select **YES** when prompted with the question:  

```
Are you sure you want to remove SANworks Virtual Replicator?
```
5. When the wizard is complete, select **YES** to restart the server.

## Installing PSM

HP recommends that you defrag all drives before PSM is installed. Once PSM is installed and snapshots are created it will not be possible to defrag a drive without deleting the snapshots associated with that drive.

- Order the CD kit from [www.hp.com](http://www.hp.com).
- Or To install PSM, download the SoftPAQ *SP21903.exe* from the support website:  
<http://h71025.www7.hp.com/support/home/index.asp>.  
Extract this file to a temporary directory on the HP StorageWorks NAS System. Double-click the file *InstallPSM.vbe* to perform a full installation of PSM. This installation will automatically reboot the system.

## Managing PSM

Once PSM has been installed it can be managed through the web user interface. For more information on PSM please refer to “PSM Administrative Overview” and Appendix A.

# Migrating a NAS b3000 with Production Data

This section covers a migration from SWVR on a NAS b3000 with production data. This procedure is for stand alone architectures. Please see the section entitled "Migrating a b3000 Cluster with Production Data" for cluster architectures.

It will be necessary to migrate all data from drives that have been configured with SANworks Virtual Replicator. There are three recommended options for data migration:



**Caution:** It is required that a full backup is performed and verified before any migration process occurs.

---

- Backup and restore to a new physical disk created through Microsoft Disk Management.
- Disk copy to a new physical disk created through Microsoft Disk Management.
  - HP recommends that file copy application is used that can maintain file permissions and ACLs.
- Replicate all data to a new physical disk created through Microsoft Disk Management with NAS data copy.
  - It is possible to replicate data through NAS Data Copy from a SWVR volume to a physical disk on the same node.

---

**Note:** Once SWVR has been removed all data contained within SWVR volumes will be inaccessible. Migrate all data before uninstalling SWVR.

---

Once all data has been migrated it is necessary to delete all SWVR resources. To delete SWVR resources, follow these steps :

1. Select **START>PROGRAMS>Compaq SANworks Virtual Replicator>Snapshot Manager**.
2. Delete all snapshots.
3. Delete all virtual disks.

4. Delete all pools.
5. Close Snapshot Manager.

## Uninstalling SWVR

1. Select **START>SETTINGS>CONTROL PANEL**.
2. Select **ADD/REMOVE PROGRAMS**.
3. Select Compaq SANworks Virtual Replicator and select **REMOVE**.
4. Select **YES** when prompted with the question:  

```
Are you sure you want to remove SANworks Virtual Replicator?
```
5. When the wizard is complete, select **YES** to restart the server.

## Installing PSM

HP recommends that you defrag all drives before PSM is installed. Once PSM is installed and snapshots are created it will not be possible to defrag a drive without deleting the snapshots associated with that drive.

- Order the CD kit from [www.hp.com](http://www.hp.com).
- Or to install PSM, download the SoftPAQ *SP21903.exe* from the support website:  
<http://h71025.www7.hp.com/support/home/index.asp>.  
Extract this file to a temporary directory on the HP StorageWorks NAS System. Double-click the file *InstallPSM.vbe* to perform a full installation of PSM. This installation will automatically reboot the system.

## Managing PSM

Once PSM has been installed it can be managed through the web user interface. For more information on PSM please refer to “PSM Administrative Overview” and Appendix A.

# Migrating a NAS b3000 Cluster with a Factory Image and No Production Data

This section covers migrating a NAS b3000 cluster with a factory image and no production data. It is assumed that the NAS b3000 has just completed the quick restore process and there is no production data. It is also assumed that the cluster setup tool has been completed and the cluster configuration is complete. This procedure is for a cluster architectures. Please see the section entitled "Migrating a NAS b3000 with a Factory Image and No Production Data" for standalone architectures.

---

**Note:** This process will need to be completed on both nodes of the cluster.

---

Move all cluster resources to node A and shut down node B. It will be necessary to leave node B off for the entire migration process of node A. Once node B is off unrepresent all LUNS used as SWVR resources from node B. Do not unrepresent the Quorum disk.



**WARNING:** In the following procedure it is assumed that no production data resides on the cluster. If SWVR resources are deleted and SWVR is uninstalled all data will be lost. If data resides on the cluster please see the section entitled "Migrating a NAS b3000 Cluster with Production Data."

---

Open Snapshot manager and delete any SWVR resources that have been created.

1. Select **START>PROGRAMS>Compaq SANworks Virtual Replicator>Snapshot Manager**.
2. Delete all snapshots.
3. Delete all virtual disks.
4. Delete all pools.
5. Close Snapshot manager.

On node A, complete the following steps:

## Uninstalling SWVR

1. Select **START>SETTINGS>CONTROL PANEL**.
2. Select **ADD/REMOVE PROGRAMS**.
3. Select Compaq SANworks Virtual Replicator and select **REMOVE**.
4. Select **YES** when prompted with the question.  
Are you sure you want to remove SANworks Virtual Replicator?
5. When the wizard is complete, select **YES** to restart the server.

## Installing PSM

All cluster resources must reside on Node B. On node A, continue the procedures to install PSM.

HP recommends that you defrag all drives before PSM is installed. Once PSM is installed and snapshots are created it will not be possible to defrag a drive without deleting the snapshots associated with that drive.

- Order the CD kit from [www.hp.com](http://www.hp.com).
- Or to install PSM, download the SoftPAQ *SP21903.exe* from the support website:  
<http://h71025.www7.hp.com/support/home/index.asp>.  
Extract this file to a temporary directory on the HP StorageWorks NAS System. Double-click the file *InstallPSM.vbe* to perform a full installation of PSM. This installation will automatically reboot the system.

Once the migration procedure is complete for node A, perform the same process for node B. When upgrading node B ensure that the cluster group resides on node A.

Once SWVR has been uninstalled from both nodes the LUNS previously used for SWVR resources will appear as unformatted physical disk resources in Disk Manager. Please see the section entitled "Configuring Physical Disk Resources in a Cluster Architecture" to configure the previously used SWVR LUNS.

# Configuring Physical Disk Resources in a Cluster Architecture

1. Present all new LUNS to be used for migration to node A. Do not present the new luns to node B.
2. Open disk manager:  
**START>RUN>diskmgmt.msc.**
3. Create the necessary partitions for migration. The disk must be basic disks, dynamic disk are not supported in a cluster configuration.
4. Reboot node A. The disks will not appear as available disk resources in cluster administrator until after a reboot.
5. Open Cluster Administrator:  
**START>RUN>cluadmin.**
6. Right-click the desired cluster group in which the physical disk resource should reside.
  - a. Select **NEW>RESOURCE.**
  - b. Name the resource and specify physical disk as the resource type and select Next.
  - c. Select the possible owners and select Next.
  - d. Set any dependencies and select Next.
  - e. Select the disk and click Finish.
  - f. Right-click the cluster group that the physical disk was just created in and select Bring Online.
7. Present the new LUNS to node B.
8. On node B open Device Manager.
9. Select **Start>Settings>Control Panel>System>Hardware> Device Manager.**
10. Right-click Disk Drives and select Scan for Hardware Changes.
11. On node A, right-click the disk groups that contain newly created physical disk resources and select Move Group.
12. Make sure that node B can accurately see the new physical disk resources.

## Managing PSM

Once PSM has been installed it can be managed through the web user interface. For more information on PSM please refer “PSM Administrative Overview” and Appendix A.

# Migrating a NAS b3000 Cluster with Production Data

This section covers migrating a NAS b3000 cluster with production data. It is assumed that the cluster setup tool has been completed and the cluster configuration is complete. This procedure is for cluster architectures. Please see the section entitled "Migrating a NAS b3000 with Production Data" for standalone architectures.

If it is desired to migrate data to clustered physical disk resources use the following procedure:

## Configuring Physical Disk Resources in a Cluster Architecture

1. Present all new LUNS to be used for migration to node A. Do not present the new luns to node B.
2. Open disk manager:  
**START>RUN>diskmgmt.msc.**
3. Create the necessary partitions for migration. The disk must be basic disks, dynamic disk are not supported in a cluster configuration.
4. Reboot node A. The disks will not appear as available disk resources in cluster administrator until after a reboot.
5. Open Cluster Administrator:  
**START>RUN>cluadmin.**
6. Right-click the desired cluster group in which the physical disk resource should reside.
  - a. Select **NEW>RESOURCE.**
  - b. Name the resource, specify physical disk as the resource type, and select Next.
  - c. Select the possible owners and select Next.
  - d. Set any dependencies and select Next.
  - e. Select the disk and click Finish.

- f. Right-click the cluster group that in which the physical disk was just created and select Bring Online.
7. Present the new LUNS to node B.
8. On node B, open Device Manager.
9. Select **Start> Settings>Control Panel>System>Hardware> Device Manager**.
10. Right-click Disk Drives and select Scan for Hardware Changes.
11. On node A, right-click the disk groups that contain newly created physical disk resources and select Move Group.
12. Make sure that node B can accurately see the new physical disk resources.

## Migrating Data

Move all cluster resources to node A and shut down node B. It will be necessary to leave node B off for the entire migration process of node A. Once node B is off unrepresent all LUNS used as SWVR resources from node B. Do not unrepresent the Quorum disk.

It will be necessary to migrate all data from drives that have been configured with SANworks Virtual Replicator. There are three recommended options for data migration:



**Caution:** It is required that a full backup is performed and verified before any migration process occurs.

---

- Backup and restore to a new physical disk created through Microsoft Disk Management.
- Disk copy to a new physical disk created through Microsoft Disk Management.
  - HP recommends that file copy application is used that can maintain file permissions and ACLs.
- Replicate all data to a new physical disk created through Microsoft Disk Management with NAS data copy.

- It is possible to replicate data through NAS Data Copy from a SWVR volume to a physical disk on the same node.



**WARNING:** In the following procedure it is assumed that all production data has been migrated from SWVR volumes. If SWVR resources are deleted and SWVR is uninstalled all data on SWVR volumes will be lost.

---

Open Snapshot manager and delete any SWVR resources that have been created.

1. Select **START>PROGRAMS>Compaq SANworks Virtual Replicator>Snapshot Manager**.
2. Delete all snapshots.
3. Delete all virtual disks.
4. Delete all pools.
5. Close Snapshot Manager.

## Uninstalling SWVR

1. Select **START>SETTINGS>CONTROL PANEL**.
2. Select **ADD/REMOVE PROGRAMS**.
3. Select **Compaq SANworks Virtual Replicator** and select **REMOVE**.
4. Select **YES** when prompted with the question:  
Are you sure you want to remove SANworks Virtual Replicator?
5. When the wizard is complete, select **YES** to restart the server.

## Installing PSM

HP recommends that you defrag all drives before PSM is installed. Once PSM is installed and snapshots are created it will not be possible to defrag a drive without deleting the snapshots associated with that drive.

- Order the CD kit from [www.hp.com](http://www.hp.com).
- Or to install PSM, download the SoftPAQ *SP21903.exe* from the support website:  
<http://h71025.www7.hp.com/support/home/index.asp>.  
Extract this file to a temporary directory on the HP StorageWorks NAS System. Double-click the file *InstallPSM.vbe* to perform a full installation of PSM. This installation will automatically reboot the system.

Once the migration procedure is complete for node A, power on node B.

### On node B uninstall SWVR

1. Select **START>SETTINGS>CONTROL PANEL**.
2. Select **ADD/REMOVE PROGRAMS**.
3. Select Compaq SANworks Virtual Replicator and select **REMOVE**.
4. Select **YES** when prompted with the question:  

```
Are you sure you want to remove SANworks Virtual Replicator?
```
5. When the wizard is complete, select **YES** to restart the server.

### On node B install PSM

Once SWVR has been uninstalled from both nodes the LUNS previously used for SWVR resources will appear as unformatted physical disk resources in Disk Manager. Please see the section entitled "Configuring Physical Disk Resources in a Cluster Architecture" to configure the previously used SWVR LUNS.

## Managing PSM

Once PSM has been installed it can be managed through the web user interface. For more information on PSM please refer to “PSM Administrative Overview” and Appendix A.

# Migrating an NAS e7000 with a Factory Image and No Production Data

This section covers migrating an NAS e7000 with a factory image and no production data. It is assumed that the NAS e7000 has just completed the quick restore process and there is no production data. This procedure is for stand alone architectures. Please see the section entitled "Migrating a NAS e7000 Cluster with a Factory Image and No Production Data" for cluster architectures.

## Uninstalling SWVR

1. Select **START>SETTINGS>CONTROL PANEL**.
2. Select **ADD/REMOVE PROGRAMS**.
3. Select Compaq SANworks Virtual Replicator and select **REMOVE**.
4. Select **YES** when prompted with the question:  

```
Are you sure you want to remove SANworks Virtual Replicator?
```
5. When the wizard is complete, select **YES** to restart the server.

## Installing PSM

HP recommends that you defrag all drives before PSM is installed. Once PSM is installed and snapshots are created it will not be possible to defrag a drive without deleting the snapshots associated with that drive.

- Order the CD kit from HP.com
- Or To install PSM, download the SoftPAQ *SP21903.exe* from the support website:  
<http://h71025.www7.hp.com/support/home/index.asp>.  
Extract this file to a temporary directory on the HP StorageWorks NAS System. Double-click the file *InstallPSM.vbe* to perform a full installation of PSM. This installation will automatically reboot the system.

## Managing PSM

Once PSM has been installed it can be managed through the web user interface. For more information on PSM please refer to “PSM Administrative Overview” and Appendix A.

# Migrating an NAS e7000 with Production Data

This section will cover a migration from SWVR on a NAS e7000 with production data. This procedure is for stand alone architectures. Please see the section entitled "Migrating a NAS e7000 Cluster with Production Data" for cluster architectures.

It will be necessary to migrate all data from drives that have been configured with SANworks Virtual Replicator. There are three recommended options for data migration:



**Caution:** It is required that a full backup is performed and verified before any migration process occurs.

---

- Backup and restore to a new physical disk created through Microsoft Disk Management.
- Disk copy to a new physical disk created through Microsoft Disk Management.
  - HP recommends that file copy application is used that can maintain file permissions and ACLs.
- Replicate all data to a new physical disk created through Microsoft Disk Management with NAS data copy.
  - It is possible to replicate data through NAS Data Copy from a SWVR volume to a physical disk on the same node.

---

**Note:** Once SWVR has been removed all data contained within SWVR volumes will be inaccessible. Migrate all data before uninstalling SWVR.

---

Once all data has been migrated, it is necessary to delete all SWVR resources. To delete SWVR resources follow these steps :

1. Select **START>PROGRAMS>Compaq SANworks Virtual Replicator>Snapshot Manager**.
2. Delete all snapshots.
3. Delete all virtual disks.

4. Delete all pools.
5. Close Snapshot Manager.

## Uninstalling SWVR

1. Select **START>SETTINGS>CONTROL PANEL**.
2. Select **ADD/REMOVE PROGRAMS**.
3. Select Compaq SANworks Virtual Replicator and select **REMOVE**.
4. Select **YES** when prompted with the question:  

```
Are you sure you want to remove SANworks Virtual Replicator?
```
5. When the wizard is complete, select **YES** to restart the server.

## Installing PSM

HP recommends that you defrag all drives before PSM is installed. Once PSM is installed and snapshots are created it will not be possible to defrag a drive without deleting the snapshots associated with that drive.

- Order the CD kit from [www.hp.com](http://www.hp.com).
- Or to install PSM, download the SoftPAQ *SP21903.exe* from the support website <http://h71025.www7.hp.com/support/home/index.asp>. Extract this file to a temporary directory on the HP StorageWorks NAS System. Double-click the file *InstallPSM.vbe* to perform a full installation of PSM. This installation will automatically reboot the system.

## Managing PSM

Once PSM has been installed it can be managed through the web user interface. For more information on PSM, please refer to “PSM Administrative Overview” and Appendix A.

# Migrating an NAS e7000 Cluster with a Factory Image and No Production Data

This section will cover migrating an NAS e7000 cluster with a factory image and no production data. It is assumed that the NAS e7000 has just completed the quick restore process and there is no production data. It is also assumed that the cluster setup tool has been completed and the cluster configuration is complete. This procedure is for a cluster architectures. Please see the section entitled "Migrating a NAS e7000 with a Factory Image and No Production Data" for standalone architectures.

---

**Note:** This process will need to be completed on both nodes of the cluster.

---

Move all cluster resources to node A and shut down node B. It will be necessary to leave node B off for the entire migration process of node A. Once node B is off unrepresent all LUNS used as SWVR resources from node B. Do not unrepresent the Quorum disk.



**WARNING:** Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or loss of life.

---

Open Snapshot manager and delete any SWVR resources that have been created.

1. Select **START>PROGRAMS>Compaq Sanworks Virtual Replicator>Snapshot Manager**.
2. Delete all snapshots.
3. Delete all virtual disks.
4. Delete all pools.
5. Close Snapshot Manager.

On node A complete the following steps:

## Uninstalling SWVR

1. Select **START>SETTINGS>CONTROL PANEL**.
2. Select **ADD/REMOVE PROGRAMS**.
3. Select Compaq SANworks Virtual Replicator and select **REMOVE**.
4. Select **YES** when prompted with the question:  
Are you sure you want to remove SANworks Virtual Replicator?
5. When the wizard is complete, select **YES** to restart the server.

## Installing PSM

All cluster resources must reside on Node B. On node A continue the procedures to install PSM.

HP recommends that you defrag all drives before PSM is installed. Once PSM is installed and snapshots are created it will not be possible to defrag a drive without deleting the snapshots associated with that drive.

- Order the CD kit from [www.hp.com](http://www.hp.com).
- Or to install PSM, download the SoftPAQ SP21903.exe from the support website:  
<http://h71025.www7.hp.com/support/home/index.asp>.  
Extract this file to a temporary directory on the HP StorageWorks NAS System. Double-click the file *InstallPSM.vbe* to perform a full installation of PSM. This installation will automatically reboot the system.

Once the migration procedure is complete for node A, perform the same process for node B. When upgrading node B ensure that the cluster group resides on node A.

Once SWVR has been uninstalled from both nodes the LUNS previously used for SWVR resources will appear as unformatted physical disk resources in Disk Manager. Please see the section entitled "Configuring Physical Disk Resources in a Cluster Architecture" to configure the previously used SWVR LUNS.

## Configuring Physical Disk Resources in a Cluster Architecture

1. Present all new LUNS to be used for migration to node A. Do not present the new luns to node B.
2. Open Disk Manager:  
**START>RUN>diskmgmt.msc.**
3. Create the necessary partitions for migration. The disk must be basic disks, dynamic disk are not supported in a cluster configuration.
4. Reboot node A. The disks will not appear as available disk resources in cluster administrator until after a reboot.
5. Open Cluster Administrator:  
**START>RUN>cluadmin.**
6. Right-click the desired cluster group the physical disk resource needs to reside in.
  - a. Select **NEW>RESOURCE.**
  - b. Name the resource and specify physical disk as the resource type and select Next.
  - c. Select the possible owners and select Next.
  - d. Set any dependencies and select Next.
  - e. Select the disk and click Finish.
  - f. Right-click the cluster group in which the physical disk was just created and select Bring Online.
7. Present the new LUNS to node B.
8. On node B, open Device Manager.
9. Select **START>SETTINGS >CONTROL PANEL>System>hardware> Device Manager.**
10. Right-click Disk Drives and select Scan for Hardware Changes.
11. On node A right-click the disk groups that contain newly created physical disk resources and select Move Group.
12. Make sure that node B can accurately see the new physical disk resources.

## Managing PSM

Once PSM has been installed it can be managed through the web user interface. For more information on PSM please refer to “PSM Administrative Overview” and Appendix A.

# Migrating an NAS e7000 Cluster with Production Data

This section will cover migrating an NAS e7000 cluster with production data. It is assumed that the cluster setup tool has been completed and the cluster configuration is complete. This procedure is for cluster architectures. Please see the section entitled "Migrating an NAS e7000 with Production Data" for stand alone architectures.

If it is desired to migrate data to clustered physical disk resources use the following procedure:

## Configuring Physical Disk Resources in a Cluster Architecture

1. Present all new LUNS to be used for migration to node A. Do not present the new luns to node B.
2. Open disk manager:  
**START>RUN>diskmgmt.msc.**
3. Create the necessary partitions for migration. The disk must be basic disks; dynamic disks are not supported in a cluster configuration. A volume label must be assigned at the creation of the partition.
4. Open Cluster Administrator:
  - a. **START>RUN>cluadmin.**
  - b. If the new disks do not appear in Cluster Administrator then reboot Node A.
5. Right-click the desired cluster group in which the physical disk resource should reside.
  - a. Select **NEW>RESOURCE.**
  - b. Name the resource, specify physical disk as the resource type, and select Next.
  - c. Select the possible owners and select Next.
  - d. Set any dependencies and select Next.
  - e. Select the disk and click Finish.

- f. Right-click the cluster group in which the physical disk was just created and select Bring Online.
6. Present the new LUNS to node B.
7. On node B open Device Manager.
8. Select **START>SETTINGS>CONTROL PANEL>System>Hardware>Device Manager**.
9. Right-click Disk Drives and select Scan for Hardware Changes.
10. On node A, right-click the disk groups that contain newly created physical disk resources and select Move Group.
11. Make sure that node B can accurately see the new physical disk resources.

## Migrating Data

Move all cluster resources to node A and shut down node B. It will be necessary to leave node B off for the entire migration process of node A. Once node B is off unrepresent all LUNS used as SWVR resources from node B. Do not unrepresent the Quorum disk.

It will be necessary to migrate all data from drives that have been configured with SANworks Virtual Replicator. There are three recommended options for data migration:



**Caution:** It is required that a full backup is performed and verified before any migration process occurs.

---

- Backup and restore to a new physical disk created through Microsoft Disk Management.
- Disk copy to a new physical disk created through Microsoft Disk Management.
  - HP recommends that file copy application is used that can maintain file permissions and ACLs.

- Replicate all data to a new physical disk created through Microsoft Disk Management with NAS data copy.
  - It is possible to replicate data through NAS Data Copy from a SWVR volume to a physical disk on the same node.



**WARNING:** In the following procedure it is assumed that all production data has been migrated from SWVR volumes. If SWVR resources are deleted and SWVR is uninstalled all data on SWVR volumes will be lost.

---

Open Snapshot manager and delete any SWVR resources that have been created.

1. Select **START>PROGRAMS>Compaq SANworks Virtual Replicator>Snapshot Manager**.
2. Delete all snapshots.
3. Delete all virtual disks.
4. Delete all pools.
5. Close Snapshot Manager.

## Uninstalling SWVR

1. Select **START>SETTINGS>CONTROL PANEL**.
2. Select **ADD/REMOVE PROGRAMS**.
3. Select Compaq SANworks Virtual Replicator and select **REMOVE**.
4. Select **YES** when prompted with the question:  
Are you sure you want to remove SANworks Virtual Replicator?
5. When the wizard is complete, select **YES** to restart the server.

## Installing PSM

HP recommends that you defrag all drives before PSM is installed. Once PSM is installed and snapshots are created it will not be possible to defrag a drive without deleting the snapshots associated with that drive.

- Order the CD kit from [www.hp.com](http://www.hp.com).
- Or to install PSM, download the SoftPAQ *SP21903.exe* from the support website:  
<http://h71025.www7.hp.com/support/home/index.asp>.  
Extract this file to a temporary directory on the HP StorageWorks NAS System. Double-click the file *InstallPSM.vbe* to perform a full installation of PSM. This installation will automatically reboot the system.

Once the migration procedure is complete for node A, power on node B.

### On node B uninstall SWVR

1. Select **START>SETTINGS>CONTROL PANEL**.
2. Select **ADD/REMOVE PROGRAMS**.
3. Select Compaq SANworks Virtual Replicator and select **REMOVE**.
4. Select **YES** when prompted with the question:  

```
Are you sure you want to remove SANworks Virtual Replicator?
```
5. When the wizard is complete, select **YES** to restart the server.

### On node B install PSM

Once SWVR has been uninstalled from both nodes the LUNS previously used for SWVR resources will appear as unformatted physical disk resources in Disk Manager. Please see the section entitled "Configuring Physical Disk Resources in a Cluster Architecture" to configure the previously used SWVR LUNS.

## Managing PSM

Once PSM has been installed it can be managed through the web user interface. For more information on PSM please refer to “PSM Administrative Overview” and Appendix A.

# PSM Administrative Overview

## Operational Overview

Each snapshot is a complete point-in-time representation of the data on the volumes. Each snapshot requires only a fraction of the hard-drive capacity of the original data. PSM does not keep all the data that was ever written. PSM maintains only the data required to maintain a snapshot.

PSM works below the operating system as a Filter Driver at the Volume block level. PSM maintains a library of snapshots, each representing a specific point-in-time. Snapshots can be accessed by users, administrators, or any Windows application, and look just like the familiar file/folder view.

With the first snapshot taken on a target volume, PSM establishes a cache file for that volume within which PSM retains overwritten data required to build a snapshot. The cache file size is based on a percentage of the volume it resides on and is configured through the WebUI; the default is 10 percent. As soon as the first snapshot is taken, PSM starts monitoring all writes on the target volume. When a write request occurs, PSM intercepts and pauses the write, reads the data that is to be overwritten, and saves the data in a Diff Directory within the PSM-specific cache file. After the original data is written to the Diff Directory, the new data is written on the active volume. This process is referred to as "copy-on-write." Only the first write forces a copy-out, subsequent writes to the same data block does not force a new copy-out, unless of course a new snapshot is taken between the initial and subsequent write.

PSM can create and manage up to 250 snapshots system wide. A snapshot can cover several volumes at once with an upper limit of 63 volumes within a single snapshot. However, when reverting from a "grouped" snapshot, the revert is non-selective and it reverts all volumes associated with the "grouped" snapshot.

## Reading Snapshots

Users who have been granted access by the NAS Administrator see snapshots as network shares.

A snapshot is a representation of the NAS volume at the time it was created. During the copy-on-write operation, the data to be overwritten is preserved in the PSM Diff Directory. When reading a snapshot, PSM determines if the data has changed, meaning it is located in the Diff Directory, or if it is on the live volume. For data that has changed, PSM inserts the original data, held in the Diff Directory and, where no changes have occurred, PSM reads directly from the live volume.

## Creating Snapshots

Creation of snapshots is scheduled through the SAK interface or may be generated by the NAS Administrator as a one-time request. When the command to create a snapshot is issued, PSM begins monitoring the file system looking for a quiescent period. A quiescent period is the amount of time a volume must be dormant before a snapshot is created. The default quiescent duration is five seconds but the NAS administrator may configure this, as can the amount of time PSM should search for this inactivity window. The quiescent period provides sufficient time for completion of writes and for the various software buffers to flush, the premise being that, by the end of the quiescent period, a volume will be produced which is in a stable state meaning that the volume is at rest and in a functional condition ready for users to access. If the volume is captured in a stable state, then that volume, or files and folder contained in the volume, will be returnable in a stable state or "useable condition" to users.

Following the quiescent period, PSM creates the snapshot.

## PSM Snapshot Attributes

When creating PSM snapshots there are three basic attributes which affect the life and consistency of the snapshot. They are Read-only, Read/write and Always Keep. Read-only should be used to enforce the integrity of a snapshot so that changes can not be made to. Read/Write can be used in instances where test data

is useful, such as developers altering a test website. Always Keep is useful when a snapshot needs to live indefinitely. These attributes are described in detail in the next section.

## Read Only

The default setting is for PSM to create "READ ONLY" snapshots which prohibits any modification to the snapshot--this is the most common parameter for snapshots. A READ ONLY snapshot allows users, who have been granted access, to view, open, and save a copy of any file represent in the snapshot. The properties of a READ ONLY snapshot may be modified by the NAS Administrator to READ/WRITE or ALWAYS KEEP.

## Read/Write

The READ/WRITE attribute may be assigned at the time of creation or the NAS Administrator may at any time change the attribute of any snapshot. READ/WRITE snapshots provide some unique capabilities to PSM.

READ ONLY snapshots changed to READ/WRITE snapshots and then modified return the data represented in the snapshot to the way it was originally, effectively acting as an UNDO.

Other applications for READ/WRITE snapshots: CFOs and auditors can run trial balances to accounting systems without affecting the actual systems. Prototyping, a new version of a program, can be installed in a READ/WRITE snapshot and its compatibility within the system tested with no adverse effects to the primary system.

## Always Keep

ALWAYS KEEP snapshots are treated as untouchable by PSM. In a cache file fill situation PSM will cease writing to the cache file to avoid deleting or corrupting an ALWAYS KEEP snapshot. A "disk full" error will be returned to the user. ALWAYS KEEP allows the administrator to set some milestones that are not subject to the automatic deletion routines.

# Automated Snapshot Deletion

PSM has a snapshot weighting system (low to highest) that helps set the priority of the snapshot. This weighting combined with the age of the snapshot determines the order by which it is deleted by PSM when the cache file fills up.

A key fact to consider is that PSM provides Primary Data Protection automatically. Once set up, PSM continues to provide Data Protection generating new scheduled snapshots or deleting older snapshots with little or no input required from system administrators.

## Data Recovery

### File/Folder/Volume Recovery

PSM facilitates instant data recovery from the stored on-line images. Individual files, groups of files, folders, groups of folders or complete volumes can be restored. Recovering the data can be accomplished by the NAS Administrator or the NAS Administrator can give individual users access to their data for that purpose through file share access over the network.

Security rights and privileges, as well as file and directory attributes, remain in effect as they were at the time the snapshot was created.

### Snapshots and Drive Defragmentation

A drive defragmenter attempts to consolidate files on a drive by reading various parts of the files and rewriting them to become contiguous on the drive. When volumes are created they are initially contiguous as possible on the underlying storage units (RAID arrays and LUNs). If defrag utilities are used on volumes where snapshots exist, snapshots would grow as the defrag utility moves blocks from one part of the disk to another. PSM disables defrag on volumes that have current running snapshots to prevent the unnatural growth of the snapshot.

PSM (current versions) is fully compatible with the Windows 2000 system file defrag utility. On drives upon which snapshots are not installed or are not active, the defrag utility runs without interruption. If snapshots are active, by design, 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 PSM 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. In the rare case when an existing volume requires defrag, disable scheduled snapshots, delete all snapshots on the volume and defrag the volume. When defrag completes, re-enable scheduled snapshots. Defrag is only effective when there are NO snapshots active on the volume being defragged.

---

**Note:** Defragmentation can not be performed if snapshots exist. To defragment a disk, first delete the snapshots. Drive defragmentation only operates on volumes formatted with a 4 KB or smaller allocation size. HP recommends larger allocation cluster sizes to improve performance.

---

## PSM and Backup

Because snapshots are quick to create, it is possible to capture a coherent view of the volume data with little or no application downtime. Lack of application downtime removes the traditional backup window or the amount of time taken to back up to offline media. While many applications must be shut down to capture an accurate backup, snapshots capture a point in time view of the data that can be used as the source of backup data. Applications can continue processing against the volume. Therefore, applications may only have to be interrupted for a few seconds during the snapshot process.



**Caution:** Snapshots are not a replacement for reliable, periodic data backup. If free cache space becomes critical, snapshots are automatically deleted. See the "Deleting Snapshots" section. In addition, snapshots are a short term convenience and may reside on the same physical drives as the data. If something happens to the data drives, the snapshots are also affected. Read Appendix A for suggestions on how to back up the NAS device.

---

Although snapshots provide a mechanism for backup that does not require downtime, there are some considerations that should be given when performing backup and restore of a system using snapshots. HP recommends you review this section prior to establishing backup and restore policies. 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, it is critical that any backup and recovery plan be thoroughly tested before use on a live system.

Be sure 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.

For backup:

- For base volumes that have snapshots in use or when backing up snapshots, archive bit resets and incremental backups should not be used. Archive bit resets are recorded as a change to the data and can fill the cache file with changes. Incremental backups make use of the archive bit set as well. Note if the snapshot is set to read only the backup will also fail.
- Be careful in the selection of folders, since snapshot folders provide a view into the data that can result in the backup of multiple views of the data. Forcing the backup to grow based on the number of snapshots in use.
- Junction points should be turned off to prevent the traversal of multiple snapshot directories of base volume backups.
- Junction points should be turned on when backing up a single snapshot. Be sure to pick the single snapshot and not the root folder. Selecting the root folder will cause multiple snapshot backups.

For restore:

- Delete all active snapshots as the restore will cause the cache file to grow.
- Select only the files representing the data of the volume and not the \*.psm files.
- Be sure to restore to the root of the target volume.

- Restoration of operating system partitions does not restore the registry hive. System state backups should be utilized in these instances.

## Snapshots Performance Impact

When using snapshots, performance of the disk may be affected, depending on the rate that data is changing and the number of snapshots kept for each disk. Read performance of the disk remains constant, regardless of the presence of snapshots. Read performance of the snapshot is identical to that of the disk. Write performance, however, may vary. PSM creates minimal additional I/O overhead which is limited to writes. The copy-on-write process adds one read (the write is paused to read the old data) and one write (the old data is written to the Diff Directory file) to each write system request. This only affects each initial write to a disk area that has a snapshot running on it. Copy out is not performed on subsequent writes to the same disk block, so write performance is unaffected after the initial write to each block.

Predicting the exact effect of snapshots on any particular disk is difficult, because several variables are involved. These variables include the type of applications accessing the data and the rate of change of the files on the disk. When a high percentage of writes is made to the same area, as when a file is constantly rewritten, the effect is called write locality. Disks with high write locality experience less performance degradation due to snapshots.

## Recovering Snapshots after a System Restore or System Loss

All HP StorageWorks NAS systems ship with a Quick Restore CD for circumstances that require a server rebuild. During the system restore or in the event of a complete system loss, registry information is lost with regard to the snapshots that were instantiated prior to system restore. Volume data will remain unaltered, only the snapshots will become invalidated. Even though all snapshot folders and cache files exist on the system volumes, the snapshots are not picked up by PSM and are

orphaned. These files will need to be cleaned up. To delete the cache files and snapshot directories please see the section on "Clearing the Cache Files" from the system later in this chapter.

## Granule Size Update Utility

PSM ships with a utility for adjusting the Granule size of the snapshots. Granules determine the largest cache size that can be managed by PSM. The default setting in the PSM product is 64 K. This setting will allow for up to 1 TB of data to be written to the cache file. In order to gain greater cache file space, the granule size will need to be adjusted. The following table provides an overview of the addressable storage space and maximum cache size of each granular size.

**Table 1: Adjusting Granule Size**

Granule Size	Largest Cache Size
64K granule	1 TB
128K granule	2 TB
256K granule	4 TB

When considering the granule size the following rules should be observed.

- Before altering the granule size, all snapshots should be removed from the target system.
- Cache File size is fixed as in the Table 1 and the limit applies to the sum total of all cache files system wide.
- Granule size affects only the block size utilized for each change that is written to the cache files. Regardless of the setting, there is approximately 15.6 million blocks available for storing snapshot information system wide other system limitations may further limit this maximum such as memory consumption.

- If the changes occur in different underlying blocks, more blocks of larger space could get written for any set of changes, versus if the changes all occur in the same block. Therefore increased granule size does not necessarily lead to increased coverage for changes on the originating volumes. In theory, larger blocks should lead to fewer blocks consumed to record the original data due to write locality.
- Highly fragmented disk space could lead to increased separate cache writes and more consumption of the maximum available number of blocks system wide.
- Setting the value too low will limit the available space for cache file writes. For example, a 10 TB system undergoing change could only experience a 10 % change in original data if the granule size is set to 64 KB, assuming all of the changes fit neatly into the 64KB blocks.
- PSM now supports the PSM granule sizes of 64 K, 128 K, 256 K with 64 K as the default. This allows for cache file to be 1 TB, 2 TB, and 4 TB respectively. The program *GRANSIZE.EXE*, available in the directory *c:\winnt\system32\serverappliance*, is provided for setup - By increasing the granule size, PSM can be better suited to support very large terabyte systems. The command provides an error message if there are running snapshots on the system. Typing *GRANSIZE ?* will display the current granule size in use in the system. Typing just *GRANSIZE* will display the command usage. The command must be executed from a command prompt while residing in this directory.
- When changing to a larger granule for systems, thus allowing for larger cache file sizes and accommodating larger amounts of storage, users should lower their percentage of volume space for the cache file. For example, if the percent is 30 and the supported amount of space in the system is 20 TB, then the cache file limit of 4 TB would get exceeded. Should the limit get exceed, PSM will issue an "Out of Memory" error in the event log and the WebUI status page. If the limit is exceeded, the cache file must be removed or reduced in size prior to system restart using either the *clearvol* command or by reducing the percent cache size under volume settings.

## Clearing the Cache File from the System

The PSM interface allows the user to set the cache file to any percentage from 1 - 70 percent but it will not allow the deletion of the cache file in its entirety. It is possible to delete these files but the process must be done from the command prompt either through terminal services or from the NAS console. To delete the PSM cache files and cache directories, the following command: `CleanVol.exe Vol:` must be performed for each existing volume where the cache file is no longer desired. The command may be found in `c:\winnt\system32\serverappliance`. Typing `cleanvol` will display the command usage. Prior to these steps the snapshots on the target volume need to be deleted as well or "access denied" error will be returned.

## Re-extending Volumes from Old Snapshots

Volumes based on dynamic disks may be extended utilizing LDM. Corresponding snapshots can exist at points in time prior to the extension and after the extension. If a re-extended volume containing snapshots of the pre-extended volume is reverted, the re-extended area of the disk will be unusable. To reclaim this space, make sure the included utility *reextend.exe* is executed after reverting from a snapshot of the pre-extended volume.

This utility is available in the directory `c:\winnt\system32\serverappliance` and must be executed either through terminal services or at the NAS console.

Usage of this utility is available by typing `reextend -?`.

This program will extend a volume back to its original size after a restore operation of a smaller volume from a snapshot.

## Volume Display in PSM

PSM fully supports the use of all Logical Disk Manager storage elements this includes basic, dynamic, partitions, extended partitions, and volumes provided they are formatted as NTFS when created. PSM makes use of two items when displaying storage elements in the UI. These include the volume label and the GUID representing that volume or partition. In several web pages, the information displayed is limited with regard to the identification information and the volume label is essentially all that can be viewed. It is therefore important that volume labels be identifiable by the user to avoid confusing one volume over another. By default, Local Volume, followed by the drive letter is displayed, for mount points the GUID is displayed. This label should be updated to reflect a unique label either during volume/partition creation in LDM or post volume/partition creation via File Explorer and the properties tab of the target drive.

## PSM Storage Limitations

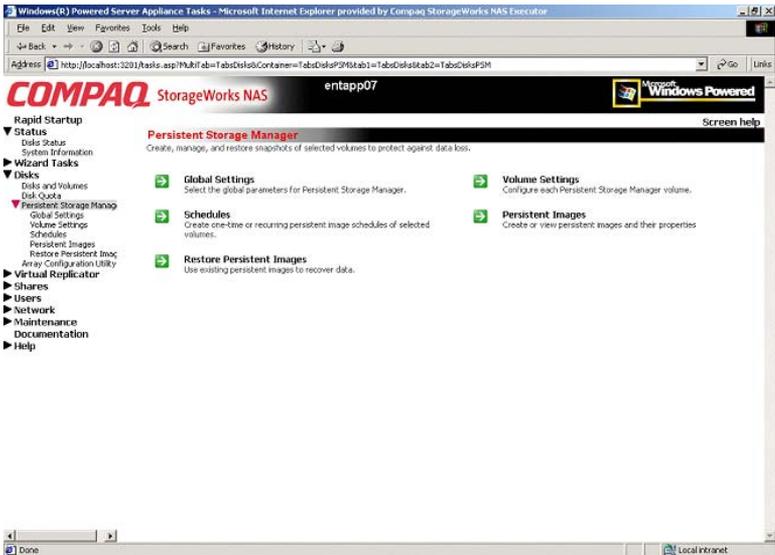
PSM is currently designed to work with 10 TB of storage with the ability to take 250 snapshots. PSM will continue to function with larger systems but the snapshot coverage should only encompass, 10 TBs worth of storage. There are no safeguards to prevent the use of storage greater than 10 TB. HP is currently working with CDP to address this storage limitation. Please check the HP website for updates regarding this support.

# Appendix A

Once PSM has been installed it can be managed through the web user interface. To manage PSM:

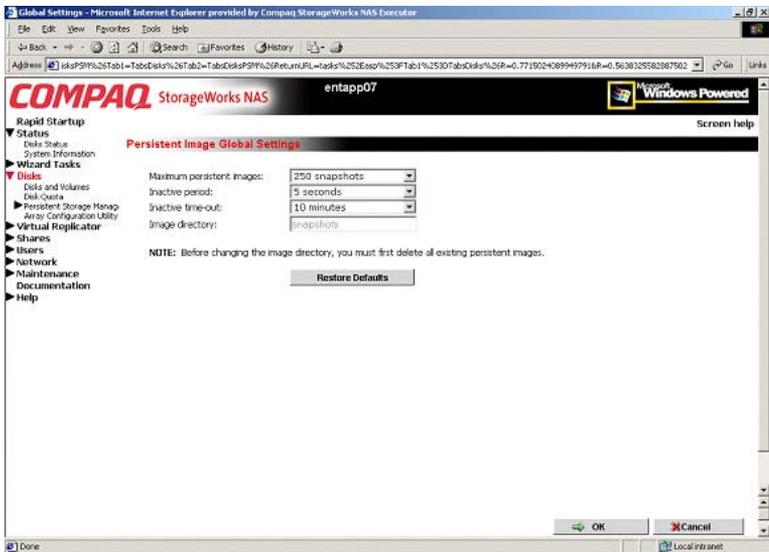
1. Open a web browser to `http://server_name:3201`
2. Select Disks from the navigation bar on the left hand side of the WEBUI.
3. Select PSM from the Disks menu.

This will display the following PSM management screen:



# Global Settings Page

From the Global Settings page you can control the overall environmental settings for PSM.



## ■ Maximum Persistent Images

This option determines the maximum number of active Persistent Images (snapshots). PSM will support a maximum of 250 snapshots per server. The size of the cache file will determine the actual amount each server can hold.

If the creation of a new snapshot would cause the maximum number to be exceeded, the system will delete the oldest existing persistent image according to the deletion heuristics established by the user.

- **Inactive Period**

This option specifies the amount of time a volume must be dormant before a snapshot is created. Before starting a snapshot, the system will wait for the volume being imaged to become inactive. The default value will allow systems to start an image with a consistent file set and a minimal time-out. Administrators can change this value for system optimization. Reducing the inactive period will allow you to create snapshots even on busy systems, but with possible synchronization problems within applications which are concurrently writing to multiple files.

- **Inactive Time Out**

This option specifies how long the server should try to create a snapshot. A snapshot will not begin until a period of relative inactivity set by the Inactive period has passed. If an interval passes that is longer than the Inactive time-out period, the snapshot will not be created and a notice generated to the system event log.

- **Image Directory**

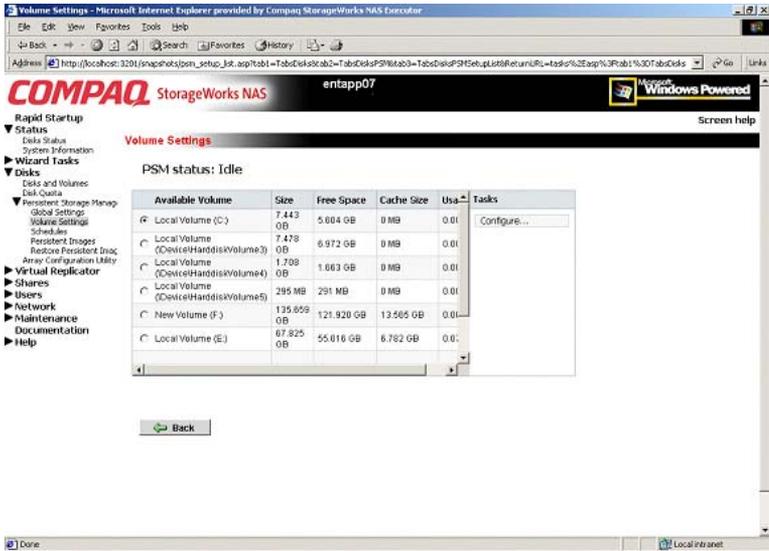
This option specifies the root directory used for the snapshot. Each snapshot appears as a subdirectory of the volume that is being imaged. The entire content of the volume as it existed at the moment the snapshot was created will appear under this directory.

- **Restore Defaults**

The Restore Defaults button will reset the system defaults.

# Volume Settings Page

From the Volume Settings page you can view the PSM attributes for each volume and change individual volume settings.



- Available Volume

This field lists all of the volumes that can support snapshots. You can select the volume you want to configure.

- Size

This column displays the size of the volume.

- Free Space

This column displays the available storage size of the volume.

- Cache Size

This column specifies the amount of space allocated to the cache file. Increasing this value will allow more and larger snapshots to be maintained.

- Usage

This column displays the current cache file use as a percentage of the cache size.

Click Configure from the Volume to modify the various aspects of PSM's volume attributes. Some of the fields will appear read-only if there are active snapshots. The Restore Defaults button will re-establish the system defaults. If it is desired to remove the cache files all together the CLEANVOL.EXE can be used to remove them; see the section on clearing the cache file. Also note the section on granular size in this chapter, prior to updating the percent reserved for cache size



**Caution:** Changing the values for the cache size can result in cache files that exceed the maximum cache file based on the current granule size. If the limit is exceeded "out of memory" notices appear in the event log and the WebUI status page when the first snapshot utilizing that cache file is taken. The snapshot will fail to create but the cache file is built regardless. It is important to reduce the cache file size via the screen or clean the cache files prior to the restart of the NAS system if an oversized cache file is created.

---

- Warning threshold reached when

This option defines the percentage of cache space which, when consumed, will trigger warning messages to the system event log.

- Begin deleting images when

This option defines the percentage of cache space which, when consumed, will trigger the automatic deletion of the oldest snapshot on the system. Automatic snapshot deletions are recorded in the system log.

- Cache size

This option specifies the amount of space allocated to the cache file. Increasing this value will allow more and larger snapshots to be maintained. Make sure that adequate space is available on the drive where snapshots are stored.





To manage snapshots

1. From the PSM Main screen select Persistent Images
2. Select the snapshot you want.
3. Choose one of the following tasks:
  - Choose New to create a new snapshot.
  - Choose Properties to view or change the image read/write attribute or retention weight.
  - Choose Delete to delete the image from the system.
  - Choose Undo to undo changes to a read/write image.

Snapshots may be created directly through the Persistent Images page. You can also use the Schedules page to schedule future or recurring snapshots.

To create a new snapshot:

1. From the PSM Main screen select Persistent Images.
2. In the Tasks list, choose New.
3. In the Volumes to include list, choose volumes to be included in the image.
4. Select the Read-only or Read/Write button.
5. Select a retention weight from the Retention weight list.
6. Type the image name in the Image name box.
7. Choose OK.

To delete a persistent image:

1. From the PSM Main screen select Persistent Images.
2. Select the snapshot you want to delete.
3. In the Tasks list, choose Delete.
4. Choose OK.

You can change properties such as the read-only attribute or preservation weight of an image.

To edit persistent image properties:

1. From the PSM Main screen select Persistent Images.
2. In the Tasks list, choose Properties.
3. Select a retention weight from the Retention weight list.
4. Select the Read-only or Read/Write button.
5. Choose OK.

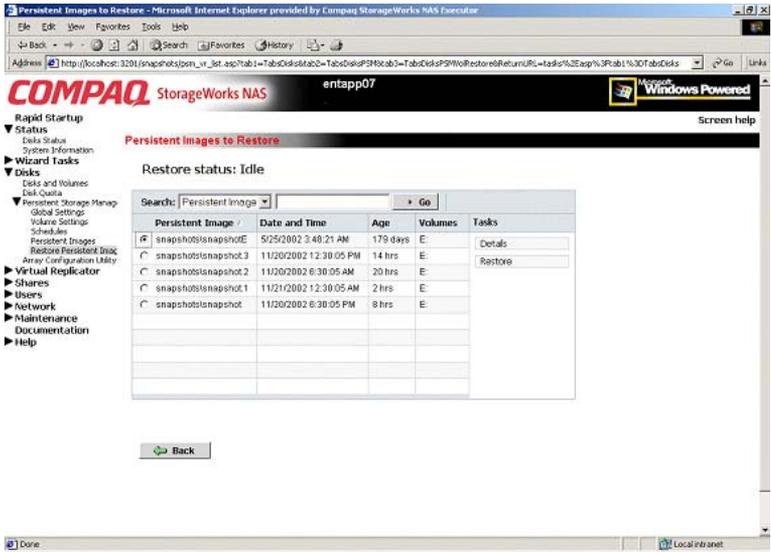
After you create a read/write snapshot, you can make changes to the image, for example, you can modify files in the image, add new files, or delete existing files. If you make a change to an existing image and later want to revert to the original file contents, you can use the following procedure to restore the original snapshot.

To undo snapshot changes:

1. From the PSM Main screen select Persistent Images.
2. Select the snapshot you want to restore to its original state.
3. In the Tasks list, choose Undo.
4. Choose OK.

# Restore Persistent Images Page

The Restore Persistent Images page displays a list of all persistent images. You can choose to view an image or restore your server appliance to an image you have previously created.



The Persistent Images to Restore page displays a list of all snapshots. You can choose to view an image or restore your server appliance to an image you have previously created.

To restore a snapshot:

1. On the PSM Main screen select Restore Persistent Images.
2. Select the snapshot you want to restore.
3. Choose Restore.
4. After selecting Restore the Are you sure screen will appear.
5. Choose OK.

---

**Note:** PSM will not allow the restoration of the system partition from a snapshot. No error is issued, it simply will not revert the volume. PSM protects the system partition against the revert operation, since it would potentially lead the operating system in an inconsistent state.

---

After a snapshot is created from the schedule you specify, it becomes a member of an image group. The Persistent Image and Group Information page can be accessed by selecting the desired snapshot and clicking Details on the Restore Persistent Images screen. The screen displays the following information about the image group:

- Image name and location on volume  
This field displays the name of the image and its path.
- Persistent image group name  
This field displays the name assigned to this group.
- Number of images in group  
This field displays the maximum number of images that can be included in the group.
- Volumes included in this image  
This field displays each volume included in the image.
- Image attributes  
This field displays the read-only or read/write attribute of the image.
- Retention weight  
This field displays the relative retention weight of the image.

- Most recent image in group  
This field displays the date and time of the image most recently added to the group.
- Oldest image in group  
This field displays the chronologically oldest image in the group.
- Next image in group to be deleted  
This field displays the date and time of the image that will be deleted next so the system can stay within the saved images limit.

# Additional Information

## Known Issues

The following are the known issues at time of publication.

### Event log error at cache full

The eventlog error a driver below this one has failed in some way may occur when the cached file is full.

### Display Error in WEBUI

Status events are not rendered properly in the WEBUI. The percent signs are not displayed value substitutions is missing in the displayed message

### Always Keep error at cache file full

If all your Persistent True Images on C:\ are tagged as Always Keep and the cache file fills up, the system may experience a blue screen at reboot.

It is not recommended to flag all Persistent True Images as Always Keep because this disallows the PSM deletion logic to delete the older Persistent True Images to free up cache file space.

### Improper display of default Cache File Size

You must delete all snapshots before changing the cache size

### Page file setting

The Page file size must not change and the initial size must be set equal to the maximum size. This setting is located in the Virtual Memory settings under System Properties.

### No Boot - No Revert

If the system cannot boot, a revert operation cannot be performed.

### Reverting of System Drive Prohibited

PSM does not provide the ability to revert the system boot drive.

## **No support for mount points in UNIX, Appletalk, or Netware**

Microsoft confirmed that the Microsoft NFS Services for UNIX, Services for Macintosh, and Services for Netware do not support volume mount points. These clients will not be able to access data on volumes mounted using a volume mount point. Since snapshots for a volume are mounted as directory junctions (mount points) and are shared, these clients will not be able to access the snapshots.

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

## For more information

Further information about the HP StorageWorks NAS Executor e7000 can be obtained from:

<http://www.compaq.com/products/storageworks/e7000/index.html>

Further information about the HP StorageWorks NAS b3000 can be obtained from:

<http://www.compaq.com/products/storageworks/b3000/index.html>

Further information about the HP StorageWorks NAS b2000 can be obtained from:

<http://www.compaq.com/products/storageworks/b2000/index.html>

Further information about SANworks Virtual Replicator can be obtained from:

<http://www.compaq.com/products/sanworks/vr/index.html>

