ActiveImage™ 2022
PROTECTOR

ActiveImage Protector 2022 CLUSTERPRO

Backup and Recovery Guide

3rd Edition — January 22, 2024

This guide provides description about the installation and operating procedures of ActiveImage Protector 2022 CLUSTERPRO (hereinafter “AIP”) in CLUSTERPRO cluster environment.
CLUSTERPRO is designed for two-node cluster, one for active server and the other for passive server.
For more detailed procedures, please refer to AIP Help and CLUSTERPRO User Guide.

Revision History

Edition	Revised on	Revised page	Description
1st Edition	2/21/2022		First Edition
2nd Edition	6/16/2022		Support for CLUSTERPRO X 5.0
3rd Edition	1/22/2024		Support for CLUSTERPRO X 5.1

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Introduction

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This document is not officially provided by NEC Corporation. Any information included in this document is provided solely on informational purposes and Actiphy shall not be liable for technical or editorial errors or omissions contained herein.
This document provides general descriptions for standard settings to use CLUSTERPRO and ActiveImage Protector that may not be applicable to a specific system environment or operation. You will be solely responsible for the installation, the use, the operation of the product in your customer's system environment.

This document is intended for the system engineers who are engaged in an effort to design and introduce a new system or the system administrators and maintenance staff who are engaged in maintenance and operational management of the existing system.
The readers of this document are supposed to have specialized expertise about Windows Server operating system and computer literacy.

This document provides the minimum of the required information for the operation of ActiveImage Protector and CLUSTERPRO. For more detailed information about the operating procedures, please refer to the manuals for the respective products.

The screen images included in this document provide only examples of the settings but may differ from the actual appearance.

1. System Requirements

It is highly recommended that you read this document carefully before using this product.
* For the latest system requirements, please visit here

■ Hardware

・CPU:
Pentium 4 or above

・Main Memory:
2048MB or more is required.

・Hard Disk Space:
650MB or more of available hard disk space is required.

・DVD-ROM drive:
Needed to install, boot, or start up the ActiveImage Protector boot environment.

・Internet Connection:
Required for activation of the product and installation of the latest updates.

■ Operating System and Supported CLUSTERPRO

・CLUSTERPRO X 5.0 / 5.1 for Windows :
Windows Server 2022
Windows Server 2019
Windows Server 2016

・CLUSTERPRO X 4.3 / 4.2 / 4.1 for Windows :
Windows Server 2019
Windows Server 2016
Windows Server 2012 R2

・CLUSTERPRO X 4.0 for Windows
Windows Server 2016
Windows Server 2012 R2

■ File System

・Hot Imaging
FAT16, FAT16X, FAT32, FAT32X, NTFS, CSVFS, ReFS

* The above listed file systems on MBR and GPT disks are supported.
* The above listed file systems on storage spaces configured on Windows 8 or later OS are supported.

・Cold Imaging in Boot Environment (Linux)
FAT16, FAT16X, FAT32, FAT32X, NTFS, Linux Ext2, Linux Ext3, Linux Ext4, Linux Swap, Linux LVM

・Cold Imaging in Boot Environment (Windows PE)
FAT16, FAT16X, FAT32, FAT32X, NTFS, ReFS, Linux Ext2, Linux Ext3, Linux Ext4, Linux Swap
* File system on Storage Space and ReFS are supported only if the boot environment is created by using Windows ADK that supports the file system.
* By using Windows ADK or Windows AIK, the boot environment may be created through

■ Storage Interface

・Parallel ATA, Serial ATA (including eSATA), SCSI, SAS, iSCSI, SAN (Fibre Channel), USB, FireWire (IEEE 1394), network shared folders compatible with file sharing SMB/CIFS protocol (shared folders of Windows OS and Samba), virtual hard disk created in storage space
* Storage media of which sector size is 512 byte or more is supported.

■ Features not supported in CLUSTERPRO X Environment

・vStandby
・HyperBoot
・Virtual Conversion
・BootCheck (Post Backup Process)
・HyperBack / HyperStandby / HyperRecovery
・In-Cloud Recovery / In-Cloud Standby
・QuickRecovery / Recovery Media Maker

■ Others

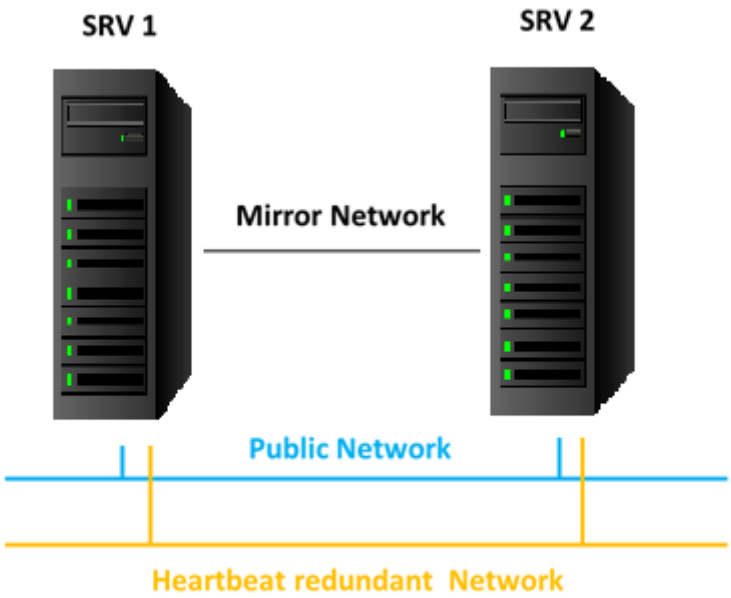
・Intel Itanium (IA-64) based systems are not supported.
・Inline Deduplication Compression
- Volume that has available space of 1% or more of the total volume size of backup source is required other than the storage space for backup image files.
- Dual Core or above CPU (recommended)
- 8GB or more main memory (recommended)

2. Configuration Example

This user guide provides backup and recovery procedures based on the following system environment.

Configuration Example

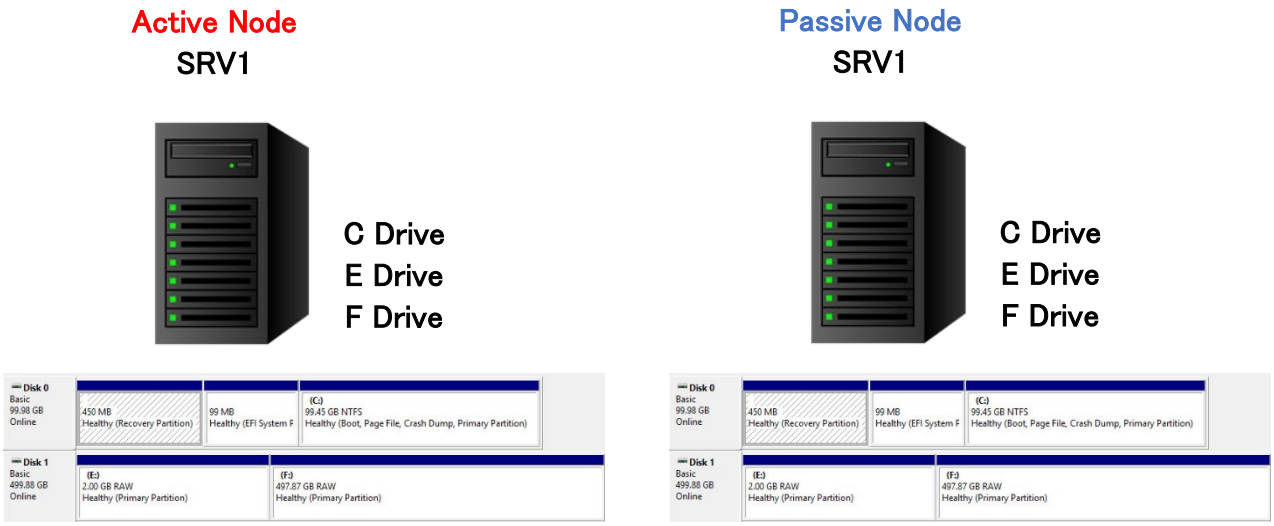
Server	SRV1	SRV2
Public Network IP Address	192.168.0.41	192.168.0.42
Mirror Network IP Address	172.16.0.41	172.16.0.42
Heartbeat Redundant Network IP Address	192.168.10.41	192.168.10.42
Cluster Partition	E Drive	E Drive
Data Partition (Mirror Drive)	F Drive	F Drive



The following recovery procedures are described assuming that the system failure occurs on SRV 1, failover to SRV 2 takes place, restore of SRV 1 and cluster configuration is performed.
The operating procedures are provided by using ActiveImage Protector (hereinafter “AIP”).

3. Before Backing up CLUSTERPRO

Before you start backing up CLUSTERPRO cluster environment, please note that the data partition on passive server is RAW (file system) that cannot be backed up.
For example, suppose that SRV1 is configured as the active server and SRV2 as the passive server. Because the data partition on the passive server is RAW partition, the use of Explorer does not allow you to browse in the data partition.



Referring to the above disk management window, the drive letters and file system information are displayed for the active server. On the other hand, because the data partitions on the passive server are RAW partitions, you are not allowed to monitor the status.
Therefore, the sector information of the drive is not readable on the passive server and backup is not allowed.
The use of AIP's Backup feature by enabling [Ignore inaccessible volumes] option that prevents backup task interruptions when an inaccessible volume is encountered and allows the backup task to be completed.

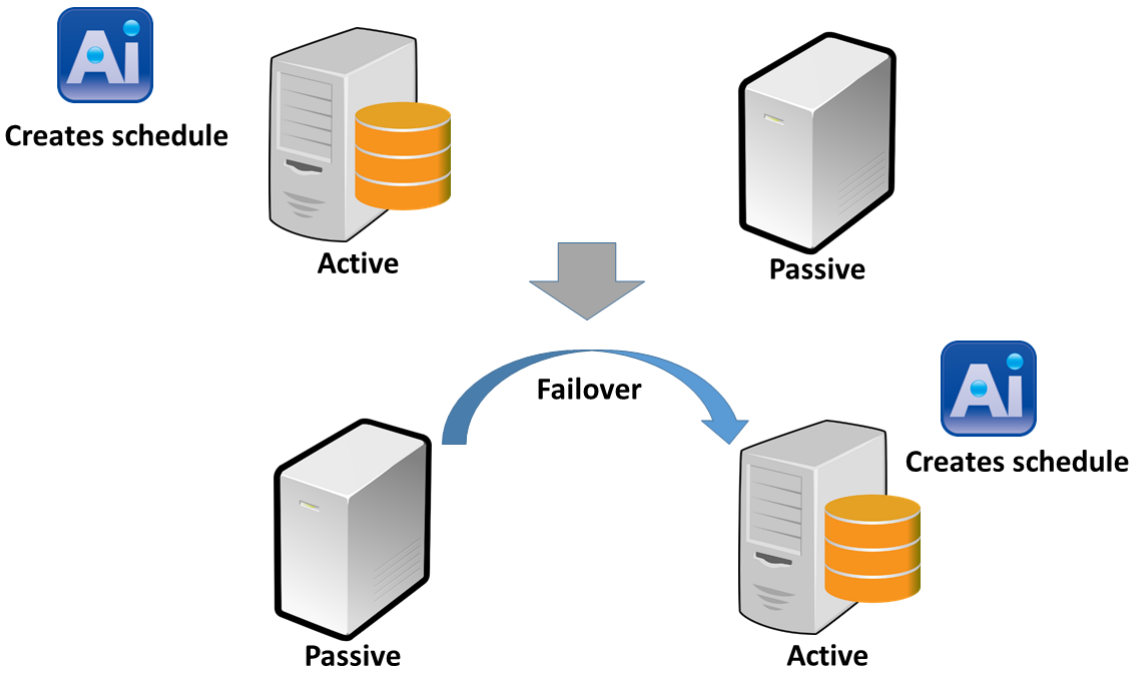
4. AIP Backup Feature

4.1 Backup Feature

Please install AIP on both active and passive servers.
For more detailed AIP installation procedures, please refer to [Install and Start ActiveImage Protector] in AIP Help.
If cluster environment is already configured by using CLUSTERPRO, the data partition must be placed online to read the drive information. To run AIP backup task or to create a schedule, please make sure that the data partition is placed online.
*For the detailed operating procedures, please refer to ActiveImage Protector or CLUSTERPRO User Manual.

Summary of Operating Procedures
(1) Create a schedule on the active server
(2) Manually perform failover
(3) Create a schedule on the active server after switchover as a result of failover
(4) Manually perform failover and restore the active server back to the active node

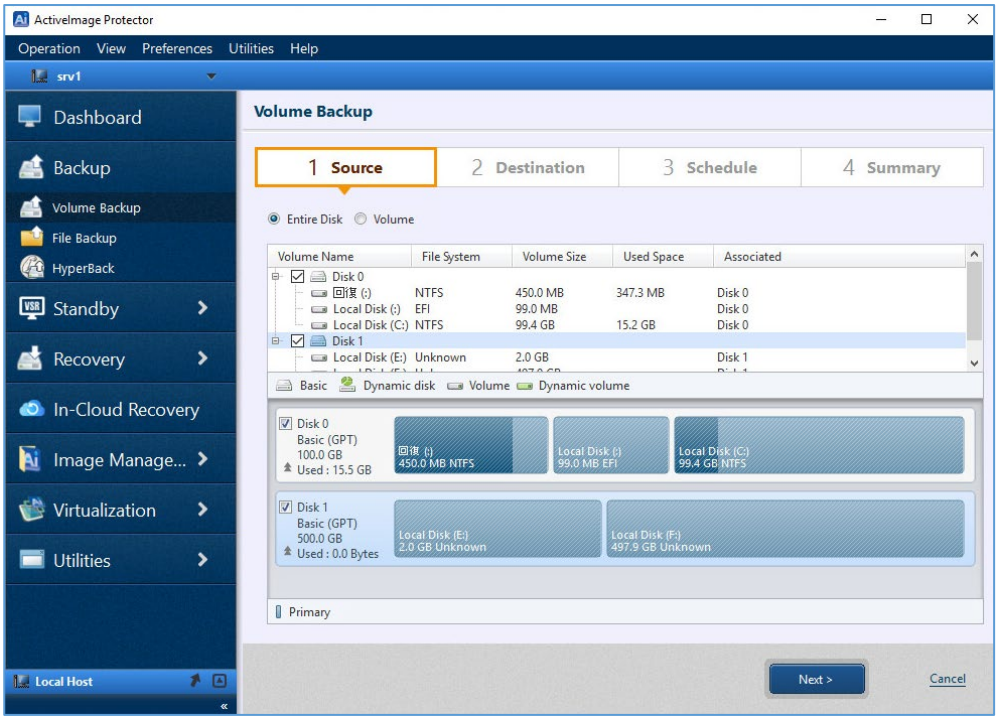
Create Backup Schedule



Once a schedule is created while the data partition is readable, backup task normally runs on passive server.

4.2 Backup Operating Procedures

1. Go to [Backup] – [Volume Backup] in AIP menu to launch Backup wizard.

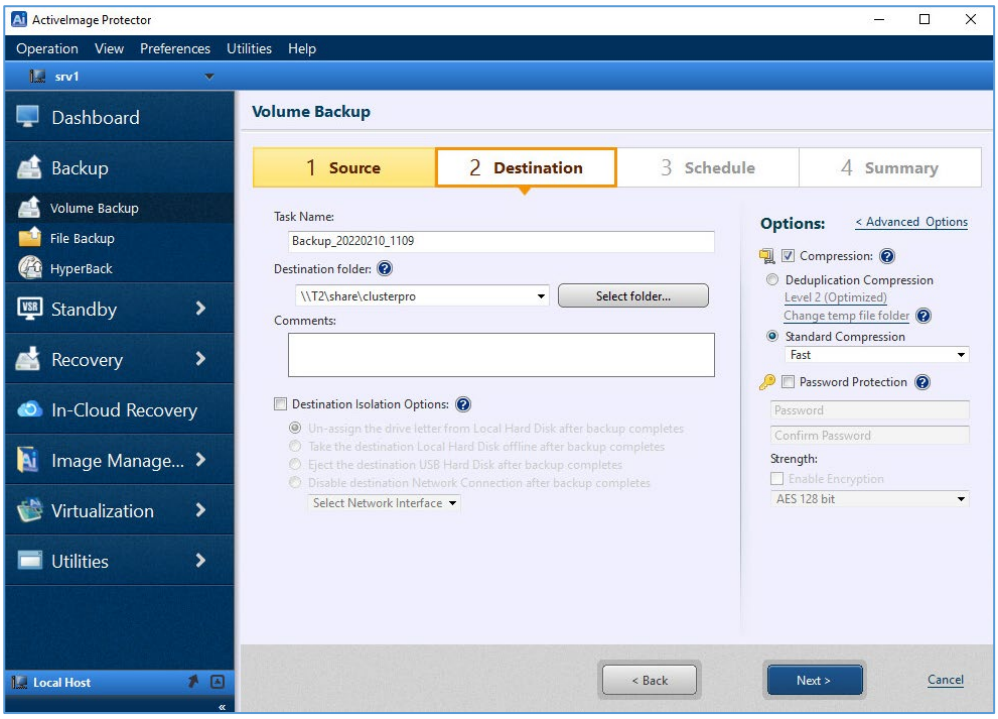


When backing up the system in uEFI environment, please back up uEFI system volume as well as the Windows system volume since uEFI system volume has to be restored before restoring Windows system volume.

You are recommended to back up the entire uEFI system disk, so that the backup image of the entire disk will be restored.

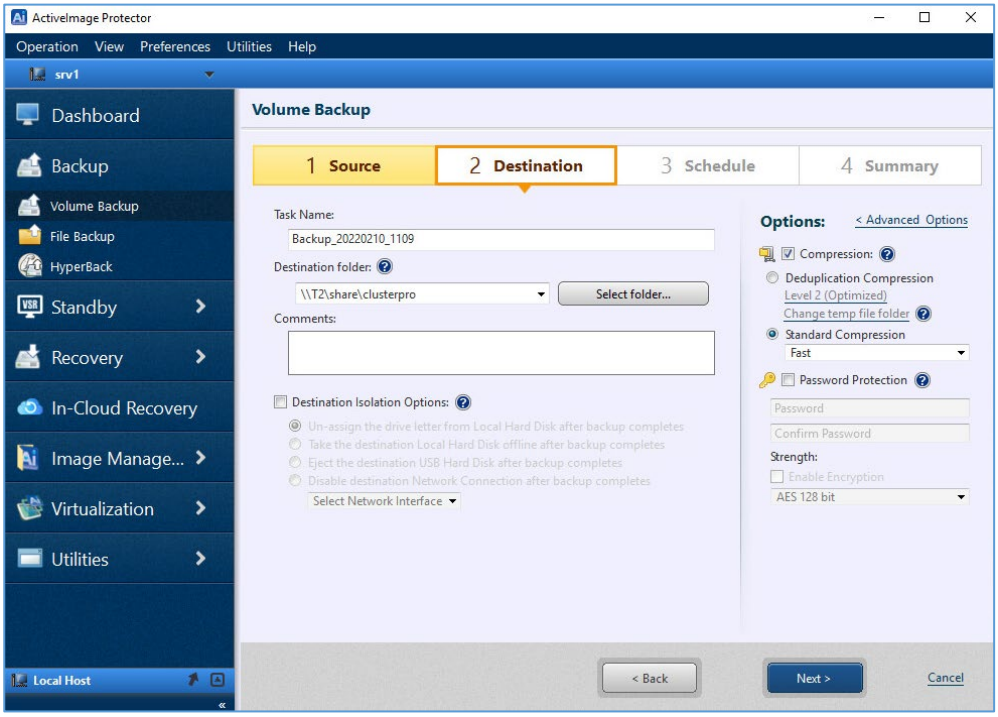
Also, please remember to back up the cluster partition together with mirror disk by selecting [Entire Disk].

2. Select Destination



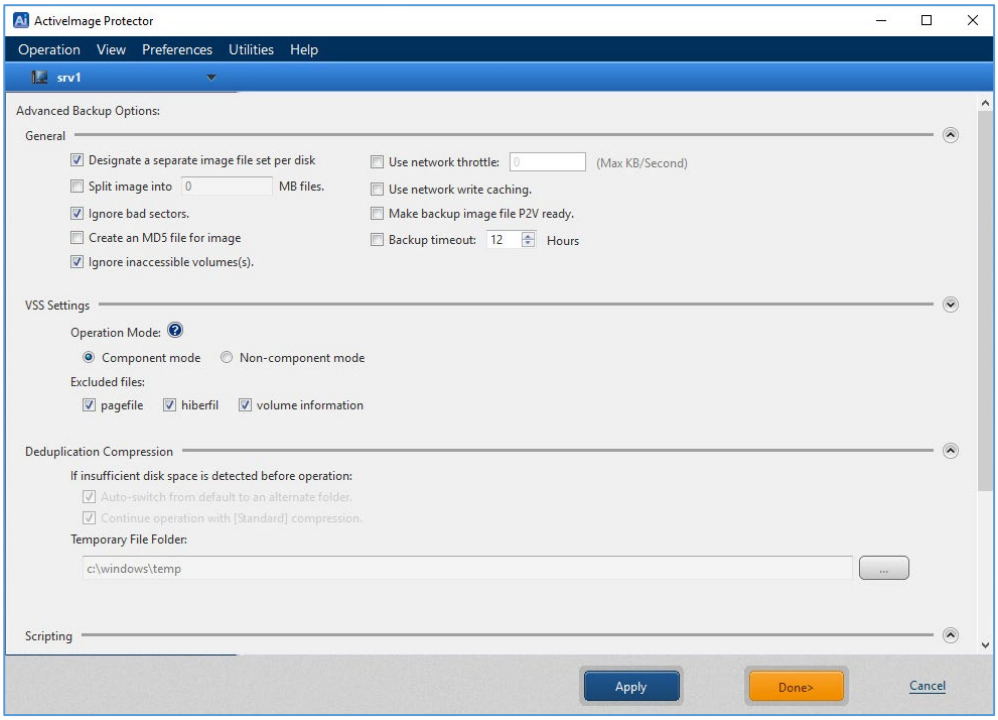
Please click on "Select Folder" to specify where you want to save the image.

3. Image Option



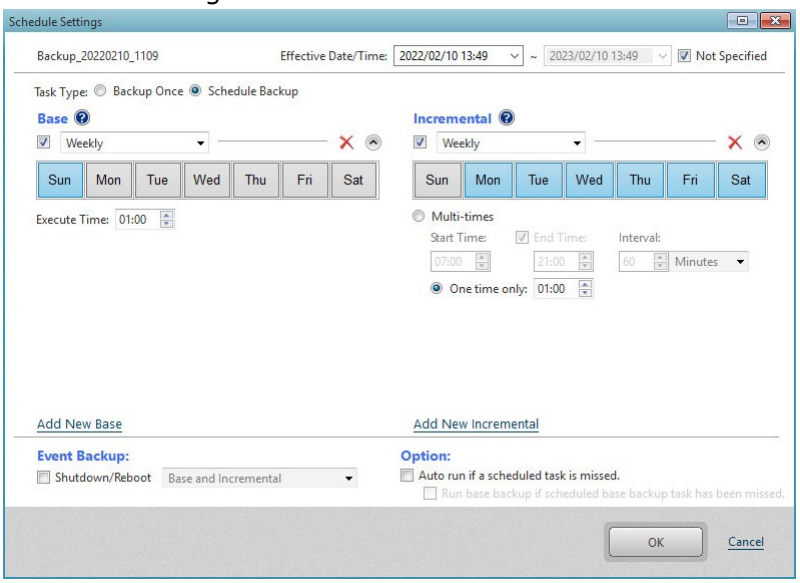
Click [Advanced Options] at the upper right corner in the right pane.

4. Advanced Backup Options



Make sure that the "Designate a separate image file set per disk" option is enabled.
Enable [Ignore inaccessible volumes] option (enabled by default). If non-VSS-compliant application or database is up and running, please use Scripting feature to stop the service or a process before taking a snapshot.

5. Schedule Settings



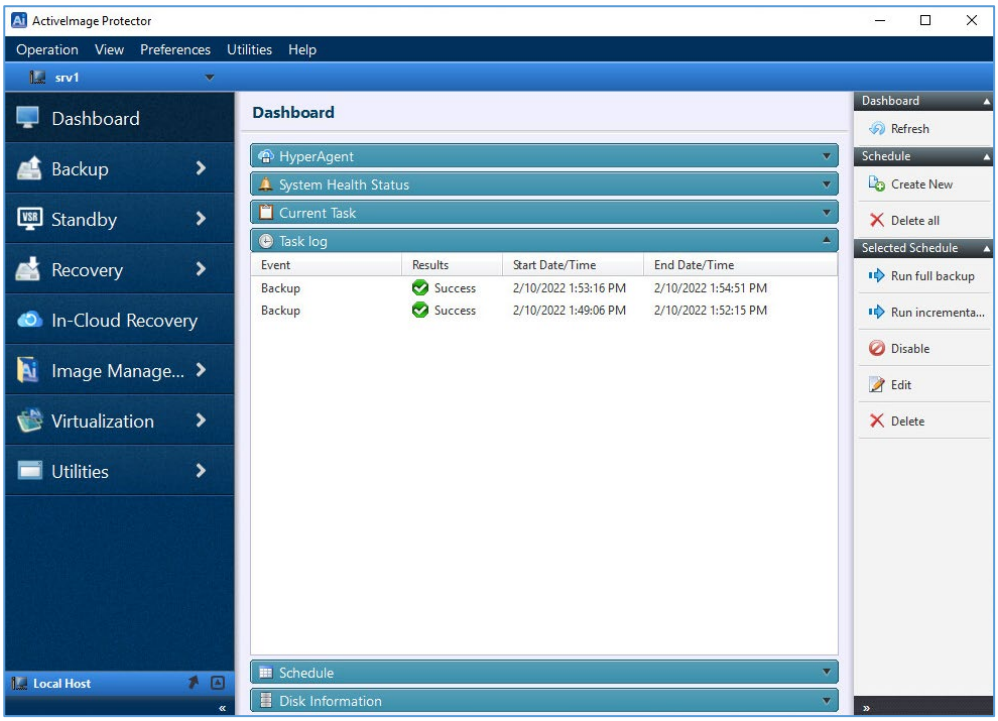
Configure the schedule settings depending on your system environment.
For more detailed operating procedures, please refer to [Backup] – [Create Backup Schedule] in AIP Help.

6. Create Backup Schedule on Passive Server
Manually perform failover and create backup schedule on passive server.

4.3 Check backup task behavior

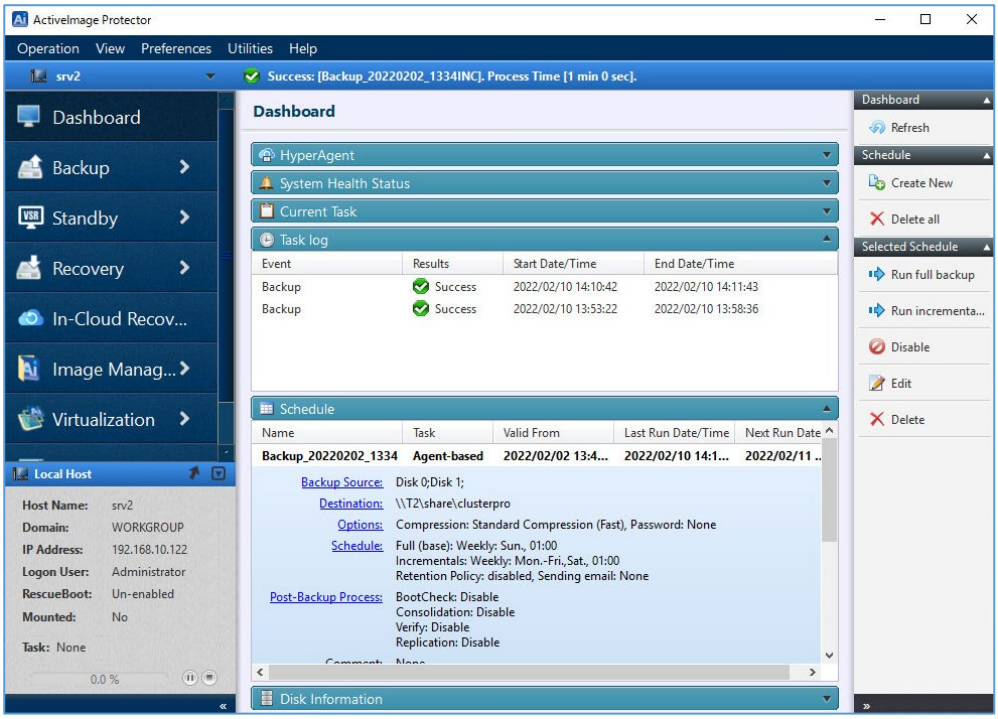
Run Full (Base) Backup according to the schedule configured for the both servers and make sure that the tasks successfully completed.
Upon completion of the backup task, you can monitor the task log from AIP Console.

Backup Event on Active Server



You can make sure that backup images are created and “Success” is displayed for active server.

Backup Event on Passive Server



On the passive server, though you cannot browse in data partition, “Success” is indicated.

If a backup image of the mirror drive of passive server is not created yet, execution of the first backup task creates a full backup file. When other disks (volumes) such as the system disk are included in backup source, a full backup image file will be created instead of an incremental backup.

5. Recovery Operating Procedures

Take the following are the steps to restore CLUSTERPRO cluster environment.

- Restore the system from backup file.
- Restore the mirror drive from backup file

CLUSTERPRO Recovery Approaches

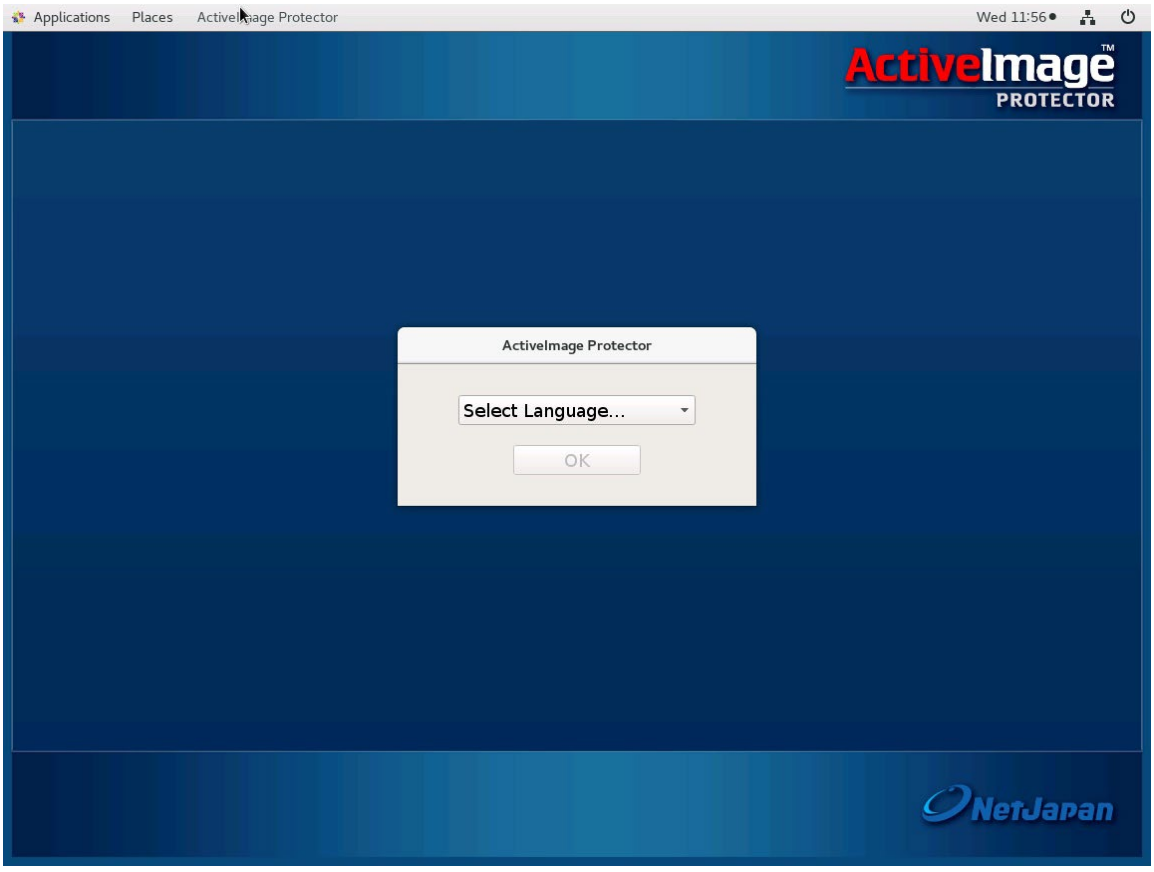
Recovery Approach	Requirements
Restore the system	AIP backup image of the system is created.
Restore data in mirror drive	AIP backup image is created.

5.1 System Recovery Procedures --- AIPBE Linux-based boot environment ---

To restore the system, you need to boot your machine into AIP boot environment (by using AIP's media) while the OS is shut down. If the OS is up and running, please shut down the OS and boot up AIP boot environment.

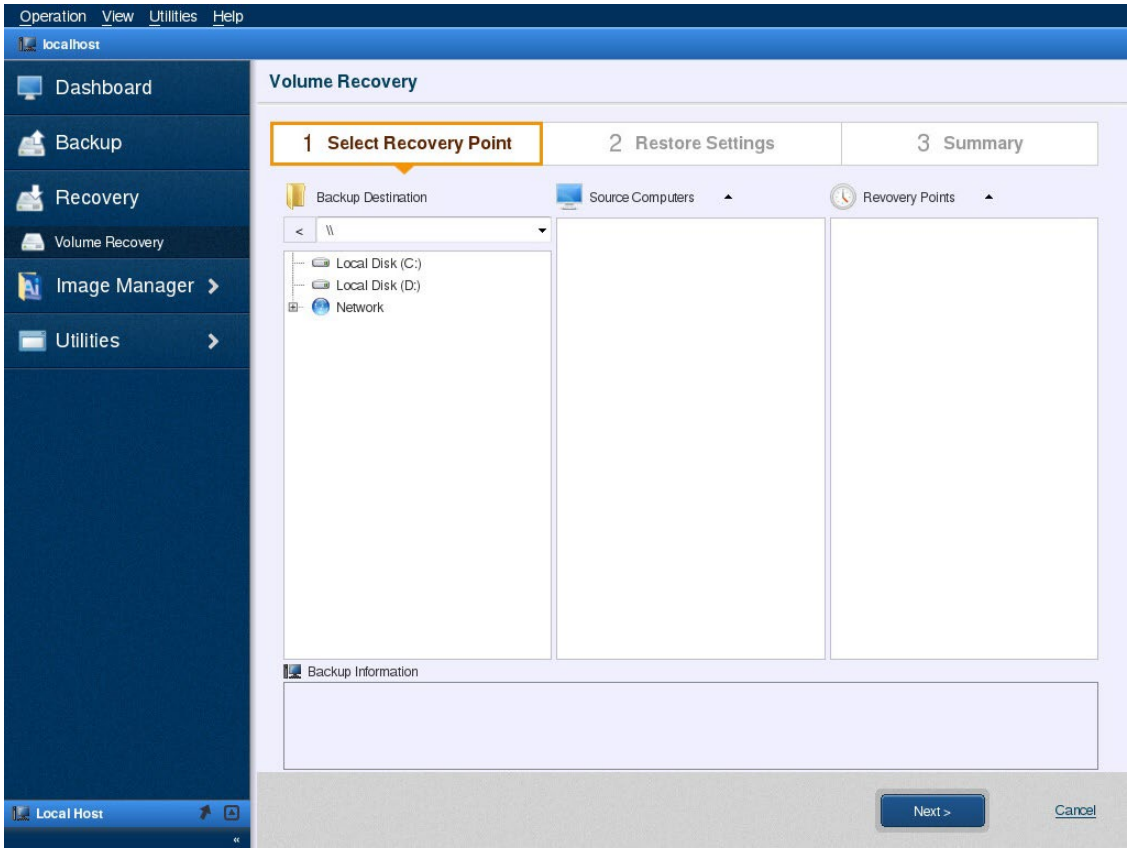
*For more detailed operating procedures, please refer to ActiveImage Protector User Guide.

1. Boot up AIP boot environment



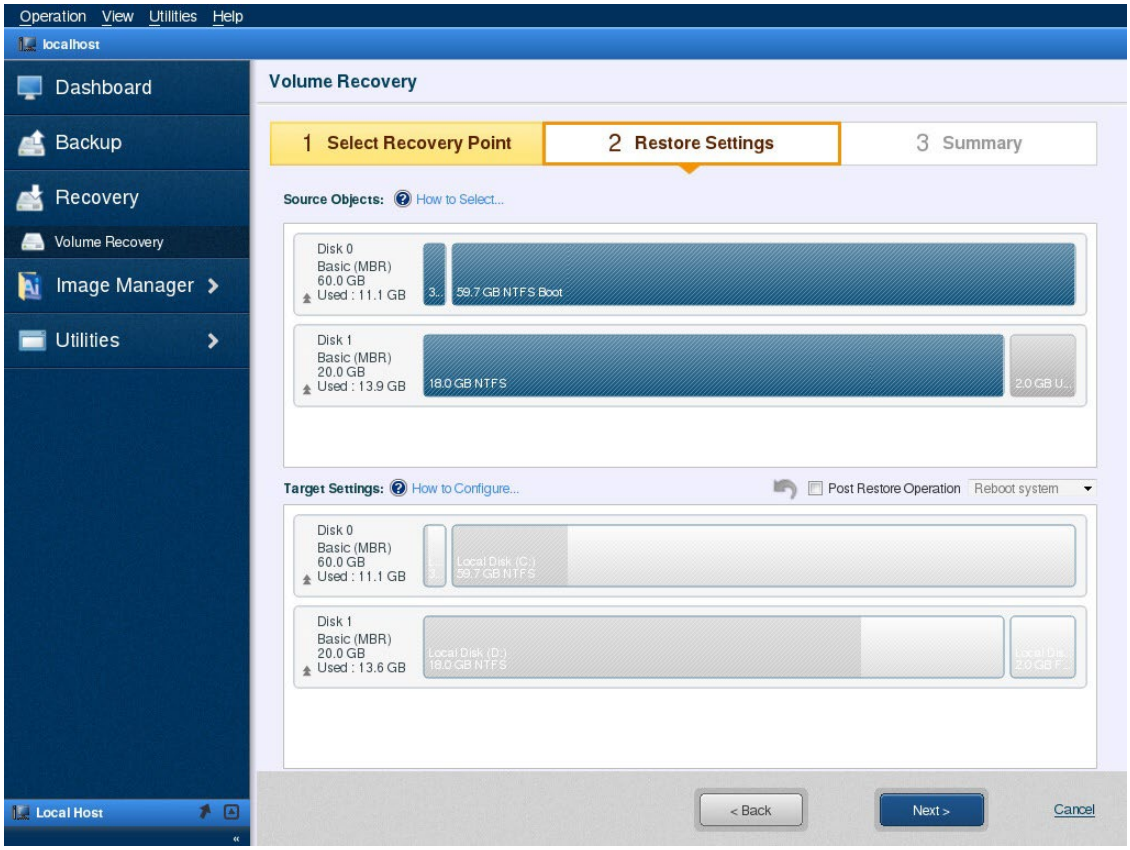
Boot up AIP Boot Environment by using AIP media.

2. Go to [Recovery] – [Volume Recovery].



Select an image file to restore.

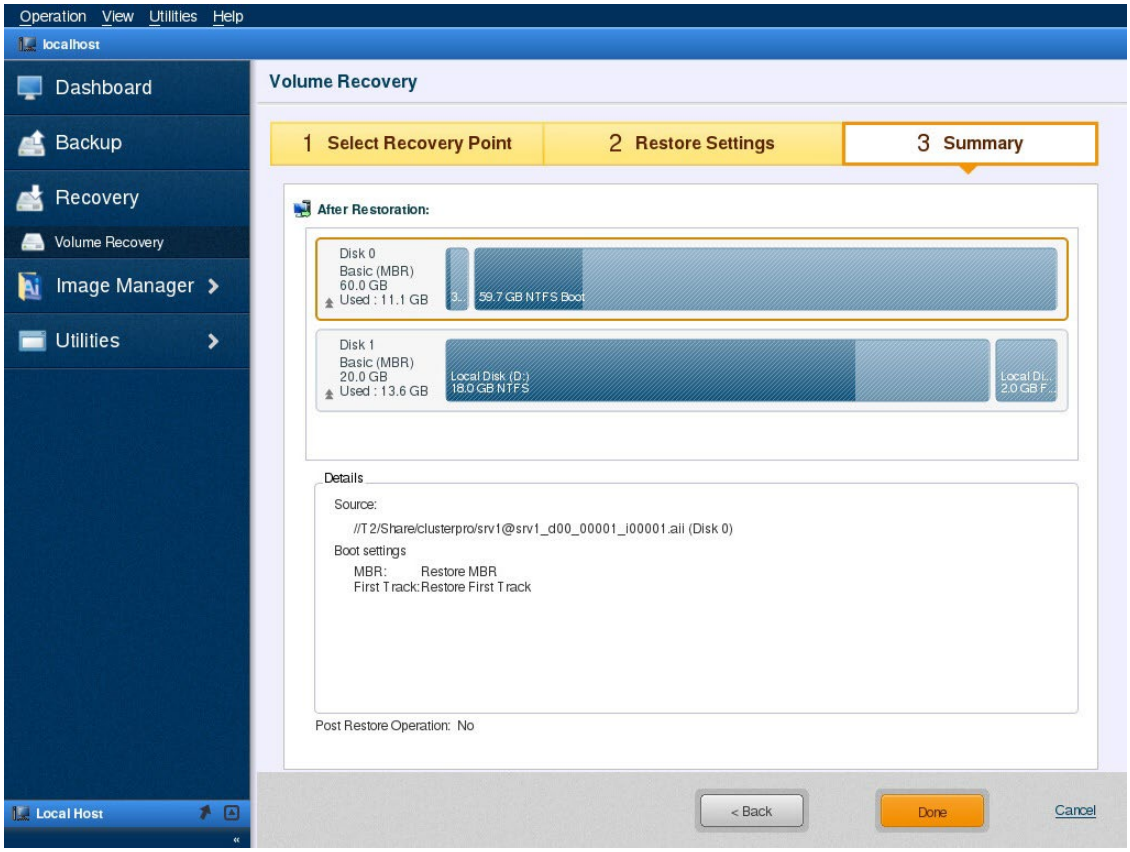
3. Restore Settings



Drag and drop the source object to the restore target disk.

If the source object disk includes the system only, please select the entire disk. If the disk includes the system volume as well as data partition, please select the system volume in the disk. (Please do not restore the cluster partition.)

4. Summary



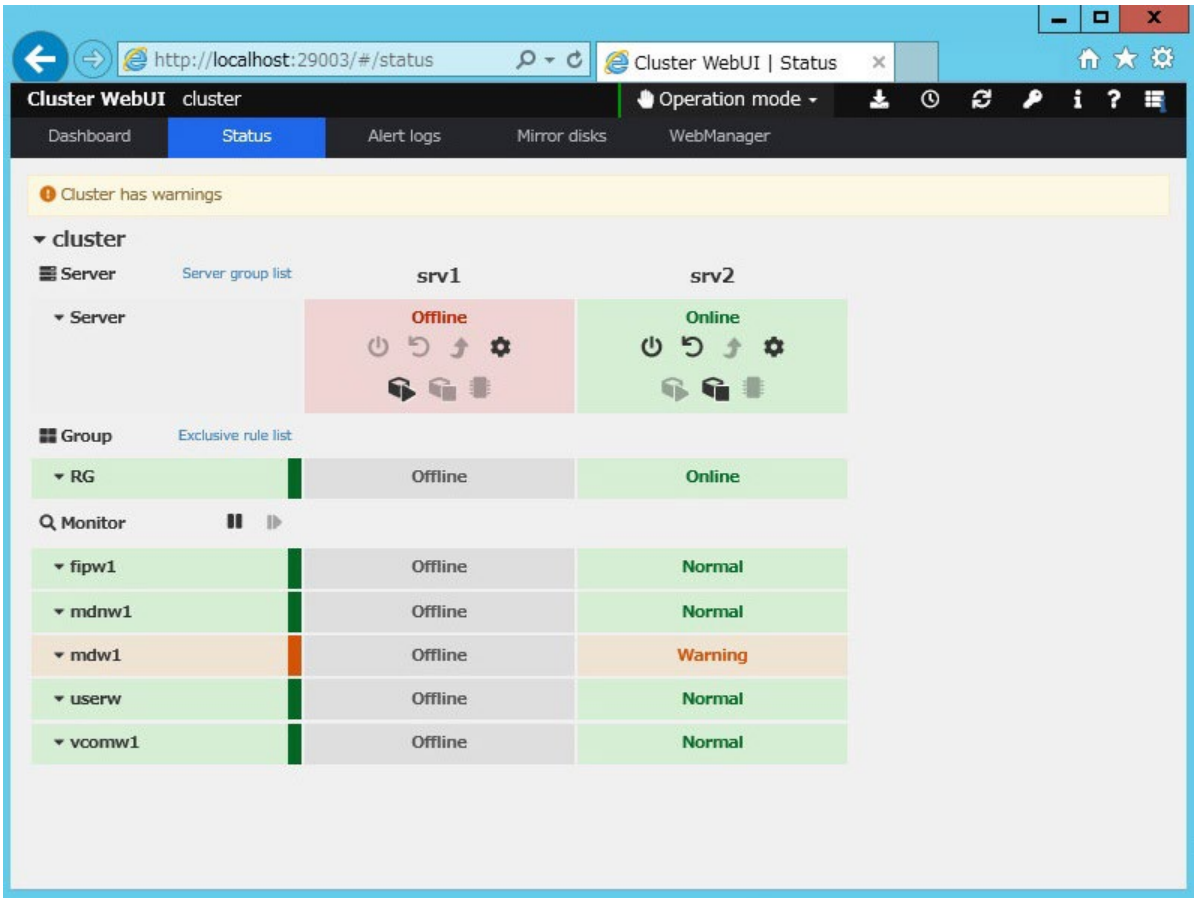
Please review the summary and make sure that no changes are required. Click [Done] button to start recovery process.

5. Reboot boot environment.
   Upon successful completion of the restore task, exit AIP boot environment and reboot the system again.

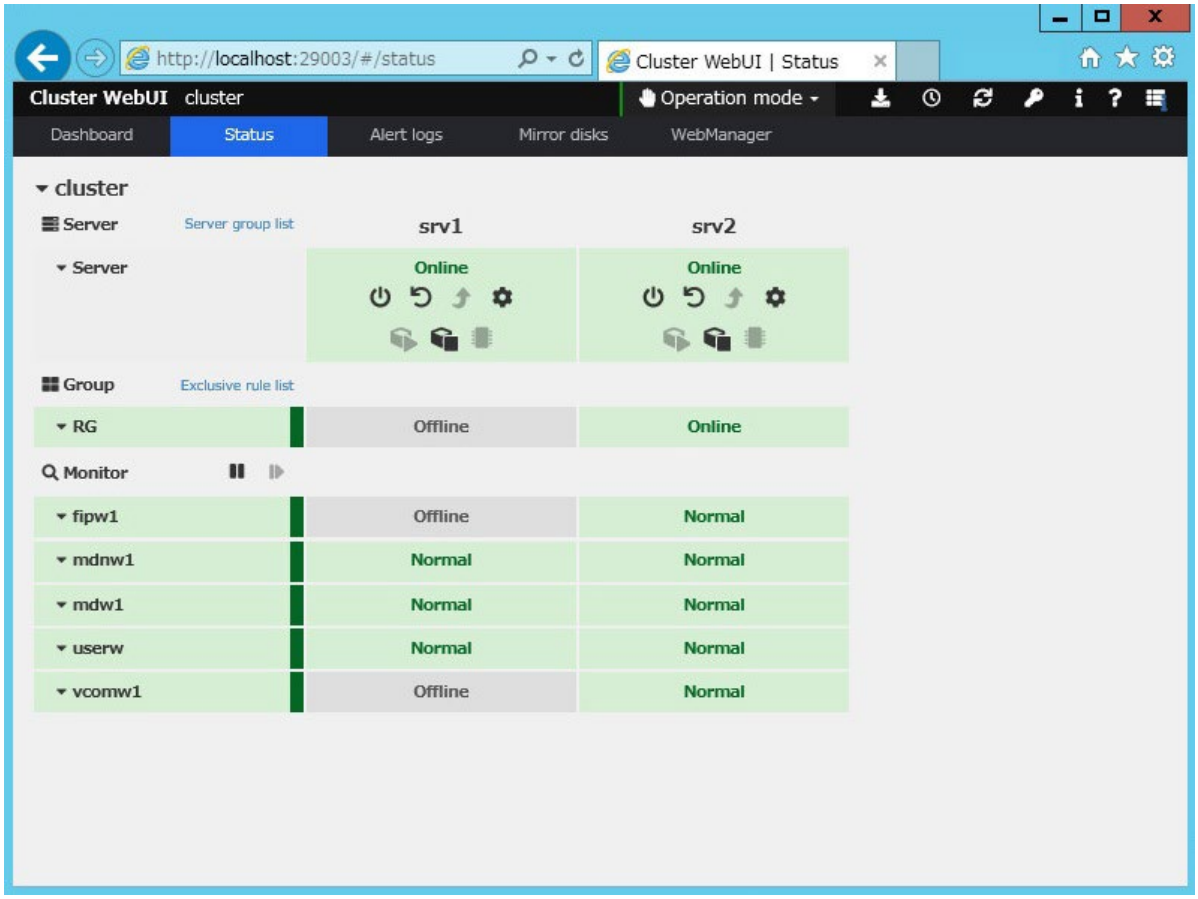
This is the end of the recovery operating procedures with AIP. Please find the operating procedures with CLUSTERPRO as follows.

6. Recovery of CLUSTERPRO cluster environment
   When the restored OS completely boots up, CLUSTERPRO Console status is displayed as follows.

Restore status of one server OS



Status after differential data synchronization between two servers



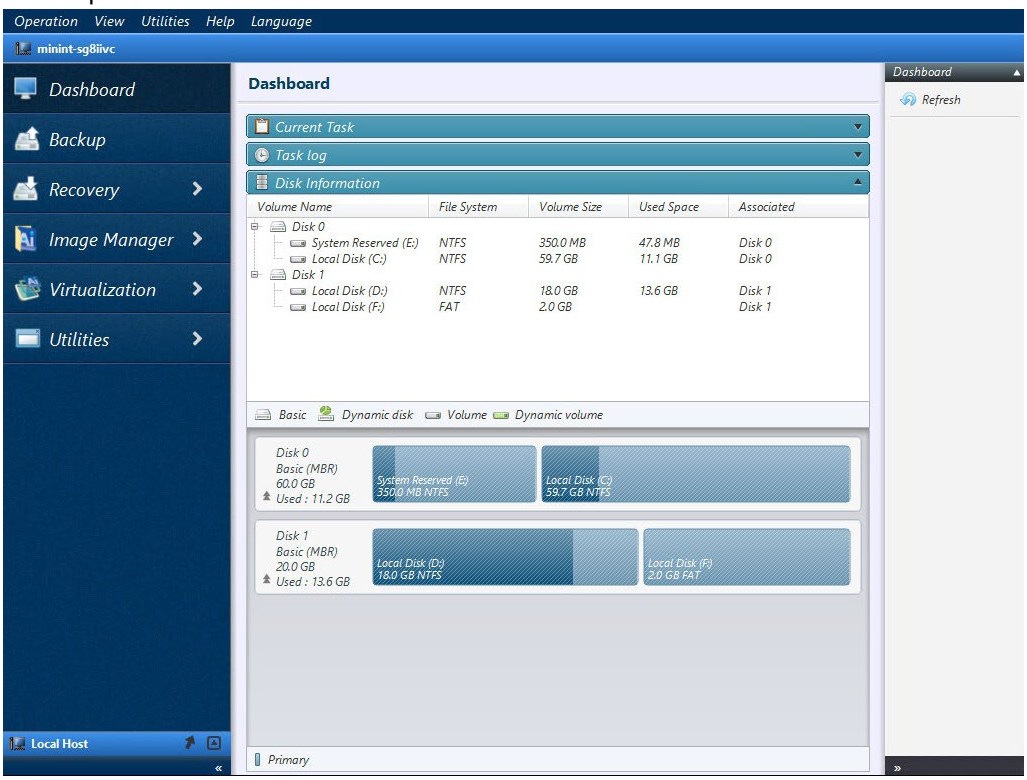
Upon completion of differential data synchronization, the status is indicated in green. The difference copy log is recorded for the alert log.

5.2 System Recovery Procedures --- AIPBE Windows PE-based boot environment

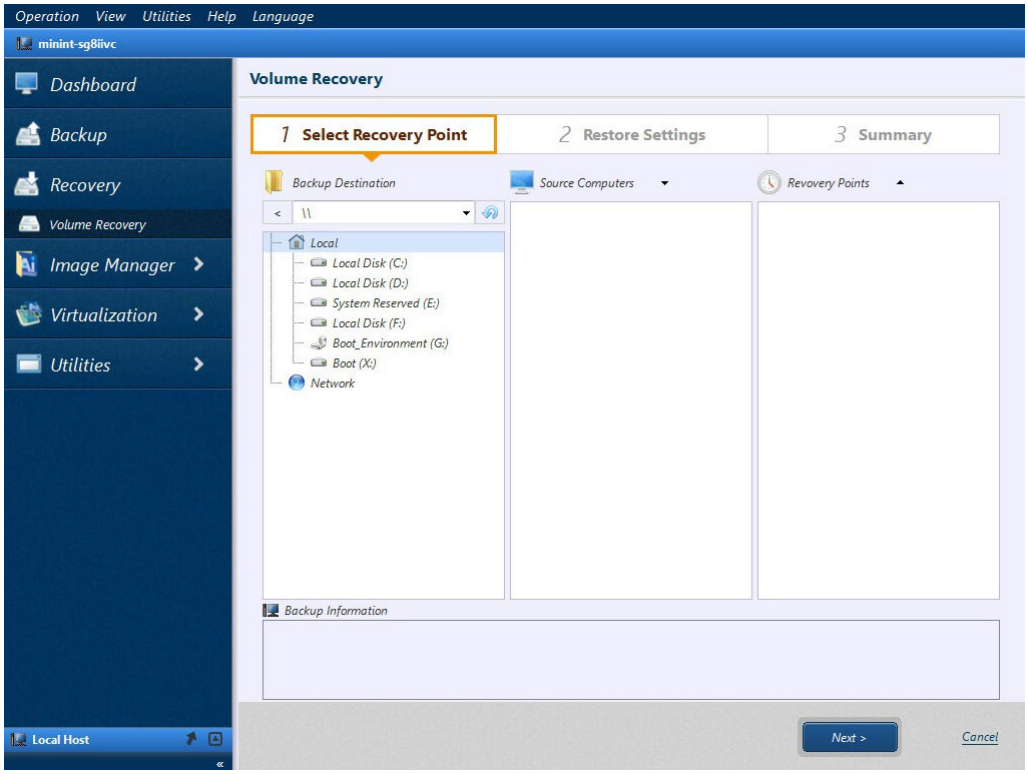
To restore the system, you need to boot your machine into Windows PE-based boot environment while the OS is shut down. If the OS is up and running, please shut down the OS and boot up Windows PE-based boot environment.

*For more detailed operating procedures, please refer to ActiveImage Protector User Guide.

1. Boot up Windows PE-based boot environment

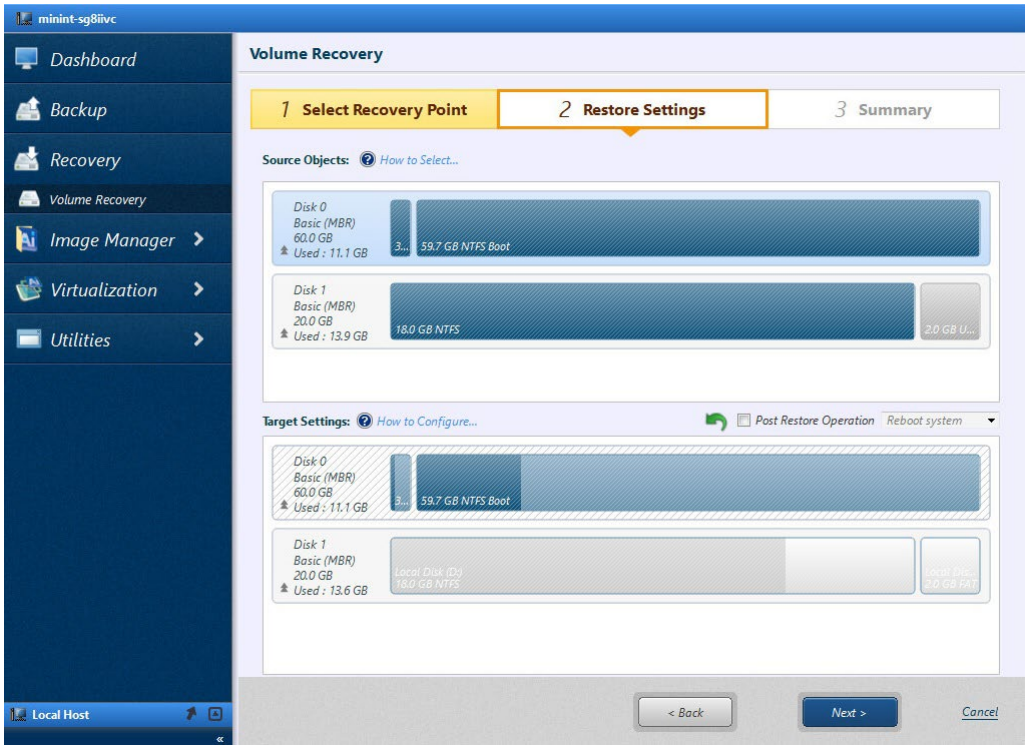


2. Go to [Recovery] – [Volume Recovery].



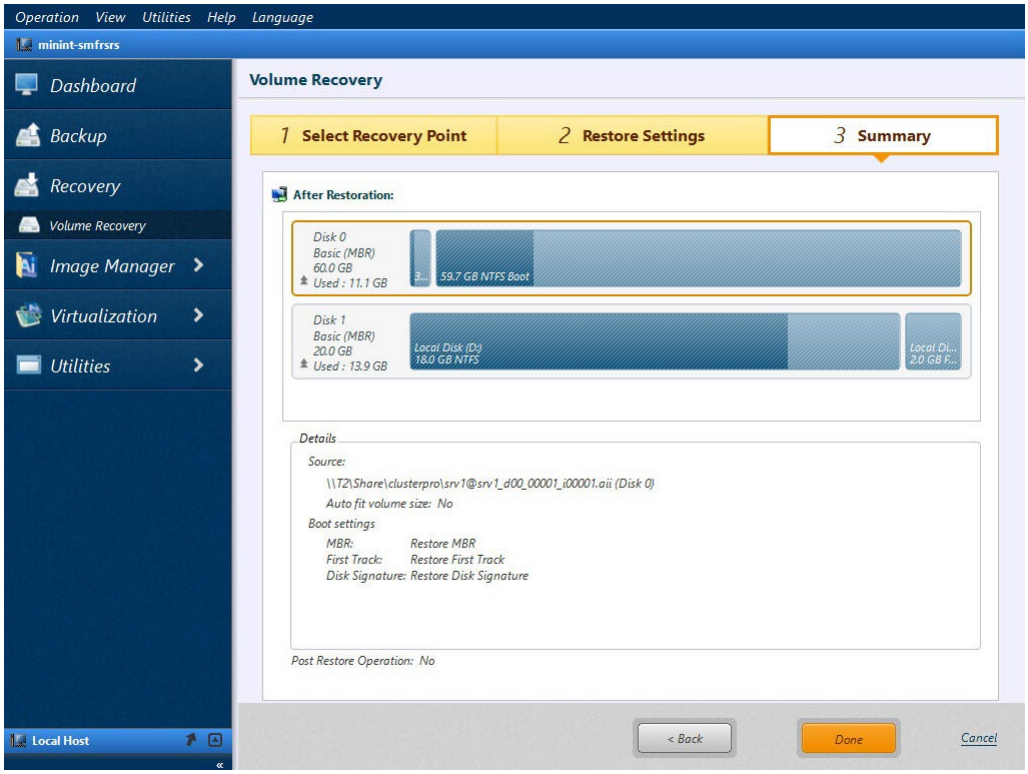
Select an image file created at the point in date/time to restore to.

3. Restore Settings



Drag and drop the source object to the restore target disk (or right-click the source object). If the source object disk includes the system only, please select the entire disk. If the disk includes the system volume as well as data partition, please select the system volume in the disk. (Please do not restore the cluster partition.)

4. Summary



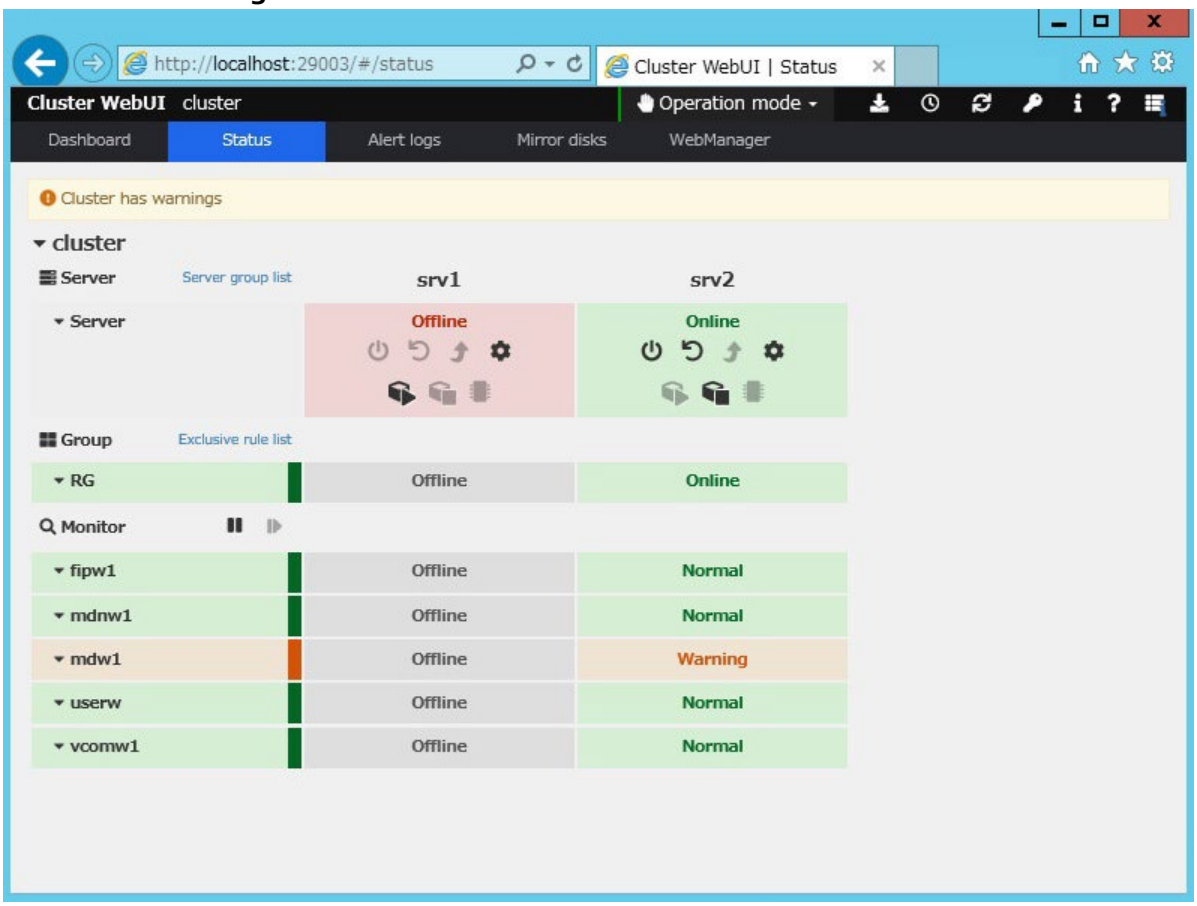
Please review the summary and make sure that no changes are required. Click [Done] button to start recovery process.

5. Reboot boot environment.
   Upon successful completion of the restore task, exit AIP boot environment and reboot the system again.

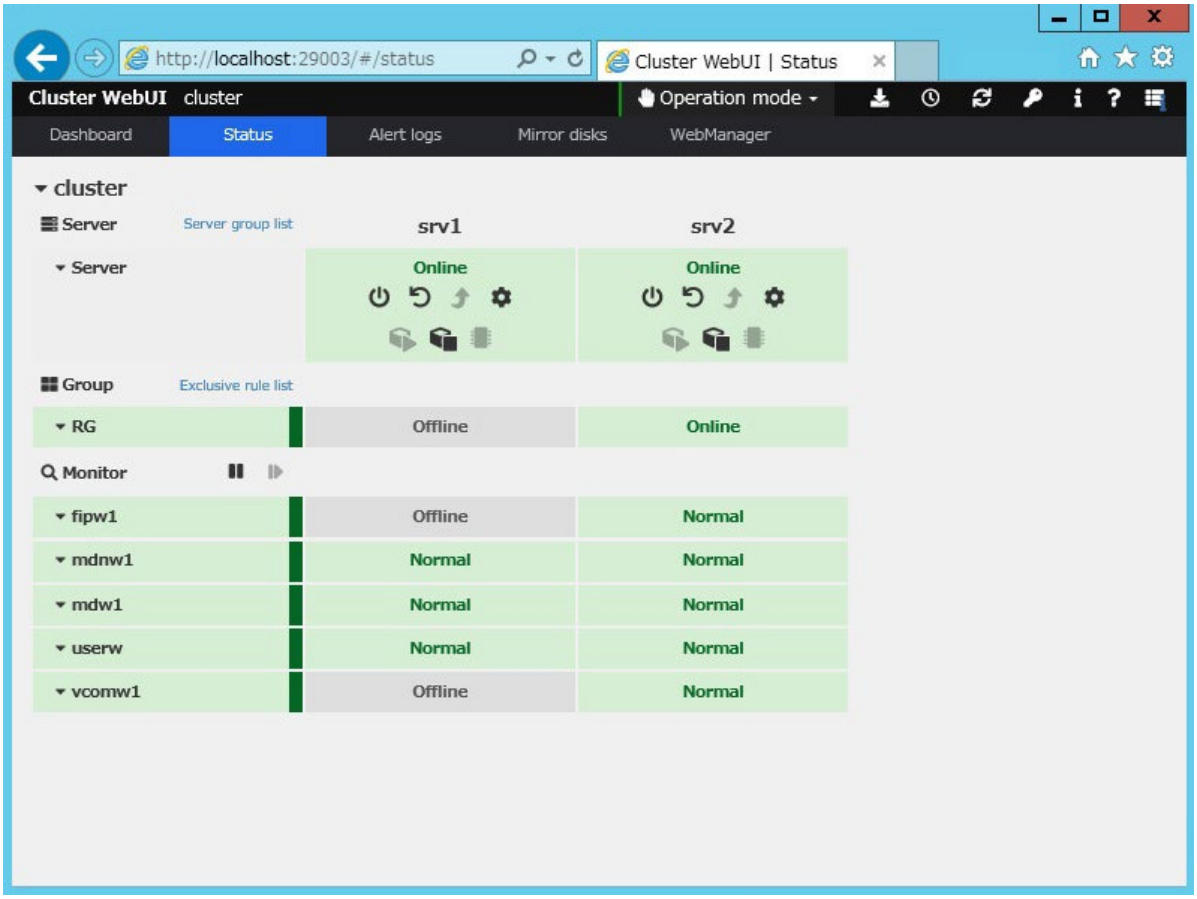
This is the end of the recovery operating procedures with AIP. Please find the operating procedures with CLUSTERPRO as follows.

6. Recovery of CLUSTERPRO cluster environment
   When the restored OS completely boots up, CLUSTERPRO Console status is displayed as follows

Status of restoring one server OS



Status upon completion of differential data synchronization between two servers



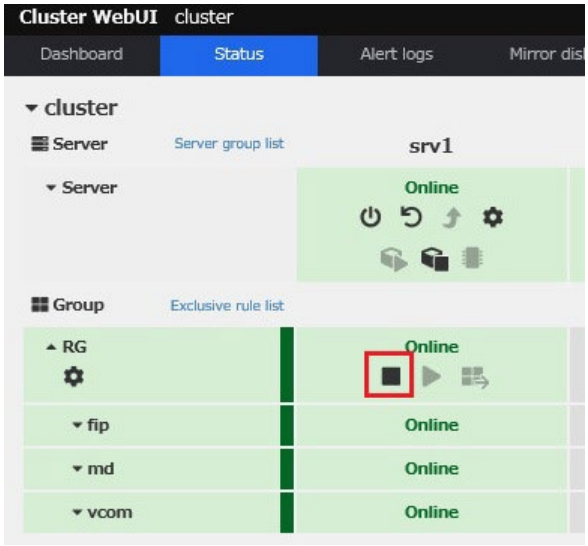
Upon completion of differential data synchronization, the status is indicated in green. The difference copy log is recorded for the alert log.

5.3 Data Partition Recovery Procedures

In the event of data loss in data partition such as corruption of data, deletion of data by mistake, AIP Hot Restore feature enables you to restore the entire data partition or a specific file.

As Cold Restore of data partition updates the sector information, which the mirror driver is not aware of, the data integrity between the both servers is not assured. Before you start Cold Restore, please make sure that both servers are synchronized when the system boots up.

1. Stop Group



Select [Stop] button to stop the group before starting to restore the data.

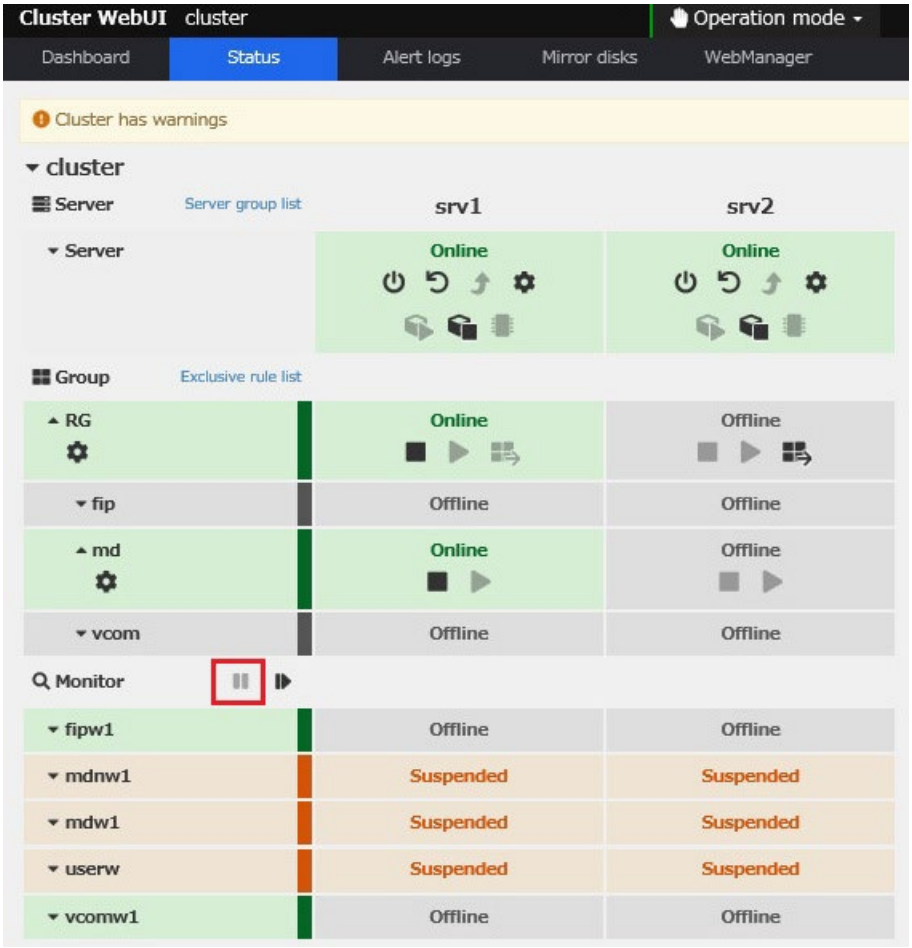
＊From this point, the group is inaccessible from client.

＊Please make sure that the group is stopped before starting restore process. Otherwise, if database or an application is running on data partition, the data integrity is not ensured. As a result database or the application may crash.

2. Start mirror disk resource.

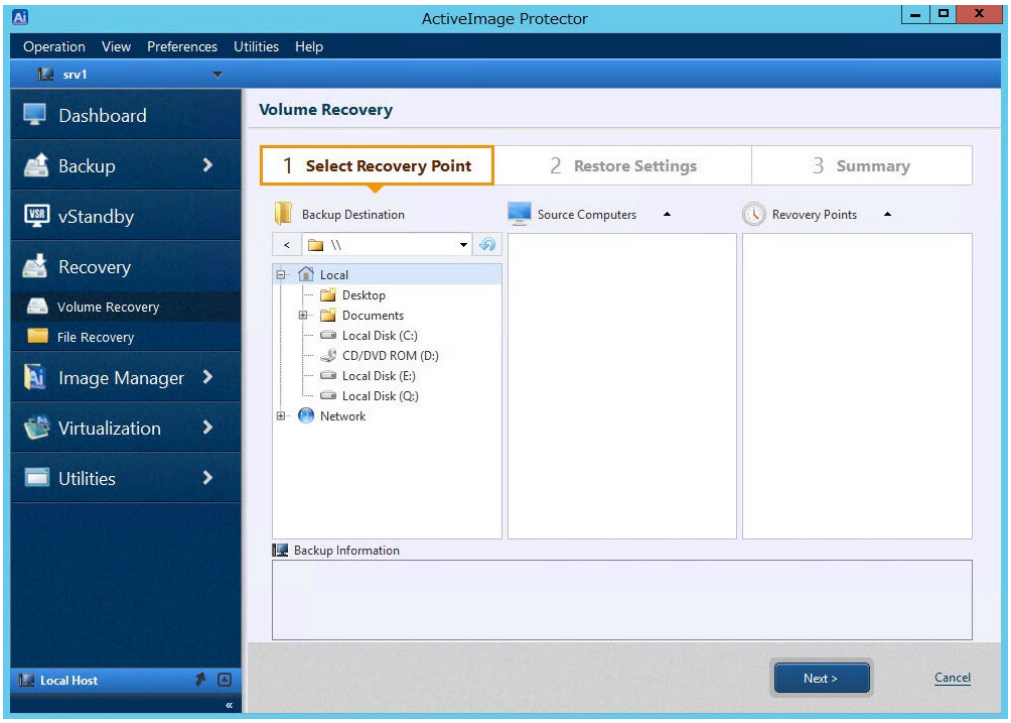
Start mirror disk resource on the restore target server.

3. Suspend every monitor.



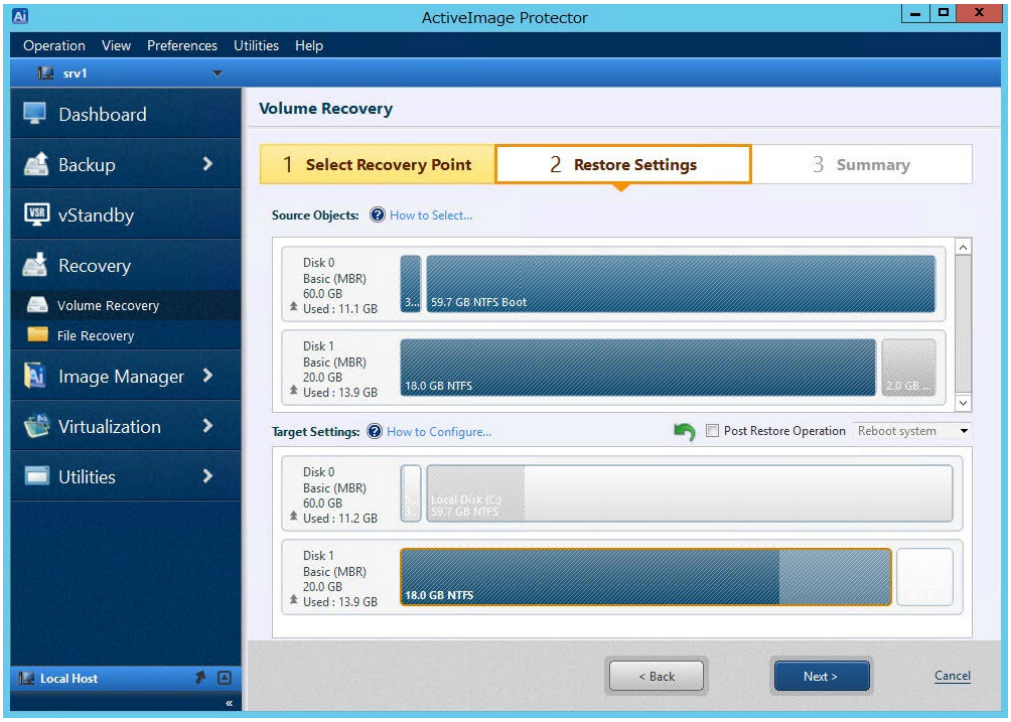
Please make sure that the monitors are suspended, since execution of recovery task fails while the monitor is working.

4. Restore Volume



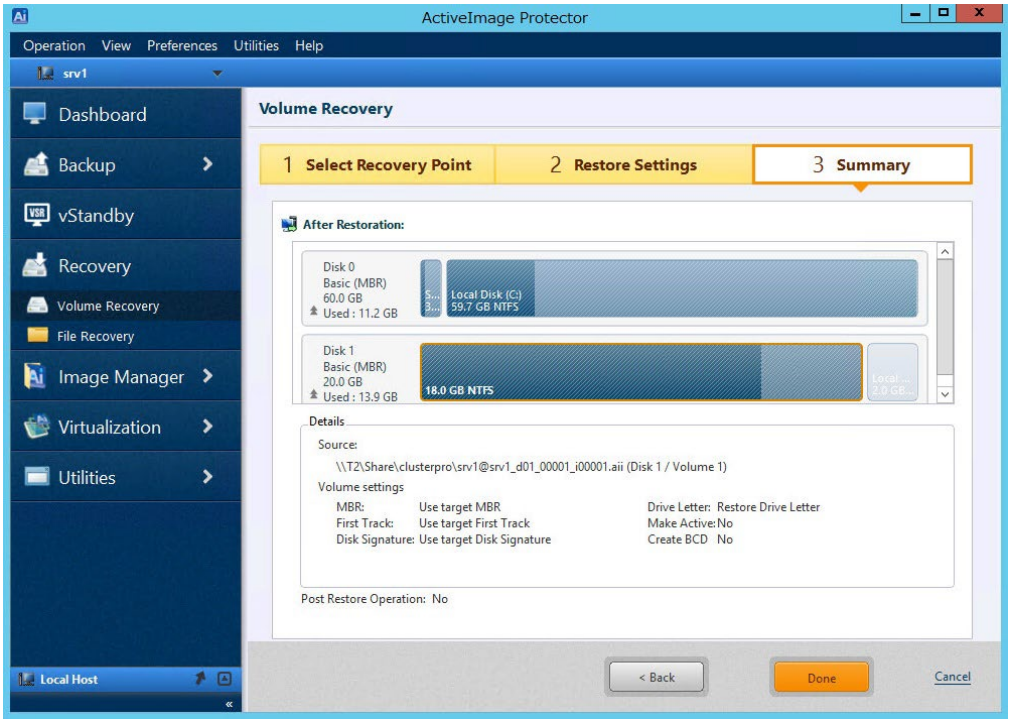
Launch AIP console to restore a volume.

5. Restore Setting



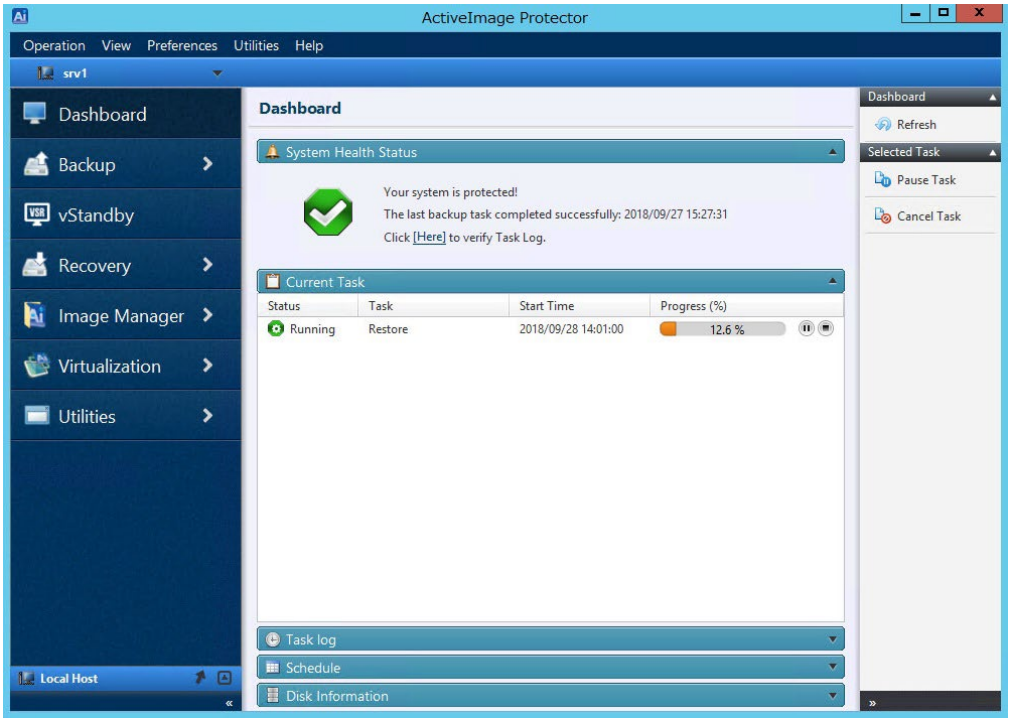
Select an image file created at the point in date/time to restore to.
If you select an image of a data partition, you can select an image of the whichever server.
Please restore the data partition only in mirror disk (please do not restore the cluster partition.)

6. Summary

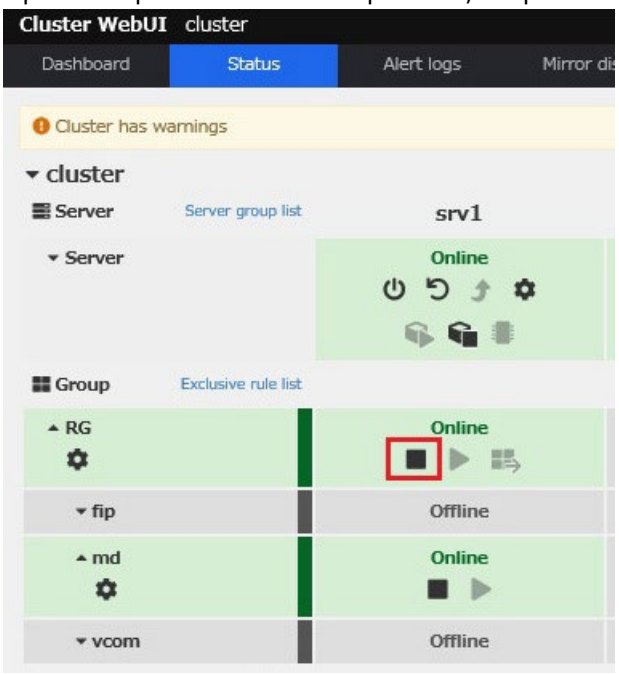


Please review the summary and make sure that no changes are required. Click [Done] button to start recovery process.

7. Running Restore Volume Task

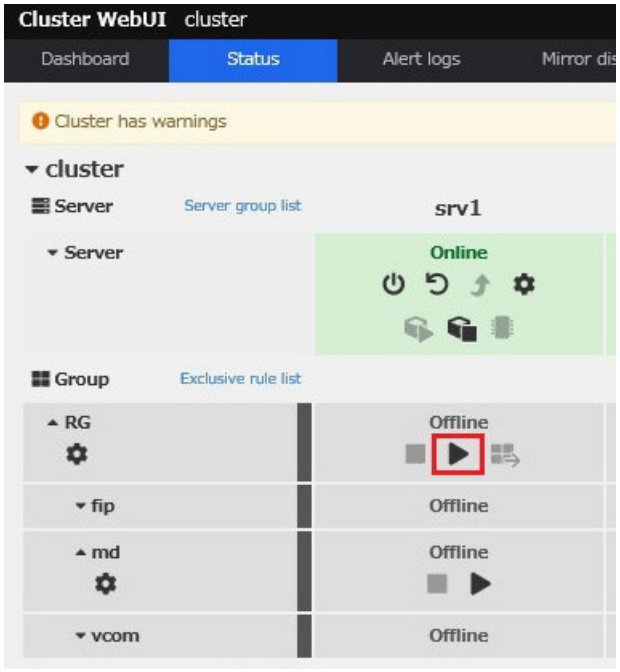


8. Upon completion of restore process, stop server group.



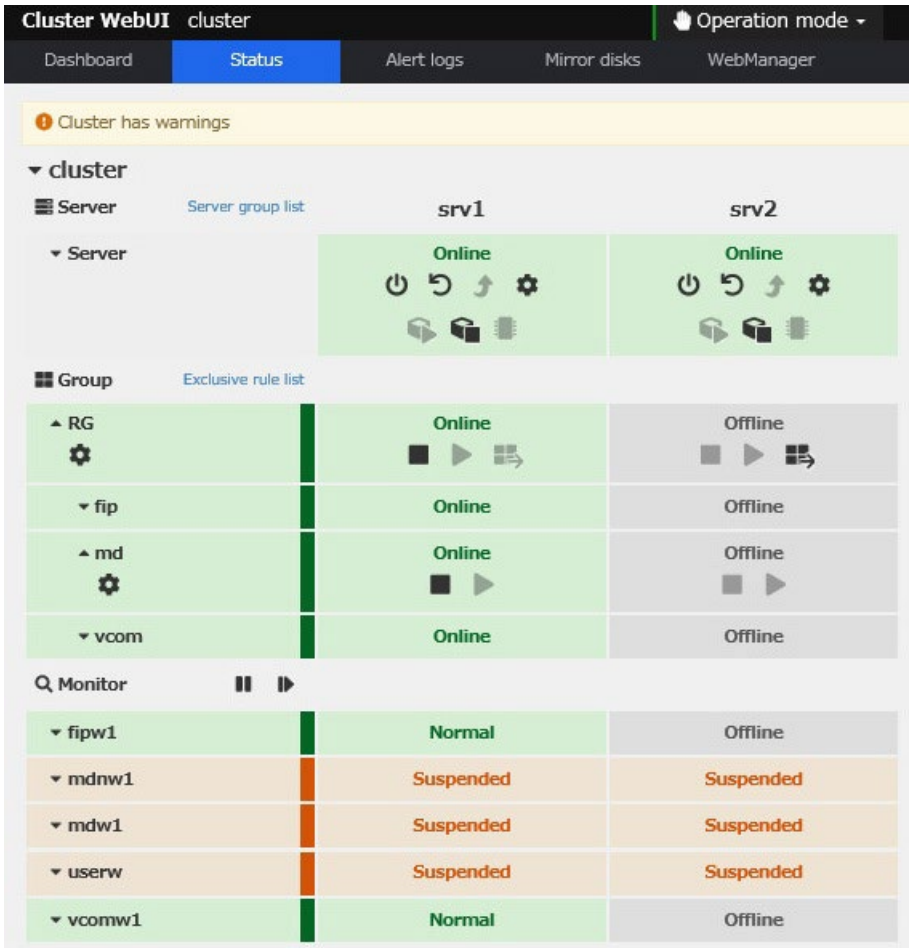
Upon completion of restore task, stop server group.

9. Start the group.



Start the group on the server restored from the image.

10. Restart monitor.



Resume the suspended monitor.

Appendix 1 Script to stop application service

In cluster environment on which VSS-unaware application is installed and clustered, you need to place the service into a paused state before a snapshot is taken for backup, ensuring data integrity.
Before stopping clustered service, please configure the advanced settings for AIP task and create a batch file to run in collaboration with CLUSTERPRO command.

·Script to execute before the snapshot is taken

1) Suspend CLUSTERPRO monitor resource.
2) Run CLUSTERPRO command to stop the clustered service.

Script to execute after the snapshot is taken

1) Run CLUSTERPRO command to start the clustered service.
2) Resume CLUSTERPRO monitor resource.

Sample script to execute before the snapshot is taken

```
@echo off

rem --- Suspend CLUSTERPRO monitor resource ---

echo %date% %time% >>c:¥stop.log
echo clpmonctrl -s >>c:¥stop.log
clpmonctrl -s >>c:¥stop.log
echo.>>c:¥stop.log

rem --- Stop service ---

echo %date% %time% >>c:¥stop.log
echo clprsc -t Service's resource name >>c:¥stop.log
clprsc -t Service's resource name >>c:¥stop.log
echo ************************************* >>c:¥stop.log
```

For more detailed information about CLUSTERPRO command, please refer to CLUSTERPRO Reference Guide.

Sample script to execute after the snapshot is taken

```
@echo off

rem --- Start Service ---
echo %date% %time% >>c:¥start.log
echo clprsc -t Service's resource name >>c:¥start.log
clprsc -s Service's resource name >>c:¥start.log
echo.>>c:¥start.log

rem --- Enable CLUSTERPRO Resource Monitor ---
echo %date% %time% >>c:¥start.log
echo clpmonctrl -r >>c:¥start.log
clpmonctrl -r >>c:¥start.log
echo ************************************ >>c:¥start.log
```

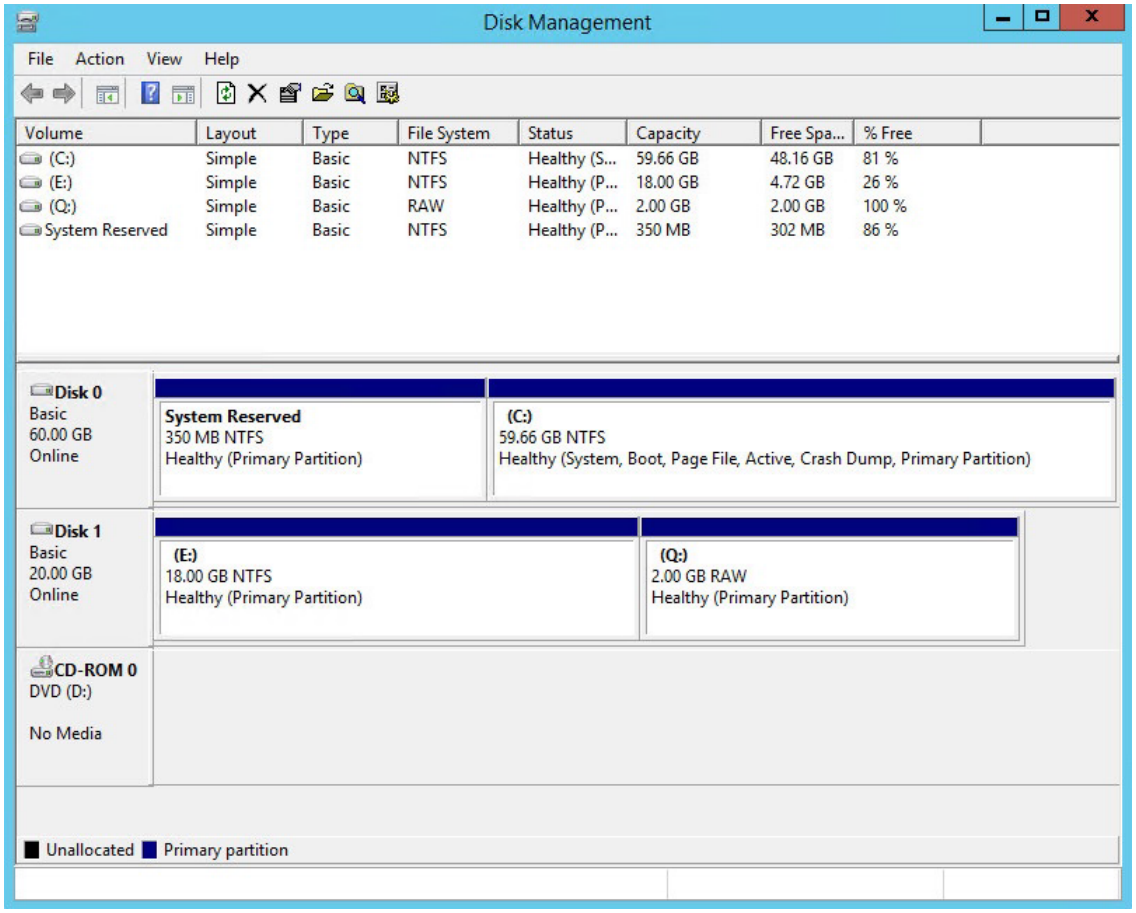
For more detailed information about CLUSTERPRO command, please refer to CLUSTERPRO Reference Guide.

Please save this batch file in a specified location.
If you encounter a problem, the log information output by this batch may be required, therefore, please save the log information in a safe place.

Appendix 2 Restore clustered data partition

Configuration of mirror disk resource or disk resource (shared disk) entails configuration of cluster partition (RAW partition) for saving management information and data partition for saving actual data. In the event that the cluster partition or data partition are damaged or if the cluster partition or data partition are deleted by mistake, the following description provides the operating procedures how to restore the mirror disk / disk resource.

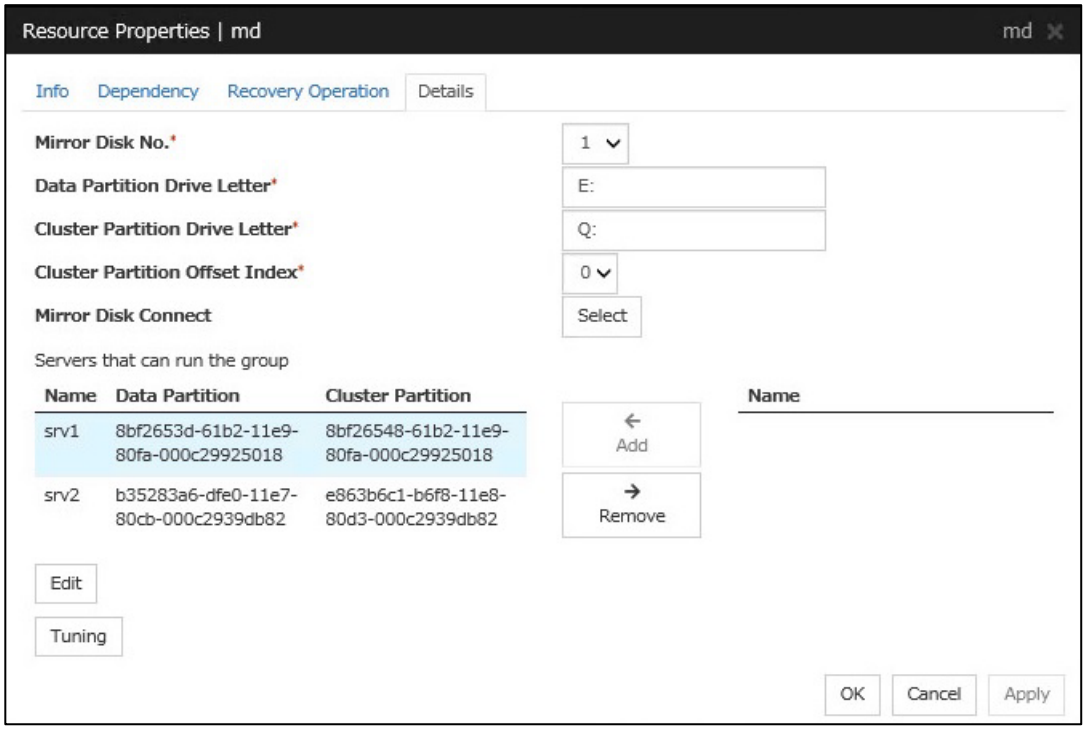
1. Create cluster / data Partition again



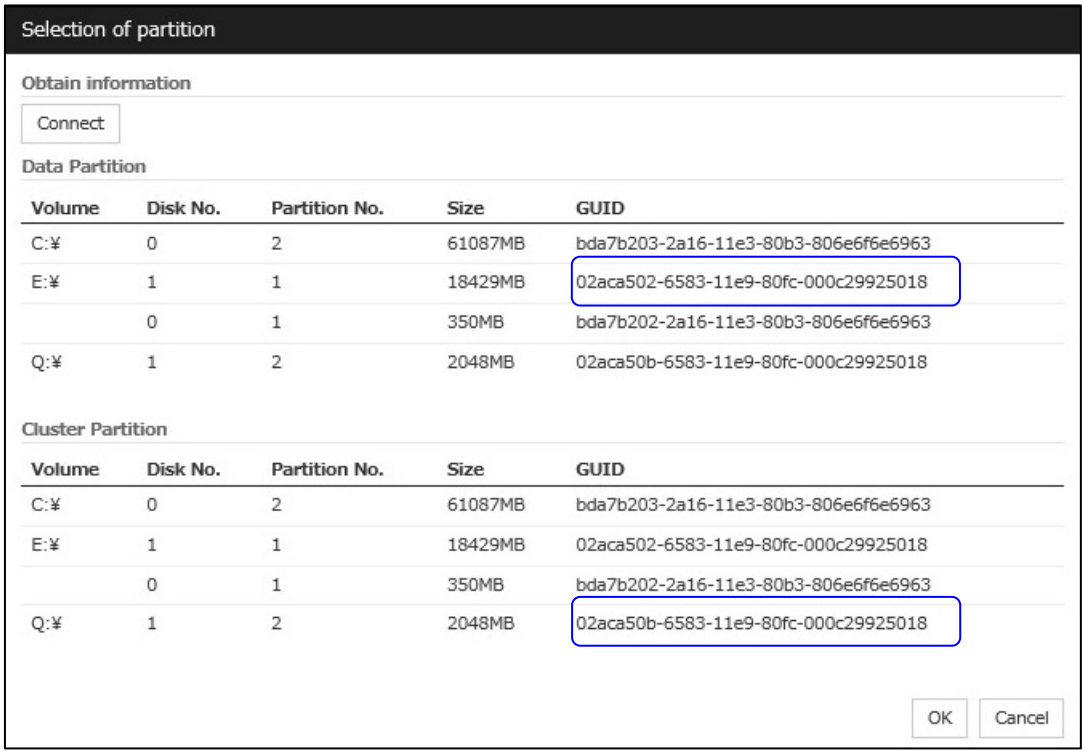
Go to [Disk Management] and please create RAW partition and mirror partition in the same size.

Disk Management window is displayed as shown above when cluster partition and mirror partition are created.

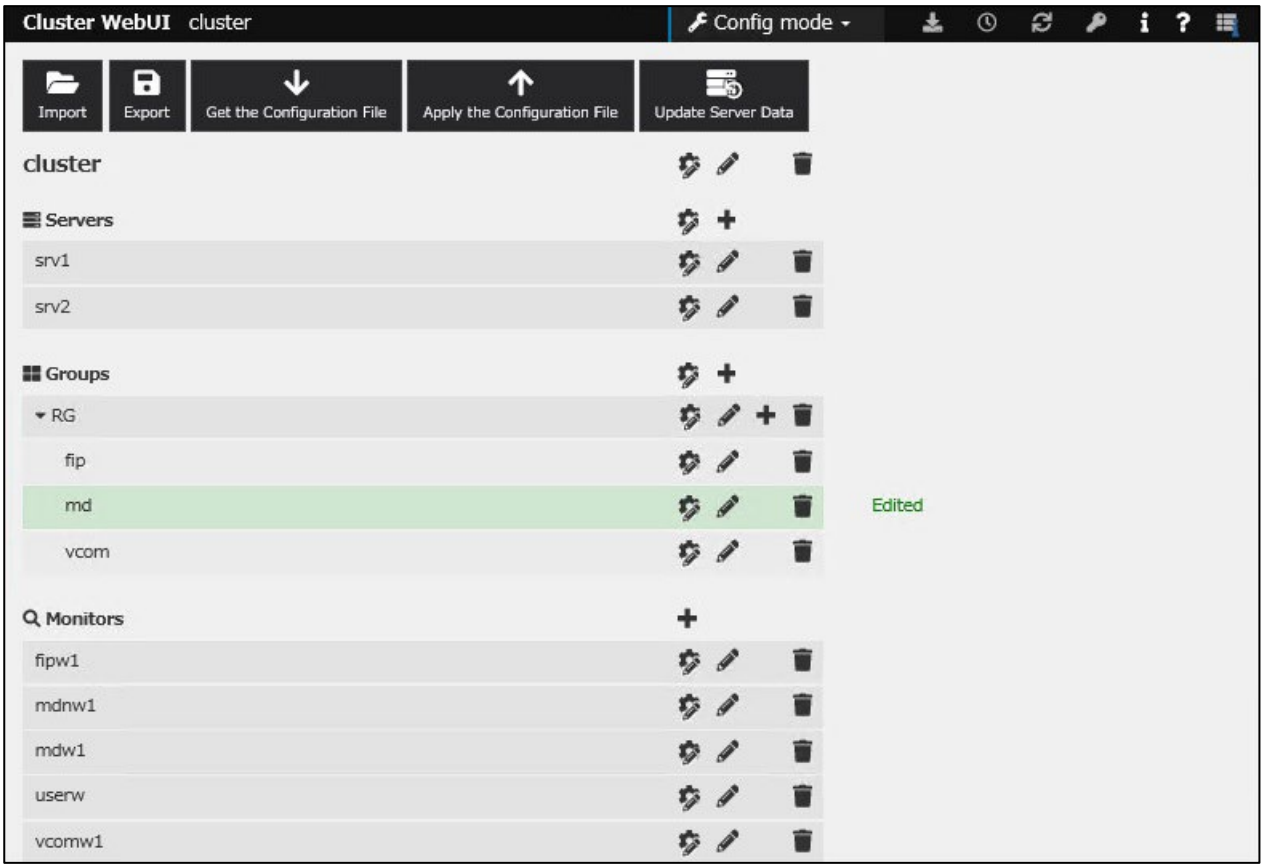
2. Configure the settings for mirror disk / disk resource



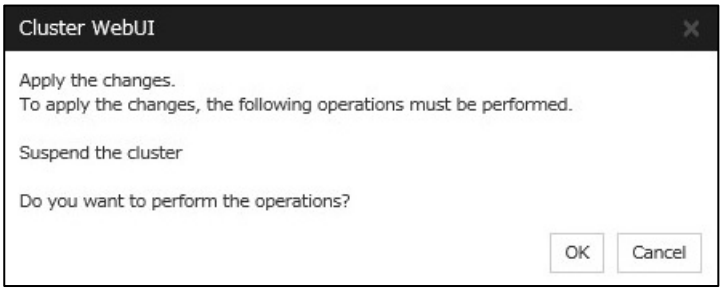
Select [Details] tab in [Resource Properties] of mirror disk / disk resource in Cluster WebUI setting mode and change the setting.
Select a specific server from [Servers that can run the group] and click [Edit].



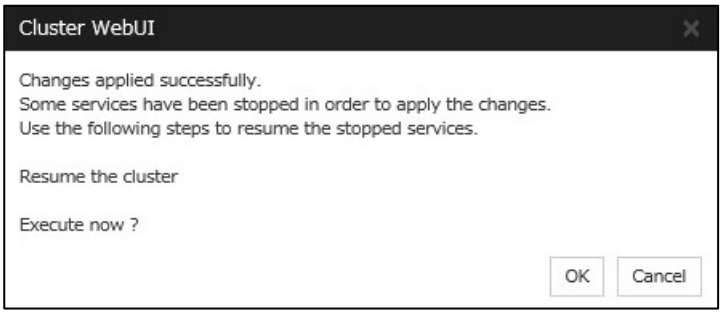
Click [Connect] and get the updated information of GUID.



Apply the changes.

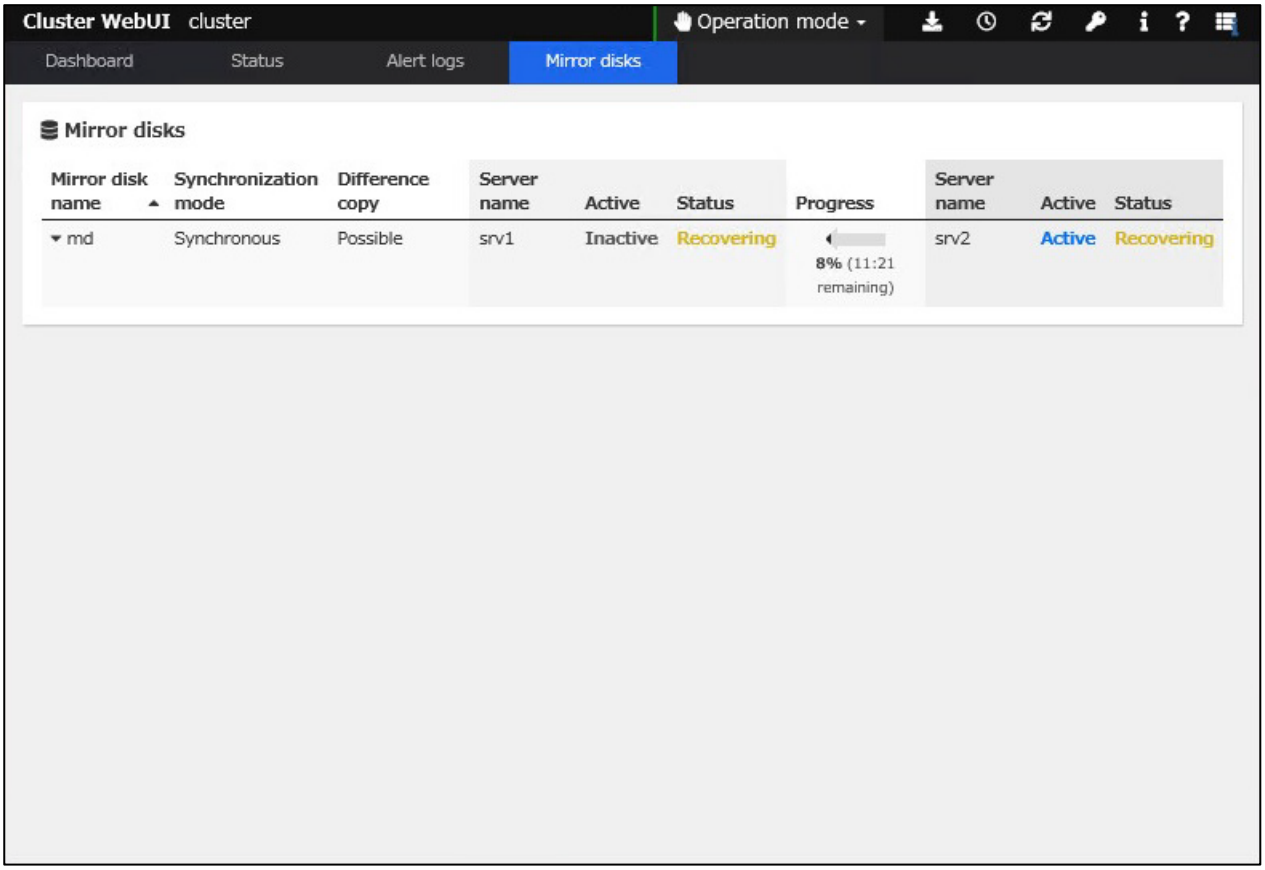


Suspend the cluster.

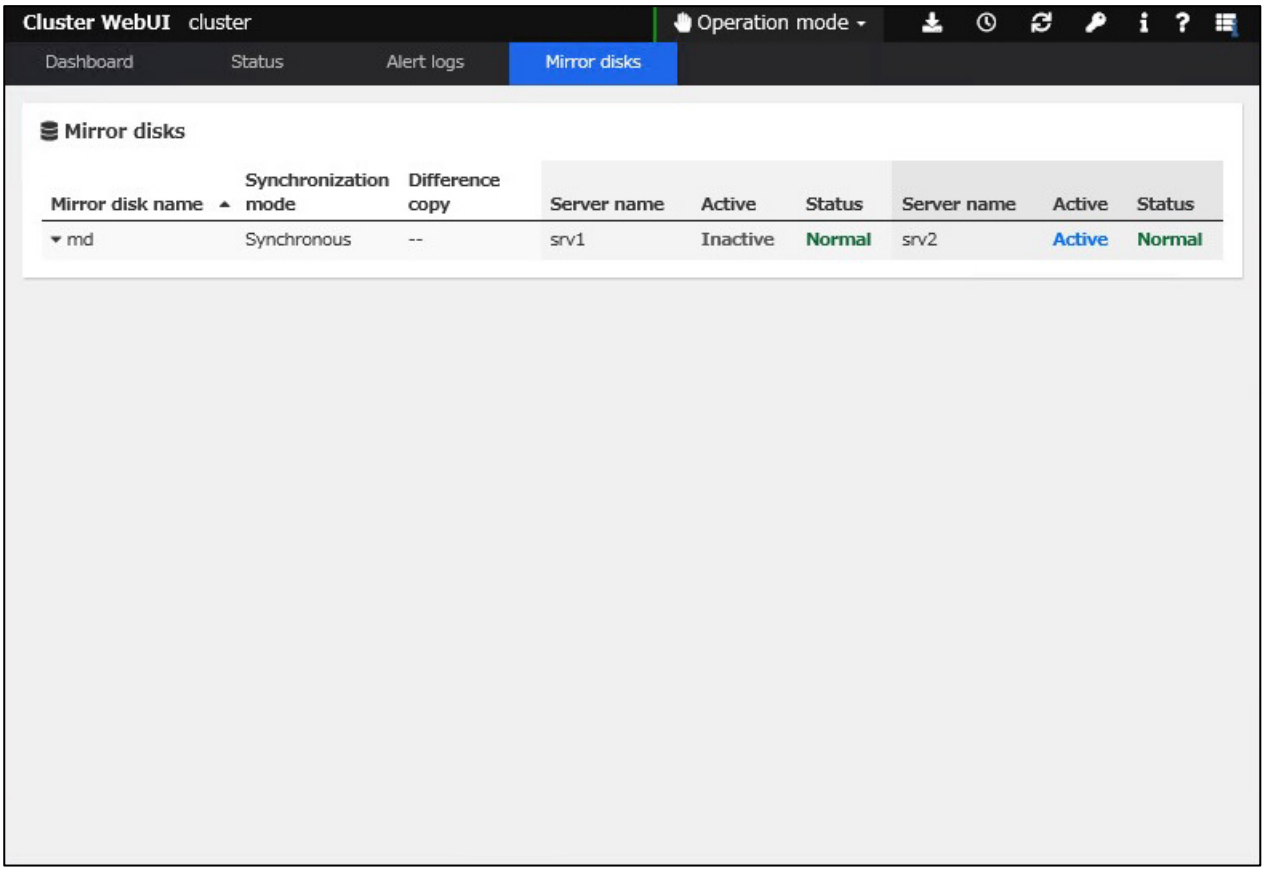


Resume the cluster.

3. Monitor the status of mirror disk resource in [Mirror Disk].



When the cluster is properly resumed, reconfiguration of mirror disk is automatically started.



Reconfiguration of mirror disks completed and please make sure that the “Normal” is indicate for [Status].

In the event that the mirror disks are not successfully restored, please refer to CLUSTERPRO Reference Guide “Understand mirrored disk resource”, “How to replace server” and perform the recovery operating procedures.

Appendix 3 Reconfiguration of Servers

In the event of system crash for some reason or corruption of RAID, or if the backup data are not available, the following are the operating procedures to restore the system after reconfiguring the OS.

1. Reinstallation of failed server OS and applications
   Reinstall the OS and the clustered applications in the same configuration as before the system failure.

2. Same configuration settings
   Please configure the settings for the following items same as before the system failure.

   ・NIC
   ・IP Addres
   ・Data Partition Size
   ・Cluster Partition (RAW partition) size
   ・Drive Letter

3. Reinstallation of CLUSTERPRO
   Please install CLUSTERPRO in the same configuration as before, and register the license.

4. Install CLUSTERPRO patch
   Apply the same patch as on the running server and make sure that the same version of CLUSTERPRO is installed on both servers.

5. Export Cluster Configuration File
   Export the configuration file from Cluster WebUI on the active server and save the file at a specified folder.

6. Import the cluster configuration file
   Import the cluster configuration file exported from Cluster WebUI on the restored server.

7. Apply the Configuration File
   Apply the Configuration File from Cluster WebUI.

8. Synchronize mirror disk resource
   Select [Operation Mode] for Cluster WebUI and make sure that “Full copy of mirror disk started” message is displayed in Status and Log of mirror disk resource.
   In the event that the mirror disk cannot be successfully restored, please refer to CLUSTERPRO Reference Guide “Understand mirrored disk resource”, “How to replace server” and perform the recovery operating procedures”.