**iStorage Server: Working with Windows Cluster**

Friday, May 28, 2010

KernSafe Technologies, Inc.

[www.kernsafe.com](http://www.kernsafe.com)

Copyright © KernSafe Technologies 2006-2009. All right reserved.
1. Overview

KernSafe iStorage Server is an advanced and powerful, full-featured software-only iSCSI Target that fully conforms to the latest iSCSI Standard 1.0 (former Draft 20). It is an IP SAN solution allowing you to quickly export existing storages such as disk images, VHD files, physical disks, partitions, CD/DVD-ROMs, tapes or any other type of SCSI based devices and even a variety of popular CD/DVD images to the client machines. The software thus delivers immediate benefits, as it allows storage to be consolidated, virtualized and centrally managed. iStorage Server also provides RAID-1 (mirror) feature enabling you to create two iSCSI devices for mirror backup. Furthermore, iStorage Server also supports a lot of features such as: VHD (Virtual Hard Disk) target, snapshots, STPI, RAID-1 and failover, these features are very important and poplar in storage industry world and make iStorage Server is suitable for any size of business.

High-availability clusters (also known as HA Clusters or Failover Clusters) are computer clusters that are implemented primarily for the purpose of providing high availability of services which the cluster provides. They operate by having redundant computers or nodes which are then used to provide service when system components fail. Normally, if a server with a particular application crashes, the application will be unavailable until someone fixes the crashed server. HA clustering remedies this situation by detecting hardware/software faults, and immediately restarting the application on another system without requiring administrative intervention, a process known as Failover. As part of this process, clustering software may configure the node before starting the application on it. For example, appropriate file systems may need to be imported and mounted, network hardware may have to be configured, and some supporting applications may need to be running as well.

After iStorage Server 2.0, it supports server side mirroring, synchronous replication and failover which allows user to create a high-availability iSCSI SAN for Windows Server 2003 clustering.

This article demonstrates how to build Windows Server 2003 high availability cluster by using KernSafe iSCSI Target. In this case, at least three computers are needed, respectively domain controller, node 1 and node 2. Each computer requires two network adapters. The computer names here are 03DCx64, node 1 and node 2.

2. Domain Controller Settings

Domain Controller Network Settings
Select 03DCx64 as the Domain Controller and the first network adapter of this computer shall be set as shown in the figure below.
IP address shall be set as 192.168.1.1.
Subnet mask is set as 255.255.255.0.
Preferred DNS server is set as 127.0.0.1.

Enter **dcpromo** in Start > Run and the **Domain Controller setup wizard** is shown.
Press the Next button in the pop-up wizard to continue.

Check operation system compatibility

Active Directory Installation Wizard

Operating System Compatibility

Improved security settings in Windows Server 2003 affect older versions of Windows.

Domain controllers running Windows Server 2003 implement security settings that require clients and other servers to communicate with those domain controllers in a more secure way.

Some older versions of Windows, including Windows 95 and Windows NT 4.0 SP3 or earlier, do not meet these requirements. Similarly, some non-Windows systems, including Apple Mac OS X and SAMBA clients, might not meet these requirements.

For more information, see Compatibility Help.

Press the Next button to continue
Specify domain controller type

Select Domain controller for a new domain.

Press the **Next** button to continue.

Select which type of domain to create

Create a new:
- **Domain in a new forest**
  - Select this option if this is the first domain in your organization or if you want the new domain to be completely independent of your current forest.

- **Child domain in an existing domain tree**
  - If you want the new domain to be a child of an existing domain, select this option. For example, you could create a new domain named `headquarters.example.microsoft.com` as a child domain of the domain `example.microsoft.com`.

- **Domain tree in an existing forest**
  - If you don't want the new domain to be a child of an existing domain, select this option. This will create a new domain tree that is separate from any existing trees.
As we are creating domain controller, select **Domain in a new forest.**

Press the **Next** button to continue.

Type new domain name

![Active Directory Installation Wizard](image)

**New Domain Name**

Specify a name for the new domain.

Type the full DNS name for the new domain (for example: headquarters.example.micosoft.com).

**Full DNS name for new domain:**

KernSafe.local

Enter the name of DNS. Take KernSafe.local as an example and press the **Next** button to continue.

Specify NetBIOS name
Enter the name of NetBIOS, which is KERNSAFE here.

Press the Next button to continue.

Specify the folders to contain the Active Directory database and log file.

Select the storage location of Database and Log Folders.
Press the **Next** button to continue.

**Specify the folder to be shared as the system volume**

![Active Directory Installation Wizard](image)

The SYSVOL folder stores the server's copy of the domain's public files. The contents of the SYSVOL folder are replicated to all domain controllers in the domain.

The SYSVOL folder must be located on an NTFS volume.

Enter a location for the SYSVOL folder.

**Folder location**

`C:\WINDOWS\SYSVOL`

Select the storage location of file SYSVOL.

Press the **Next** button to continue.

**Diagnostic DNS registration**
Select **Install and configure the DNS server on this computer, and set this computer to use this DNS server as its preferred DNS server.**

Press the **Next** button to continue.

Select default permissions for user and group objects
Select Permissions compatible only with Windows 2000 or Windows Server 2003 operating systems.

Press the Next button to continue.

Specify restore mode administrator password

Set the administrator password, take abc.123 for example here.

Press the Next button to continue.

Finish Active Directory installation wizard
Press the **Next** button to continue.

Press the **Finish** button.

Restart operation system
Now restart the computer and the new settings will take effect.

Press the Restart button to restart your computer.

Enter `dcpromo` in Start -> Run and the Domain Controller setup wizard is shown.

Open DNS Manager, right click on Reverse Lookup Zone and select New Zone, the New Zone Wizard is shown.
Press the **Next** button to continue.

Select zone type

Select the type of zone you want to create:

- **Primary zone**
  - Creates a copy of a zone that can be updated directly on this server.

- **Secondary zone**
  - Creates a copy of a zone that exists on another server. This option helps balance the processing load of primary servers and provides fault tolerance.

- **Stub zone**
  - Creates a copy of a zone containing only Name Server (NS), Start of Authority (SOA), and possibly glue Host (A) records. A server containing a stub zone is not authoritative for that zone.

- **Store the zone in Active Directory** *(available only if DNS server is a domain controller)*

Select **Primary zone**.

Press the **Next** button to continue.
Select zone data replicated

**Active Directory Zone Replication Scope**
You can select how you want DNS data replicated throughout your network.

Select how you want zone data replicated:

- To all DNS servers in the Active Directory forest Domain.KernSafe.com
- To all DNS servers in the Active Directory domain Domain.KernSafe.com
- To all domain controllers in the Active Directory domain Domain.KernSafe.com
  
Choose this option if the zone should be loaded by Windows 2000 DNS servers running on the domain controllers in the same domain.

- To all domain controllers specified in the scope of the following application directory partition:

Press the **Next** button to continue.

Specify reverse lookup zone name
Select Network ID, enter 192.168.1.

Press the **Next** button to continue.

Set Dynamic update types

Select **Allow only secure dynamic updates (recommended for Active Directory)**.
Press the **Next** button to continue.

**Complete the New Zone Wizard**

Press the **Finish** button.

Come back to the domain controller management console.
Right click on **KernSafe.local** and select **New Host** (A), the **New Host dialog** is shown.

Type node in **Name** field, 192.168.1.11 in the **IP address** field and check **Create associated pointer (PTR) record**.

Press the **Add Host** button to continue.

Type node2 in **Name** field, 192.168.1.22 in the **IP address** field and check **Create associated pointer (PTR) record**.

Press the **Add Host** button to continue.
Come back to the domain controller management console.

After all the above operations are done successfully, the status of DNS Manager is shown as in the figure below.
Open Active Directory Users and Computers console

Right click on Users and select New -> User, the **New Object-User** dialog is shown

Create any user as shown in the picture, take node1adm as an example.
Press the **Next** button to continue.

Specify user’s password

![Password Entry Form]

Enter password, take abc.123 for example here, check **User cannot change password** and **Password never expires**.

Press the **Next** button to continue.

Finish creating user
Press the Finish button.

Come back to Active Directory Users and Computers console

Create the second user.

Right click on Users and select New -> User, the New Object-User dialog is shown.
Create any user as shown in the figure, take node2adm as an example.

Press the Next button to continue.

Specify user’s password

Enter password, take abc.123 as an example, check User cannot change password and Password never expires.
Press the **Next** button to continue.

**Finish creating user**

![New Object - User]

When you click Finish, the following object will be created:

- **Full name**: node2admin
- **User logon name**: node2admin@KernSafe.local
- The user cannot change the password.
- The password never expires.

Press the **Finish** button to finish user creating.

**Come back to Active Directory Users and Computers console**

**Create a user cluster**
Right click on Users and select New -> User, the New Object-User dialog is shown.

Create any user as shown in the figure, take cluster as an example.

Press the Next button to continue.
Specify user's password

Enter password, take abc.123 as an example, check **User cannot change password and Password never expires**.

Press the Next button to continue.

Finish creating user

When you click Finish, the following object will be created:

- Full name: cluster
- User logon name: cluster@KernSafe.local
- The user cannot change the password.
- The password never expires.
Press the Finish button.

Come back to Active Directory Users and Computers console

Add node1adm and node2adm to **Domain Admins** and **Administrators** groups.

Select node1adm and node2adm and right click to select Add to a group, the **Select Group dialog** is shown.

Enter Domain Admins and press the **OK** button.
Enter Administrators and press the **OK** button.
3. KernSafe iStorage Server Settings

If three computers are used, you can install KernSafe iStorage Server on the Domain Controller, or use a fourth computer to install KernSafe iStorage Server. Taking three computers for example, this article installs KernSafe iStorage Server on the Domain Controller.

Network setting

Set the second network adapter of Domain Controller as shown in the figure. IP address is set as 192.168.2.1 and Subnet mask is set as 255.255.255.0.

Create iSCSI device, press the Create button on the toolbar of iStorage Server management console, the Create Device Wizard is shown.

Select a device type
Choose **Hard Disk**.

Press the **Next** button to continue.

Choose **Image File** in **iSCSI Medium Type** window.
Press the **Next** button to continue.

![iSCSI Target Wizard](image)

**iSCSI Image Type**

Select image type of the iSCSI disk you want to create.

- **Standard Image File**
  Create iSCSI disk by using a standard disk image file.

- **Virtual Hard Disk (VHD)**
  Create iSCSI disk by using a Virtual Hard Disk image file.

We choose **Standard Image File** and then press the **Next** button.

Set image disk parameters

![Image Disk Configuration](image)

**Image Disk Configuration**

You can specify a image file as an iSCSI device.

- **Device Parameters**
  - **Use existing image file**: G:\quorum.img
  - **Create a new image file**: Create a new image file with a size of 1024MB

- **Options**
  - **Use sparse file on NTFS file system**: (Optional)

Note: Using sparse file can save your hard disk space, the size of disk image file only depend on its content used. But we recommended that using this feature when image file size is less than 1TB bytes.

Create an .img file named quorum with a size of 1024MB as an example.
Press the **Next** button to continue.

**Finish creating iSCSI Target**

Enter **quorum** as the name of Target, check Enable multiple initiators with full access connected (sharing and clustering).

Press the **Finish** button to complete target creation.

Create the second iSCSI Target.

Select a device type
Choose **Hard Disk**.

Press the **Next** button to continue.

Choose **Image File** in **iSCSI Medium Type** window.
Then press **Next** button to continue.

We choose **Standard Image File** and then press **Next** button.

Set image disk parameters

Create an image file named generic with a size of 2048MB as an example.
Press the Next button to continue.

Finish creating iSCSI Target

Enter generic as the name of Target, check Enable multiple initiators with full access connected (sharing and clustering).

Press the Finish button to finish creating iSCSI Targets.

Come back to iStorage Server management console.

After the successful creation, the detail shown in the figure.
4. Node1 Settings

Network settings

Set the first network adapter of node1 as shown in the picture.
IP address is set as 192.168.1.11, Subnet mask is set as 255.255.255.0 and Preferred DNS Server is set as 192.168.1.1.
Set the second network adapter of node1 as shown in the picture. IP address is set as 192.168.2.11 and Subnet mask is set as 255.255.255.0.

Add nodes to domain, open System Properties page
Click **Change** in the page of Computer Name, the **Computer Name Changes dialog** is shown.
Select Domain and enter Domain name, here the name is KernSafe.local. Press the OK button to continue.

Type domain user and password

![Computer Name Changes]

Enter the name and password of an account with permission to join the domain.

User name: node1\admin
Password: ********

Press the OK button to continue.

The Computer Name Changes message dialog is shown

![Computer Name Changes]

Press the OK button to continue.

Restarting computer is needed.

![Computer Name Changes]

Press the OK button to restart computer.

Open iSCSI Initiator.
Change to Discovery page
Press the Add button in the Discovery page.

The Add Target Portal dialog is shown.

Press the Add button and enter the IP address of KernSafe iStorage Server, which is 192.168.2.1 here.

Press the OK button to continue.

Change to Targets page
Select one Target and then press the Log On button, the Log On to Target dialog is shown.

Select generic and click Log On. Check Automatically restore this connection when the system boots.
Select quorum and Log On. Check **Automatically restore this connection when the system boots**.

After the successful operation, the status is shown as in the picture.

Open Computer Management
Select Disk Management, the **Initialize and Convert Disk Wizard** is shown.

Press the **Next** button to continue.

Select disks to be initialized
Press the Next button to continue.

Select disks to be converted

Do not select any one of them, press the Next button to continue.

Finish disks initialization
Press the **Finish** button.

Partition the quorum disk.

Right click on the disk and select New Partition, the **New Partition Wizard** is shown.
Press the **Next** button to continue.

**Select Partition Type**

- **Select Partition Type**
  - There are three types of partitions: primary, extended, and logical.

Select the partition you want to create:

- **Primary partition**
- **Extended partition**
- **Logical drive**

**Description**

A primary partition is a volume you create using free space on a basic disk. Windows and other operating systems can start from a primary partition. You can create up to 128 primary partitions on a GPT basic disk. On a Master Boot Record (MBR) basic disk, you can create up to four primary partitions or three primary partitions and an extended partition.

Press the **Next** button to continue.
Specify partition size

Maximum disk space in megabytes (MB): 1019
Minimum disk space in MB: 8
Partition size in MB: [1000]

Press the Next button to continue.

Assign drive letter

Assign the following drive letter: [D]
Mount in the following empty NTFS folder: [Browse...]
Do not assign a drive letter or drive path

Press the Next button to continue.
Assign Q as the drive letter.
Press the **Next** button to continue.

Format disk

Enter Quorum as Volume label.
Press the **Next** button to continue.

Finish disk formatting
Press the **Finish** button to format the disk.

Partition the generic disk.

Right click on the disk and select **New Partition**, the **New Partition Wizard** is shown.
Welcome to the New Partition Wizard

This wizard helps you create a partition on a basic disk.

A basic disk is a physical disk that contains primary partitions, extended partitions, and logical drives.

Partitions created on Master Boot Record (MBR) disks can be accessed from any version of Windows or MS-DOS.

Partitions created on GUID Partition Table (GPT) disks can only be accessed from Windows Server 2003 Service Pack 1 or later, or from any 64-bit version of Windows.

To continue, click Next.

Press the **Next** button to continue.

Select partition type

Select the partition you want to create:

- Primary partition
- Extended partition
- Logical drive

Description:

A primary partition is a volume you create using free space on a basic disk. Windows and other operating systems can start from a primary partition. You can create up to 128 primary partitions on a GPT basic disk. On a Master Boot Record (MBR) basic disk, you can create up to four primary partitions or three primary partitions and an extended partition.

Select Primary partition.

Press the **Next** button to continue.
Specify partition size

Press the **Next** button to continue.

Assign a drive letter

Assign Q as the drive letter.
Press the **Next** button to continue.

Format the disk

[Image of New Partition Wizard window]

Choose whether you want to format this partition, and if so, what settings you want to use.

- [ ] Do not format this partition
- [ ] Format this partition with the following settings:
  - File system: NTFS
  - Allocation unit size: Default
  - Volume label: Generic
  - [ ] Perform a quick format
  - [ ] Enable file and folder compression

Enter Generic as Volume label.

Press the **Next** button to continue

Finish partition disk.
Press the **Finish** button.

Come back to the Computer Management console, after the successful operation, the status is shown as in the figure.
5. Node2 Settings

Networking settings

Set the first network adapter of node2 as shown in the figure. IP address is set as 192.168.1.22, Subnet mask is set as 255.255.255.0 and **Referenced DNS Server** is set as 192.168.1.1.
Set the second network adapter of node2 as shown in the picture. IP address is set as 192.168.2.22 and Subnet mask is set as 255.255.255.0.

Add nodes to domain, open System Properties page
Click Change in the page of Computer Name, the **Computer Name Changes** dialog is shown.
Select Domain and enter Domain name, which is KernSafe.local here.

Press the OK button, the **Computer Names Changes** dialog is shown.

Specify user and password

![Computer Name Changes dialog]

Enter the username and password of node2.

Press the OK button, and then the **Computer Name Changes** message dialog is shown.

![Computer Name Changes message dialog]

Press the OK button, and then the **Computer Name Changes** dialog is shown.

![Computer Name Changes dialog]

Press the OK button to restart the computer.

Launch Microsoft iSCSI Initiator.
Change to **Discovery** page
Press the **Add** button in the Discovery page and then the **Add Target Portal dialog** is shown.

Press the **Add** button and enter the IP address of KernSafe iStorage Server, which is 192.168.2.1 here.

Press the **OK** button to continue.

Change to the **Targets** page
Select a Target and then press the Log On button, the Log On to Target dialog is shown.

Select generic and click the Log On button. Check **Automatically restore this connection when the system boots**.
Select quorum and click the **Log On** button. Check **Automatically restore this connection when the system boots**.

After the successful operation, the status is shown as in the figure.

Open **Computer Management Console**
Open Computer Management and select Disk Management.

Assign drive letters
Right click on quorum disk and select Change Drive Letter and Paths.

Click the **Add** button, and the **Add Drive Letter or Path dialog** is shown.
Assign \textbf{Q} as drive letter.

Press the \textbf{OK} button.

Come back to the Computer Management Console

Right click on generic disk and select Change Drive Letter and Paths.
Click the **Add** button, the Add Drive Letter or Path dialog is shown.

Assign **R** as drive letter.

Press the **OK** button to continue.

Come back to the Computer Management Console
After the successful operation, the status is shown as in the figure.
6. Creating Cluster

Open Cluster Administrator on node1.

Select Create new cluster.

Press the OK button, the **New Server Cluster Wizard** is shown.
Press the **Next** button to continue.

Specify cluster name

Select or type the name of the domain in which the cluster will be created. Only computers in this domain can be members of the cluster.

**Domain**

KernSafe.local

Type a cluster name that is unique in the domain. This must be a valid computer name.

**Cluster name**

KernSafe.cluster

Select Domain and enter Cluster name, KernSafe.local is selected here and the Cluster name is
KernSafecluster.

Press the **Next** button to continue.

Select computer

![Select Computer Wizard](image)

Select Computer

The computer must be a member of the domain you specified.

Enter the name of the computer that will be the first node in the new cluster.

- **Computer name:**
  - node1
  - **Browse**
  - **Advanced**

Enter node1.

Press the **Next** button to continue.

Analyzing configuration
If there is any problem during the testing process, press the **Back** button to change the configuration.

When all the tests are passed, press the **Next** button to continue.

Enter an IP address of the cluster
Enter the IP address of Cluster, take 192.168.1.33 for example here.

Press the **Next** button to continue.

Type cluster service account

Enter the username and password of cluster.
Press the **Next** button to continue.

Proposed cluster configuration

Click the **Quorum** button, the **Cluster Configuration Quorum dialog** is shown.

Select **Disk Q**.

Press the **OK** button to continue.

Creating cluster
If there is any problem during the testing process, press the **Back** button to change the configuration.

When all the tests are passed, press the **Next** button to continue.

Complete cluster creating
Press the Finish button to finish.

Come back to the Cluster Administrator Console

After the successful operation, the status is shown as in the figure.

Add node2 to the cluster
Open Cluster Administrator on node2, select Add nodes to cluster and Cluster name, which is KERNSAFECLUSTER here.

Press the OK button to continue.

The Add Nodes Wizard is shown.

Press the Next button to continue.

Select Computers
Enter node2 in Computer name and click Add to add node2 into selected computers.

Press the Next button to continue.
Analyzing configuration

If there is any problem during the testing process, press the Back button to change the configuration.

When all the tests are passed, press the Next button to continue.

Specify cluster service account
Enter the password of cluster user.

Press the **Next** button to continue.

**Proposed cluster configuration**

- **Cluster name:** KERNSAFECLUSTER.KernSafe.local
- **Cluster IP address:** 192.168.1.11 255.255.255.0
- **Cluster network:**
  - Local Area Connection - Private and Public
    - Primary Address: 192.168.1.11 \ 255.255.255.0
- **Cluster service account credentials:**
  - Name: cluster
  - Password: **********

To add nodes to a cluster with this configuration, click Next.
Press the **Next** button to continue.

Adding nodes to the cluster

If there is any problem during the testing process, press the **Back** button to change the configuration.

When all the tests are passed, press the **Next** button to continue.

Finish adding node to the cluster.
7. Add new shared resources

Open iStorage Server Console and then press the Create button on the toolbar, and then the Create Device Wizard is shown.
Choose **Hard Disk**.

Press the **Next** button to continue.

Choose **Image File** in **iSCSI Medium Type** window.

Press the **Next** button to continue.
We choose **Standard Image File** and then press **Next** button.

Set image disk parameters

Create an .img file named spool with a size of 1024MB as an example.

Press the **Next** button to continue.

Finish creating iSCSI Target
Enter spool as the Target name, Choose the **Enable multiple initiators with full access connected (sharing and clustering)**.

Press the **Finish** button to complete iSCSI Target creation.

Come back to iStorage Server Console.
After the successful creation, the status is shown as in the figure.

Open iSCSI Initiator on node1, and then press the Refresh button on the Targets page.

Press the Log On button.

Select spool and click the Log On button. Check Automatically restore this connection when the system boots.

Open Computer Management, select Disk Management and then the Initialize and Convert Disk
Wizard is shown.

Welcome to the Initialize and Convert Disk Wizard

This wizard helps you to initialize new disks and to convert empty basic disks to dynamic disks.

You can use dynamic disks to create software-based volumes that can be mirrored, or they can be striped or spanned across multiple disks. You can also expand single-disk and spanned volumes without having to restart the computer.

After you convert a disk to dynamic, you can only use Windows 2000 and later versions of Windows on any volume of that disk.

To continue, click Next.

Press the **Next** button to continue.

Select disks to be initialized.

Select one or more disks to initialize.

- **Disk 3**

Select Disk3.
Press the **Next** button to continue.

Select disks to be converted.

![Initialize and Convert Disk Wizard](image)

**Select Disks to Convert**
The disks you select will be converted to dynamic disks.

Select one or more disks to convert:

<table>
<thead>
<tr>
<th>Disks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disk 3</td>
</tr>
</tbody>
</table>

Press the **Next** button to continue.

Finish initializing disk.
Press the Finish button.

Come back to the Computer Management Console.

Right click on the disk3 and then select New Partition, the New Partition Wizard is shown.
Welcome to the New Partition Wizard

This wizard helps you create a partition on a basic disk.

A basic disk is a physical disk that contains primary partitions, extended partitions, and logical drives.

Partitions created on Master Boot Record (MBR) disks can be accessed from any version of Windows or MS-DOS.

Partitions created on GUID Partition Table (GPT) disks can only be accessed from Windows Server 2003 Service Pack 1 or later, or from any 64-bit version of Windows.

To continue, click Next.

Press the Next button to continue.

Select partition type.

Select Primary partition
Press the **Next** button to continue.

**Specify partition size**

![Specify Partition Size window](image)

- Maximum disk space in megabytes (MB): 1019
- Minimum disk space in MB: 8
- Partition size in MB: 1019

Press the **Next** button to continue.

**Assign drive letter**

![Assign Drive Letter window](image)

- Assign the following drive letter: S
- Mount in the following empty NTFS folder: [Path]
- Do not assign a drive letter or drive path

Press the **Next** button to continue.
Assign S as drive letter.

Press the **Next** button to continue.

Format partition

![New Partition Wizard dialog box](image)

Choose whether you want to format this partition, and if so, what settings you want to use.

- **Do not format this partition**
- **Format this partition with the following settings:**
  - **File system:** NTFS
  - **Allocation unit size:** Default
  - **Volume label:** Spool

- [ ] **Perform a quick format**
- [ ] **Enable file and folder compression**

Enter Spool as Volume label.

Press the **Next** button to continue.

Finish disk formatting
Press the **Finish** button.

Come back to the Computer Management Console.

After the successful operation, the status is shown as in the figure.

Open iSCSI Imitator on node2, client the **Refresh** button on the **Targets** page.
Select spool and then press the Log On button, the Log On to Target dialog is shown.

Select spool and click the Log On button. Check Automatically restore this connection when the system boots.

Open Computer Management and select Disk Management.
Right click on spool disk and select **Change Drive Letter and Paths**.

Click the **Add** button.
Assign S as drive letter and press the OK button.

Open Cluster Administrator

Right click on Resources, then select New - > Resource, the New Resource dialog is shown
Enter contents for each item.

Enter Spool as Name, KernSafe Disk as Description, Physical Disk as Resource type and Group 0 as Group.

Press the Next button to continue.
Add node1 and node2 to Possible owners.

Press the Next button to continue.
Select **S:(Spool)** and press the **Finish** button.

Press the **OK** button.

Come back to the Cluster Administrator Console
Right click on Spool and select Bring Online.

After the successful operation, the status is shown as in the figure. Now, the cluster has been created successfully and can increase nodes and resources.