# iStorage Server: High Availability iSCSI SAN for Linux Server

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KernSafe Technologies, Inc.

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# **Table of Contents**

Overview	1
Configure on iStorage Server1	2
Create Target	2
Configure on iStorage Server2	7
Preparing target	7
Create application	8
Configure Linux	13
Install iscsi-initiator	13
Install MPIO	14
Discover iSCSI Targets	17
Log on to iSCSI Target	18
Partition disk	19
Format partition	22
Mount the partition	23
Contact	25

#### **Overview**

iStorage Server is a network based storage virtualization software powered by KernSafe Technologies, Inc. Being a powerful, full-featured and software-only iSCSI Target SAN solution, that can quickly convert existing Windows computer into IP SAN. Storage media of iSCSI Target can include existing storage devices such as the entire hard disk or partitions, CD-RWs, tapes and USB storage devices, as well as disk image file or CD image files including ISO9660(.ISO),.bin,.mdf,.cdi,.b5i,.nrg,.ccd,.sub,.img,.raw and other image file formats. Furthermore, iStorage Server also supports a lot of features such as: VHD (Virtual Hard Disk) target, snapshots, STPI, RAID-1and failover, these features are very important and popular in storage industry world and make iStorage Server is suitable for any size of business.

High availability is the implementation of technology so that if a component fails, another can take over for it. By using highly available platforms, the downtime for a system can reduced, and in many cases, it can be reduced to a short enough time that the users of the system do not see the failure.

This article demonstrates how iStorage Server works with Linux. Such powerful combination will expand the application scope of your Linux server and workstation, thereby enabling WINDOWS server to expand the storage of your Linux computer. It also allows you to directly use the storage devices of the existing Windows server for Linux server. With High Available IP SAN solution provided by iStorage Server, you may install application and server software, as well as store data required wish you like.

We need two servers to create Failover Application, here are: 192.168.0.111, 192.168.0.112

# **Configure on iStorage Server1**

### **Create Target**

Launch the **iStorage Server Management Console**, press the **create** button on the toolbar of iStorage Server management console, the Create Device Wizard is shown. Select a device type

Create iSCSI Target Wizard	×
iSCSI Device Type Select which device type of the iSCSI target you want to create.	
Hard Disk Create iSCSI target by using physical disk, partition, standard image file or VHD.	
Optical Device Create iSCSI target by using physical optical drive or CD / DVD image file.	
Generic SCSI Create iSCSI target by using generic SCSI device, such as disk, CD-ROM, tape, printer.	
Advanced Device Create advanced iSCSI target such as CDP device and snapshot linked device.	
< <u>Back</u> <u>N</u> ext > Car	icel

Choose Hard Disk Press the Next button to continue

Select a medium type.

Create iSCSI Target Wizard	x
<b>iSCSI Medium Type</b> Select medium of the iSCSI disk you want to create.	
Image File Create iSCSI disk by using standard image file or Virtual Hard Disk (.VHD).	
RAM Space     Create iSCSI disk by using memory space	
Security Images Create iSCSI disk images for each initiators, any image is individual for each initiator.	
Disk Partition     Create iSCSI target by using a disk partition	
Physical Disk Create iSCSI target by using physical disk.	
< <u>B</u> ack <u>N</u> ext > Ca	ncel

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

Select an Image type



Choose **Standard Image File** Press **Next** button to continue

Specify image file path and size.

Create iSCSI Target Wizard	×
Virtual Image Disk Configuration Specify a image file full path and parameters.	2
Image file parameters	
Create a new image file     O Use existing image file	
Full path and name of the image file:	
H:\iStorage server\linux.img	Browse
Device Size in MBs: 10240	
Fill with zeros	
File system options	
Sparse file (Recommended for image files smaller then 1TB)	
Compressed (Enable file system compress feature)	
Encrypted (Enable NTFS encryption feature)	
< Back Next >	Cancel

Specify the image file.

Specify the size.

If you check **sparse file**, the size of disk image file only depend on its content used, it can save your hard disk space.

Press the **Next** button to continue.

Set authorization mode.

Create iSCSI Target Wizard	<
Authorization You can select an authorization mode, Anonymous, CHAP or IP filter.	
Anonymous Select this option to disable any authorization.	
CHAP Select this option to use CHAP authorization.	
IP Filter Select this option to use IP address authorization.	
Mixed Select this option to use both CHAP and IP address authorization.	
Inherit security roles from global settings.	
< <u>B</u> ack <u>N</u> ext > Cancel	

Choose **Anonymous** Authorization. Press the Next button to continue.

Finish creating iSCSI Target.

Create iSCSI Target Wizard	x
Completing the Create iSCSI Wizard You can specify a target name and other options to complete iSCSI target creating.	
Basic Target Information	
Target Name:	
iqn.2006-03.com.kemsafe:linuxHA	
Report as readonly device when initiator can not get write access	
Enable multiple initiators with full access connected (sharing and clustering)	
Note	
By default, only one client has full access right, when the second initiaor log on with full access, it will fail. But this option is usfull for clustering, disk sharing and NAS.	
< <u>B</u> ack Finish Cano	cel

Type a target name you like or use the default. Press **Finish** button.

## **Configure on iStorage Server2**

#### **Preparing target**

We also need create a target on iStorage Server2.We create it as we do on iStorage Server1.The main interface is shown as follow if successful.

3 iStorage Server Management Console	1			_	
<u>F</u> ile <u>S</u> erver Stora <u>g</u> e <u>C</u> lients ⊻i	ew <u>T</u> ools <u>H</u> elp				
Create Delete Start Stop	Refresh Add Remove View	Access	Settings Print Ab	Dut	
Servers Tree ×	iStorage Server: 192.168.0.1	12			
E					
	General Targets Applications IPFilters	s    Users    (	Groups    Logs		
inuxHAP	Target Name	Device I	Source	Capacity	Authenticati
	Sign.2006-03.com.kernsate:linuxHAP	Disk Drive	C:\istorage\newimage.i	10.00G	Anonymous
Groups     Groups     Groups     Groups					
4	•	III	<i></i>		•
			Connected: 192.168.0	.112 (Ultima	te License) .::

## **Create application**

Right click the Applications on the left tree of the main interface, choose Create Application on the pop-up menu, the Create Application Wizard window will be shown.

Create Application Wizard
Application Type Select which type application that you want to create.
<ul> <li>Synchronous Replication Create real-time remote synchronous replication to iSCSI target or image file.</li> <li>Asynchronous Replication Create real-time remote asynchronous replication to iSCSI target or image file.</li> <li>High Availability Node Create a high-availability iSCSI SAN node or synchronizing with other iSCSI targets.</li> <li>Automatic Snapshots Create automatical snapshots and replications to other iSCSI targets.</li> </ul>
< <u>Back</u> <u>N</u> ext > Cancel

#### Choose High Availability Node.

Then **press** Next button to continue.

ate Application Wizard	
Failover Configuration You can specify two servers to fail over each of	her.
Base Target	
Target Name	Device Type
🔽 iqn.2006-03.com.kemsafe:linuxHA	Disk
Partner Target	
	Setting
	< Back Next > Cancel

Choose the **Base Target** we have just created. Press **Edit** to find the Partner Target.

Select iSCSI Tar	get		×
- iSCSI Source	e		
Host Name:	192.168.0.112	Port:	3260
CHAP	Use CHAP to logon		
User Name:			
Secret:			
Target			
Target:	iqn.2006-03.com.kemsafe:linuxHAP		~
	Discovery OK		Cancel

Input the IP and Port of Server2 in **iSCSI Source** tab, and then click **Discovery** on the bottom of the windows to find the remote target.

Press OK button to continue.

**Note**: if the target needs CHAP authorization, you should provide User Name and Secret.

Create Application Wizard	<b></b>
Failover Configuration You can specify two servers to fail over each oth	ier.
Base Target	
Target Name	Device Type
iqn.2006-03.com.kemsafe:linuxHA	Disk
Patau Tarat	
ian 2006-02 com kompate linux HAP	Current
Iqn.200003.com.keinsare.iinuk.hAr	Setting
	< <u>B</u> ack <u>N</u> ext > Cancel

Press **Next** button to continue.

eate Application W	izard
<b>Synchronizatio</b> You can speci	fy parameters for synchronization.
Local Target	
Target Name:	iqn.2006-03.com.kemsafe:linuxHA
Portal Address:	Any V Port: Any V
Remote Target	
Target Name:	iqn.2006-03.com.kemsafe:linuxHAP
Portal Address:	192.168.0.112 V Port: 3260
Specify a folder t	o save temporary data dump (folder must exist):
C:\Temp\	Browse

Specify the portal and port for synchronization.

Press **Next** button to continue.

Mirror Synchronization	x
Synchronization Type	
Create mirror device with full synchronization from base iSCSI targe	è.
Create mirror device without synchronization (Manual Initialization)	
Warning: all data on the mirror device will be destroyed after synchronization. OK Cance	el

Now, the mirror device should be synchronized from base target, if the two targets are both new and not initialized, we can choose **Create mirror device without synchronization (Manual Initialization), otherwise,** we must choose **Create mirror device with full synchronization from base iSCSI target.**  Press **OK** button to continue.

Create Application Wizard	×
3	Completing the Create Applicatio Wizard
	Application name: SAN Cluster Cluster type: iSCSI Local node: iqn.2006-03.com.kemsafe:linuxHA Local portal: Any:Auto Remote node: iqn.2006-03.com.kemsafe:linuxHAP Remote portal: 192.168.0.112:3260 Work path: C:\Temp\
	To close this wizard, click Finish.

Click **Finish** to complete the application creation.

We do the same operation on iStorage Server2. If successful it should be shown as follow.

3 iStorage Server Management	t Console		
<u>File Server Storage Clie</u>	ents <u>V</u> iew <u>T</u> ools <u>H</u> elp		
Create Delete Start	stop Refresh Add Remove	view Access Setti	ngs Print About
Servers Tree ×	iStorage Server: 192.168.0.11	2	
	General Targets Applications IPFilters	Users Groups Logs	
LinuxHAP	'arget Name	Application Type	Partner Device
Applications	🔋 iqn.2006-03.com.kernsafe:linuxHAP	High Availability	iSCSI: 192.168.0.111:3260:iqn.2006-03.com.kernsafe:linuxHA
- 🤮 Groups			
Ebgs			
<	•	III	•
			S Connected: 192.168.0.112 (Ultimate License)

## **Configure Linux**

Here we take CentOS 6.2 as an example.

#### Install iscsi-initiator

Use command **yum search iscsi-initiator** to find iscsi-initiator installation.



Install iscsi-initiator-utils.x86\_64 with CLI yum install.

E ro	oot@SANDP0	12:~/Desktop		_ C	×	:
<u>File Edit View Search Terr</u>	ninal <u>H</u> elp					
<pre>[root@SANDP012 Desktop]# yu Loaded plugins: fastestmiry Loading mirror speeds from * base: mirror.bit.edu.cn * extras: ftp.twaren.net * updates: ftp.tc.edu.tw Setting up Install Process</pre>	ım install is <sup>r</sup> or, refresh- cached hostf	csi-initiator-utils.x86 packagekit, security ile	_64		•	<
Resolving Dependencies > Running transaction che > Package iscsi-initiato > Finished Dependency Res Dependencies Resolved	eck or-utils.x86_ solution	64 0:6.2.0.873-2.el6 wi	ll be insta	lled	:	111.
Package	Arch	Version	Repositor	y Siz	ze	
Installing: iscsi-initiator-utils Transaction Summary	x86_64	6.2.0.873-2.el6	base	655	k	
Install 1 Package(s)						~

After finishing installation, you should start service. Type **service iscsid start** in the console

### **Install MPIO**

We need two softwares to achieve MPIO which are device-mapper and

#### device-mapper-multipath.

First you can run **rpm -qa** to see whether they are installed or not.

E root@SANDP029:~/Desktop	-	×
<u>F</u> ile <u>E</u> dit <u>V</u> iew <u>S</u> earch <u>T</u> erminal <u>H</u> elp		
<pre>[root@SANDP029 Desktop]# rpm -qa grep device-mapper device-mapper-event-libs-1.02.66-6.el6.x86_64 device-mapper-libs-1.02.66-6.el6.x86_64 device-mapper-event-1.02.66-6.el6.x86_64 device-mapper-1.02.66-6.el6.x86_64 [root@SANDP029 Desktop]# rpm -qa grep device-mapper-multipath [root@SANDP029 Desktop]# ]</pre>		<
		Ξ.

Now we should install device-mapper-multipath.

Type yum search device-mapper-multipath



Type yum install device-mapper-multipath.x86\_64

E root@SANDP029:~/Desktop _		×
<u>F</u> ile <u>E</u> dit <u>V</u> iew <u>S</u> earch <u>T</u> erminal <u>H</u> elp		
<pre>[root@SANDP029 Desktop]# yum install device-mapper-multipath.x86_64 Loaded plugins: fastestmirror, refresh-packagekit, security Loading mirror speeds from cached hostfile * base: ftp.stu.edu.tw</pre>		~
* extras: centos.ustc.edu.cn * undates: centosx4 centos org		
Setting up Install Process Resolving Dependencies		Ш
> Running transaction check		
> Package device-mapper-multipath.x86_64 0:0.4.9-64.el6 will be installed > Processing Dependency: kpartx = 0.4.9-64.el6 for package: device-mapper-m ipath-0.4.9-64.el6.x86 64	ult	t
> Processing Dependency: device-mapper-multipath-libs = 0.4.9-64.el6 for pa	icka	a
<pre>ge: device-mapper-multipath-0.4.9-64.el6.x86_64&gt; Processing Dependency: libmultipath.so()(64bit) for package: device-mappe ultipath-0.4.9-64.el6.x86_64</pre>	:r-n	n
> Processing Dependency: libmpathpersist.so.0()(64bit) for package: device- per-multipath-0.4.9-64.el6.x86_64	map	c
<pre>&gt; Running transaction thete &gt; Package device-mapper-multipath-libs.x86_64 0:0.4.9-64.el6 will be insta d</pre>	lle	e
> Package kpartx.x86_64 0:0.4.9-46.el6 will be updated > Package kpartx.x86_64 0:0.4.9-64.el6 will be an update > Finished Dependency Resolution		~

After installation you can configure multipath.conf. If the example file, multipath.conf is not in /etc, copy it from /usr/share/doc/device-mapper- multipath-0.4.9/multipath.conf and edit it as below

			root	@localhost:~/Desktop	_ 🗆 🗙
<u>F</u> ile <u>E</u> d	it <u>V</u> iew	<u>S</u> earch	<u>T</u> ermina	l <u>H</u> elp	
[root@lc ath.conf [root@lc	calhost /etc/m	Desktop ultipat Desktop	 ]# cp / n.conf ]# ∎	'usr/share/doc/device-mapper-multipath-0.4.9	}/multip ́
					V

Cofigure defaults. Insert path\_grouping\_policy, failback and no\_path\_retry

```
root@loca[\gost:~/Desktop
                                                                           _ 0 ×
 File Edit View Search Terminal Help
# for the changes to take effect in multipathd
## By default, devices with vendor = "IBM" and product = "S/390.*" are
## blacklisted. To enable mulitpathing on these devies, uncomment the
## following lines.
#blacklist exceptions {
#
        device {
#
                vendor "IBM"
                product "S/390.*"
#
#
        }
#}
## Use user friendly names, instead of using WWIDs as names.
defaults {
        user_friendly_names yes
        path_grouping_policy multibus
                    immediate
        failback
        no_path_retry fail
}
##
## Here is an example of how to configure some standard options.
##
```

Save and exit.

Type chkconfig multipathd reset Type chkconfig multipathd on Type service multipathd start

#### **Discover iSCSI Targets**

Type **iscsiadm –m discovery –t st –p 192.168.0.111** in the console, the server address 192.168.0.111 can be changed to the IP Address of your own iSCSI Target Server.

E root@localhost:~/Desktop	_ 🗆 X
<u>F</u> ile <u>E</u> dit <u>V</u> iew <u>S</u> earch <u>T</u> erminal <u>H</u> elp	
<pre>[root@localhost Desktop]# iscsiadm -m discovery -t st -p 192.168.0.111 192.168.0.111:3260,1 iqn.2006-03.com.kernsafe:linuxHA [root@localhost Desktop]# iscsiadm -m discovery -t st -p 192.168.0.112 192.168.0.112:3260,1 iqn.2006-03.com.kernsafe:linuxHAP [root@localhost Desktop]# ]</pre>	~
	=

### Log on to iSCSI Target

Log on without authorization, type **iscsiadm** –**m node** – **T iqn.2006-03.com.kernsafe: linuxHA** –**p 192.168.0.111** –**l** in the console. When logging on other targets, you can change the Address and the Target name.

E root@localhost:~/Desktop	_ 0	×
<u>F</u> ile <u>E</u> dit <u>V</u> iew <u>S</u> earch <u>T</u> erminal <u>H</u> elp		
<pre>[root@localhost Desktop]# iscsiadm -m node -T iqn.2006-03.com.kernsafe:lin p 192.168.0.111 -l Logging in to [iface: default, target: iqn.2006-03.com.kernsafe:linuxHA, p 192.168.0.111,3260] (multiple) Login to [iface: default, target: iqn.2006-03.com.kernsafe:linuxHA, portal 168.0.111,3260] successful. [root@localhost Desktop]# ]</pre>	uxHA orta : 192	- 🔨 l: 2.
		E E

Hit the **Enter** key to continue.

Log on the target in iStorage Server2.

E root@localhost:~/Desktop	_ 🗆 🗙
<u>File Edit View Search Terminal H</u> elp	
<pre>File Edit View Search Terminal Help [root@localhost Desktop]# iscsiadm -m node -T iqn.2006-03.com.kernsafe:1 p 192.168.0.111 -l Logging in to [iface: default, target: iqn.2006-03.com.kernsafe:linuxHA, 192.168.0.111,3260] (multiple) Login to [iface: default, target: iqn.2006-03.com.kernsafe:linuxHA, port 168.0.111,3260] successful. [root@localhost Desktop]# iscsiadm -m node -T iqn.2006-03.com.kernsafe:linuxHAF : 192.168.0.112 -l Logging in to [iface: default, target: iqn.2006-03.com.kernsafe:linuxHAF : 192.168.0.112,3260] (multiple) Login to [iface: default, target: iqn.2006-03.com.kernsafe:linuxHAF : 192.168.0.112,3260] (multiple) Login to [iface: default, target: iqn.2006-03.com.kernsafe:linuxHAF : 192.168.0.112,3260] successful. [root@localhost Desktop]# ]</pre>	.inuxHA - portal: al: 192. .inuxHAP , portal tal: 192
	~

### **Partition disk**

Now check that **dev-mapper** has configured the iSCSI disk. Type **multipath** –**II** in the console



If the configuration is correct, there is a device called **mpatha** in **/dev/mapper**. And you also can type fdisk –I to see whether there is **mpatha** or **dm-0**. Now you can partition **mpatha**. Type **fdisk /dev/mapper/mpatha** 

root@localhost:~/Desktop Σ \_ 🗆 🗙 <u>File Edit View Search Terminal Help</u> [root@localhost Desktop]# fdisk /dev/mapper/mpatha Device contains neither a valid DOS partition table, nor Sun, SGI or OSF disklab el Building a new DOS disklabel with disk identifier 0x1b15e94d. Changes will remain in memory only, until you decide to write them. After that, of course, the previous content won't be recoverable. Warning: invalid flag 0x0000 of partition table 4 will be corrected by w(rite) WARNING: DOS-compatible mode is deprecated. It's strongly recommended to switch off the mode (command 'c') and change display units to sectors (command 'u'). Command (m for help): m Command action a toggle a bootable flag b edit bsd disklabel C toggle the dos compatibility flag d delete a partition ι list known partition types m print this menu n add a new partition create a new empty DOS partition table 0 print the partition table D q quit without saving changes create a new empty Sun disklabel s t change a partition's system id change display/entry units u verify the partition table v write table to disk and exit W extra functionality (experts only) х

We can type **n** to add a new partition

Σ				root@	localhost:~/[	Desktop				-	×
<u>F</u> ile	<u>E</u> dit	<u>V</u> iew	<u>S</u> earch	<u>T</u> erminal	<u>H</u> elp						
Comma e p Parti Firsi Last Comma Disk	and ac exi pr: ition t cyl: cylin and (n /dev,	ction tended imary numbe inder nder, n for /mappe	partitic r (1-4): (1-1305 +cylinde help): p r/mpatha	on (1-4) : 1 , default ers or +s o a: 10.7 G	1): 1 ize{K,M,G} (1 B, 1073741824	1-1305, 0 40 bytes	default 13	05):	1305		<
255 H Units Secto I/O s Disk	neads s = cy or siz size iden	, 63 s ylinde ze (lo (minim tifier	ectors/1 rs of 10 gical/pl um/optin : 0x2c60	track, 13 5065 * 51 hysical): nal): 512 ed14e	05 cylinders 2 = 8225280   512 bytes / bytes / 512	bytes 512 byte bytes	es				=
/dev,	/mappe	De er/mpa	vice Boo thap1	ot S	tart 1	End 1305	Blocks 10482381	Id 83	System Linux		
Comma The p	and (r barti	n for tion t	help): w able has	√ s been al	tered!						
Call	ing i	octl()	to re-	read part	ition table.						~

And type **w** to write and exit.

#### **Format partition**

The new partition **mpathap1** we have created with fdisk utility may not be added into /dev/mapper at once.

You can restart iscsi service to make it appear. Type service iscsi restart

E root@localhost:~/Desktop _	×
<u>F</u> ile <u>E</u> dit <u>V</u> iew <u>S</u> earch <u>T</u> erminal <u>H</u> elp	
<pre>[root@localhost Desktop]# service iscsi restart Stopping iscsi: [ OK ] Starting iscsi: [ OK ] [root@localhost Desktop]# ls -l /dev/mapper/ total 0 crw-rw 1 root root 10, 58 Jul 24 18:17 control lrwxrwxrwx. 1 root root 7 Jul 24 19:25 mpatha -&gt;/dm-0 lrwxrwxrwx. 1 root root 7 Jul 24 19:25 mpathap1 -&gt;/dm-1 [root@localhost Desktop]# ]</pre>	
	H

Then type mkfs.ext3 /dev/mapper/mpathap1

E root@SANDP012:~/Desktop	-	×
<u>File Edit View Search Terminal H</u> elp		
<pre>[root@SANDP012 Desktop]# mkfs.ext3 /dev/mapper/mpathap1</pre>		^
mke2fs 1.41.12 (17-May-2010)		
Filesystem label=		
OS type: Linux		
Block size=4096 (log=2)		
Fragment size=4096 (log=2)		
Stride=0 blocks, Stripe width=0 blocks		
b55360 inodes, 2620595 blocks		
First data block=0		
Maximum filesustem blocks-2684354560		
80 block groups		
32768 blocks per group, 32768 fragments per group		Ξ
8192 inodes per group		
Superblock backups stored on blocks:		
32768, 98304, 163840, 229376, 294912, 819200, 884736, 16056	32	
Writing inode tables: done		
Creating journal (32768 blocks): done		
Writing superblocks and filesystem accounting information: done		
This filesystem will be automatically checked every 38 mounts or		
180 days, whichever comes first. Use tune2Ts -C or -1 to override.		
[TOOL@SANDPOIZ DESKLOP]#		$\leq$

#### Mount the partition

First you should create a new folder under **mnt**.

Type mkdir /mnt/LinuxHA

Then type **mount /dev/mapper/mpathap1** 



After mounted, it will be shown as follow.

				Comp	outer			-	×
<u>F</u> ile	<u>E</u> dit	<u>V</u> iew	<u>P</u> laces	<u>H</u> elp					
	CD/DV	/D Driv	e	11 GB F	Filesysten		Filesystem	1	
■ c	ompute	er 🗸 "1	1 GB Fil	esystem	" selecte	d			:

### Contact

Supportsupport@kernsafe.comSalessales@kernsafe.comWebsitewww.kernsafe.comForumwww.kernsafe.com/forum/



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