

# Dell Compellent Storage Center Boot from SAN: Best Practices for Windows Servers

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Best Practices



Compellent

## Document revision

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## Contents

Document revision .....	2
Contents .....	3
General syntax .....	4
Conventions .....	4
Where to Get Help .....	4
Overview .....	5
Boot from SAN fundamentals .....	6
MPIO .....	6
Boot volume and LUN 0 .....	6
Exclusive access .....	6
Pagefile location .....	6
Boot volume size .....	6
Dynamic disks .....	7
Fibre card preparation .....	7
Fibre card drivers .....	7
Creating a base image .....	8
Disk cloning tools .....	8
Standard new installation .....	8
SysPrep .....	9
Why use Data Instant Replay with base images .....	9

## Tables

Table 1. Document syntax .....	4
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## General syntax

**Table 1. Document syntax**

Item	Convention
Menu items, dialog box titles, field names, keys	<b>Bold</b>
Mouse click required	Click:
User Input	Monospace Font
User typing required	Type:
Website addresses	<a href="http://www.compellent.com">http://www.compellent.com</a>
Email addresses	<a href="mailto:info@compellent.com">info@compellent.com</a>

## Conventions



Note

Notes are used to convey special information or instructions.



Timesaver

Timesavers are tips specifically designed to save time or reduce the number of steps.



Caution

Caution indicates the potential for risk including system or data damage.



Warning

Warning indicates that failure to follow directions could result in bodily harm.

## Where to Get Help

If you have questions or comments contact: Customer Support

Tel 866-EZSTORE (866.397.8673)

[support@compellent.com](mailto:support@compellent.com)

## Overview

Utilizing Boot from SAN in a Microsoft Windows environment is a powerful tool in aiding with server consolidation, disaster recovery, test scenarios, and high availability applications.

Boot from SAN can be leveraged to consolidate enterprise environments by reducing total physical server and disk counts. This technology allows for speedier recovery in a failure situation when similar or identical hardware platforms are being used.

With the use of Dell™ Compellent™ Storage Center™, test cases and test runs can be simplified with the use of Data Instant Replay. For example, a mission critical application server could have instant Replays of its volumes, including the system volume, taken before installing critical security patches during a monthly patch cycle. This process would allow us to quickly and flawlessly recover these volumes utilizing Data Instant Replay from any potential problems that could arise from the changes made by these security patches. Being able to easily identify these types of conditions in a test environment decreases the likelihood of implementing changes that could have a detrimental effect on your production environment.

In addition, Data Instant Replay can be used to create a base image which can be used, reused, and updated as needed for future deployments. This use of instant Replays is a great way to save time and resources in providing a quick solution to getting a server up and running.

## Boot from SAN fundamentals

### MPIO

MPIO or Multi-Path I/O as defined by Microsoft, is the ability of a system to use more than one read/write path to a storage device to provide fault tolerance against a single point of failure in hardware components. MPIO is a great solution for redundancy since it can also provide load balancing of the traffic resulting in improved performance.

MPIO is not supported for Windows boot volumes without third-party path management software.

### Boot volume and LUN 0

Windows and Linux are two popular operating systems with an absolute requirement that a boot volume must be assigned as LUN 0.

In a standard configuration, LUN 0 is assigned to the Fibre controller and is accessible to all servers. This assignment is part of the SCSI-3 standard because a number of operating systems do not boot unless the controller is assigned as LUN 0.

### Exclusive access

Although we talk about the concept of creating a base image, it is important to remember that Windows cannot currently share a boot volume (image). Each server requires its own dedicated volume from which to boot.

### Pagefile location

A pagefile is an adjustable size file which is used as an addition to memory (RAM) for data that hasn't been used recently on the system. To reduce potential contention on the SAN, it might be appropriate to use local disk to store the pagefile. If a diskless system is being used, the only option is to use the SAN to store the pagefile. If a system is showing excessive I/O in the form of paging, this is a sign that the system has utilized its available memory and is using the pagefile for data operations. You can decrease and sometimes eliminate paging by adding additional memory (RAM) to the system.

### Boot volume size

Windows NT Server 4.0 had a limitation that the boot volume could not be larger than 7.8 GB. The limit was increased to 16 GB in Windows 2000 and eliminated with Windows 2003. The only potential block to this would be from the system BIOS; however, most current data systems support large volume sizes for system volumes.

## Dynamic disks

Dynamic disks were introduced with Windows 2000. Dynamic disks, in addition to simple volumes, allow you to create spanned, mirrored, or striped volumes; by contrast, basic disks only allow you to create partitions and logical drives.

The majority of disk cloning tools do not support the cloning of dynamic disk that contain a configuration other than simple volumes.

If you are using Boot from SAN technology with a Dell Compellent Storage Center, there are no advantages of using dynamic disks since the additional functionality of volume types is already available on the Dell Compellent. In addition, remember that dynamic disks are not accessible by any operating system including MS-DOS prior to Windows 2000.

**IMPORTANT:** Once a disk is converted from basic to dynamic, this change cannot be reverted. The only way to go back to a basic disk is to delete the existing volumes and repartition the disk. (Don't forget to backup your data!)

## Fibre card preparation

Numerous vendors have instructions for configuring their adapters for Boot from SAN. Dell Compellent has identified optimal settings for QLogic Fibre cards. This information can be found in Knowledge Center.

The process of enabling a card for Boot from SAN is relatively simple. Once you present a volume (either empty or an "image") to the server, it is a matter of configuring the card to enable the "Selectable Boot" option (QLogic) and select the boot port and LUN.

With a QLogic card, we do this by:

1. During boot, press CTRL+Q to access the QLogic card BIOS.
2. From the Fast!UTIL Options menu, select "Configuration Settings" > "Selectable Boot Settings".
3. Select "Selectable Boot" and change to "Enable".
4. Select "(Primary) Boot Port Name, LUN". Press enter and change to the correct Fibre Channel device ID. You will be able to see the Dell Compellent in this list.
5. Press ESC and be sure to save your changes. Reboot and you'll be ready for installation or have a LUN that will boot the existing image from the volume.

## Fibre card drivers

QLogic now offers a single driver per operating system for all of their 2 GB and 4 GB HBAs. When creating a new installation of Windows Server 2003, HBAs that are 24xx series and above will require that its driver is loaded as an "additional mass storage driver" during the non-GUI portion of the setup. If a driver is not loaded for the HBA, it will be unable to detect any SAN-attached disk. Previous series cards can utilize the QLogic driver that is built in to Windows and is loaded automatically.

## Creating a base image

Dell Compellent Data Instant Replay allows you to simplify the OS image standardization and build process by being able to take Replays of an existing volume. We'll talk about creating a base image using disk cloning tools, SysPrep, and a standard new installation process.

### Disk cloning tools

Using disk cloning tools has been the easiest and most widely used way of deploying desktops and servers in the past. Some of the more popular disk cloning tools include Norton Ghost and O&O DiskImage. Both tools provide the ability to copy partition to partition or disk-to-disk.

**IMPORTANT:** You can clone your existing disk to a SAN volume using these tools in preparation to make it Boot from SAN. Once a disk is cloned to the SAN, with any clone operation you have to make sure that the new boot partition is set to "Active". Norton Ghost, for example, has a clone disk option called "Set Drive Active". This option makes the destination drive the active partition (the drive the computer starts from). Remember, only one drive can be active at a time.

If your cloning tool doesn't have an option to set the active partition, you have to use a utility such as Partition Magic to complete this step.

Using disk cloning tools is the appropriate and recommended method of migrating DAS servers to a SAN environment.

### Standard new installation

Walking through a new installation of Windows Server is fairly time-consuming, requiring an hour or two to complete. However, once an installation is complete, you have a number of options on how you wish to use the new installation.

A new installation might be useful to use and reuse in a test environment that is separated or isolated from a production network. Keep in mind that using a duplicate image on a network results in a duplicate SID (Security Identifier) for that machine which can cause problems if a machine created by this method were to join a Windows domain. This type of situation can be eliminated with utilities such as Sidwalker which create a new machine ID. This method of changing the SID is documented and supported by Microsoft. For more information, go to:

<http://technet2.microsoft.com/WindowsServer/en/library/81e8939d-d58b-4451-958d-6f39ff5ae5541033.aspx?mfr=true>.

A new installation is the best starting point for creating a reusable, hardware independent operating system using SysPrep.



## SysPrep

Microsoft introduced SysPrep as a way to create flexible multi-system drive images. A single image can be updated (applications added, security patches updated) and deployed in under 15 minutes. SysPrep overcomes issues of duplicate SIDs by assigning a unique security ID (SID) to each destination computer the first time the computer is restarted.

A few things to note about SysPrep:

- The destination server must have the same mass storage controller and a compatible hardware abstraction layer (HAL) as the original SysPrep image.
- When you SysPrep a machine, it has to be a member of a workgroup. If it is a member of a domain, it will be removed.
- SysPrep can only be run on standalone servers--not on domain controllers, cluster servers or certificate services servers.
- Don't run SysPrep on an NTFS file system partition that contains encrypted files or folders. The data will become completely unreadable and unrecoverable.

To completely automate the installation of a Windows Server, use the Setup Manager included in the deploy.cab on a Windows Server or Windows XP CD. The Setup Manager allows you to create the sysprep.inf file with all the parameters that you select for the installation. SysPrep.exe and sysprep.inf should be placed in the SYSPREP folder on the local drive.

Once you have the sysprep.inf file, have customized settings and installed any additional necessary applications or components, then run SysPrep.exe. SysPrep will be run in the mode selected and will perform a system shutdown when complete. This is now your base image.

## Why use Data Instant Replay with base images

Once you have your base image created, the volume should have its mapping removed, copied in the Dell Compellent Storage Center and kept for safe keeping. This image should never be mounted for booting a server, instead use a Replay.

Using Boot from SAN technology is especially advantageous when coupled with a Dell Compellent Storage Center. The ability to create a base image, and then create a Replay which can be mapped to a server as the boot volume conserves overall disk space since the Replay only contains changes from the point of the Replay going forward. So, a base installation that consumes 1.5 GB from the Windows installation consumes 1.5 GB only once. This is not duplicated across the number of total servers or Replays used from that volume. Each server that uses a Replay starts from 0 and consumes disk space as changes occur on that individual Replay volume for that server.