SHOWCASE® Image Center
Image Directory Creation and Maintenance

The ShowCase Image Center stores DICOM data in **Image Directories**. An Image Directory is a folder on a hard drive or NAS that you set up from the Image Center Console. Most states and governing bodies require a practice to store (a minimum of) seven years of study data. The Image Center and its Image Directories are designed to easily accommodate this volume of data with little to no manual intervention. For larger sites, archives of 20TB or more are not uncommon, containing millions of images, with no degradation in performance or speed of access.

Follow the recommendations in this document and you will have many years of trouble-free storage of your study data.

Tips and Recommendations
- Purchase enough disk space to hold at least 5 years of studies.
- Set up offsite backup of your Image Directory using something like iDrive, Carbonite, etc.
- Put your Image Directories on quality hard drives, like a 5 year warranty WD Black or equivalent
- **DO NOT** delete or move files out of your Image Directory. This will likely result in permanent loss of data.
- **DO NOT** copy or move data into an Image Directory. This can result in patient misdiagnosis.
- **DO NOT** set up an Image Directory on your C: drive or in Desktop folders.
- **DO NOT** attempt to move Image Directories without following the instructions in this guide.
- **DO NOT** attempt a 'small short term' Image Directory hand-copied to a 'larger long term' Image Directory.
- **DO NOT** use the Browse function in ShowCase to directly access an Image Directory on disk.

Disk Space Requirements

The amount of storage you need depends on the number of studies you do and their size. An average ultrasound study takes up 150 MB of disk space. To budget five years of disk space, use the formula:

150 MB x (# studies/day) x (250 working days/year) x (5 years) = ? MB

Example: Let's say you have 4 ultrasound machines doing 10 studies a day with average study size of 150MB:

150 MB x **40** studies/day x **250** working days x **5** years = 7,500,000 MB or **7.5 Terabytes**

If you already have an image directory in use, that's a great way to get real numbers. Don't forget to budget space for your existing image directory *plus* the next 5 years.
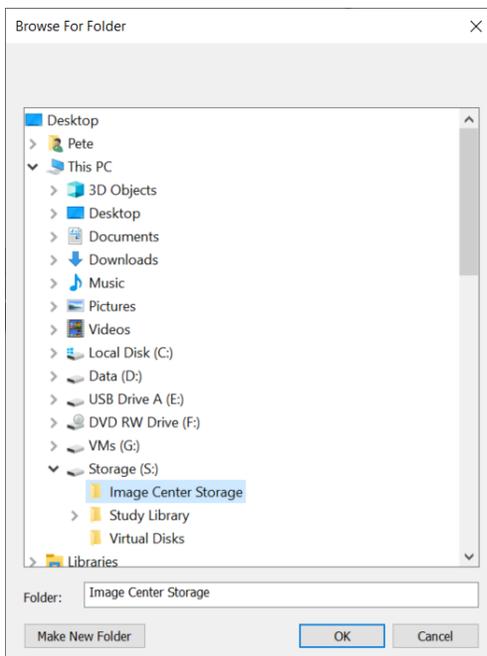
Creating An Image Directory

When the Image Center is first installed, it will be unable to store studies until you create an Image Directory for it.

1. Start the Image Center Console application.
2. Click the **Manage Directories** button. A dialog appears.
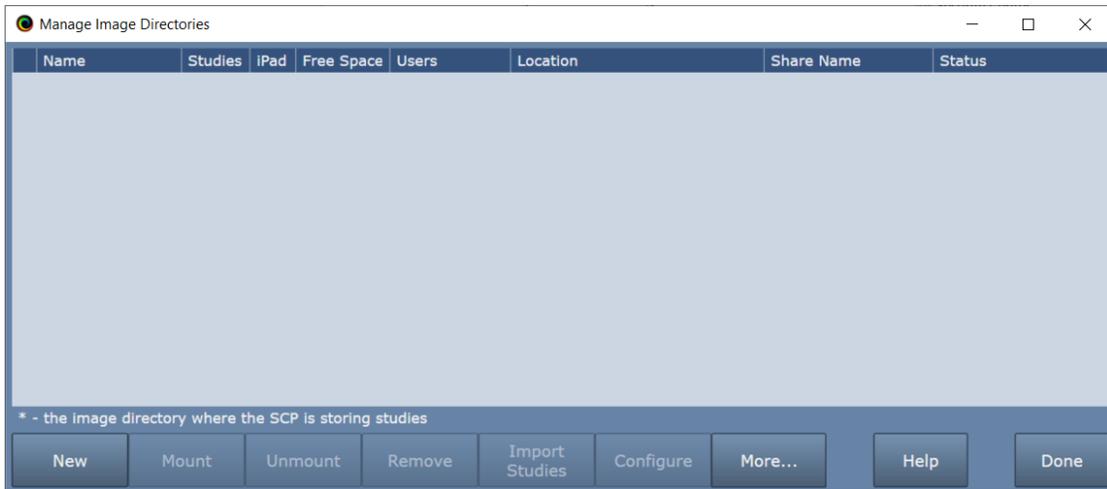
3. Click the **New...** button. A folder browser appears.

4. Select an empty folder (or click **Make New Folder**) on a disk that has plenty of disk space. If you want to set up Image Center to use a network share, enter the full UNC path name of the share in the **Folder:** text box, e.g. "\\25.66.165.65\Image Center Main Store" or "\\NAS34\Image Center Main Store". Please be sure to read the section "Setting up Image Directories on Network Shares" for more details on using network shares.

   Note: Only create Image Directories in empty folders. Never try to place an Image Directory inside of another Image Directory. Do not attempt to create Image Directories on mounted drives, or other kinds of virtual drives that exist only when you are logged in.

5. Click OK. A Configuration screen appears:
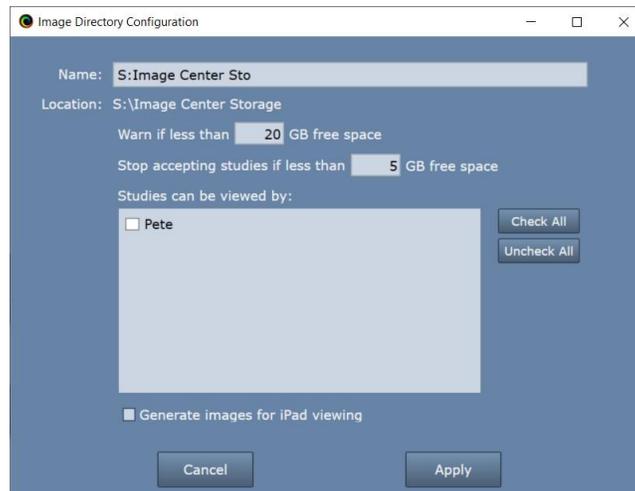
6. Select all of the Users that will need access to this Image Directory.
7. Click **Apply.**
   If you get a warning about the folder not being shared, you will need to manually share the Image Directory you just created so that ShowCase Premier and Workstation clients can access the studies. See the next section.

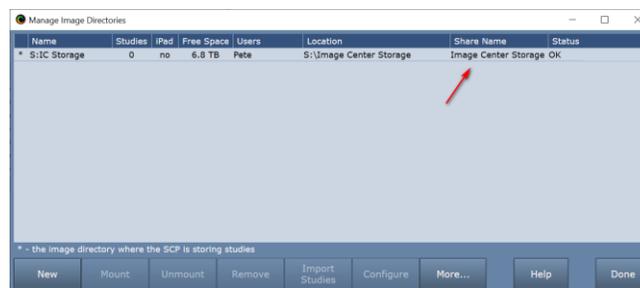## Image Directories on Hard Drives

If you followed the instructions above and didn't get any warning dialogs, it's very likely your Image Directory is ready to go. But if you did get a 'sharing' warning, please read on.

Image Directories On Hard Drives Want To Be Shared

For ShowCase clients to access the studies managed by the Image Center, the Image Directories have to be shared. When you created the Image Directory, the software will try to share the folder for you, but if you saw a dialog saying it couldn't, then you're going to have to share the folder manually. Folder sharing is tied into the security practices of your clinic, so you should engage your IT support for this. Please let them know that they need to set the share to "Read" permission for the "Everyone" user.

Checking To See If the Folder Is Shared

To check and see if your folder is shared, look at the Image Center Manage Directories screen, under the **Share Name** column. If you see an entry in there, the folder is being shared.

Image Directories on Network Shares (NAS)

Make sure you entered the full UNC pathname to the NAS share as was recommended in step 4 above.

The Image Center has two Windows Services that access Image Directories: the **ShowCase Image Center Service** and the **ShowCase Image Center Web Service**. For the Image Center to use network shares, these two

services must have full read/write/create permission for the network share. One way to accomplish this is to configure the services to use login credentials that have full access permissions to those shares.

1. Open the Windows Services dialog
2. Right click on the ShowCase Image Center Service and select Properties
3. Click on the Log On tab
4. Select the "This account:" option and enter an account name and password. You may need to Browse to get the exact name for the account you want to use. Make sure this account has full access to the folder share.
5. Stop and Start the ShowCase Image Center Service
6. Repeat this procedure for the ShowCase Image Center Web Service.

These steps may vary, depending on the Windows operating system you are using. This is only one way to approach providing proper access to the network shares for the Image Center's Windows Services. Your IT policies may dictate another.

You will also need to make sure that your ShowCase viewer clients have at least read access to the network share. If you have problems with this, see the "Image Center Sharing Enabled Troubleshooting" guide.

Backing Up Image Directories

Image Directories should *always* be backed up using automated offsite backup, for several reasons:

- Protection from ransomware attacks.
- Catastrophe protection: theft, fire, or simply a hard drive that dies.
- You are legally required to maintain an archive of your studies for, in most cases, a minimum of seven years.

There are several good products out there that are affordable: iDrive and Carbonite, for example. Whatever you choose should fit in with the backup practices of your site. **Tip:** Backups should always be automated. Manually backing up or making manual copies of your studies is prone to error and will result in data loss.

Restoring From Backup

If your Image Center got caught in whatever catastrophe affected your Image Directory (fire, ransomware, etc.), then you should be restoring your Image Directories as part of that recovery. See the Image Center Administrator's Guide for details on how to do that. If only the Image Directory itself was affected (i.e. disk crashed, somebody deleted stuff they weren't supposed to, etc.), then read on.

1. Go to your backup software and fetch your Image Directory data from the latest backup. Note the time the data was backed up – it is completely possible that studies were sent to the Image Center after the last backup. If studies were sent after the latest backup, then they will need to be re-sent from the imaging machines once you've restored your Image Directory.

2. Open the Manage Directories screen from the Image Center Console. It will look something like this:

The Image Directory Status should be "Offline" or something similar.

3. If you can restore the backup to the exact same location as the original, then do so. You will need to set the access and sharing permissions of the recovered folder to be the same as the original. The Image Center should be able to recover automatically once the data is in place. If it does, the Status will go to "OK". If it doesn't, please contact support.

4. [Optional] If you can't restore the backup to the exact same location as the original, but were able to get it restored to a new location, do the following:

   a. Select the Image Directory and click the Unmount button.Select the Image Directory and click the Mount button.
   b. You will see a **Browse For Folder** dialog. Browse to the new location of the Image Directory, or, in the case of network shares, enter the full UNC pathname of the new location into the **Folder:** text box. Click **OK**.
   c. If everything went well, you should see the Image Directory status go from Unmounted to OK.

Increasing Image Center Storage

Adding more storage to your Image Center is fairly straightforward: purchase a new drive with lots of free space and create a new Image Directory on it. Please refer to the sizing guidelines at the beginning of this document to ensure the storage you purchase will meet your needs. The Image Center aggregates all study list queries across all Image Directory volumes into one coherent study list so from the standpoint of your physicians, nothing has changed.

1. Set up a disk or file share that has plenty of free storage. Make sure it has the same Windows sharing and security permissions as the other folders you have used for Image Directories.
2. Open the Image Center Console
3. Click the **Image Directories** button.
4. Click the **New** button. A folder browser will appear.
5. Select an empty folder (or click **Make New Folder**) on the storage from step 1 and click OK.
6. A **Configuration** dialog appears. Configure this new Image Directory with the same users and settings as your other Image Directories.
7. Click **Apply.**
8. Click **Done** to close the Image Directories dialog.

Now you're ready to switch storage over to the new Image Directory. **Note:** Only do this when the practice is not sending studies to the Image Center, otherwise you will have studies partially stored across different Image Directories.

9. Click the **Admin** button on the main console.

10. Under *Incoming Studies (DICOM SCP)* section click the dropdown arrow on the **Store Images To** and choose the new Image Directory you just created.
11. Click the **Done** button.

All incoming images from this point forward will now be stored in the new Image Directory. Time to test your work.

12. Create a test study at your imaging device and send it to the Image Center.
13. Check the **Incoming Studies** window on the Image Center Console to ensure it arrived.
14. Go to a ShowCase Viewer and open the study. If you have any problems viewing the new study, see the **Image Center "Sharing Enabled" Troubleshooting** guide for help on troubleshooting any security and sharing problems with the folder you created.

Moving an Image Directory

Moving an Image Directory should only be done during off-hours when your practice is not scanning patients or reading studies. Read through these instructions before you begin. A large, multi-terabyte volume can take hours to migrate. Plan ahead: if you're moving a large volume, figure out how you're going to move the data, e.g. over the network, via USB drive, etc. and try to get a feel for how long it will take.

1. **Unmount the Image Directory**
   Open the Image Center console and click the **Manage Directories** button. Select the Image Directory you want to move and click the **Unmount** button.
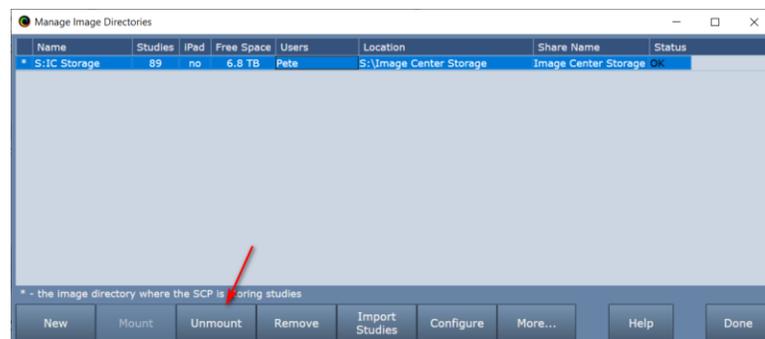
   The Image Directory is now "Umounted" and can no longer be access by ShowCase nor can the Image Center store incoming studies to it.
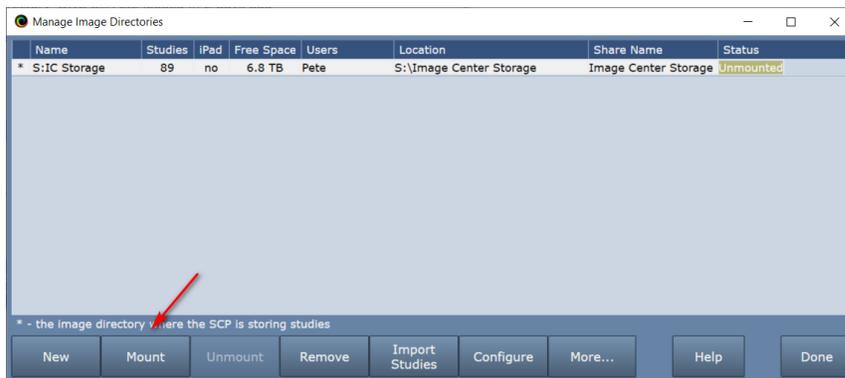
2. **Move the Image Directory**
   Using Microsoft Windows, copy the entire Image Directory to its new location. Image Directories can be very large, and you may want to use a large copy utility like windows robocopy.

   Make sure the new Image Directory and its contents have the same sharing and access permissions as the original folder. If this is a new network share, make sure the Image Center services are properly configured to access the share. (See the Image Directories on Network Shares (NAS) section in this document)

3. **Mount the New Image Directory**
   Open the Image Center console and click the **Manage Directories** button. Select the Image Directory you are moving and click the **Mount** button:

A **Browse For Folder** dialog will appear.
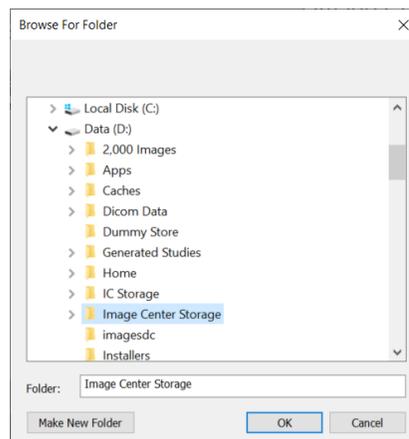
Browse to the new location of the Image Directory, or, in the case of network shares, enter the full UNC pathname of the new location into the **Folder:** text box. Click **OK**.

If everything went well, you should see the Image Directory status go from Unmounted to OK.

4. **Test Your Work**
   Send a test study to the Image Center from one of your imaging devices and make sure there are no errors. Go to a ShowCase client and view a study that is located in the Image Directory you just moved. If you do encounter errors, the most likely cause will be permission and sharing issues, wherein the new Image Directory does not have the same permissions and sharing as the old.

Hardware Recommendations

An internal hard drive with high reliability and lots of storage space is a good place to start. **[Do not use your C: drive.]** NAS are also great, as long as you've got 1000T cabled network between your NAS and the Image Center computer.

Disk drives are a key area of failure in any computer system. If you can, deploy RAID based storage with automated offsite backup. At a minimum, make sure you have automated offsite backup to foil ransomware predators or recover from other catastrophic situations.

Can I use external USB drives?

Yes. Just don't buy cheap ones. Make sure they're USB 3.0 or better. Make sure they meet your storage requirement needs. Make sure that they're stored in such a fashion that they won't be unplugged by someone 'looking for a hard drive'. (This happens. I'm not kidding. Hide it or attach it to the PC.)

What About NAS?

Network Attached Storage is a great solution, as long you have high speed connectivity (1000T ethernet recommended) between your NAS and the Image Center.

What About RAID?

RAID is great. You want to favor redundancy (RAID 1 or 10) over speed. The main thing you're protecting against is hard drive failure. RAID 1 or 10 will allow your system to keep running even if a hard drive fails. If this happens all you have to do is replace the bad drive, instead of initiating a data recovery. Even if you have a RAID, you will still need offsite backup.

Do I Need a RAID?

No, and please make sure you have offsite backup.

What about high-speed drives, like SSD?

There's no need to use these. The key bottleneck in your system will always be the network between your drives and the ShowCase clients. We've done extensive testing on this, using 5400 rpm, 7200 rpm, SSD, and a variety of other drives. There is no perceptible difference in performance from the physician's perspective. Focus on high reliability and large storage. (And a robust fast network)

Can I Host My Data in SD-WAN?

Do not attempt to place your Image Directory separate from the Image Center on an SD-WAN or similar architecture. Image Center storage should always be 'local' to the Image Center, either internal hard drive, NAS on a good network, or equivalent.

What About VMs?

A properly set up and configured VM environment works well for the Image Center and its storage. Be mindful that your storage is properly configured for rapid write/read access from the Image Center Services. Think "database accessing its paging and logging volumes" **not** "web site with occasionally accessed read-only files".

What About File Sharing or Cloud Drives, like OneDrive or DropBox?

These simply won't work. Don't even try it.

Freeing Up Space, Long Term Archives, Study Migration Old Studies

Please see the *Image Center Study Data Management* guide for details on these and other advanced storage topics.