EVERYTHING YOU SHOULD KNOW ABOUT DISK IMAGING . . .

. . . ALMOST
(FIRST DRAFT)

Including

- What is a disk image
- Why do we create disk images
- How do we create disk images
- what is the difference between imaging, cloning and copying files

WHAT IS A DISK IMAGE

A disk image is a computer file containing the contents and structure of an entire data storage device like a hard disk, tape drive, floppy disk, optical disc, or USB flash drive. A disk image is an exact, unaltered copy of the original media being duplicated. Disk partitions can also be imaged individually. When a data storage device is imaged, all the files, partitions and structures are copied, physical sector by physical sector.

WHY DO WE CREATE DISK IMAGES

there are many reasons to create disk images and they can be used to solve many problems. The first and primary purpose of a disk image is as a backup. But a computer's ability to make fast digital copies can serve several other functions

Personal Computer Backups are a common reason for disk imaging. When you get a new computer most people will install their favorite programs, customize their desktops, install a wallpaper and set-up their web browser with their favorite bookmarks. When this initial set-up is done, creating a disk image of the computer's freshly configured hard drive gives you a backup of your new computer's operating system, configuration files and file system(s). That includes all the programs and customization you just did.

If the hard drive fails a replacement drive can be purchased and the saved image can be copied onto it. If your computer is attacked by a ransomware hacker, you can simply push your disk image back onto the hard drive and copy over the damaged drive. Your computer will start-up just like to day you made the image. Of course there must be a separate back-up strategy for your data files as well.

Computer Manufacturers will install the operating system (Windows or Mac OS X) and the necessary configuration files for a new computer model. This might also add various software packages. The manufacturer will do this install on a master machine and then create a disk image. This image will then be copied onto many hard drives at one time and these hard drives then get installed in the factories where the computers are assembled.

Schools and businesses will often need to have computers with uniform configurations for their students and employees. Large organizations like these will usually buy lots of computers at one time and creating an image for computers with the same hardware works very well. Computer users in schools and businesses will usually have local network accounts on servers where they can keep their files and data. Network configuration can be easily written into the image.

Forensic Imaging is an interesting way that the police and investigators use disk imaging to save the information and data from computers that have been used in crimes. We have all seen detectives on TV shows and movies put on rubber gloves before they pick-up evidence at a crime scene. Creating a disk image of a hard drive is like dropping the disk into a plastic bag and sealing it.

A computer suspected of being used in criminal activity cannot be investigated or even turned on! Every time a computer starts up, its configuration files, log information and other data gets changed automatically. Starting a computer would corrupt its validity as evidence. In order to look at the data on the computer's hard drive, a disk image is created and installed on another computer or hard drive and the data can be viewed without touching the original. Since a disk image is an exact copy, the court will recognize it as evidence if the original is intact.

WCE Disk Images are a little different than the disk images described above because they are made to work on a wide variety of computer hardware. WCE gets computers from many different individuals and organizations. Since WCE images use the open source Linux operating system, it can more easily adapt to different hardware. Operating systems like MS Windows and Mac OS X will often need small programs, supplied by hardware manufacturers that add more and special features to audio, video, network and other adapters, installed in computers. These added programs are called drivers.

Because Linux is open source and designed to be very flexible, WCE images can be successfully installed on a wide variety of hardware. While Linux hardware drivers are very flexible, they don't always have some of the features of the driver programs supplied by hardware manufacturers.

HOW DO WE CREATE DISK IMAGES

There is a lot of hidden information on a disk that has an installed operating system, configuration files and user data. Pulling all that information off a hard drive so it can be correctly recopied onto a new disk can be done different ways. The programs listed below are some common examples.

Commercial Imaging Programs

- **Acronis** was started in 2003 and offers software that does backup and disaster recovery based on disk imaging technology.
- **Imperius Backup** has a set of software packages that does disk imaging and data backup. They offer free versions with limited capability.
- **Ghost** (an acronym for general hardware-oriented system transfer) is a disk cloning and backup tool originally developed in 1995 and acquired 1998 by Symantec. This software package is currently available as part of **Symantec Ghost Solution Suite**.

Open Source Iimaging Programs

- **Clonezilla** is a free and open-source disk cloning, disk imaging, data recovery, and deployment computer program. Clonezilla is designed by Steven Shiau and developed by the NCHC Free Software Labs in Taiwan. Clonezilla can create images of entire data strage devices or single disk drive partitions. Clonezilla Server Edition can copy images to multiple devices at one time over a local network.
- **The Linux dd command line utility** is not really a disk imaging program like the ones mentioned above. It is really just an operating system command that can copy, clone or image files, directories, partitions or entire disks. It is a powerful and simple tool that has been around since the times when computers used tape drives to store data.

THE DIFFERENCE BETWEEN IMAGING, CLONING AND COPYING FILES

Cloning is the process of making an exact physical copy of a computer disk (or data storage device). Every file and "bit" of data has been copied from the original disk to the same location on the cloned disk. You don't have to create an image file to make a clone. Two computers can be hooked together and the data from one hard drive can be directly written to the other without making an image file.

There are also cloning machines where the original disk can be plugged into one slot and many blank drives plugged into other slots and the data is copied directly. There are even end user hard drive docking stations that can physically clone 2 drives.

Imaging is the process of disk cloning by taking the intermediate step of creating an image file. Having an image file can be handy for several reasons. It can be kept as a record or shared with others who can use it as necessary. WCE makes its images and distributes them so refurbishing clubs around the world can prepare computers as volunteers finish checking them out.

Imaging and cloning are different from copying files. When a computer user copies files:

- from one location to another on the same drive
- from one drive to another
- from one computer to another

That user is asking the operating system to make room on the file system. Give the copied file the same or a new name, creation date, and other file data. And then write it to the physical location(s) on the drive wherever the operating system needs t put it.

Imaging and cloning copies chunks of data from a physical location on one drive to the same location on another drive. A different way to say that is; Cloning takes the data from sector 1 on a drive and puts each "bit" of information in the same place of sector 1 of another drive. This process continues until all sectors are copied bit for bit. Cloning is a "physical" copying process.