Global Information Assurance Certification Paper

Securely Deleting Files

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1. Introduction

Many people and companies spend thousands of dollars to secure their sensitive information and to protect it from unauthorized disclosure. They spend dollars on security isolation devices like firewalls, they install and use good authentication, and they require strong passwords to protect their computer information. Most companies practice other good security protection measures like shredding all sensitive paper and documents. Companies and individuals understand that they must protect their information.

But, when it comes time to replace their old and outdated computers with new systems, are all necessary steps taken to properly protect the information that may still reside on the old computers.

Many times the company or individuals tries to sell there old systems to unknown individuals or they simply try to do the civic minding thing and donate they're old computer to schools, and other non-profit organizations.

Companies and individuals must ensure that all information is totally destroyed and not recoverable before they lose control of their systems. If you are disposing of a computer system, you must make sure all sensitive files contained on the hard drive(s) has been completely destroyed by using a disk wiping utility or some form of secure delete program. The information on your computer and disks is a valuable asset, and we must ensure that it is protected or completely destroyed.

2. Information Storage

There are many different types of storage disks, from the simple floppy disk to the large volume IDE and SCSI hard disk drives. No matter what type of disk, they all involve turning some kind of magnetic pulses on and off as the disk moves under the magnetic read/write head(s). The various characteristics of how the information gets placed on the disk depends on the computer operating system, how much information can be put in a given space on the disk, and the precision and quality of the read/write heads.

Disks provide long-term, inexpensive method of storing information. Disks have different physical characteristics as well as different software requirements. The method of connecting the disk to the computer can also be different. But, the basic concept for all disk types is basically the same. The media stores information on the disks by writing magnetic pulses (0'and 1"s) on specific spaces (cluster or sectors) on the disk media. The number of cluster or sectors used to store files or programs can expand and contract depending on the size of the file or program. The computer operating system keeps track of where specific files and programs were placed on the disk (what cluster or sector) and

provides instructions on how and were to retrieve specific files and programs to access the information when needed. The operating system also keeps track of what cluster or sectors contain previously stored information that cannot be overwritten and what clusters or sectors are free for the system to use to write new information.

Deleted Files

Contrary to popular belief, deleting files and programs on disks does not erase or overwrite the information on the disk. Delete and erase commands simply removes the flags or pointers that tells the computer's operation system what specific clusters or sectors are being used to store the information. Removing the flags or pointers tells the operating system that the clusters or sectors can be reused by the computer for saving other files and programs. All of the information (0's and 1's) are still on the disk and can be easily recovered. Until those specific clusters or sectors are overwritten by new information (0' and 1's) the original information can be recovered.

Most modern operating systems have added addition features that place deleted files in a recovery folder. Files will remain protected in this folder and will not be overwritten and destroyed until they are deleted a second time. This feature allows the user to retrieve and totally recover deleted files. Once the files are deleted out of the recovery folder the spaces or cluster or sectors can be reused by operating system.

Many software manufactures (Norton Utilities UnErase, etc.) offer a wide range of programs that will search your disk and try to recover deleted files. If the clusters or sectors that originally contained the deleted file information have not been overwritten, the UnErase programs can normally completely recover deleted files.

Formatting

Most operating systems store information on your disk is two areas, the system area and data area. The system area contains bookkeeping information that tells the computer what kind of disk is being accessed, how to read the information and what specific clusters or sectors were used to store the data. The data area contains the actual data from your files. When you format a disk the operating system normally only overwrites the system information. This will erasing all information about where specific files were located on the disk, but does not overwrite the entire disk or the data area of the disk that contains the stored information. Since the information (0's and 1's) still resides on the disk it can be recovered.

Some format commands do overwrite all areas of the disk such as floppy disks and some older DOS format commands will overwrite the entire disk, however most simply overwrite the system information.

Other files

Most operating systems like Windows creates and maintains the original files, but while processing, printing, moving or coping data files, portions of the original file may be stored in various locations on the hard drive. Swap files, .TMP files, and spool files are all files that the computer uses to temporarily store and process information. Most users believe that the information has been deleted and cannot be recovered or don't even realize that the information was temporarily stored in other locations. These type of temporary files maybe recovered using software programs on the market (such as Power Quest's Lost & Found).

Disk Editors

As described above deleted files can normally be recovered using various unerase or recovery programs. Once, the disk media has been formatted or repartitioned these unerase programs may not recover the files. Once the disk has been formatted or partitioned the disk will indicate that the disk does not contain any information or files, however until you overwrite all disk clusters or sectors information from a previously stored files can be read and recovered by a disk editor. Disk editors read data directly from the disk clusters or sectors, therefore they can read partially overwritten information or information that is not normally recoverable using other file recovery software. There are many other software programs available (Encase) that can read directly from the disk, analyze the information and recover information and files.

Destroy your Information

If and when you ever dispose computer equipment or disks that have contained sensitive information, be sure to take precautions to ensure that all information is not only deleted, but it is completely destroyed. Simply deleting a file is not sufficient to prevent a clever user from undeleting the file and recovering sensitive information

Many software programs are available such as Norton Utilities Wipeinfo, Shredder, Secure Clean and BC Wipe that addresses these problems by completely overwriting disk media and completely eliminating unwanted data. The cleaning process should securely overwrite all cluster or sectors at least three times to ensure that the information has been completely destroyed.

Some highly sophisticated techniques are available that may be able to recover information from a disk even after it has been overwritten. If your information is highly sensitive you may need to take additional steps such as physically destroying the disk or degaussing the drives.

Conclusion

Disks provide long-term storage of information and will retain the information until it has been overwritten by new information. Simply deleting files only removes markers used by the operating to prevent the files from being inadvertently overwritten by new data. It

is vital that computer resources released out of our control be completely overwritten to protect sensitive information that may be retained on the disk media. If the information is highly sensitive them additional measures such as physical destruction of the disks may be required.

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