Survey on Hard Disk Duplication

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Abstract— In this paper, we have proposed a survey on Hard disk Duplication. Hard disk duplication means it copying or recovery or booting the hard disk. Hard disk duplication mostly used for to restore lost or damaged data, or to move wanted data into a new disk, though other reasons also exist. Hard disk duplication can be done in two ways one is disk cloning and other one is disk imaging. In this survey mainly we compare different disk image and clone tools [1].

Keywords— Disk cloning; system Backup; Disk cloning tools; File and folder Backup; Partition and drive Backup

I. INTRODUCTION

This Disk cloning is the process of copying the contents of one computer hard disk to another disk such that drive 2 is identical to drive 1 although it is possible to clone different sized drives. Disk image is used for recovery or backup the data or booting the disk. Disk image is mostly used in computer forensics. Some tools can perform both disk clone and drive image. Disk imaging as defined by Jim Bates, Technical Director of Computer Forensics Ltd, refers to "An image of the whole disk was copied. This was regardless of any software on the disk and the important point was that the complete content of the disk was copied including the location of the data. Disk imaging takes sector-by-sector copy usually for forensic purposes and as such it will contain some mechanism (internal verification) to prove that the copy is exact and has not been altered. It does not necessarily need the same geometry as the original as long as arrangements are made to simulate the geometry if it becomes necessary to boot into the acquired image."[3].

II. HARD DISK DUPLICATION COMMON USES

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A. Reboot and restore

A technique in which the disk of a computer is automatically wiped and restored from a "clean", master image, which should be in full working order and should have been swept for viruses. This is used by some cybercafés and some training and educational institutes, and helps ensure that even if a user does misconfigure something, downloads inappropriate content or programs, or infects a computer with a virus, the computer will be restored to a clean, working state. The reboot and restore process can either take place irregularly when a computer shows signs of malfunctioning, on a regular basis (e.g., nightly) or even, in some cases, every time a user logs off, which is the safest approach (although that does involve some downtime).

B. Provisioning new Computers

Provisioning with a standard set of software so that a new user is ready to go straight away with a complete application suite and does not have to waste time installing individual applications. This is often done by original equipment manufacturers and larger companies.

C. Hard drive upgrade

An individual user may use disk copying (cloning) to upgrade to a new, usually larger, hard disk.

D. Full system backup

A user may create a comprehensive backup of their operating system and installed software.

E. System recovery

An OEM can provide media that can restore a computer to its original factory software configuration.

III. DISK CLONE HISTORY

Before Windows 95, some computer manufacturers used hardware disk copying machines to copy software. This had the disadvantages of copying not just the used data on the disk, but also unused sectors, as the hardware used was not aware of the structures on the disks. A larger hard disk could not be copied to a smaller one, and copying a smaller one to a larger left the remaining space on the new disk unused. The two disks required identical geometries.

Other manufacturers and companies partitioned and formatted disks manually, then used file copy utilities or archiving utilities, such as tar or zip to copy files. It is not sufficient simply to copy all files from one disk to another, because there are special boot files or boot tracks which

must be specifically placed for an operating system to run, so additional manual steps were required.

Windows 95 compounded the problems because it was larger than earlier popular operating systems, and thus took more time to install. The long filenames added to the FAT file system by Microsoft in Windows 95 were not supported by most copy programs, and the introduction of the FAT32 file system in 1997 caused problems for others. The growth of the personal computer market at this time also made a more efficient solution desirable.

Ghost was introduced in 1996 by Binary Research. It initially supported only FAT file systems directly, but it could copy but not resize other file systems by performing a sector copy on them. Ghost added support for the NTFS file system later that year, and also provided a program to change the Security Identifier (SID) which made Windows NT systems distinguishable from each other. Support for the ext2 file system was added in 1999.

Competitors to Ghost soon arose, and a features war has carried on to the present day. Many disk cloning programs now offer features which go beyond simple disk cloning, such as asset management and user settings migration. On UNIX based computer systems, dd was more commonplace due to the lack of file system support in Ghost.

IV. SOME OF DISK CLONING TOOLS

A. Platform independent

- Norton Ghost (Home and SMB Edition), Symantec Ghost Solution Suite (Enterprise Edition)
- Kleo Bare Metal Backup for Servers
- PING (Part image Is Not Ghost)
- R-Drive Image

B. Windows

- Active@ Disk Image[citation needed]
- Altiris - Deployment Solutions
- Apricorn - EZ Gig software & data transfer kits, e.g., packaged with Crucial SSD upgrades
- Clonezilla Freeware hard disk clone tool.
- Drive Image XML Backup Software Runtime Software [8]
- Ease US Todo Backup [7]
- HD Clone
- Macrium Reflect

C. Linux

- UDP Cast - a utility to clone multiple PCs at once using multicast
- Mondo Rescue
- Part Image (SystemRescueCD)
- Trinity Rescue Kit
- FOG
- ntfsclone - a utility in the package of ntfsprogs
- partclone[3]
- TeraByte Image for Linux

- Redo Backup and Recovery
- dd (Unix)
- AmigaOS
- Nibbler
- QuickNibble
- ZCopier
- XCopy/Cachet
- FastCopier
- Disk Avenger
- Tetra Copier
- Cyclone
- Maverick
- D-Copy
- Safe II

V. DISK IMAGE

A disk image file (or simply a disk image) is an exact binary copy of an entire disk or drive. Disk image files contain ALL the data stored on the source drive including not only its files and folders but also its boot sectors, file allocation tables, volume attributes and any other system-specific data. Actually, a disk image is not a collection of files or folders but is an exact duplicate of the raw data of the original disk, sector by sector.

Since disk images contain the raw disk data, it is possible to create an image of a disk written in an unknown format or even under an unknown operating system. File formats of disk images usually depend on the type of the source drive. For example, ISO files are CD images; IMG (or IMA) files usually are images of hard, floppy and/or removable disks; and XDF files are always floppy disk images.

Disk images are widely used by CD recording software for transferring and storing complete CD contents. A lot of CD recording programs use their own formats for disk images. Some of these formats are plain ISO image files renamed with another extension.

A. Uses

Some operating systems such as Linux[1] and Mac OS X[2] have virtual drive functionality built-in(such as the loop device), while others such as Microsoft Windows require additional software. Virtual drives are typically read-only, being used to mount existing disk images which are not modifiable by the drive. However some software provides virtual CD/DVD drives which can produce new disk images; this type of virtual drive goes by a variety of names, including "virtual burner".

V. COMPARISON OF TOOLS

A. Disk Digger

Disk Digger has two modes of operation which you can select every time you scan a disk. These modes are called "dig deep" and "dig deeper."

1. *Digging Deep:* The "dig deep" mode makes Disk Digger "undelete" files from the file system on your disk. Under most file systems, when you delete a file, it doesn't actually get wiped clean

from the disk. Instead, the file system will simply mark the file as deleted, and no longer show you the file when you browse the contents of the disk. Disk Digger scans the file system for such deleted files, exposes them to you, and allows you to bring them back as ordinary files again

After a file is deleted, the file system is completely free to overwrite the contents of the deleted file with new data. From the point of view of the file system, the deleted file is now as good as free space, ready for the taking. The next file that is saved by the file system may just be written on top of the deleted one. If that happens, the deleted file will truly be lost forever.

So, a general rule would be something like this: The undelete process is effective only for files that have been deleted very recently. Or, more precisely: The probability of successfully recovering a file is inversely proportional to the amount of time elapsed after deleting it[4].

2. *Digging Deeper:* The "dig deeper" mode causes Disk Digger to become a powerful data carver, and carve out whatever files it can find on the disk, independent of the file system. Data carving refers to physically scanning every single sector on the disk, and looking for traces of known file types.

3. *Advantages*

- The main advantage is that it's independent of the file system that's on the disk, so the disk can be formatted as FAT, NTFS, HFS, ext2, or anything else; it doesn't matter. Disk Digger scans "underneath" the file system, which gives it an additional advantage of being able to scan any free space on the disk outside of the file system, which the "dig deep" mode cannot do.

- Another disadvantage of this mode is that only a limited number of file types can be recovered. Since we're not aware of the file system, we have no way of knowing what types of files are present, so the only things we have to go on are the actual bytes that we see on the disk. This means that Disk Digger has to be aware of the structure of the types of files we need to recover, and search for patterns of bytes specific to each file format. Fortunately, Disk Digger supports a fairly wide variety of file types which should cover most cases.

- The only other disadvantage of this approach is that it's not possible to recover files that have been fragmented by the file system. Since it's not aware of the file system, Disk Digger has no way of knowing whether or not a certain file has been fragmented. So, technically, when digging deeper, Disk Digger will only recover the first fragment of a file. Most files consist of a single fragment anyway, but in some cases, the file system will choose to split a file into two or more

fragments. A rule of thumb is: the larger a file is, the more likely it is that it's been fragmented.

B. NTFS Walker

NTFS Walker is a portable application that contains its own NTFS drivers that allow it to "walk through" the entire file structure, bypassing the need for the Windows operating system.

The ability to recover deleted files from an NTFS file system is something any good consultant should have in their back pocket. This also applies to the ability to recover files from a machine that has been rendered unbootable. There are plenty of tools available for that task, but few of them are as simple as the free tool NTFS Walker.

NTFS Walker is a portable application (it can be used from a thumb drive) that contains its own NTFS drivers that allow it to "walk through" the entire file structure, bypassing the need for the Windows operating system. Once NTFS Walker has read your system it will then allow you to view every record on the file system's Master File Table. And when you view a record you can actually get very detailed information about the file to be recovered [5].

- *Supported operating systems:* Windows XP, Vista and Windows 7

C. Ease us todo backup[7]

This tool can be perform both disk clone and disk image. There are 2 basic types of backup you can do with Todo Backup.

1. *File & Folder Backup:* This is the simplest form of backup there is, and basically just makes a copy of files. These kind of basic backups are suitable when your documents or data are the most important thing, but you don't care about your operating system or the applications installed on it. As you have a fine control over what to backup, the size of your backup is determined by your data only. However, once you've taken a full back up, you can run "incremental backups" subsequently, which only backs up the files that have changed. This saves space and time, while still giving you an up to date copy of files should the worst happen.

2. *Partition & Drive Backup:* This can save a copy of your entire computer, including the operating system. It's the best choice if your computer is your primary work machine and getting it up and running again quickly is important, or if you have a lot of applications installed that you don't want to lose. With a full partition and drive backup, you can simply change the broken drive and restore everything back to it in a few hours. Of course, these kind of backups will take longer to perform, and they include everything on that partition, so they tend to grow large. The screen shots of back up are shown below.
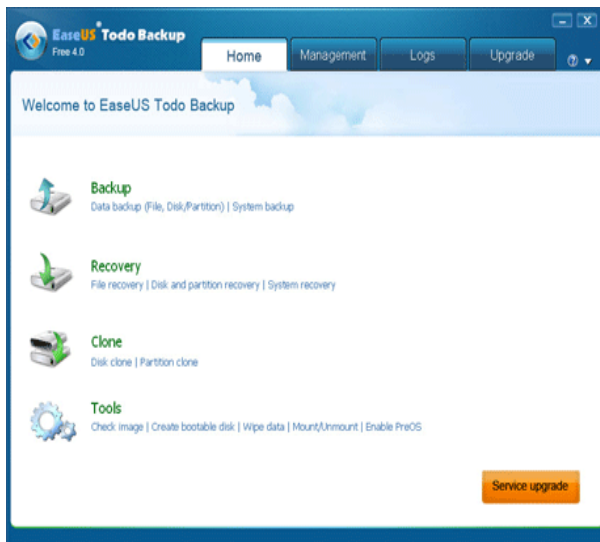
Fig. 1 Todo Backup

3. *Backup Features:*
   - System Backup
   - Disk and Partition Image
   - File and Folder Backup
   - Schedule Backup
   - Network Backup
4. *Recovery Features:*
   - Disaster Recovery--Restore important files from backed up image and perform disaster recovery just by simple clicks. It ensures quick recovery from system crash, a personal error, hardware or software failure, virus attack or hacker's intrusive destruction, etc.
   - Bootable disk:double insurence-- This freeware provides Linux based bootable disk to enable you to survive system disaster easily

VI. DRIVE IMAGE XML

Image creation uses Microsoft's Volume Shadow Services (VSS), allowing you to create safe "hot images" even from drives currently in use. . Images are stored in XML files, allowing you to process them with 3rd party tools. Never again be stuck with a useless backup! Restore images to drives without having to reboot. Drive Image XML is now faster than ever, offering two different compression levels [8].

1. *Features:*

   - Backup logical drives and partitions to image files.
   - Browse images, view and extract files.
   - Restore images to the same or a different drive.
   - Copy directly from drive to drive.
   - Schedule automatic backups.
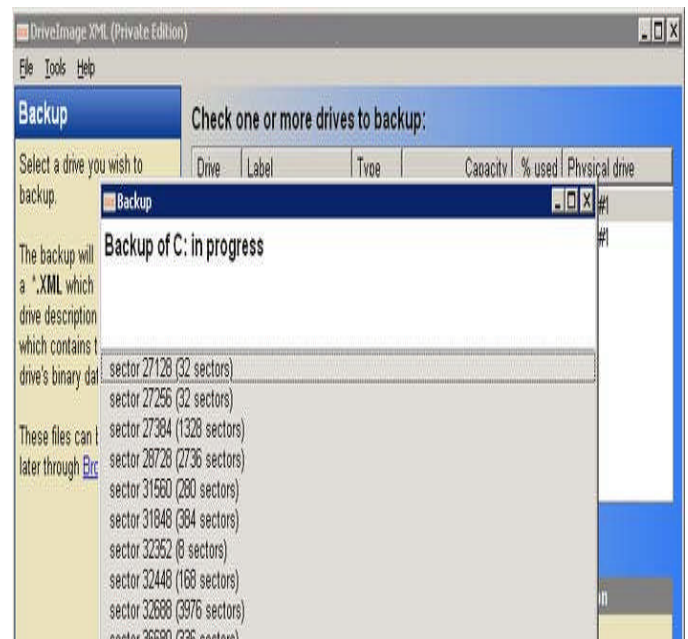   - Run Drive Image from WinPE boot CD-ROM.

Fig.2 Drive image xml.

VII. CONCLUSIONS

Disk duplication is especially useful when you want to upgrade the older smaller hard disk to a newer larger one,or backup,or recovery the disk and we could give the some tools used for it.In future we are trying to implement a new duplication tools which will have all the positives of present tools

ACKNOWLEDGMENT

REFERENCES

[1]   http://en.wikipedia.org
[2]   http://www.wilderssecurity.com/showthread.php?t=238515
[3]   http://en.wikipedia.org/wiki/Disk_image
[4]   http://www.undisker.com/products/undisker/disk-images.html
[5]   NTFSWalkerDownload.com
        http://download.cnet.com/NTFSWalker/3000-2094_4-
        75218525.html#ixzz1qQpICV9L
[6]   http://www.easeus-backup.com/review/easeus-todo-backup-
        free.htm
[7]   http://www.easeus-backup.com/review/easeus-todo-backup-
        free.htm
[8]   http://www.runtime.org/driveimage-xml.htm
[9]   "VMWare ESX Configuration Guide" (PDF). VMware, Inc.. 18
        May 2010. Retrieved 10 December 2010.

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