

Data Retrieval

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ABSTRACT

Data retrieval, in database management, involves extracting the wanted data from a database. The two primary forms of the retrieved data are *reports* and *queries*. In order to retrieve the desired data the user present a set of criteria by a query. Reports and queries are the two primary forms of the retrieved data from a database. There are some overlaps between them, but queries generally select a relatively small portion of the database, while reports show larger amounts of data. Queries also present the data in a standard format and usually display it on the monitor; whereas reports allow formatting of the output however you like and is normally printed. Data recovery is the process of salvaging data from damaged, failed, corrupted, or inaccessible secondary storage media when it cannot be accessed normally. Often the data are being salvaged from storage media such as internal or external hard disk drives, solid-state drives (SSD), USB flash drive, storage tapes, CDs(Compact Disc), DVDs(Digital Versatile/Video Disc), RAID(Redundant array of independent disks), and other electronics. Recovery may be required due to physical damage to the storage device or logical damage to the file system that prevents it from being mounted by the host operating system.

Keywords – CD, Database, FTL, Head, LBA, OS, PCB, RAID, Secondary Storage, Solid State Drive (SSD), Tapes, USB flash drive.

I. INTRODUCTION

The most common "data recovery" scenario involves an operating system (OS) failure (typically on a single-disk, single-partition, single-OS system), in which case the goal is simply to copy all wanted files to another disk. This can be easily accomplished with a Live CD, most of which provide a means to mount the system drive and backup disks or removable media, and to move the files from the system disk to the backup media with a file manager or optical disc authoring software. Such cases can often be mitigated by disk partitioning and consistently storing valuable data files (or copies of

them) on a different partition from the replaceable OS system files.

Another scenario involves a disk-level failure, such as a compromised file system or disk partition, or a hard disk failure. In any of these cases, the data cannot be easily read. Depending on the situation, solutions involve repairing the file system, partition table or master boot record, or hard disk recovery techniques ranging from software-based recovery of corrupted data to hardware replacement on a physically damaged disk. If hard disk recovery is necessary, the disk itself has typically failed permanently, and the focus is rather on a one-time recovery, salvaging whatever data can be read.

In a third scenario, files have been "deleted" from a storage medium. Typically, the contents of deleted files are not removed immediately from the drive, instead, references to them in the directory structure are removed, and the space they occupy is made available for later overwriting. In the meantime, the original file contents remain, often in a number of disconnected fragments, and may be recoverable.

The term "data recovery" is also used in the context of forensic applications or espionage, where data which has been encrypted or hidden, rather than damaged, is recovered.

II. RECOVERING DATA AFTER PHYSICAL DAMAGE

A wide variety of failures can cause physical damage to storage media. CD-ROMs can have their metallic substrate or dye layer scratched off, hard disks can suffer any of several mechanical failures, such as head crashes and failed motors, tapes can simply break. Physical damage always causes at least some data loss, and in many cases the logical structures of the file system are damaged as well. Any logical damage must be dealt with before files can be salvaged from the failed media.

Most physical damage cannot be repaired by end users. For example, opening a hard disk drive in a normal environment can allow airborne dust to settle on the platter and become caught between the platter and the read/write head, causing new head crashes that further damage the platter and thus compromise the recovery process. Furthermore, end users generally do not have the hardware or technical expertise required to make these repairs. Consequently, costly data recovery companies are often employed to salvage important data.

III. THE PRINCIPAL OF DATA RECOVERY

Data recovery is a process of finding and recovering data, in which there may be some risk, for no all situations can be anticipated or prearranged. It means maybe there will be some unexpected things happen. So you need to reduce the following.

- 1) Danger in data recovery to the lowest.
- 2) Backup all the data in your hard disk.
- 3) Prevent the equipment from being damaged again.
- 4) Don't write anything to the device on which you want to recover data.
- 5) Try to get detailed information on how the data lost and the losing process.
- 6) Backup the data recovered in time.

IV. RECOVERY TECHNIQUES

Recovering data from physically damaged hardware can involve multiple techniques. Some damage can be repaired by replacing parts in the hard disk. This alone may make the disk usable, but there may still be logical damage. A specialized disk-imaging procedure is used to recover every readable bit from the surface. Once this image is acquired and saved on a reliable medium, the image can be safely analyzed for logical damage and will possibly allow much of the original file system to be reconstructed.

1) Hardware Repair

A damaged printed circuit board (PCB) may be replaced during recovery procedures by an identical PCB from a healthy drive, this does not necessarily work, as data specific to an individual drive unit may be stored on a chip, so that even boards manufactured to be identical may not work on a drive mechanism for which they are not set up.



Fig. 1 Media that has suffered a catastrophic electronic failure requires data recovery in order to salvage its contents.

Other examples of physical recovery procedures include performing a live PCB swap (in which the System Area of the HDD is damaged on the target drive which is then instead read from the donor drive, the PCB then disconnected while still under power and transferred to the target drive), read/write head assembly with matching parts from a healthy drive, removing the hard disk platters from the original damaged drive and installing them into a healthy drive, and oftentimes a combination of all of these procedures. Some procedures require training for successful use, most void manufacturers' warranties.

2) Recovering data after logical (non-hardware) damage

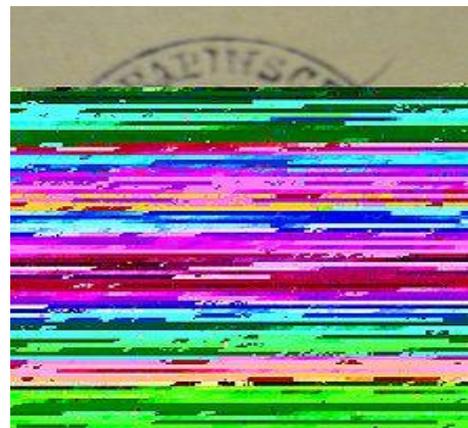


Fig.2 Result of a failed data recovery from a Hard disk drive

3) Corrupt partitions and file systems, media errors.

In some cases, data on a hard drive can be unreadable due to damage to the partition table or file system, or to (intermittent) media errors. In the majority of these cases, at least a portion of the original data can be

recovered by repairing the damaged partition table or filesystem using specialized data recovery software such as Testdisk; software like dd_rescue can image media despite intermittent errors, and image raw data when there is partition table or filesystem damage. This type of data recovery can be performed by people without expertise in drive hardware, as it requires no special physical equipment or access to platters. Sometimes data can be recovered using relatively simple methods and tools, more serious cases can require expert intervention, particularly if parts of files are irrecoverable. Data carving is the recovery of parts of damaged files using knowledge of their structure.

4) Overwritten data

When data has been physically overwritten on a hard disk drive it is generally assumed that the previous data is no longer possible to recover. In 1996, Peter Gutmann, a computer scientist, presented a paper that suggested overwritten data could be recovered through the use of magnetic force microscope. In 2001, he presented another paper on a similar topic. Substantial criticism has followed, primarily dealing with the lack of any concrete examples of significant amounts of overwritten data being recovered. Although Gutmann's theory may be correct, there is no practical evidence that overwritten data can be recovered. Moreover, there are good reasons to think that it cannot. To guard against this type of data recovery, Gutmann and Colin Plumb designed a method of irreversibly scrubbing data, known as the Gutmann method and used by several disk-scrubbing software packages.

Solid-state drives (SSD) overwrite data differently than hard disk drives (HDD) which makes at least some of their data easier to recover. Most SSDs use flash memory to store data in pages and blocks, referenced by logical block addresses (LBA) which are managed by the flash translation layer (FTL). When the FTL modifies a sector it writes the new data to another location and updates the map so the new data appears at the target LBA. This leaves the pre-modification data in place, with possibly many generations, and recoverable by data recovery software.

5) Recovering Deleted Data

Data can be deleted from hard drive by a mistake. In this case recovery process may be similar to Recovering data after logical (non-hardware) damage. Main position of

this process is to choose data recovery software (example: Recuva)

6) Remote data recovery

It is not always necessary for experts to have physical access to the damaged drive, where data can be recovered by software techniques; they can often be used remotely, with an expert using a computer at another location linked by an Internet or other connection to equipment at the fault site. Remote recovery requires a stable connection of adequate bandwidth. It is not applicable where access to the hardware is required, as for cases of physical damage.

I. V. CONCLUSION

Data recovery means retrieving lost, deleted, unusable or inaccessible data that lost for various reasons. Data recovery not only restores lost files but also recovers corrupted data. On the basis of different lost reason, we can adopt different data recovery methods. There are software and hardware reasons that cause data loss, while we can recover data by software and hardware ways. Being different from prevention and backup, data recovery is the remedial measure. The best way to insure the security of your data is prevention and backup regularly. To operate and use your data according to the normative steps, you can reduce the danger of data loss to the lowest.

Limitation

Unfortunately, not all files can be recovered without error, in case of deleted file recovery in Linux, recovery of files with names is not possible because the names & other important attributes are completely wiped off when a file is deleted, unlike FAT or NTFS file system, Power surges, fires and spillage are all causes of hard disk damage which could potentially rob you of valuable data and years of work.

Scope of Data Recovery

The solid-state drive (SSD) industry has an opportunity to address the issue of data loss and recovery from failed SSD devices relatively early in the market and product development cycle. The elimination of moving parts in SSD's should increase the mean time between failure when compared to hard disk drives (HDD's), however still maturing technology and unpredictable operating conditions is already resulting in SSD failure. A certain percentage of these failures will involve the loss of critical data and require data recovery services. The

paradigm shift from magnetic to semiconductor-based storage required the development of a completely new set of data recovery techniques. These techniques produce varying degrees of success and are expensive and time consuming to perform. In addition, certain implementations of SSD technologies have been identified that can complicate the recovery process and adversely affect the ability to recover data. By choosing to take a proactive approach and assisting data recovery professionals, the SSD industry will help to ease public concern and increase data recovery success rates while minimizing recovery costs and turn-around times.

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