HARD DISK DIAGNOSTICS AND MAINTENANCE

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ANNOTATION

Currently, in order to automatically test the performance of hard disk drives in modern computers, SMART technology, which automatically tests, analyzes and constantly prepares reports on the results of hard disk drives and devices working with them (Self-Monitoring Analysis and Reporting Technology) is widely used. This is a technology that continuously monitors the state of hard disk drives and predicts possible defects in their operation.

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In information systems, the basic element of which is a computer, the main volumes of information are stored on hard magnetic disks. It is in the hard disk drive (HARD DRIVE ON MAGNETIC DISK) that its operating system, information processed during use, as well as used and deleted information is stored and loaded from it into the computer's RAM.

The widespread use of HARD MAGNETIC DISK DRIVES is facilitated by a number of their positive operational qualities: reliability, speed of access and low cost (per unit of information storage). In addition, one of the most important indicators - energy independence - makes HARD MAGNETIC DISK STORAGE practically indispensable for the prompt and long-term storage of large amounts of information.

At the same time, the placement and storage of information in long-term non-volatile memory devices creates prerequisites for both the loss of important information and unauthorized access to it. Recently, the amount of information stored on hard drives has increased significantly. Basically, the increase in volume was achieved by increasing the recording density. The increase in recording density has led to the need for special measures aimed at increasing the reliability of hard drives. Despite the reliability measures taken by hard drive manufacturers, the hard drive remains the most unreliable element of a computer. Every year, more than one and a half to two thousand hard drives come to the EPOS service center for repair. About a third of them had malfunctions due to natural causes. But two-thirds of all breakdowns are due to careless handling of discs. Hard drive failure can lead to the loss of important information. To reduce the risk of information loss in servers, it is necessary to use fault-tolerant disk systems - RAID. However, the use of such systems may be unacceptable, for example, for economic reasons. Moreover, the loss of information is also possible on a working hard drive, for example, due to its accidental destruction or due to a virus attack. Fortunately, in most cases information is not lost forever. It can be restored.

In the simplest cases, accidentally destroyed information can be restored using standard, widely used utilities. The tooling and special recovery utilities developed by EPOS make it possible to restore information in most cases even in the event of a disk failure (including, for example, even a broken head).

The possibility of information recovery is based on the fact that when information is erased by means of the operating system, only data on the location of information on the disk is actually erased, and the information itself is not physically destroyed. Therefore, the task of restoring information in most cases is reduced to solving a difficult but feasible logical task. Even the destruction of the boot sector (as, for example, the CIH virus does) is not a serious obstacle to data recovery, since the specific values of the BIOS parameter

block (cluster size, number of clusters in the volume, number of FAT elements, etc.) can be received by calculation.

Destroying FAT tables (for example, when formatting a disk) greatly complicates the task of data recovery, since they are the vital file layouts. The entire file area becomes a sea of information without any pointers. Automatic data recovery using utilities does not guarantee complete recovery, and the greater the degree of file fragmentation, the less likely it is to recover them. Full recovery is possible only in an interactive mode by information recovery specialists, but this already requires the use of specialized software and significant time costs.

Mechanical damage to the elements located in the hard drive chamber, as a rule, can no longer be corrected. Nevertheless, if, for example, the magnetic head is broken, then our service center will be able to restore the information. To do this, experts will open the camera, install a new magnetic head and restore the lost data. The opening of the hard disk chamber is carried out in a specially equipped "clean room". "Clean room" is a complex engineering structure. It is arranged like a nesting doll: a separate room, isolated from the rest of the premises, into which clean air is supplied from the air conditioner. Inside this room is another room, which is equipped with two air purification circuits. Inside this room is the actual workplace, equipped with an additional air purification system.

Nevertheless, in case of mechanical damage to the elements located in the hard disk chamber, we can only talk about the restoration of information, but not about the further operation of the disk.

Information recovery is used not only to recover lost information, but also for intelligence purposes: by restoring confidential information, for example, on disks returned under warranty or scrapped.

Due to the impossibility in most cases to repair and maintain a failed HARD DRIVE on the site, it is replaced with a new one. In this case, all information in a form accessible or inaccessible to the operating system remains on the HARD MAGNETIC DRIVE to be replaced. In some cases, attackers use the principle of simulating the failure of computers due to the fault of a HARD DRIVE after a certain period of operation and accumulation of information. Since the warranty contract, as a rule, covers the entire batch of computer equipment and provides for the replacement of the HARD DRIVE DRIVE on a free basis, provided that the seals are intact and the operating rules are observed, the information stored on HARD DRIVE .

To prevent information leakage, in the simplest case, it is possible to write arbitrary data to a file that previously contained confidential information. In this case, it is impossible to restore information using widely used utilities. However, special-purpose utilities can, in many cases, recover data in bad sectors of a disk by, for example, statistically accumulating information by repeatedly reading data in bad sectors. This method is used, in particular, in devices and utilities developed by EPOS for copying information from discs with minor surface damage. Therefore, in order to destroy information, it is necessary to write random data not only to those sectors of the hard disk in which important information was stored, but to all sectors, including damaged ones. As a rule, this can only be done with the help of highly specialized software or with the help of special equipment.

Recently, more powerful methods of information recovery have been developed, in particular, based on the principles of magnetic force microscopy (MFM). MFM is based on scanning probe microscopy.

The magnetic tip of the probe moves over the surface of the plate at a distance of about 10 - 100 Å. Depending on the strength of the magnetic interaction between the plate and the tip, the distance between them changes. These distance fluctuations are detected by an optical interferometer. The resulting image is an image

of the magnetization distribution. With these methods it is possible to measure the magnetic topography of the disk surface and, consequently, to recover information.

It is important to note that due to the very high recording density, the mechanical system (magnet head drive) is not able to accurately follow the required trajectory. Therefore, when writing new data over confidential information, the new data will always be written with some offset relative to the previously recorded data.

The resolution of magnetic force microscopy is sufficient for separate reading of several successive records of information.

To ensure the destruction of confidential information, various methods have been developed, which can be conditionally divided into two large groups:

- destruction of data while maintaining the operability of the drive;
- Destruction of data with loss of drive performance.

With guaranteed destruction of information while maintaining the operability of the drive, as a rule, specially selected codes are repeatedly written to each sector of the hard disk. Recording of special codes is also carried out in damaged and reserve sectors. Guaranteed destruction of data while maintaining the operability of the drive is carried out, as a rule, by hardware, although in some cases software tools are also applicable.

Several algorithms are known, the use of which ensures the guaranteed destruction of information with a certain reliability.

Both considered methods provide a sufficient level of information destruction guarantee. A more practical method is considered to preserve the health of the drive. Firstly, after data destruction, drives can be used in the future. Secondly, the methods of destruction are defined by standards, which causes a certain level of trust. However, most often the failure of the drive for the user is unexpected and occurs at the most inopportune moment. Therefore, often the user cannot independently destroy the information stored on the HARD MAGNETIC DRIVE that has become faulty. Moreover, in the event of a malfunction of the elements located in the drive chamber, even in the conditions of a specialized service center, it is impossible to guarantee that the original arrangement of the heads will be preserved during the repair process. Therefore, with the exception of the simplest cases (failure of the disk controller), when a drive fails, it is guaranteed that information can be destroyed only by destructive methods.

The stand allows you to carry out a complete diagnosis of the hard disk, adaptive copying of disks (even with some damage to the source disk), as well as guaranteed destruction of information by repeatedly writing special codes to all physical sectors of the hard disk.

Currently, EPOS LLC is conducting R & D to prepare for serial production of the next generation of a stand for maintenance of hard disk drives, which has advanced functions both for diagnosing a drive and for destroying information. In particular, to destroy information on disks with significant damage, the stand is equipped with a device that allows you to erase data on the entire disk, including service areas and servo marks, by applying a powerful magnetic pulse.

REFERENCES

[1] Bigelow S. "Personal Computer Design and Repair: Hardware Platform and Main Components." / S. Bigelow. M.: BINOM, 2010. - 976s.

[2] https://ela.kpi.ua/bitstream/123456789/12565/1/05_p47.pdf

[3] http://stlad.narod.ru/Programmi2021/Sborka_i_obsluzhivanie_personalnogo_kompyuter_red_.pdf