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Minitool hard drive recovery

As you might suspect, operating systems such as Mac OS and Linux use different file management systems and have different requirements in terms of defragmentation.The operating system for Apple's Macintosh computers doesn't include a built-in defragmentation application, although third-party utilities are available. According to Apple, Mac OS is designed to reduce fragmentation by writing new data to larger open areas of the disk. Smaller segments, such as those left over when a file is deleted, are only used when necessary. Macintosh software developers are taking advantage of faster hard drives to eliminate fragmentation by always writing complete files to the disk rather than adding data to existing files. Mac OS (10.3 Panther) and later versions defragment files on an ongoing basis, making batch defragmentation unnecessary.As for Linux, there are two major reasons defragging is less of an issue. First, Linux doesn't store files in order, so there's often room to append data to an existing file in its current location. Linux also places the disk reading head at the center of the platter. Unless a file is fragmented to opposite sides of the disk, the head can reach multiple clusters quickly. Linux isn't, however, immune to fragmentation, particularly when a disk nears its maximum capacity. The bad news is, when the disk is nearly full (more than 75 percent of space used), it becomes more difficult for a defrag utility to operate effectively. So, by the time a Linux disk becomes fragmented enough to slow things down, it's difficult to solve the problem. For many users, this paradox provides a reason to defragment Linux hard drives on an ongoing basis.Third-party defrag applications are available for all operating systems. In addition to defragmentation, many of these utilities provide additional capabilities, such as:Simplified schedulingBackground defragmentationFile storage optimization/fragmentation preventionOptimization of other system elements such as the registryPermanent removal of sensitive filesElimination of cookies and temporary Internet filesBut what about non-mechanical disk technologies such as solid state or thumb drives? Some computer manufacturers are already putting them in laptops and other electronic devices. Do those need to be defragged, too?The reason defragmenting a hard drive can increase computing speed is because the drive uses moving parts (the disk and drive head) to access data. A solid state drive has no moving parts, so retrieving any specific bit of data requires the same access time no matter where the file clusters are stored. In fact, some experts claim that defragmenting a solid state drive may actually be harmful. Solid state memory can be written and overwritten many times, but there is a limit. Each time data are written to a bit of memory, its lifespan is decreased slightly. Therefore, continuously defragmenting a thumb drive could hasten its demise with no real benefit. Dear Lifehacker,I know hard drives can fail, but how long do they really last? Will they last longer if I don't use them as often?Sincerely,Drives for PosterityDear Drives for Posterity,These are good questions, and you've asked a bunch of them! You're essentially asking how long different kinds of hard drives will last under regular or normal use, and then how long they'll last under no use at all (as in, stored in a box somewhere.) Let's go through each of them one by one.Under Normal UseAny hard drive in active use is essentially a ticking bomb. Let's be honest: It's not a matter of if a hard drive fails, it's a matter of when, and how lucky you'll get postponing that as long as possible. If you're really lucky, it'll be after you've upgraded to a new one. If you're unlucky, it'll be in a matter of months or years, and when it does die, we can only hope you've made sure to back up your computer before it happens.At least once a month, some friend or family member asks me how to recover data from a failed hard…Read moreAs for the average life of the hard drive in your computer, well, that depends mostly on whether it's a traditional hard drive or an SSD. Here's the basic breakdown though, and some average life expectancy:Hard Drives: Traditional hard drives (also known as HDDs), which you'll usually find in desktop computers and some cheaper laptops, will often fail sooner because they use moving parts. The average life of a hard drive depends on a lot of things, like the brand, type, size, and interface method, but you're looking at about four years on average. Online backup service Backblaze studied the drives in their infrastructure and found about 80% of them survived for four years. Of course, that also means 20% didn't and failed sooner, most of those in the third year of use. Similarly, the brand of drive you use makes a difference. Seagate, for example, failed much more frequently than Western Digital or Hitachi drives in Backblaze's tests. You can check out the raw data on all 41,000 drives for more, but in short, keep your data backed up, watch for SMART alerts, and keep an eye on your hard drive's warranty. Most are about two to three years, and while your drive may last much longer than that, be ready for failures after that point.Solid State Drives: Solid state drives, which have become extremely popular in laptops and desktops for their faster speeds, are different. You may hear people say that you have to be careful with SSDs because they have a limited number of reads and writes. In reality, consumer SSDs actually last a really, really long time under normal use. TechReport's famous SSD endurance test showed us that a lot of those fears are over-blown, and even consumer SSDs managed to survive writing and reading well over 700TB of data. These drives usually come with a three to five year warranty, and manufacturers assume you'll write 20GB-40GB per day in data. That means to get to that 700TB, you'd have to do 40GB every day for 17,500 days, or about 50 years. That doesn't mean you should mistreat your drive, and it doesn't mean SSDs won't fail due to other issues, but if you're worrying your SSD will die because you used it too much, don't. Of course, all of this is average data. Your experiences may differ, and you may wind up with a great drive that lasts forever, or another one that fails a few days out of the box. That's why it's important to keep your systems backed up. Beyond that though, stick to trusted brands with solid warranties that don't make it a nightmare to RMA a drive that dies before its prime.If You Aren't Using Your Hard Drive at AllThe other side of the coin involves "cold storage." If you put data on a drive and then, say, drop it in a safe deposit box or a time capsule, how long would the data on it survive before it degrades? We touched on the question a bit in this guide to storing data for the long haul, but if you're talking about true cold storage—as in you don't want to access it for years, perhaps decades at a time, the numbers change a bit. Dear Lifehacker, I have some files that are very important to me, and I want to make sure they…Read moreAgain, things are different depending on whether you're talking about SSDs or traditional HDDs. Here's what you need to know:Hard Drives: If you're planning to drop some data on a hard drive and toss it into a storage unit or a safe deposit box, you probably don't need to worry about the data deteriorating on its own. On episode 11 of TekThing, Patrick Norton talked to PCPer's Allyn Malventano, who said as long as your drive is in a climate controlled environment, the only issue to worry about is the oil around the ball bearings drying out. In short, spin them up every few years—which you should do anyway to make additional backups and switch storage methods (which we'll get to a little later.) If your environment isn't climate controlled, well...just make sure it's climate controlled. A time capsule in the ground with a hard drive in it likely won't survive to be dug up and read.Solid State Drives: SSDs for archival purposes is a difficult thing to pin down. SSDs are still relatively new technology, especially compared to magnetic media (which most businesses still use for archival backups) so there aren't many serious studies as to their long-term survivability in cold storage. We have an idea that, under power, SSDs can last a good long time, but even SSD technology is evolving (future consumer SSDs will likely be PCI, just for speed purposes, the way enterprise SSDs have been for a while) and everything could change again in a matter of years. Theoretically though, assuming a climate controlled environment the only thing you'd have to worry about is the slow degradation of data in the drive's NAND cells, but that's a process that takes decades, possibly longer.Long story short, if you keep a hard drive offline and in a box—as long as it's someplace well maintained, you'll have other problems to worry about long before the eventual degradation of the data on the drive. Conceivably you could keep either for decades, probably longer, and then fire them up and they'll work as good as they did the last time they were powered down, and the data would be right there for you to read.The More Important Factor: Interface TechnologyAll this talk about the mechanical or physical life of storage is great, but it misses the biggest, most important point: Technology moves fast, and your hard drive may become obsolete before it dies.. After all, it wasn't too long ago that the hard drive interface standard was IDE, then SATA, then SATA II and III. For external media, long before we had USB 3 and Thunderbolt, we made do with Parallel Port and Serial connections. You may still be able to use some of those old drives, but many newer computers won't be able to connect to them, so you'd need to find equally old technology (or working converters and adapters) to retrieve it.This isn't as big a deal for regular hard drive usage, but if you're talking serious long-term storage for future generations, it's worth considering. If you think you can slap some precious photos onto a 1TB USB drive, put it in a safe deposit box at the bank, and will it to your children with instructions to open it when you pass away, it's a gamble that (depending on how old you are, of course) there'll be any USB devices left by the time they get around to seeing what's on it. Just think: If someone handed you a ZIP disk today and told you there was something important on it for you, how would you go about getting at that data? Your best bet is to diversify your storage methods, update data and drive formats every few years, and keep more than one type of backup whenever possible.Your data really isn't safe unless you're backing up properly and with lots of redundancy. The…Read moreIn any event, the physical life of your hard drive is one thing, but the practical, useful life of it is something completely different. Hopefully we've addressed both for you here though, and you can rest assured knowing your drives will probably last you a while. That said, make sure you back up your data!Sincerely,LifehackerHave a question or suggestion for Ask Lifehacker? Send it to tips+asklh@lifehacker.com.Illustration by Brian Hagen. Additional photos by Simon Wüllhorst, Chris Bannister, and walknboston. What is a hard drive? It's a common question and one that we're more than happy to answer. Whether you are looking for ways to upgrade your hard drive, trying to buy a computer with the right hard drive, or just trying to figure out what everyone is talking about, read on. We'll explain everything and give you tips on which hard drive properties are essential. The hard drive's purpose The hard drive is where a computing device stores data for the long term — not just the things you save, but all the code required for the operating system, the framework browsers use to access the internet, drivers for accessories, and everything else. When referring to computer storage, "hard drive" (or solid-state drive, see below) is typically used. Every hard drive has a specific amount of space. Some of that space is automatically consumed by the OS and backup installations. However, the rest can be filled with data you download and save, whether it's a new app or a funny cat picture someone shared. Hard drive space isn't as important now as it once was. That's because cloud-based software doesn't require local storage. Data can be stored in the cloud as well, freeing up precious space on the hard drive. This cloud-based dependency — which relies on remote servers and their hard drives in data centers — originally fueled Google's Chrome OS platform. Chromebooks have very little physical storage space due to their reliance on streaming and cloud solutions. That's changing to some degree, thanks to growing support for Google Play Android apps. Birth of the hard drive Reynold B. Johnson developed the first real hard drive at IBM in 1956. Johnson's team originally experimented with other methods to store data on things like magnetic tape. However, his team discovered ways to store information (in the form of bytes) on metal, magnetic disks, which could overwrite with new information as desired. This led to the development of an automated disk that read itself like a record player — except much larger. The first commercially-available version, RAMAC, had a hard drive nearly the size of a kitchen pantry. Later, IBM developed floppy disks in the late 1960s to easily load code into their mainframes. These disks initially measured 8 inches in diameter, packing read-only data. The first commercially-available read/write drive didn't appear until 1972 when the team's head — Alan Shugart — migrated to Memorex. Overall, these two parts — the automated magnetic disk and the smaller, transferable "floppy" disk — became the backbone of the early hard drive. For many years, the method of storing data remained the same, while great improvements were made in how the hard drive could store, read, and eventually write data on the disk. Two types of drives A hard drive can be internal or external. Internal means a hard drive is located inside a computing device and directly connects to the motherboard, but it's not always upgradable. For instance, a desktop side can be easily removed to disconnect the old drive and connect the new drive. It's a quick, simple upgrade. On laptops, however, the upgrade process may not be quite so simple. Typically there is a door along the bottom providing access to the drive. Other laptops, like Apple's MacBooks, don't have removable storage. Read the specifications on the manufacturer's websites on how to change a laptop's drive properly. External means a hard drive is located outside the PC and typically connects through a USB or Thunderbolt cable. This option is typically slower due to the connection, but it can also be detached from the parent PC without any major issues. Besides internal and external, a hard drive can be a hard disk drive (HDD) or a solid-state drive (SSD). There's a huge difference between the two that we explain in a separate article, SSD versus HDD. However, here are the shorter explanations: HDD: Hard drive disks use a spinning magnetic disk that holds information inscribed in very tiny tracks — a bit like a record player. This requires moving parts, specifically heads to read and write data to the disk as needed and propulsion to spin the disk. It's a simple method, making HDDs very inexpensive to purchase, especially when creating extensive storage setups. SSD: There are no moving parts in SSDs. Instead, these drives use semiconductors that store information by changing the electrical state of very tiny capacitors. They are much faster than HDDs and can store information more easily without the risk of parts wearing out. SSDs are why modern PCs boot up so fast. Important hard drive qualities Speed: The speed of a hard drive depends on how fast it can read or write data. The connection to the PC also factors in. A poor connection can bottleneck the data flow and, ultimately, impact the machine's performance. For mechanical hard drives, the spin speed is also essential: 7,200RPM drives, for example, are faster than 5,400RPM drives. Both are far slower than SSDs. Physical security: Hard drives need to be able to resist the occasional jolts and bumps. That's what physical security is all about — your device's resistance to damage that could result in data loss. Physical security is primarily about durability, and it's an important consideration for both internally-mounted and external hard drives. Environmental factors, such as extreme heat or cold, are an essential consideration. Also, some manufactures include features that help prevent hacking or discourage theft. Connections: Choose a hard drive with ports that fit your computer, like PCI Express, Thunderbolt, USB, or SATA. Check out our guide to know more about SATA. Make sure you know your computer connection types. Different hard drives affect speed differently. An external solid-state drive connected to an old port will significantly restrict data flow by 60 megabytes per second. Know your available connections and choose the best option to work with the hardware you currently have. Editors' Recommendations

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