STAR Watch

Statewide Technology Assistance Resources Project

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Disk Rot: CDs And DVDs Are Not Immortal

Ask almost any person you know this question: "How long will CDs and DVDs last?" Most people will state with great confidence that CDs and DVDs are vitually indestructible and will last a long time—maybe even hundreds of years. Well, in a little over 20 years after their widespread acceptance, many CD-ROMs have already deteriorated so badly that they are useless.

The problem is called Disk Rot. When held up to a strong light, a CD or DVD affected by this problem will allow light to pass through what appears to be hundreds/ thousands of pinholes in the data layer of the disk. These pinholes begin to appear where the data layer has deteriorated.

Disk Rot does not just affect music CDs. It can also affect software installation CD/ DVDs and archived data that is stored on CDs and DVDs.

How did this happen?

While some problems are the result of poor manufacturing back in the early days of CDs, the majority of problems are the results of poor handling and storage by users. There is a commonly-held belief among users that the underside of the CD-ROM is the vulnerable part, when the exact opposite is true. The underside of a CD-ROM is nothing but a thick layer of plastic. While it is true that this layer can be scratched, the scratches need to be quite deep before there is a problem.

On the other hand, the label side of the CD-ROM is quite fragile because the foil layer that contains all of the data is right under the label. It is held in place and protected from the environment by a thin layer of lacquer. If the lacquer was improperly applied by the manufacturer or the CD was mishandled by the user, the lacquer layer can be damaged, allowing air to penetrate and oxidize the aluminum in the data layer.

Recordable CDs and DVDs (CD-Rs, CD-RWs, DVD-Rs, DVD-RWs, etc.) are less likely to encounter this problem, since the data layer sandwiched between layers of plastic on both the top and the bottom, but poor handling can still cause the layers of the disk to separate at the edges, causing data problems to occur. Unlike CD-ROMs and DVD-ROMs, exposure to prolonged sunlight

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can seriously deteriorate the data layer on recordable CDs and DVDs.

When using CDs and DVDs…
- Do not leave CDs and DVDs lying around. They should be put back into their storage cases immediately after use.
- Keep the disks clean, but use only products that are specifically designed for that purpose. Wipe the disk off radially-- from the center to the outer edge. Never use a circular motion.
- Handle the disk by the edges. Avoid touching either surface of the disk.
- Do not bend the disk. This can cause the lacquer to crack or the layers in the CD to begin to separate, allowing air to get to the data layer.
- Do not write on CDs and DVDs with ball-point pens or solvent-based markers. Use water-based or alcohol-based felt-tip (soft) markers.
- Do not stick adhesive labels on CD-ROMs. There are solvents in the adhesive that, over time, can seep into the lacquer layer and begin to dissolve it. BUT, if you have already stuck additional labels on the CDs, do not even try to remove them, since pulling on the label can bend the disk causing more damage.
- Do not expose the disks to extremes in temperature or humidity. Automobiles are a terrible place to store CDs and DVDs.
- For archival storage, use CD-Rs, DVD-Rs, or DVD+Rs. Do not use rewriteable disks.
- Do not even open the package until you are ready to use the CD or DVD

What can be done to slow this deterioration?

The National Institute of Standards and Technology has published a list of recommendations for the storage of CDs and DVDs. While it true that nothing lasts forever, there are some steps that can be taken that can postpone the inevitable:
- Do not use rewriteable CDs and DVDs for long-term storage. The data layer in the disk tends to decay more quickly than those in CD-Rs, DVD-Rs, and DVD+Rs.
- Disks should be stored upright, not flat
- Disks should be stored in cases or sleeves specifically designed for that purpose.
- Disk should be stored away from extreme heat and humidity. The storage area should be cool, dark and dry. Sunlight is a source of ultraviolet light and should be avoided. The temperature should be between 40 and 70 degrees Fahrenheit. 40% humidity is ideal.

If a CD or DVD shows signs of Disk Rot, what can be done?

A CD or DVD with Disk Rot may or may not be readable, but there is no way that it can damage the CD/DVD drive on a computer. If you have a CD or DVD burner, you can try to copy the data to a new, fresh disk. Your success will depend on whether or not the Disk Rot has destroyed an area where data is stored or not. In CD-R/RWs, and DVD-R/ RWs, data is written from the center outward. Disk Rot typically starts at the edges and works inward. The rot may not have reached any/all of the data. It is worth a try.

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GeekSpeak 101: Units of Measure

According to a recently published article, computer geeks are the most well-known form of geeks. The mere ownership or use of a computer does not automatically turn you into a computer geek—You must earn that title. Here is a list of activities that will help you to qualify as a bona fide computer geek:

- You window shop at Radio Shack.

- Your laptop computer costs more than your car.

- You have given your computer a name

- You have already calculated how much you make per second.

- You still own a slide rule and you know how to use it.

- You can quote scenes from any Monty Python movie.

- You are at an air show and know how fast the skydivers are falling.

- You have saved every power cord from all your broken appliances.

- You spent more on your calculator than you did on your wedding ring.

- You bought your girlfriend/wife a new CD ROM drive for her birthday.

- You comment to your girlfriend/wife that her straight hair is nice and parallel.

- Choosing to buy flowers for your girlfriend/wife or to spend the money to upgrade your RAM is a moral dilemma.

- When things get tough, you ask yourself, "What would Bill Gates do in a situation like this?"

Above all, true geeks are open-minded, which allows for absorption of information that non-geeks would characterize as trivial and/or useless. Geeks will examine all points of view, whether they agree with them or not. Geeks will seemingly obsess over a subject to the point of exhaustion or until they get bored with it. For those interested in becoming geeks, here is some reasonably trivial information to obsess over:

Most of the non-geek population of planet Earth that has used a computer for a reasonable amount of time has a passing understanding of the following abbreviations:

- "Kilo"- meaning 10^3 (abbreviated "K")

- "Mega"- meaning 10^6 (abbreviated "M")

- "Giga"- meaning 10^9 (abbreviated "G")

These prefixes are commonly used to describe amounts of storage on a computer. Non-geek computer users describe the amount of RAM on their computer in "megabytes", hard drives in "gigabytes", and file sizes in "kilobytes", "megabytes" or "gigabytes (depending on the size of the file).

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This information, while important, is simply too important to be worthy of a real card-carrying computer geek—too many people already know it. There must be something that is close to this topic, but known only to a small elite group and we have found it. For all the true geeks and wannabe geeks out there, this is for you.

Kibibytes, Mebibytes, and Gibibytes…

Many true computer geeks have noticed that no matter what stated capacity of the hard drive in his or her computer, the actual capacity as shown by the operating system is always less. On a computer that is described as having a "60 Gigabyte" hard drive, the properties of the drive are described as follows:

Used space:
12,814,719,488 bytes
11.9 GB

Unused space:
47,180,440,064 bytes   43.9 GB

Capacity:
59,995,159,552 bytes   55.8 GB
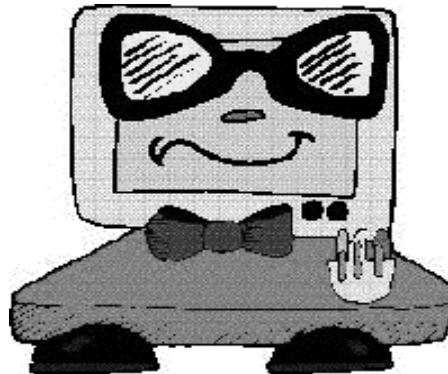
Does anyone see a problem? Why does "12,814,719,488 bytes" round to "11.9 GB" instead of "12.8 GB"? One might be able to accept the fact that "59,995,159,552 bytes" is really close to the stated capacity of the drive, but what happened to the other 4.2 billion characters of disk drive capacity when the capacity in "bytes" was converted to "GB"? Now here is some trivial information that true computer geeks treasure!

The truth is, that in an effort to reduce the confusion among the non-geek computer users, the geeks working for Microsoft as well as the multitude of hard drive manufacturers have made it worse. The problem exists because two different units of measure are being used and the abbreviations for the units of measure are incorrect in virtually all Microsoft products. One measurement system is based on   powers of 10 (decimal), the other is based on powers of 2 (binary). In the decimal system, $10^3 = 1,000$, but in the binary system, $2^{10} = 1,024$. It does not seem like much of a difference, but the discrepancy gets exponentially larger as the numbers increase.

Everything would have been fine if the capacities for the disk drive in question used the binary units of measure such as:

- Kilobinary- meaning 2^{10} or 1,024 (abbreviated "Ki")

- Mebibinary- meaning 2^{20} or 1,048,576 (abbreviated "Mi")

- Gigabinary- meaning 2^{30} or 1,073,741,824 (abbreviated "Gi")

So, the properties of our "60 Gigabyte" hard drive should have been stated as:

Used space:
12,814,719,488 bytes   11.9 GiB

Unused space:
47,180,440,064 bytes   43.9 GiB

Capacity:
59,995,159,552 bytes   55.8 GiB

Now, doesn't that look much better? A true computer geek would revel in the satisfaction that comes with this new-found nugget of knowledge. It is this kind of information that true geeks find to be comforting on those days or weeks when their imaginary friends refuse to associate with them. But for those of you who cannot find any reason to get excited, do not despair. Sometimes, it takes several tries to succeed at becoming a geek.
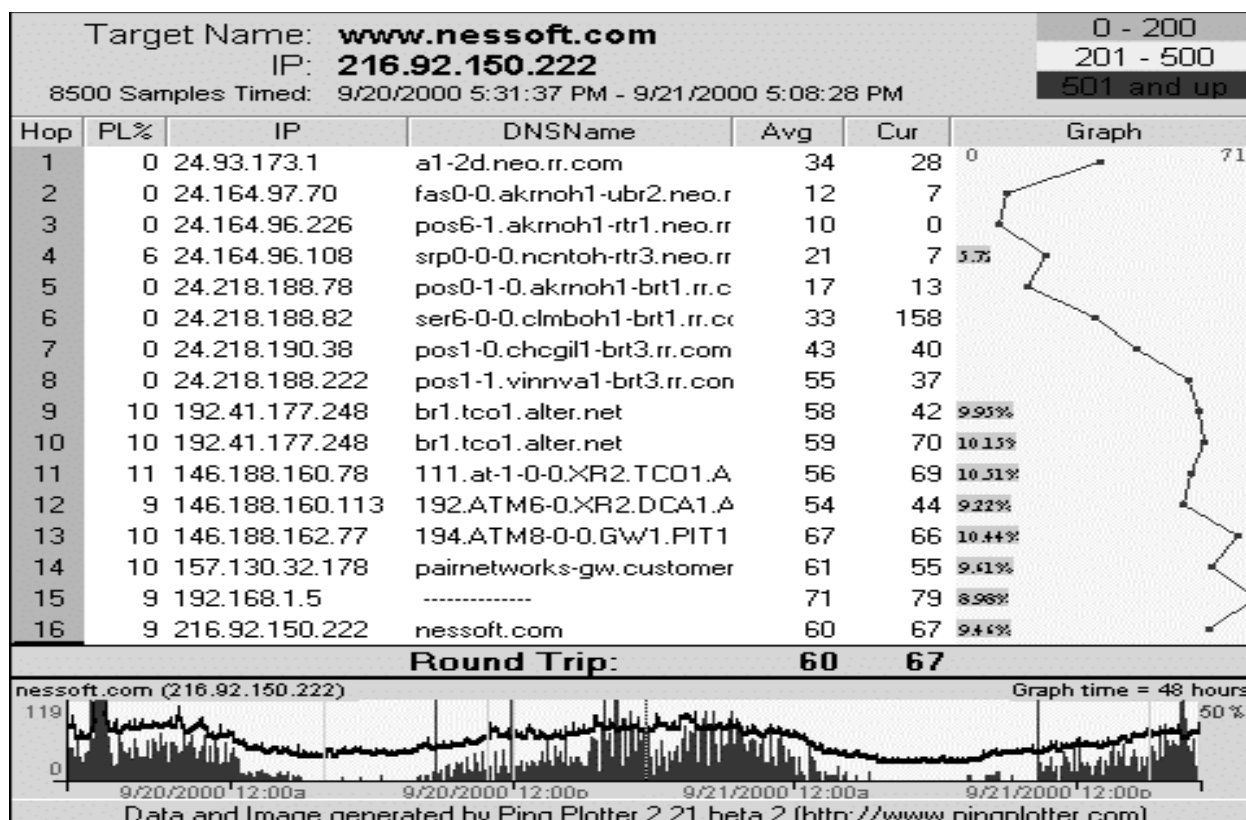
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Great Utilities: PingPlotter

Most Internet users think that performance problems are easy to diagnose and easy to resolve. If responses take longer than the user cares to wait, the Internet must be at fault and the solution is to call the local Internet Service Provider (ISP) and complain. Unfortunately, it is not that simple. While it is entirely possible that the local ISP is at fault, it is just as likely that a problem on the Internet has absolutely nothing to do with the user's ISP. What can a user on a budget do to define the problem?

PingPlotter is a network-troubleshooting and diagnostic tool that does not have a steep learning curve. Its graphic interface displays Internet performance information in a way that makes it easy to identify problems—which is the first step toward getting things fixed.

When tracing starts, the display lists all steps -- by DNS name where possible -- on the route to the target IP address, and graphs the minimum, maximum, current and average ping time for each step. At the bottom of the display, a second graph shows the average ping time to the target displayed in a horizontal, scrolling ticker.

Target Name: **www.nessoft.com**
IP: **216.92.150.222**
8500 Samples Timed: 9/20/2000 5:31:37 PM - 9/21/2000 5:08:28 PM

0 - 200
201 - 500
501 and up

Hop	PL%	IP	DNSName	Avg	Cur	Graph
1	0	24.93.173.1	a1-2d.neo.rr.com	34	28	
2	0	24.164.97.70	fas0-0.akrnoh1-ubr2.neo.r	12	7	
3	0	24.164.96.226	pos6-1.akrnoh1-rtr1.neo.rr	10	0	
4	6	24.164.96.108	srp0-0-0.ncntoh-rtr3.neo.rr	21	7	5.7%
5	0	24.218.188.78	pos0-1-0.akrnoh1-brt1.rr.c	17	13	
6	0	24.218.188.82	ser6-0-0.clmboh1-brt1.rr.co	33	158	
7	0	24.218.190.38	pos1-0.chcgil1-brt3.rr.com	43	40	
8	0	24.218.188.222	pos1-1.vinnva1-brt3.rr.con	55	37	
9	10	192.41.177.248	br1.tco1.alter.net	58	42	9.95%
10	10	192.41.177.248	br1.tco1.alter.net	59	70	10.15%
11	11	146.188.160.78	111.at-1-0-0.XR2.TCO1.A	56	69	10.31%
12	9	146.188.160.113	192.ATM6-0.XR2.DCA1.A	54	44	9.22%
13	10	146.188.162.77	194.ATM8-0-0.GW1.PIT1	67	66	10.44%
14	10	157.130.32.178	pairnetworks-gw.customer	61	55	9.61%
15	9	192.168.1.5	--------------	71	79	8.96%
16	9	216.92.150.222	nessoft.com	60	67	9.46%

Round Trip: **60** **67**

nessoft.com (216.92.150.222)   Graph time = 48 hours

Data and Image generated by Ping Plotter 2.21 beta 2 (http://www.pingplotter.com)

Pingplotter can be set up to alert you when certain thresholds are exceeded, and e-mail alerts can also be configured to have the trace data attached.

It is available from Nessoft (www.nessoft.com) on their web site for $24.95 a copy. Multi-copy discounts are available.
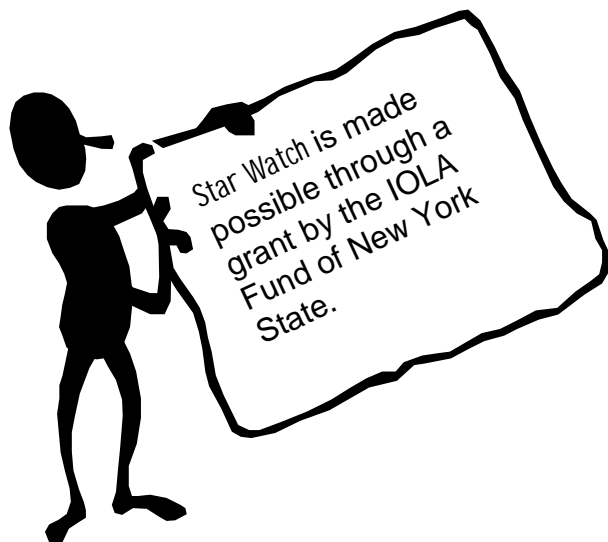
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Low-Cost Antivirus Protection Available

Is the cost of antivirus software preventing you from keeping the workstations in your office protected? F-Prot Antivirus for Windows is a product that can provide the security that you need at a very affordable cost.

The annual educational/non-profit license fee for F-Prot Antivirus for Windows is $50 for the first 14 licenses, $3 each for licenses 15 – 50, $2.25 each for licenses 51 - 100, and $1.50 for each license in excess of 100.

For more information visit the F-Prot webste at: http://www.f-prot.com/.

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