10 REASONS YOUR COMPUTER IS SLOW

(and what to do about it)

AN ASK LEO! SPECIAL REPORT

LEO A. NOTENBOOM

10 Reasons Your Computer Is Slow

(and what to do about it)

V1.0

by

Leo A. Notenboom

An Ask Leo!® *Special Report*

http://askleo.com

Copyright © 2014

Contents

Slow Computers 7

1: Too Much Running Software 8

What to do: 9

Additional References: 9

2: Malware 10

What to do: 10

Additional References: 10

3: Too Much Anti-Malware 12

What to do: 13

Additional Resources: 13

4: Insufficient RAM 14

What to do: 14

Additional resources: 15

5: Doing Too Much 16

What to do: 17

Additional Resources: 17

6: "Software Rot" 18

What to do: 19

Additional Resources: 20

7: Anti-Malware Tools at Work 21

What to do: 21

Additional Resources: 22
8: Slow Internet 23
What to do: 23
Additional Resources: 24
9: Bad Sectors 25
What to do: 26
Additional Resources: 26
10: Clutter 27
What to do: 27
Additional Resources: 28
More Reasons 29
Hardware Problems 29
Out of Date System, Drivers and Applications 29
You've never defragged 29
You haven't rebooted lately 30
Color Depth 30
Slow CPU 31
Non-Reasons 32
Registry 32
"Fragmented" RAM 32
Afterword 33
The Ask Leo! Newsletter 34

Ask Leo! Books 35
About the Author 36
Feedback, Questions and Contacting Leo 37
Copyright & Administrivia 38

The Ask Leo! Manifesto

I believe that personally accessible technology is the foundation of humanity's future.

Computers are incredibly powerful devices that open up worlds of possibilities like never before. Add the Internet and the opportunity for communication, information exchange and community building is truly phenomenal, on a global scale like never before.

To that end, I teach people to understand and safely use personal computers and related technology so that they can do more, be more, grow more, and connect more than ever before and be an active participant in that future.

I do that by answering questions, educating about important topics and trends, and sharing my overall passion and excitement for the possibilities. I want to replace the frustration that many people feel too often with the sense of *amazement and wonder* I feel every day.

That is why Ask Leo! exists.

I hope I can help you.

Leo A. Notenboom
http://askleo.com

Slow Computers

"My computer is slow"

That's one of the most common symptoms I hear while answering questions out at Ask Leo! (http://askleo.com). And, indeed, it's one of the most common problems that average computer users face on almost a daily basis.

There are many – *many* – reasons a computer might be running slow. In fact, in researching this report I actually had a hard time limiting it to just ten. As a result, you'll find a section that includes a handful of other things to look at beyond the ten most common issues.

If they apply to your situation many of these issues are quite simple to fix. Other issues might require a tad more work, or even playing with the hardware in your computer. There's nothing here that should be out of most people's reach, but even if it is the items could be significant enough to warrant finding a trained professional – or even just a geeky friend – to help you out. You'll appreciate the improvement.

Before we begin, there's one thing I have to remind you of:

Back up your computer first.

Again, the steps and ideas here are generally straightforward, but as we all know these are computers we're talking about and they have an almost perverse ability to turn good intentions into questionable results when you least expect it.

A complete image backup of your machine taken before you attempt any of the steps outlined in this report will guarantee you can always undo whatever was done with a simple restore.

Besides, you should be backing up regularly anyway. Right? RIGHT. ☺

You'll find several books on backing up in my on-line store http://store.askleo.com as well as many, many articles on the topic at http://askleo.com.

1: Too Much Running Software

In my experience, this is perhaps the single most common cause of computers running slowly. There are simply too many programs actually running – so much so that they eat away at system resources to the point that the program you actually want to use is constantly competing with all these other programs and as a result appears slow. Sometimes very slow.

Sometimes that program "competing" with all the software running on your machine is Windows itself.

This is a common scenario in computers that have been in use for "a while". One of the reasons that new computers often feel so much faster – even when running on identical hardware – is that they've not had all this additional software installed.

So where does it all come from?

There's one major culprit: installing software.

Now, simply installing software *should* be benign. Installing software shouldn't actually cause software to be run – it should just "install" or place the software on your machine in such a way that you can run it when you want to. Unfortunately the reality is somewhat different.

Many software packages include components that, when installed, are run automatically when you login or when Windows starts. Sometimes they're legitimate components. DropBox, as one example, needs its component running to provide the services for which people use it. On the other hand there are often components instructed to auto-start that, at least in most people's opinions, are completely unnecessary. Microsoft Office used to install what they called its "quick launch bar" which was run on login. Its job was to pre-load portions of Office *just in case* you were going to use it. The reality, though, is that the quick launch bar simply slowed down startup as well as other applications. Yes, Office programs appeared to load more quickly, but at a cost.

Those are just examples. There are quite literally thousands of different things that could be impacting your computers speed by having been installed and running automatically without your knowledge.

What to do:

- **Don't install software you don't need.** The people whose computers have the most serious problems are often those who like to "try things out". As a result they're installing package after package after package … and then end up wondering why their computer takes forever to start and runs slowly when it does.
- **Uninstall software you don't use.** The good news is that I'd say 90% of the time programs that install software that runs constantly in the background will also uninstall it cleanly if you remove the package.
- **Turn off auto-start options.** Many programs will actually allow you to control whether or not they will start some component at Windows startup or user login. Check the Preferences or Options in those programs for checkboxes or other settings that you can control.
- **Review what's in the notification area of your taskbar.** The notification area – that area to the bottom right of the taskbar – contains icons that are typically managed by software that's running in the background on your machine. For each, see if running that software is even necessary. If it's not, uninstall it, or check in the application for an auto-start option to turn it off.
- **Examine what else is auto-starting.** Using tools like autoruns, CCleaner or WinPatrol you can examine what else is automatically starting on your computer. Each of these will allow you to identify the programs being automatically started. *Don't* just turn things off. Rather, use what you find as a basis for further research to determine exactly what that program is, and whether or not you need it.

Additional References:

What's this program running on my machine? There may be many programs running on your machine. It's not always obvious exactly what they are or why they're running. We'll look for some clues.

What's all this stuff running after I boot Windows? When you start Windows many programs start automatically as well. It can be difficult to identify everything and whether or not they're all necessary.

2: Malware

Number two on the list is the conclusion that many people jump to, often rightfully.

Malware can absolutely slow down your machine. It can do a lot more, of course, but when it's running correctly (for the malware author's definition of "correct") malware's initial, or sometimes its only symptom can be a machine that has begun to slow down.

The issue is actually very much related to the previous one: malware is additional software that is running in the background on your machine. It's not always designed to behave nicely, and as a result it can have a negative impact on the machine overall.

Unfortunately there's no real magic bullet here. The solution is to avoid malware in the first place, and remove it when you encounter it.

The things to do are the things we keep hearing about – I call it the "litany of safety".

What to do:

- Make sure your computer is behind a firewall.
- Run good, up-to-date anti-malware tools including an anti-virus tool and an anti-spyware tool.
- Make sure that your anti-malware tools are configured to update themselves and their database of malware information daily.
- Keep your computer's software, especially Windows itself, up-to-date.
- Learn to identify scams, phishing attempts and suspicious email attachments. Don't fall for the former, and don't open the latter.
- Secure your router.

Staying safe from malware, and recovering from malware infections is a huge topic, but those are the basics.

Additional References:

Internet safety: 8 steps to keeping your computer safe on the internet Internet Safety is difficult, yet critical. Here are eight key steps to keep your computer safe on the internet.

What security software do you recommend? I have recommendations for specific security software and techniques in various places on the site. Here's a short single page summary.

3: Too Much Anti-Malware

It's ironic that the next item on my list is a direct result of the previous.

Malware scares people. The reality is bad enough, of course, but the tech and popular press actually make things seem even more dire to capitalize on people's fear in order to drive readership and clicks.

Also capitalizing on your fear are anti-malware vendors, or even worse, folks creating questionable and even malicious "solutions" to the problem.

As a result it's very common for me to encounter machines that have multiple anti-malware tools installed, along with a variety of other so-called security software, cleaning software, firewall software and more. Not only do all these installed packages add to the load of software that's running on your computer and slowing it down, it's extremely common for the tools to actually conflict and interfere with each other creating even more performance and other problems.

Yes, you need anti-malware tools, but don't go overboard.

Here's what you need:

- **A firewall**. If your computer is connected to the internet through a router you do not need to install any software for this. The router is your firewall.
- **Anti-virus scanner**. You only need one. Sometimes it will be combined with an anti-spyware scanner.
- **Anti-spyware scanner**. You only need one. Sometimes it will be combined with an anti-virus scanner.

There are other tools that are sometimes helpful. WinPatrol, for example, will alert you to system changes and allow you to control other aspects of your computer's performance. But ultimately the big three are all you need: a firewall, anti-virus and anti-spyware.

Well, that and common sense, of course.

The problem, of course, is that instead of relying on common sense or a little bit of education, people keep installing more and more tools that promise to protect from malware or solve problems, which in reality only make things worse.

What you *don't* need:

- Memory optimizers.
- Performance scanners.
- Registry cleaners.
- Tune-up utilities.

While there are cases where some specific solutions and very specific tools may be called for, in general *they should be completely avoided*. There are, to put it mildly, too many scams out there that simply overstate the threat in order to fleece you of your money. In most cases the tools do little to nothing, and all too often come with malware or additional components that simply make your slow computer even slower.

There are tools in this category which are reputable, and can be used, but in my opinion they are valuable *only* to address specific problems, and are not something that should be installed or run as some kind of preventative or general purpose cleanup.

What to do:

- Make sure you have one good anti-malware package installed, one good anti-spyware package installed, and that your computer is behind a firewall, preferably a router.
- Uninstall all those others so-called optimizers, cleaners and tune-up utilities. They're just slowing your computer down.

Additional Resources:

What security software do you recommend? I have recommendations for specific security software and techniques in various places on the site. Here's a short single page summary.

Do "Fix All Your Windows Problems" utilities work? 'Fix All Your Windows Problems' is a claim made by many products and utilities, and it's best viewed with skepticism. We'll look at how to evaluate some of those claims.

4: Insufficient RAM

Unlike hard disk space, RAM (Random Access Memory) is the memory that is used to hold all the programs that are running when you use your computer, including Windows itself. When you turn off your computer RAM is erased, and the boot process when you turn your computer back on is mostly about reloading Windows and all those running programs into RAM.

I've often said that Windows loves RAM, and that one of the best speed-ups you can perform on an older system is to simply add RAM to it.

It's counterintuitive, though, that a computer that was running perfectly fine when you first purchased it might now require additional memory.

There are two reasons this happens:

- As programs are updated, their requirements tend to increase; not by leaps and bounds, but incrementally as bugs are fixed and perhaps new features added. Each successive iteration of the software requires just a little bit more RAM to run comfortably. Eventually, the difference between the original version of the software and the current actually turns out to be significant. Multiply this effect by all of the software that runs on your computer, including Windows itself, and a machine that had a comfortable amount of RAM some years ago might be running low today.
- We ask more of our computers. This surprises people, but if you think about it you're probably doing more with your computer today than you did, say five or ten years ago. "Asking more" really means "doing more", and of course that implies that we are "running more" software now than we did originally. The net result is that a computer which once had enough resources to meet our needs is now only marginally capable.

Insufficient RAM impacts our computers performance directly and immediately. When Windows runs out of memory for certain operations, it starts to use the hard disk as *virtual* memory, VM, in what's called the paging or swap file.

And, to put it simply, hard disks are much slower than RAM.

What to do:

- Add more RAM to your system if you can. Particularly for older systems I actually recommend installing the maximum amount of RAM that your

computer can accommodate. Exactly how much that is will vary greatly based on your computer make and model, and age.

- When buying a new computer, always ensure that the RAM can be upgraded beyond what you need today. You may only need 4 gigabytes today, and that's a fine amount to purchase – just make sure that the machine can be upgraded to, say, 8 or 16 gigabytes in the future. The future you will be grateful.

Additional resources:

Will adding RAM to my system solve my problems? Windows loves RAM, but whether or not adding RAM will resolve the issues that you're experiencing depends on the issues. We'll look at an example.

Can you have too much RAM? Is 64bit just a marketing ploy? 64-bit machines and 64-bit support are becoming more common, which begs the question: is it hype? Or is it worth it? And how much RAM is enough?

5: Doing Too Much

I do more with my computer today than I did five years ago when I first got it.

In my case, I run virtual machines I didn't use back then. I now run applications such as Adobe Photoshop, which I didn't have five years ago. I'm also running Camtasia to record and edit on-screen videos.

In other words I've been asking my computer to do more and more.

And while I have upgraded it – repeatedly, and in various ways – the net result is that it's still slowing down. Not due to anything inherently wrong with the machine or the software on it, it's just that I continue to push the machine to its limits by virtue of the things I now ask it to do.

And there are limits. If I ask it to do too much, such as running more than one virtual machine at a time, the machine bogs down. One of the most common symptoms is increased virtual memory use which I talked about earlier. Disk is slower than RAM, and as a result, my computer slows down.

So I don't do that. My machine is maxed out in terms of hardware, so … I simply choose not to do some things that I would otherwise want to.

It's not uncommon for many people to be in a similar situation, often without realizing it, when they've had a computer for a bit of time.

You don't really have to be running new applications that you didn't used to to be "doing too much". It can be as simple as your own habits slowly changing over time.

For example, how many tabs do you typically have open in your browser at the same time? I'd wager it's more than you usually had open 5 years ago.

One of the things that has changed dramatically over time is the amount of time we spend online and the number of different online services we use. As a result, not only are we multi-tasking more than ever, but we're doing it all within our browser. Each open tab takes more of your computer's resources.

Thus your own change in behavior – keeping more tabs open in your browser, in this example – has the side effect of demanding more from your computer than in the past.

I use browser tabs simply as an example. It's very possible that, like me, you're now running more applications, more powerful applications, or simply using existing applications in ways that are using more resources that you perhaps did originally.

What to do:

- Review how you use your computer. Are you asking it to do too much? Are you trying to do too many things at once?
- Rather than leaving programs running or tabs open, consider closing them when done in order to free up resources for the things you're actually doing.
- Consider doing things – and thus running the applicable programs – in sequence rather than simultaneously.

Additional Resources:

What is Virtual Memory? Virtual memory is conceptually somewhere between RAM and hard disk space; it's disk space used to maximize the amount of RAM available to programs.

How much of the swap file actually gets used? How much a swap file gets used depends on how much RAM your computer has, and what's running on it at any given time. Knowing that will also help you decide where to place the file.

6: "Software Rot"

Software rot is both very real, and one of the most difficult things to explain and understand.

The concept behind software rot is simply that for inexplicable reasons, a system will become slow and more unstable over time.

I say "inexplicable" because understanding exactly what changes are occurring, and exactly why those changes are having the effect that they seem to be having is almost impossible. However the effect that people experience is very, very real.

We do know, however. that one thing appears to lead to software rot, or at least contributes to it happening more quickly:

- Installing and uninstalling programs.

In addition, and rather ironically, running poorly behaving "clean-up" utilities can also contribute to the problem.

The issue is a complex one, but boils down to the fact that applications are complex. As a result, installing applications is a complex operation that affects many different parts of the computer beyond just the application itself.

People tend to focus on the Windows registry as the root of this evil. While it can be part of the problem, there are frequently much larger issues at play.

Applications try, as much as possible, to avoid duplicating functionality and avoid re-inventing the wheel by sharing code, or by using libraries of code that are designed to be shared among multiple applications. For example:

- Program A installs and uses library Y.
- Program B uses library Y also, but doesn't need to install it since it's already there by virtue of program A.

You save disk space, and both programs A and B save development cost since they both didn't need to invent library Y.

What happens when you uninstall program A? Should it:

- Uninstall library Y, since it was responsible for installing it?

- Leave library Y, since another program *is* using it?
- Leave library Y, since another program *might* be using it?

(I have to call out the difference between "is using" and "might be using" since there is no reliable technique to keep track of who's using what in this scenario.)

No matter what decision is made, it can be viewed as either right or wrong.

And the situation gets even more complex when applications end up relying on different *versions* of the same libraries. This is why you'll often see multiple versions of the .NET Framework installed in Windows. Apparently the approach taken is to install the version you need if it's not already there, and then never uninstall it in case another program is using it.

The net result of all this confusion is applications break, misbehave or simply behave poorly because the assumptions that they once made about what resources to use and how to use them are challenged as applications are installed and uninstalled.

What to do:

- Avoid installing and uninstalling software. I know it's nice to try out software from time to time, but if this is something you do frequently it's best to use a sacrificial machine, or better , -- a virtual machine -- that you can rebuild from scratch or restore form a backup image after your experimentation.
- Take a backup before and restore to that backup after a software trial. This guarantees that all changes made by the software are removed from your machine.

When software rot is highly suspected as the cause of your machine's general performance issues and instability there are only two approaches to recovery:

- Restore the machine from an image backup made when it was stable and performing properly.

Or

- Backup, reformat and reinstall the operating system from scratch, install the applications you need from scratch and restore your data.

While the situation has improved in recent years, software rot remains enough of an issue that individuals such as myself whose job it is to try out software of various

sorts will simply plan on a complete reinstall of the software on their computer (by restoring a backup or performing an actual reinstall) every couple of years.

Additional Resources:

Does an unstable system imply a hardware problem? System instability is often the result of what we call "software rot." It can be the result of installing and uninstalling lots of programs - and the cure isn't easy.

What kind of maintenance should I do to avoid software rot? Regular maintenance of your computer can help keep it performing well, but some things, like software rot, can only be delayed – not avoided entirely.

How do I remove uninstalled software "leftovers"? It's not uncommon for uninstallers to leave behind "leftovers" after they complete. Sometimes it's intentional, and sometimes not. In this article, we'll look at how to deal with leftovers.

7: Anti-Malware Tools at Work

When you think about it, the anti-malware tools on your computer have to do a lot of work.

When we ask them to perform a full scan, they actually need to read and examine the contents of every single file on your computer. Even when restricted to those file types that most commonly contain malware, that adds up to thousands upon thousands of files.

On top of that we're asking the anti-malware tool to check each file against its entire database of known malware. That could include hundreds of thousands of different characteristics or patterns.

So each of thousands of different files are getting checked against each of thousands of different known malware patterns.

That's a bunch of work. Naturally, exactly how impactful these scans are going to be will vary based on exactly what anti-malware tool you're running and how fast your machine actually is. In an ideal scenario the scan operates without notice, but the reality is somewhat different.

The most common scenario I hear about is that a computer is slow for "a while" after it's been first turned on. This is often the result of the anti-malware tool doing its job immediately upon booting. One the scan is complete the computer returns to normal.

And of course some anti-malware tools are simply better at minimizing their impact while doing their work than others.

What to do:

- Try to pick an anti-malware tool that has a reputation for not being particularly disruptive.
- Have the malware tool perform its automated full scan at a time when you're typically not using the computer.
- Look for options in the anti-malware tool to adjust its performance impact. Some will allow you to adjust the amount of CPU used during a scan, some will pause a scan if the computer begins to be used, and others will actually delay the scan completely until the computer is idle.

Additional Resources:

I have constant disk activity and I don't know why. How can I tell what program is doing it? Unexplained disk activity turns out to be fairly easy to identify with the right tools. We'll use Process Monitor to track down disk activity.

How do I find out what program is using all my CPU? Occasionally, one program will use up all of your computers processing resources. Using Process Explorer, it's easy to figure out which program that is.

Why, when I'm doing nothing at all, will my hard disk suddenly start thrashing? There are several reasons you might see hard disk activity when you're not doing something yourself. It's not hard to find out what's causing it.

8: Slow Internet

This one frequently surprises people.

As I mentioned earlier, we're doing more and more online than ever before. In many ways the computer is transforming from a device on which we do local computing (running our programs, creating documents and so on) to a device that provides an interface to the larger world of the internet.

The problem, of course, is that the internet comes to us through a single point: our internet connection. As a result the speed of our online experience is almost completely dependent on the speed of that connection.

Things quickly get confusing, however.

When a YouTube video won't play smoothly, is it the connection or the computer? It could be either, but most often it's the connection.

When a website fails to come up quickly, is it the connection or the computer? Well, if just a single website is slow, then it's probably the not the connection but either the website itself or your computer. If most websites feel slow, then the speed of your internet connection may be to blame.

Many people see it as their computer being slow, when in fact it's the resources used getting to the internet and the resources out on the internet that are to blame.

Unfortunately there's almost nothing you can do to your computer that will speed up your internet connection appreciably. Yes, I know, there are utilities that claim to be able to tweak settings to do so, but they rarely have an impact and when they do it's often something you'd never notice.

You can't make the internet connection faster, but given that your internet connection is a resource that's shared among all applications on your computer, and in fact among all computers on your network, there are a few things you can do to help make it *appear* faster.

What to do:

- Take stock of how many computers you have that are accessing the internet simultaneously, and decide if they all really need to be doing so. Turn off the

computers, or the internet-connected applications on those computers if it makes sense.

- Take stock of all the applications running on your computer that could be accessing the internet and make the same decision: do they really need to be running? If not, exit them.
- Watch the number of browser tabs or windows you keep open. Many modern web sites – in particular social media sites – will often make periodic contact across the internet checking for updates even if you do nothing in your browser, sometimes even if the tab or page isn't visible.

The thing to realize is that use of your internet connection is, in a sense, a competition between all computers and all programs that are trying to use it. What's happening on a computer in the next room could easily impact the perceived speed of the internet, and as a result, the perceived speed of your computer.

That's not to say that your computer may not be contributing to the problem: many of the other things I discuss in this report as slowing down your computer can absolutely manifest as slowing down your internet. My point here is simply that a slow internet connection can look like a slow computer, when in fact the computer isn't at fault at all.

Additional Resources:

How can I view online video without the starts and stops? Online video is becoming more and more popular, but it often assumes you have a fast connection. If you don't, video playback can be affected.

How can I be sure I'm getting the internet speed I'm paying for? It's not uncommon to feel like the internet is slowing down. Determining if it's your ISP's fault is possible, but it needs to be done carefully.

9: Bad Sectors

One of the underappreciated aspects of most modern computers is just how resilient they try to be. Many different aspects of your hardware, operating system and other software are often engineered to try to carry on as best they can in the face of impending failure or just bad circumstances.

One of the somewhat common areas where this can occur is on your hard disk.

A hard disk is typically made of magnetic material, and that material can have or develop physical flaws. If data is written to one of the flawed areas the hard disk's internal circuitry will note the failure and place the data it's writing somewhere else. The flawed area is then marked as being unavailable. Hard disks actually include a certain amount of extra space on them for just this purpose: to be used when some other area on the hard disk is damaged or unusable.

While a simple write attempt to a damaged area on the hard disk is typically handled quickly, things get more interesting when the damage develops over time, and to an area that already contains data.

When reading data from a hard disk, the controller hardware that is part of the disk actually notes when reads are successful or not. When a read is not successful it tries again. If the read then succeeds, all is well. A certain amount of failed reads are expected and typically you'll never notice when a simple retry or two can recover the data.

Performance problems happen when the area containing the data is more severely damaged. The hard disk will dutifully try again and again to read the damaged sector until it either exceeds some limit, or the data is successfully read. When this happens the time spent trying over and over becomes noticeable.

Add to that the fact that "bad sectors", as they're called, typically occur in groups, and the time can start to add up quickly. Or, rather, slowly.

The scenario we care about looks like this:

1. You setup your computer, operating system and software and are happily using your machine.
2. A set of sectors on a hard disk begin to go bad. This can happen over time, and for a variety of reasons.

3. Those sectors just happen to contain data that is used frequently, and rarely if ever, rewritten. A good example might be a critical operating system file, or an application that you use frequently.
4. Now, when that file is read it's read noticeably slowly because of the hard disk needing to try again and again to get a successful read.

If that happens to enough sectors on enough critical files it can slow your system to a crawl.

Even worse, it's actually a sign of impending disaster. Eventually those bad sectors won't be able to be read at all, and your system or application will crash, and data may be lost or worse.

What to do:

- Back up regularly. Hard disks do die. If you're lucky you'll notice an increasing slowdown in the hard disk's performance. Unfortunately it's also possible for a hard disk's failure to be sudden and complete.
- Periodically, maybe once every six months or so, run CHKDSK /R on your magnetic hard disks. (Solid State Drives, SSDs and flash drives do not suffer the types of problems I'm discussing here.)
- If you are experiencing a suspected hard disk degradation due to surface errors, it can be useful to run SpinRite. While not free, it performs what I like to refer to as a non-destructive format, actually reading and re-writing the entire hard disk, detecting and repairing bad sectors, while recovering data along the way.
- Alternately, consider replacing the hard drive. Run CHKDSK /R on the replacement to make sure that any manufacturing defects are detected and avoided from the start.

Additional Resources:

Checking and repairing a disk with CHKDSK The Windows system utility CHKDSK is a powerful and useful tool in diagnosing and repairing certain types of disk problems. I'll review several ways to run it, and try and describe what it does.

How do I fix errors on my hard disk? Hard disk errors come from several different sources, and as a result there are several different approaches to resolving them.

SpinRite - Repair hard disk failures and recover your data SpinRite is a hard disk repair utility that can frequently recover and repair physical hard disk issues such as CRC errors.

10: Clutter

I'm not talking about a cluttered desktop, a personal pet peeve of mine, but rather clutter left over by applications that don't clean up properly after themselves, or in some cases simply cannot clean up properly for various reasons.

If left un-dealt with this type of clutter can fill up your hard disk to a point where other disk operations are impacted and can slow down your machine.

The types of things I'm talking about include temporary files, left over installation files, web browser caches and more. There's an entire class of "stuff" that can accumulate on your machine.

One of the greatest examples is the web browser cache. In order to speed up your web browsing experience, all modern browsers download the components of a web page to what's called a "cache" or holding area. That way when you browse to another page that requires the same components these don't need to be downloaded again since they're already in the cache. A good example is the image that is the logo on Ask Leo!. Regardless of how many pages you view, that image need be downloaded only for the first.

The problem is that the browser cache can develop issues over time. So one common debugging technique, indeed often the first suggestion, is to empty the browser cache. This both frees up disk space and forces the browser to rebuild the cache from scratch. For an assortment of reasons browsers can get "confused" about what's in the cache, and a periodic cleaning helps them stay on top of things.

Fortunately there are relatively simple steps and tools to help manage and clean up much of the clutter that normal usage of any computer can leave behind.

What to do:

- Run the Windows Disk Cleanup utility every few months. Even better: download and run CCleaner, which cleans up more things than the built-in Windows utility does.
- Keep an eye on your disk space usage. Dwindling disk space can be both a performance issue in-and-of itself as well as a sign of a performance issue in some other application.

Additional Resources:

Using Windows Disk Cleanup Over time, it's not uncommon for files to accumulate on your system – unused files, old ones, or files you no longer need. There are many reasons for this, but most are pretty valid when you get down to the details.

CCleaner – Windows Cleaning Tool CCleaner is a popular and highly regarded tool for cleaning files, history, cookies, and much more from your computer.

Where's my disk space going? It's not uncommon to run out of disk space. A free utility can help tell where your disk space is going so you can determine what steps to take.

More Reasons

I couldn't limit myself. As I said earlier, when I started researching possible causes I kept coming up with … more causes!

So, while the previous 10 items are, indeed, the 10 most common and most fixable problems that I encounter, here are a few more. These are less common sources of slowness, and often aren't as easily fixed, but they're definitely worth being aware of, just in case.

Hardware Problems

People seem to fall into two camps: those who are ready to replace their entire computer because of a software (not hardware) problem, and those who fail to ever realize that hardware can, in fact, break.

Hardware fails in several different ways. Often it's immediate and clear. Other times, however, failure can be gradual and happen in stages. Much like bad sectors on a hard disk that I discussed earlier, other hardware connected to the computer – everything from networking cables to video display adapters to mice and more – can in fact sometimes fail gradually. And that "gradually" can manifest as a perceived slowdown of the computer.

The best thing to do here is to keep an eye on the characteristics of the slowdown. See if it manifests only or most often when doing certain things, and then think about the hardware components that might be involved.

Out of Date System, Drivers and Applications

Quite often the problems we experience can be related back to problems inherent in the software that's installed on our machines. When a system , a driver or an application is identified as having a performance problem, it's not at all uncommon for that to be treated as a bug that needs to be fixed.

For a variety of reasons, usually related to security, it's important to keep your system up to date. It can also impact your computer's speed as well, as issues get resolved.

You've never defragged

This is really only an issue for people running Windows prior to Windows 7. Windows 7 automatically defrags attached magnetic hard drives weekly.

Fragmentation is a performance issue relating to how files are laid out on a hard drive's surface. I've likened it to a book whose pages have been detached and spread out around a home. In order to read the book you need to locate each page, in order, read it, and then proceed to find the next page. It'smuch easier and faster to have the pages already gathered one next to the other in order. The same applies to how files are stored on a hard disk.

Fragmentation gets worse over time as files are deleted and written to the hard disk.

Defragmentation should happen "once in a while", with Windows 7's default of once a week being a fine choice. More often than that and you'd probably never notice the difference.

If you're running Windows versions prior to Windows 7 and you've never defragmented your hard disk you could be experiencing significant slowdowns as a result. I recommend you do so, and then continue to do so periodically.

You haven't rebooted lately

Much like the hard disk, things can get kind of disorganized in a computer that's been left on for a long time without rebooting. It varies *dramatically* based on how you use the computer and what applications you run, but it can sometimes contribute to performance issues.

Fortunately the "solution" is relatively simple: reboot once in a while.

For an assortment of reasons, even though I leave my computers powered on all the time, I have my primary desktop – the computer on which I do the most and the most varied work – reboot automatically once a night.

Other computers, those dedicated to single or a few number of tasks, don't need the reboot treatment as often, so I let them run until there's some reason to reboot. Typically a Windows Update will come along and force the issue.

Color Depth

Color depth is the number of different colors each pixel or dot on your computer screen can display. The more colors your video card is configured to be able to display, the more memory is required by both Windows, as it manages the display, and possibly by applications attempting to display things.

Most common settings are 8, 16, 24 or 32 bit color, representing 256, 65 thousand, 16 million or 4 billion different possible colors (and sometimes "intensity") for any individual pixel on your screen.

Most computers today come configured for 24 or 32 bit color, and indeed, some modern hardware will not support less than that. However older hardware can often support a smaller color depth, and it's on this older hardware that there may well be performance benefits from selecting a lower number, such as 16 bit color.

Slow CPU

And yes, it does have to be said: sometimes the CPU is simply no longer up to the task. What was once a blazingly fast machine is now a slow behemoth.

That's simply the nature of progress.

Modern operating systems and applications are more likely to assume modern, or at least close to modern, hardware and CPU speeds.

There sometimes a small chance, a very small change, that your existing CPU or motherboard might be replaced with one that supports a higher speed or more powerful chip.

Unfortunately that's unlikely, and it's typically more cost effective to simply replace the machine.

Non-Reasons

Registry

I know lots of people love to blame the registry for performance issues. There are a number of companies that would love to sell you a tool to fix these supposed registry problems.

And yes, while there are circumstances where the registry can contribute to performance issues, it's just not as common as those folks would lead you to believe. Most of the time "cleaning" your registry is simply a waste of time. Couple that with the very real risk that a registry clean can often damage the information stored in the registry and actually *cause* more problems than it might solve. It's just not worth the time or risk.

"Fragmented" RAM

I'm shocked to see this still floating around. It applied to old versions of Windows – as in Windows 95 and 98. Current versions of Windows do a fine job of managing their own memory, thank you very much. So called "RAM cleaners" or "RAM defragmenters" simply second-guess Windows own optimizations and either do little or nothing, or actually make things slower.

If things are really that bad, a reboot will give you the benefits of starting over with a clean slate.

Afterword

I hope that this report helps you identify some of the performance issues you might be experiencing, and gives you a place to start resolving them.

In addition to the "Additional Resources" I've provided at the end of each item, there's even more information on all of them, and more, out at Ask Leo! – I encourage you to visit, browse around, and search for answers to your performance questions.

If you found this report helpful, you'll *love* my weekly newsletter.

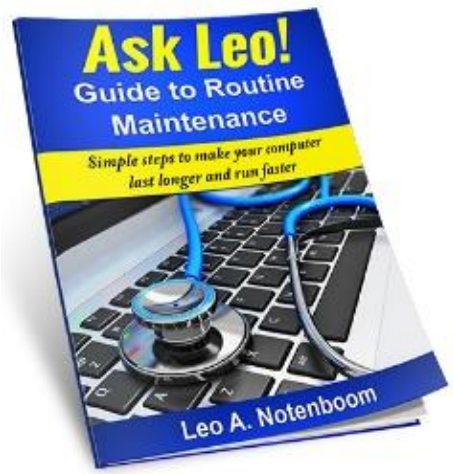
Each week you'll find fixes to common problems, tips to keep your computer and online information safe and secure, commentary on technology issues of the day and even the occasional explanation as to just why things are the way they are. It's educational, fun, and can help you be more effective, less frustrated and safer as you use technology. And it's completely FREE.

Visit http://go.askleo.com/s10news to learn more, browse the archives and sign up, today!

Ask Leo! Books

In addition to Ask Leo!, and The Ask Leo! Newsletter I also have several books. In fact, I think there's one that may be of particular interest if you're tracking down suspected performance issues:

The Ask Leo! Guide to Routine Maintenance is all about helping you:



- Keep your computer running longer.
- Avoid spending money you don't need to spend.
- Speed up your computer.
- Free up space.

These are the steps you'll want to take to keep your computer running well for as long as possible.

Available in PDF, Kindle and Paperback, complete with companion online videos, you can find out more about *The Ask Leo! Guide to Routine Maintenance* here.

Be sure to visit The Ask Leo! Store for other Ask Leo! Books.

About the Author

I've been writing software in various forms since 1976. In over 18 years at Microsoft, I held both managerial and individual contributor (i.e. programmer) roles in a number of groups ranging from programming languages to Windows Help, Microsoft Money, and Expedia. Since 2003, I've been answering tech questions at the extremely popular Ask Leo! website (http://askleo.com) and in entrepreneurial projects like this book.

Curious for more? Someone asked and I answered on the site: Who is Leo? (http://askleo.com/who-is-leo/)

Feedback, Questions and Contacting Leo

I'd love to hear from you.

Honest.

I truly appreciate reader input, comments, feedback, corrections, and opinions – even when the opinions differ from my own!

Here's how best to contact me:

- If you have a computer or tech related question, the best approach *by far* is to first search Ask Leo! (http://askleo.com). Many, many questions are already answered right there, and finding those is much faster than waiting for me.

- If you can't find your answer using search, visit http://askleo.com/ask and submit your question.

If you just want to drop me a line or have something that want to share that isn't covered above, you can use http://askleo.com/ask too.

Copyright & Administrivia

This publication is protected under the US Copyright Act of 1974 and all other applicable international, federal, state and local laws. All rights are reserved.

Please note that much of this publication is based on my own personal experience and anecdotal evidence. Although I've made every reasonable attempt to achieve complete accuracy of the content in this book, I can assume no responsibility for errors or omissions. You should use this information as you see fit and at your own risk.

Any trademarks, service marks, product names, or named features are assumed to be the property of their respective owners. They are used only for reference. Unless specifically stated otherwise, there is no implied endorsement if I use one of these terms.