

10 REASONS YOUR COMPUTER IS SLOW

(and what to do about it)

Updated
for
Windows 10



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(and what to do about it)

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by

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The Ask Leo! Manifesto

I believe personal technology is essential to humanity's future.

It has amazing potential to empower individuals,
but it can also frustrate and intimidate.

I want you to have the *confidence* to use technology effectively.

I want to replace that *frustration* and *intimidation*
with the *amazement* and *wonder* that I feel every day.

I want it to be a *resource* rather than a *roadblock*;
a *valuable tool*, instead of a source of *irritation*.

I want personal technology to empower you,
so you can be a part of that amazing future.

That's why *Ask Leo!* exists.



Leo A. Notenboom

askleo.com

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INTRODUCTION

Slow Computers

“My computer is slow.”

That’s one of the most common symptoms I hear while answering questions out at Ask Leo! (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://askleo.com) as well as many, many articles on the topic at askleo.com.

I: TOO MUCH RUNNING SOFTWARE

Perhaps the #1 complaint among computer users is that their computer is running too slow, or just takes too long to start up, shut down, or just "do things."

Obviously, there are many possible reasons, but in my experience, there one reason stands out above all others.

Too. Much. Software.

In my experience, this is perhaps the single most common cause of computers running slowly.

There are simply too many programs running—so many that the program you want to use is competing with all these other programs for system resources, 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 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.

Installing Shouldn't Hurt, But...

Installing software should be benign. Installing software shouldn’t cause software to be run automatically—it should just 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 log in or when Windows starts. Sometimes they’re

legitimate components. DropBox, for example, needs its component running to provide the services for which people use it.

On the other hand often components are 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, was that the quick launch bar 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 literally thousands of different things that could impact your computer's 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 install software 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, I'd say 90% of the time programs that install software that runs constantly in the background also uninstall it cleanly if you remove the package.
- **Turn off auto-start options.** Many programs allow you to control whether or not they start components at Windows startup or user login. Check the Preferences or Options in those programs for settings 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 of software running in the background on your machine. Consider whether running that software is 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 autoruns¹ or the Startup tab in the Windows Task Manager, you can examine starts automatically on your computer. Don't just turn things off; use what you

¹ <https://go.askleo.com/autoruns>

find as a basis for further research to determine exactly what that program is and whether or not you need it.

The Extreme Solution

This problem isn't new. Speed and stability declining over time have plagued computers since their invention. It's sometimes referred to as "software rot" because the implication is that things just get worse over time.

There's also a long-standing solution that isn't quite as piecemeal as what I've discussed so far:

- Back up.
- Reinstall Windows from scratch, formatting or erasing the disk as part of the process.
- *Install only the applications you actually need.*

The frequent result is a faster machine simply because you didn't reinstall all that old stuff you weren't using anyway.

It's tempting to have lots of things on your machine "in case" you might need it some day. I do it myself. But over time, particularly if you find you're not using what you installed some months or even years ago, it's time to uninstall. It's also a great time to reconsider whether "in case" is enough of a criteria to install additional tools in the future.

2: PREVENTION, PRESENCE, OR REMOVAL OF MALWARE

It's no surprise that malware can impact your computer's speed. It's one of the conclusions people often jump to when their computer slows down, and it's not uncommon for them to be quite right.

Interestingly enough, malware can impact speed before it arrives, while it's present, and even after it's been removed.

Malware's Impact Before It Arrives



One of the most common causes of computer slow-downs is trying to run too much software.

One common cause of running too much software? Fear of malware. Or, rather, installing too much (or poor quality) security software on your machine to avoid it.

Having too many different security solutions installed is a fast path to problems, and one of those problems is speed (or the lack thereof). The various security software packages come into conflict or duplicate efforts to the point where your computer is spending so much time scanning and trying to stay safe that it can do little else.

Pick a solution and stick with it. [I have recommendations](#)², but regardless of what you choose, make sure it has a good reputation and meets your specific needs.

Don't randomly add more tools. If you want to replace the solution you've chosen, uninstall it before installing its replacement to avoid conflicts.³

And of course, ignore the advertisements claiming amazing results or [one tool that does it all](#).⁴ There are good solutions out there, but the poor ones are advertised right alongside them. Do your research.

² <https://askleo.com/3517>

³ Except for Windows Security (aka Windows Defender) — it will simply step aside if you install a different solution.

⁴ <https://askleo.com/2815>

Malware at Work

Malware on your machine can absolutely slow it down. It can do a lot more, of course, but when it's running correctly (by the malware author's definition of "correct"), malware's initial (and sometimes only) symptom can be a machine that has begun to slow down. Ransomware gets the most press these days; it systematically encrypts files, taking computer resources to do so.

This is also very much related to the issue of too much software: malware is additional software 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 performance.

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

The Impact of Malware Removal

Even after successful malware removal, its memory can linger in the form of poor performance.

The problem is, not all security software does a good job of both removing the malware and returning your system to the state it was in before the malware showed up.

In fact, even with the best anti-malware tools, there may not be a way to return to a pre-infected state. The now-departed malware could have affected other things, like system settings or other applications, such that the net result is a slower system even with the malware no longer present.

When that happens, the only pragmatic recourse is to either revert to a backup image taken prior to the malware's arrival, or reinstall Windows so it can reset everything back to a known good state.

Of course, the best solution, as always, is not to allow malware on your machine to begin with.

Staying Safe

Keeping your machine safe is something we hear often. I call it the "litany of safety."

- Make sure your computer is behind a firewall; your home router will likely do.
- Run good, up-to-date [security software](#)⁵; Windows 10's Windows Security may be enough for most.
- Make sure your security tools are configured to keep themselves up to date.
- Keep all your computer's software, especially Windows itself, up to date.
- Be [skeptical](#).⁶ Learn to identify scams, phishing attempts, and suspicious email attachments.
- [Secure your router](#).⁷

Staying safe from malware and recovering from malware infections is a huge topic, but those are the basics. You can read more about them here, in what I consider my single most important article: [Internet Safety: 7 Steps to Keeping Your Computer Safe on the Internet](#).⁸

⁵ <https://askleo.com/3517>

⁶ <https://askleo.com/21535>

⁷ <https://askleo.com/11107>

⁸ <https://askleo.com/2374>

3: ANTI-MALWARE TOOLS AT WORK

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

Scanning Takes Time and Resources

When we ask our security software to perform a full scan, it needs to read and examine the contents of every single file on our computer. Even when restricted to those file types that most commonly contain malware, that adds up to thousands and 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.



The result? Thousands of different files on our machines are getting checked against each of hundreds of thousands of different known malware patterns.

That's a bunch of work. Naturally, exactly how much impact the scans will have on performance vary based on which anti-malware tool you're running and how fast your machine is. In an ideal scenario, the scan operates without notice, but reality is somewhat different.

Slow for "a While"

The most common scenario I hear about is a computer that's slow for "a while" after it's first turned on, or after it's logged into.

This is often the result of security software performing a scan (as requested) immediately upon booting. Once the scan is complete, the computer returns to normal.

And, of course, some tools are better at minimizing their impact than others.

What To Do

There are a few options to explore if you find that your security software is impacting your computer's performance when you'd rather it didn't.

- Try to pick an anti-malware tool that has a reputation for not being particularly disruptive. This is one of the factors heavily impacting my [recommendation of Windows 10's Windows Defender](#)⁹ built-in tool.
- Have the malware tool perform its automated full scan at a time you don't typically use the computer. This means possibly leaving the computer on when you're not normally using it and scheduling the scans to happen then. The most obvious choice is to leave it on and run the scans overnight.
- Look for options in the anti-malware tool to adjust its performance impact. Some 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 delay the scan completely until the computer is idle.

Security software is important. I'd even go so far as to say that it's a [critically important](#)¹⁰ part of [keeping you safe](#).¹¹ That safety, though, comes at a cost: the tool needs the time and resources to do the job we ask it to do. By picking and choosing the right tool and the parameters under which it runs, we can minimize the impact to the point of it not being an issue at all.

⁹ <https://askleo.com/3517>

¹⁰ <https://askleo.com/16432>

¹¹ <https://askleo.com/2374>

4: INSUFFICIENT RAM

When diagnosing system slowness, one of the things to review is how much RAM your computer has.

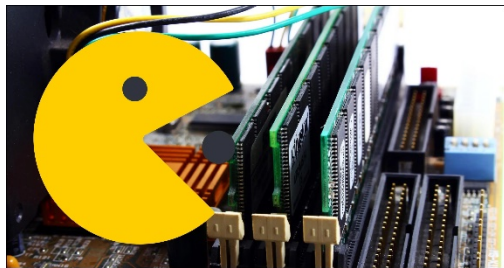
Not only does Windows love RAM, so do Windows applications. And, of course, the more things you run at once, the more RAM you need.

RAM (Random Access Memory) is the memory used to hold the programs running as you use your computer, including Windows itself.

When you turn off your computer, RAM is erased. When you turn it on again, the boot process is mostly about reloading Windows and all those running programs back into RAM.

To a certain point, the more RAM you have, the faster your system will run.

Windows and RAM



I've often said that Windows loves RAM. It operates better when you have more than you need.

The trick, of course, is that Windows will run—or try to run—even if you don't have all the RAM you need. Windows will try to "fake it" by using the swap (or paging) file to make it look like there is more RAM in the system than there really is.

Applications (including most of Windows itself) will use whatever RAM they need, and if the combination of all the demand is more than the actual RAM installed in your computer, Windows moves things in and out of RAM by writing to and reading from disk.

The problem? Disks, even SSDs, are slower than RAM.

The result? Your system slows down if there's not enough RAM for what you're trying to do. If you see lots of disk activity while you're not actually reading or writing files, this might be you.

Degradation Over Time

It's pretty easy to not realize you're using more RAM than you have, particularly if you've had your computer for some time.

The problem is this: RAM requirements only get worse over time. Your machine may have run Windows well five years ago, when it only needed X amount of RAM. Today, however, Windows might want half again as much RAM to do the same job, and your machine might not have it.

It's not just Windows. Applications increase their RAM usage and requirements over time as well. Couple that with Windows, and the combination could mean your machine just doesn't have enough RAM to do the same job it did a few years ago.¹²

We also ask more of our computers. You're probably doing more with your computer today than you did five or ten years ago. That implies we're running more software now than we did originally. The result is that a computer that once had enough resources to meet our needs is now only marginally capable.

Two Solutions

The first solution is to do less with your computer, if you can. Most often that means trying not to run as many applications all at the same time. Exit one before moving on to the next.

However, that is annoying, and doesn't solve the underlying problem: Windows and your applications want more RAM.

The second solution, then, is to give it to them: add more RAM, *if you can*. Particularly for older systems, I recommend installing the maximum amount of RAM your computer can accommodate. That will vary based on your computer make, model, and age.

Of course, someday you'll run into a situation where you need to run all those apps and your machine is already maxed out on RAM. The only solution then will be to buy a new machine.

¹² It's not a conspiracy. The machine you buy today has more RAM than your older machines, and software — both the operating system and applications — take advantage of that. Consumers also expect more of their software, which means it needs more room to work.

RAM and New Machines

When buying a new computer, I recommend you ensure the RAM can be expanded beyond what you need today.

My most recent desktop has 64GB of RAM, and I rarely come close to using it all. Over time, of course, that will change, which is why I made sure the motherboard can be upgraded to 128GB of RAM someday.

Similar RAM upgrades significantly lengthened the usable life of my previous two desktop machines. Each came with an amount of RAM appropriate to their purchase date, but with room for more. And each was eventually upgraded to their maximum capacity.

The bottom line: when it comes to RAM, more is better, and not having enough could be one of the reasons your machine is slowing down.

5: DOING TOO MUCH

Every time I buy a new computer, I end up doing more with it.

For example, I now regularly run virtual machines, record and edit video, and run applications such as Adobe Photoshop. Each of these things have two important characteristics:



- They're not things I did a few years ago.
- They place an additional load on the computer.

I've been asking my computer to do more and more—and I suspect you have, too.

Is it any wonder it seems slower?

Upgrades only go so far

Most of my machines have been upgraded—repeatedly, and in various ways—and yet over time, they still slowed down.

The slowdown wasn't due to anything inherently wrong with the machines or the software. I simply continued to push each to its limits by virtue of the things I asked it to do.

And there are limits. If I asked one to do too much, such as running too many virtual machines at a time, the machine bogged down. One of the most common symptoms is increased [virtual memory](#)¹³ use. Since disks are slower than RAM, my computer slowed down.

So I stopped doing that. Once a machine is maxed out in terms of hardware, I choose not to do some things I would otherwise.

Of course, if that goes on long enough, I replace the machine with something more powerful. That, too, is a choice.

¹³ <https://askleo.com/3062>

It's easy to ask too much

When you've had a computer for a length of time, it's not uncommon to be in a similar situation, often without realizing it.

You don't really have to be running new applications 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 wager it's more than you usually had open five 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, we are multi-tasking more than ever, and 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 you may have in the past.

I use browser tabs simply as an example. It's very possible that, like me, you're now running more (and/or more powerful) applications, or using existing applications in ways that use more resources.

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.

Eventually, as I did, you'll probably end up getting a newer, faster, and more capable machine. But by being aware of and managing your own use of your system, you can delay that necessity as long as is pragmatically possible.

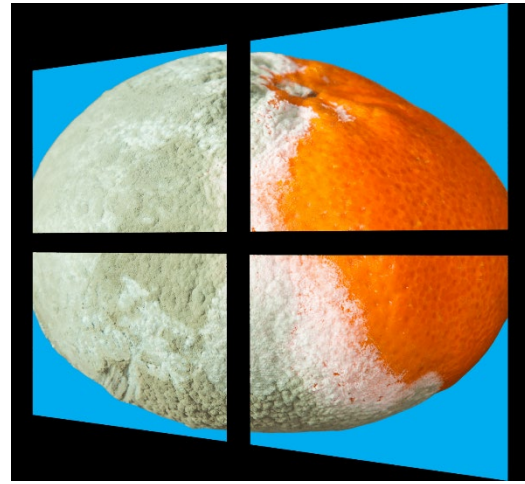
6: AVOIDING OR FIXING SOFTWARE ROT

Software rot is both very real and very difficult to explain and understand.

The concept behind software rot is very simple: for seemingly inexplicable reasons, systems become slower and more unstable over time, even though you've done nothing you would think would cause it.

I say “seemingly inexplicable” because understanding what changes are occurring and why those changes are having the effect that they seem to be having is really difficult. On the other hand, the effect you and I experience is very, very real.

To be clear, software is not like some kind of fresh fruit that you have to keep in a refrigerator to keep it from degrading. Untouched, software should remain exactly as it is as long as the computer it's installed on keeps running.



And yet, it feels like it does decay over time. It seems to slowly "rot," if you will.

The key is that word I used above: "untouched. "We're doing things with and to our computers all the time."¹⁴

Installing and Uninstalling Software

This might be the #1 cause of software rot over time. It particularly affects those who love to try things out by installing them on their computers, and then uninstalling them (or perhaps not) after some time.

¹⁴ I was really tempted to bring up an analogy that some things are the equivalent of picking up food with clean(ish) hands versus dirty and disgusting hands, and that some of the things we do to and with our computers have various levels of analogous cleanliness. I'm afraid people would take me literally, so to be clear: the actual state or cleanliness of your hands has nothing to do with software rot. But wash your hands anyway—it's just good personal hygiene. 😊

The issue is a thorny one, but boils down to the fact that modern computer programs are incredibly complex. As a result, installing an application is an intricate operation affecting many different parts of the computer.

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

Applications try to avoid duplicating functionality and avoid re-inventing the wheel by sharing code—by using libraries of code designed to be shared among multiple applications. These are called Dynamic Link Libraries, or .dll files. 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 because Program A was installed.

You save disk space, and both programs A and B save development cost, since neither one had to independently 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 what software is using what in this scenario.)

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

Version Accumulation

The situation gets even more complex when applications rely on different versions of the same libraries. For example:

- Program A uses version 2.14 of library Y.
- Program B uses version 2.12 of library Y.

If version 2.14 of the library is present because program A was installed first, what should program B do?

Assume 2.14 is the version to use, since that's "better than" then version 2.12, which it requires? If that assumption is wrong, program B fails.

Assume that only version 2.12 will do and install it along side of 2.14, if that's even possible?

"Downgrade" the library by replacing 2.14 with version 2.12, possibly breaking program A?

Or if program B was installed first, what should program A's installation do?

Replace version 2.12 of the library with version 2.14 because it's a newer version and an "upgrade," possibly breaking program B?

Install version 2.14 of the library along side 2.12, if that's even possible?

And what, if anything, should happen when either program A or B is uninstalled?

The kicker is that all of these answers are absolutely right and absolutely wrong, depending on the programs involved, the libraries involved, and a multitude of other things.

Most often this is why you'll often see multiple versions of libraries, like [Visual C++ Runtime](#),¹⁵ 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 that applications break, misbehave, or behave poorly because the assumptions they once made about what resources to use and how to use them are challenged as applications are installed and uninstalled.

Updates

One of the things many folks point to as the cause of software rot are software updates—specifically Windows Update. We keep hearing news stories of systems that have problems after an update.

¹⁵ <https://askleo.com/4854>

Yes, I would say this is a form of software rot. Bad updates can cause problems. But even completely benign updates can impact your system's performance by pushing resource requirements higher, perhaps even beyond your system's ability to cope.

Nonetheless, continuing to regularly take updates is important. You are more likely to be impacted by an unpatched vulnerability if you don't take updates than you are by some kind of destabilization if you do.

Don't let headlines spook you into poor decisions. "Bad" updates make headlines because they're uncommon. "Good" updates never make news because they just work. Most updates, by far, just work.¹⁶

Preventing Software Rot

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 yet, a virtual machine that you can rebuild from scratch or restore from a backup image after your experimentation.

Take a backup before and restore it after a software trial. This guarantees changes made by the software are removed from your machine. Take the backup before even installation if you don't plan to restore it, just in case something goes wrong.

Fixing Software Rot

If you suspect software rot as the cause of your machine's performance issues or instability, there are only two approaches to recovery:

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

Or

Back up, [reformat and reinstall](#)¹⁷ the operating system from scratch, install the applications you need from scratch, and restore your data.

¹⁶ Protect yourself with regular backups if you are concerned. Protect yourself with regular backups even if you're not concerned, since backups protect you from much, much more than the occasional bad update.

¹⁷ <https://askleo.com/23277>

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

7: SLOW INTERNET

This one frequently surprises people.

If things seem slow, it's important to realize that it might not be your computer at all. It might be your slow internet connection.

You might have the fastest computer in the world, but it's still limited by the speed of your internet connection. And if you have multiple devices sharing that connection, things get even worse.

Online More and More

We're doing more and more online than ever before. In many ways, our computers are transforming from devices on which we do local computing (running our programs, creating documents and so on) to devices providing an interface to the larger world of the internet.

The problem, of course, is that the internet comes to us through a single point: the connection as provided by our ISP.

As a result, the speed of our online experience depends almost completely on the speed of that connection.

Things quickly get confusing, however.

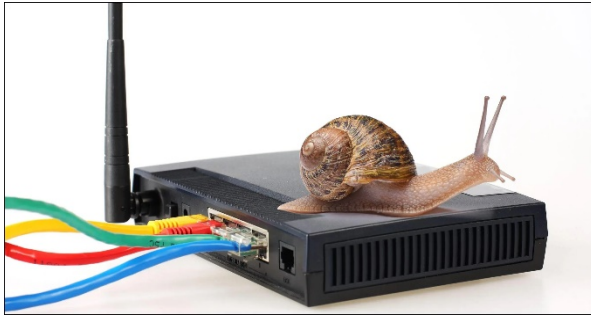
Is It You or Me?

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

When a website fails to come up quickly, is it the website itself, the connection, or the computer? It could be any of those things.

If your social media pages fail to update quickly, is it the service, the connection, or the computer? Once again, any of the above.

Diagnosing Connection Speed Problems



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

If just a single website is slow, then it's probably the not the connection, but

either the website itself or your computer.

On the other hand, if most websites feel slow, the speed of your internet connection may be to blame.

If things feel faster on a different computer that shares your internet connection, perhaps your computer is to blame. If things are as pokey on one machine or another, that points to the connection.

So. Much. Internet.

Of late, another problem has arisen: competition.

As I type this, I count no fewer than 32 devices sharing my single internet connection. While you may not have nearly as many as I do, it's likely more than you think.

Be it two or 32, all those devices are competing for the available bandwidth of your connection. While most might be idle a majority of the time, if one or more of them begin downloading a large update or start streaming a video, it will negatively impact the apparent speed of your connection for all other devices.

The Fastest Wi-Fi Doesn't Help

There are a lot of tips out there for speeding up your Wi-Fi, and I often see advertisements from one ISP or another touting their "fastest Wi-Fi" as a feature.

Wi-Fi is not what I pay my ISP for. I pay them for the wire that delivers the internet to my home. If that's slow or overloaded, it doesn't matter how fast my Wi-Fi is.

Unfortunately, there's almost nothing you can do to your computer (or your Wi-Fi) to 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 usually something you'd never notice.

You Can't Make It Faster, but...

You can't make the internet connection faster, but given that your internet connection is a resource that is shared among all the applications on your computer, and 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 accessing the internet simultaneously. Do they all really need to be doing so? Turn off the computers, or the internet-connected applications on those computers, if it makes sense. For example, I have several television sets that include internet capability. I have that feature turned off; there's simply no need.
- Take stock of all the applications running on your computers that access the internet, and make the same decision: do they really need to be running? Cloud-storage services like Dropbox, OneDrive, and others are common culprits. While they're incredibly useful, perhaps you can run them only as needed.
- Watch the number of browser tabs or windows you keep open. Many modern websites—in particular, social media sites—make periodic internet contact checking for updates even if you do nothing, and even if the tab or page isn't visible. Advertising-heavy sides (sadly, like many news media outlets) are notorious for streaming video after video regardless of whether you're watching.

The use of your internet connection is, in a sense, a competition between all the computers and programs 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.

OK, You *Can* Make It Faster, but...

Actually, there is one way to make your internet connection faster. If you've done everything I've suggested above and you still feel the need for more speed, there's one alternative.

Contact your ISP for a speed upgrade.

If, of course, it's available. If not, and if you have alternatives, see if other ISPs serving your area would be able to give you something better.

Yes, it does mean throwing more money at the problem, but the way we've come to rely on the internet and connectivity, it may be a small price to pay.

But the most important thing to realize is that a slow internet connection can look like a slow computer when in fact the computer isn't at fault at all.

8: CLUTTER

When I talk about computer clutter, I'm not talking about a [cluttered desktop](#)¹⁸ (a personal pet peeve of mine) but clutter left over from applications not cleaning up properly after themselves, or applications that can't clean up for various reasons.

If left undealt with, this type of clutter can fill up your hard disk to a point where other disk operations are impacted.

In other words, it can slow your machine down.

Leftovers: the browser cache

The type of computer clutter I'm talking about includes temporary files, leftover installation files, web-browser caches, and more. There's an entire class of "stuff" that can accumulate on your machine.

One of the best examples is the web-browser cache. In order to speed up your web-browsing experience, all modern browsers download the components of a webpage to what's called a "cache," or holding area. That way, when you browse to another page that requires the same components, they don't need to be downloaded again since they're already in the cache.

A good example is the Ask Leo! Logo on askleo.com. Regardless of how many pages you view, the image need be downloaded only once—the first time your browser encounters it.

The problem is the browser cache can develop issues over time. For an assortment of reasons, browsers can get "confused" about what's in the cache. One common debugging technique—often the first suggestion when troubleshooting a web-based problem—is to [empty the browser cache](#)¹⁹. This frees up disk space and forces the browser to rebuild the cache from scratch.

Leftovers: temporary files

Another common source of leftover files and more computer clutter is what are called "temporary" files. These are files created by running programs—

¹⁸ <https://askleo.com/12831>

¹⁹ <https://askleo.com/12274>

often setup programs—that are left behind when the program has completed its work.

Sometimes it's just sloppy programming. Sometimes something else has interfered with the delete. And sometimes there's a logical reason that such a file might be intentionally left behind. Log files that might need to be examined after the fact are one good example of the latter.

It's generally safe to remove all temporary files, but it isn't something that is done automatically for you. You might need that log file, after all.

Leftovers: intentional, but no longer needed

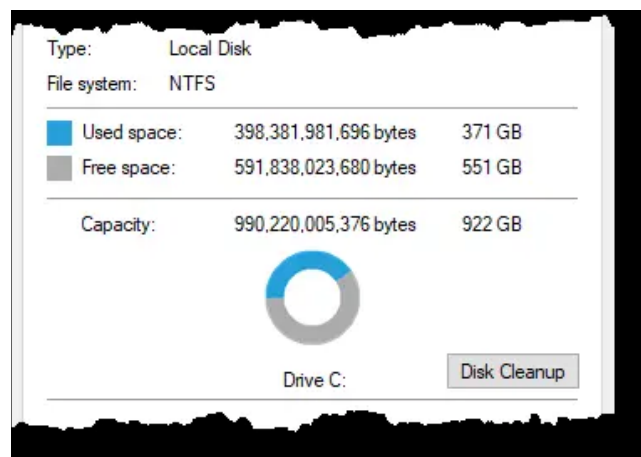
One of the biggest space hogs many people are surprised to encounter on their systems is a previously installed version of Windows.

Upgrade to Windows 10, for example, and you may find your old installation of Windows 7 in a folder called "Windows.old."

Another leftover? All the old versions of files replaced by Windows updates. They're not really computer clutter, per se. They're left around "just in case" you need to revert to them, but after some time, they're no longer needed. How long is "some time"? Well, it depends, and that's why they don't magically disappear after a while—there's no way for an automated process to know with certainty that it's safe to delete them.

Drive usage in Windows File Explorer

Particularly with today's SSDs (solid state drives), the impact of having a lot of leftover files stored on your computer isn't what it once was—but it can still add up. Particularly as your hard disk nears being full, all that clutter—be it temporary files, leftovers, or whatnot—can impact your computer's speed and even its stability.



While not high on the priority list, it is something I recommend you pay attention to periodically.

The good news is that most of it is easy to deal with.

Dealing with a cluttered disk

There are relatively simple steps and tools to clean up much of the clutter that normal usage of any computer leaves behind.

I recommend you run [Windows Disk Cleanup](#)²⁰ utility every few months. It includes tools to clean up many of the most common and easily overlooked space hogs that are safe to remove.

I recommend you also [clear your browser's cache](#)²¹ periodically. Normally this is something you'll do periodically anyway, I suspect, as you track down various browser-related problems, but even if you don't have a specific reason, I still recommend it. "Starting over"²² allows your browser to manage its disk usage better and maybe even speed up a little.

Consider using a third-party tool like [CCleaner](#)²³ for additional cleaning. Windows' own disk clean-up utility only cleans things Windows knows about. CCleaner, and other utilities like it, cleans up third-party leftovers and more.²⁴

And finally, keep an eye on your [disk space usage](#).²⁵ Dwindling disk space can be a performance issue in and of itself as well as a sign of a performance issue in some other application.

²⁰ <https://askleo.com/7949>

²¹ <https://askleo.com/12274>

²² "Starting over" is a common theme in computing. Be it "reboot" or "reformat and reinstall," starting over is a common, safe approach to problem prevention and resolution.

²³ <https://askleo.com/5033>

²⁴ I mention CCleaner with some reluctance, as of late it's a common source of PUPs. Install with caution.

²⁵ <https://askleo.com/3173>

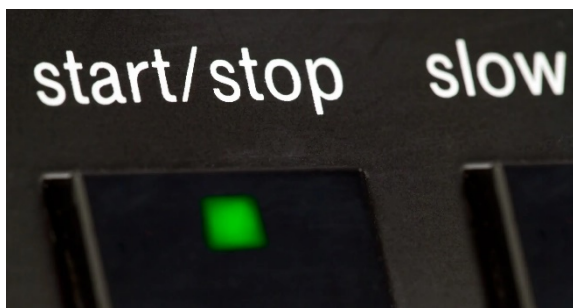
9: SLOW STARTUP

Does your computer seem like it takes forever to start? Does signing in seem to take forever?

You're not alone.

There are definitely some things to look at (besides grabbing a cup of coffee while your computer starts).

Security



The most common reason for poor performance for “awhile” after turning your computer on is security scan in progress.

Most security tools operate at two levels: so-called “continuous” protection, which attempts to monitor activity in

real time as you use your computer, and periodic scans, which scan your computer’s hard disk for malware.

By default, periodic scans typically happen once a day; the question is, when?

If you leave your computer on 24 hours a day, chances are the scans will happen in the middle of the night, when you don’t notice or care. However, if your computer is turned off overnight, the scans missed overnight may begin immediately after you turn on your computer and sign in. Depending on your security software and its settings, your system may slow to a crawl.

There are several possible solutions.

You might switch to a less intrusive scanner, or configure your security tools to be less intrusive when they scan, if that’s an option. Many tools need not impact your computer’s operation so severely while they scan. (This is one of the reason Windows 10’s built-in Windows Security, aka Windows Defender, remains [my recommendation](https://askleo.com/3517).²⁶)

²⁶ <https://askleo.com/3517>

Another option might be to configure the scans to happen at a time when your computer would be on, but not as actively used—perhaps during lunch or dinner time.

Exactly how you make these changes will depend on the specific security software you're using.

Of course you could take my approach: leave your machine on all the time and let the scans happen while you're asleep.

Backups

Backups are probably the second most common cause of prolonged performance issues after startup.

When it comes to scheduling, backup software operates much like security software. Most commonly, backups are scheduled for once a day. If the computer is off at the time of the scheduled backup, then the backup program may start the backup as soon as the machine is turned back on. Depending on the backup software, this might impact your computer's performance as you try to do other things at the same time.

The solutions here are similar: if you can, lower the priority of the backup to be less intrusive, change the scheduled time of the backup to have a lower chance of impacting your use, or just leave the machine on.

If it turns out that backups are the issue here — well, *good on you* for backing up. Regardless of when or how they happen, it's critically important that they do.

Indexing

For whatever reason, this one seems to come and go with various Windows versions and updates.

The content indexing service periodically scans your hard disk much like your security software and backup tools do. As a result, it, too, can impact your start-up performance.

This feature allows Windows' built-in search to search the *contents* of your files in addition to their names and locations. To do so, it reads all of the files and adds them to its index for faster searching.

The quick test here is to simply stop indexing your hard disks. Right-click on each in Windows File Explorer, click on **Properties** and on the **General** tab, and uncheck the option “Allow files on this drive to have contents indexed in addition to file properties.”

Unfortunately, there’s little to be done if this turns out to be the cause of your slowdown, other than to leave that checkbox unchecked and live without the content indexing feature.

Other Services

Naturally, anything present in your system’s start-up list is suspect. [Carefully review what’s there](#)²⁷ and decide whether a) they’re needed, and b) their impact on startup is lasting longer than they warrant.

Rather than guessing (which, to be honest is all we’ve done so far), another approach is to run a tool like [Process Monitor](#)²⁸ and [analyze what’s happening](#)²⁹ while your machine’s being so slow.

Armed with the results of that analysis, you should then be able to make some decisions and changes to improve your start-up experience.

I was serious about the coffee

It’s not at all uncommon for your computer to “take a little while” when you first start it. You may be able to use it pretty quickly, but depending on how it’s configured, you may see other activity continuing for some time as start-up tasks run and eventually complete in the background.

That’s one of the reasons I do, indeed, log in to my computer and then go get my cup of coffee. I could start using it right away, but it’s just more responsive if I give it a chance to complete its own morning ritual.

Even if I skip the coffee, the computer’s usable. I’m also only talking a minute or two, and definitely not half an hour. If my computer took half an hour to start up, I’d definitely be looking at the steps I’ve outlined here.

²⁷ <https://askleo.com/2633>

²⁸ <https://go.askleo.com/procmon>

²⁹ <http://ask-leo.com/C4454>

10. WHEN ONE PROGRAM IS USING ALL YOUR CPU

Sometimes your slow computer can be traced to exactly one program: a program that decides it has something very, *very* important to do and uses all the computer's processing power to do it.

The good news is, it's pretty easy to find out which program that might be.

Multitasking is a lie

All evidence to the contrary, computers can only do one thing at a time.

More precisely, each computer's core can only do one thing at a time. A dual-core machine can do exactly and only two things at a time, a quad-core can do four, and so on.

Be it one core or dozens, to you and me it looks like one computer doing several things at once — many more things than it has cores.

The magic is that the computer is constantly switching back and forth between all those things so quickly that it *looks like* they're all happening at once. They're not.

CPU hogs



When one program needs all of the CPU's attention, other programs that also need the CPU might not get enough time to do their work. Exactly how that manifests on modern multi-core machines depends on how the software was written.

If the software was written assuming a single CPU — so-called “single-threaded” software — you'll see one core of a multi-core processor fully used³⁰ while the other cores remain available for other things. You might see a solid 25% CPU

usage on a quad-core computer, for example.

³⁰ In reality, it's rare that a single core will be maxed out, but the work will be spread out among all cores as Windows shifts the program around. The net effect is that each core will show a percentage of use equivalent to a single core being 100% utilized — for example, 25% usage on a four-core machine.

On the other hand, if the software was written to utilize all available CPUs — “multi-threaded” software — it’s not uncommon for a CPU hog to fully utilize all the available CPUs.

Sometimes, it’s the right thing to do; what you’ve asked the program to do requires all available computing power.

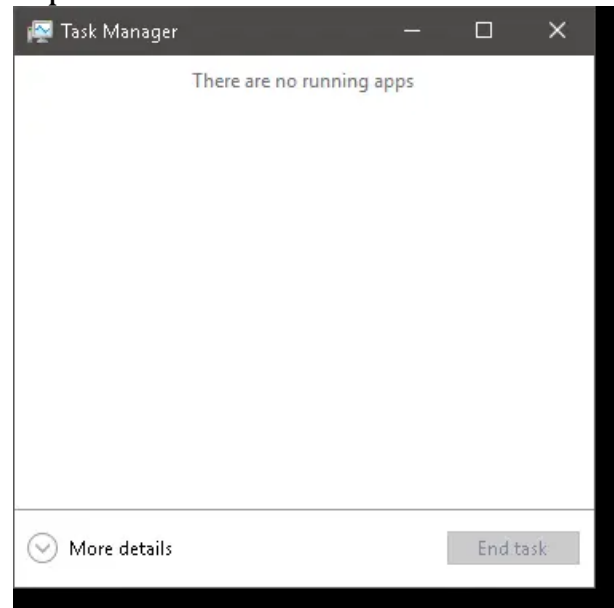
Sometimes, it’s a bug or a sign of some other problem.

Task Manager

In Windows 10,³¹ Task Manager helps us determine what program is hogging the CPU.

Right-click on the clock and click on Task Manager. The initial view may be exceptionally unhelpful.

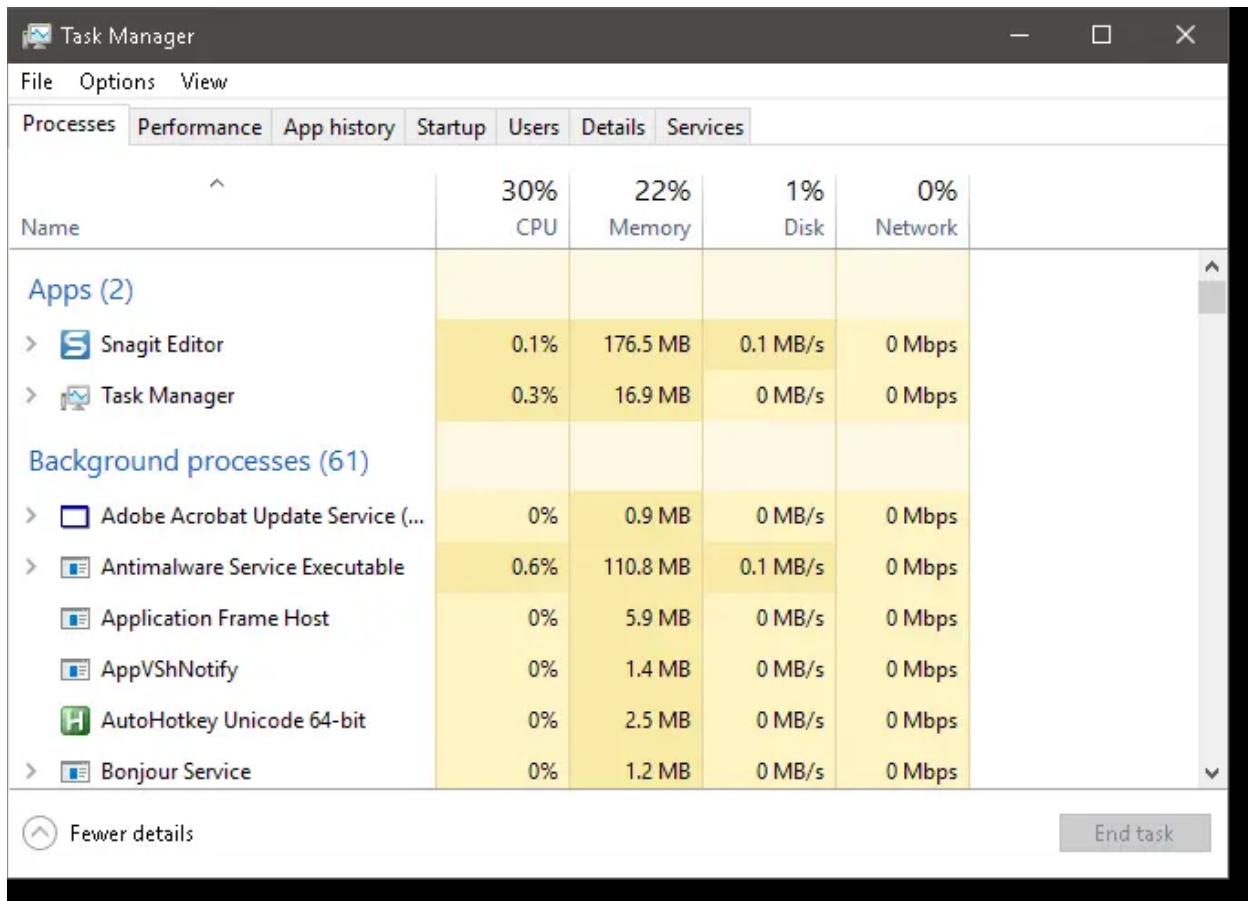
By default, Task Manager only displays those programs you’ve explicitly run.³² We want to know about everything, including the software making up Windows itself.



Click on **More details** near the bottom of the window.

³¹ For previous versions of Windows, I tend to prefer the free download Process Explorer, also from Microsoft.

³² Actually, the definition is a little weirder than that, from what I can tell.

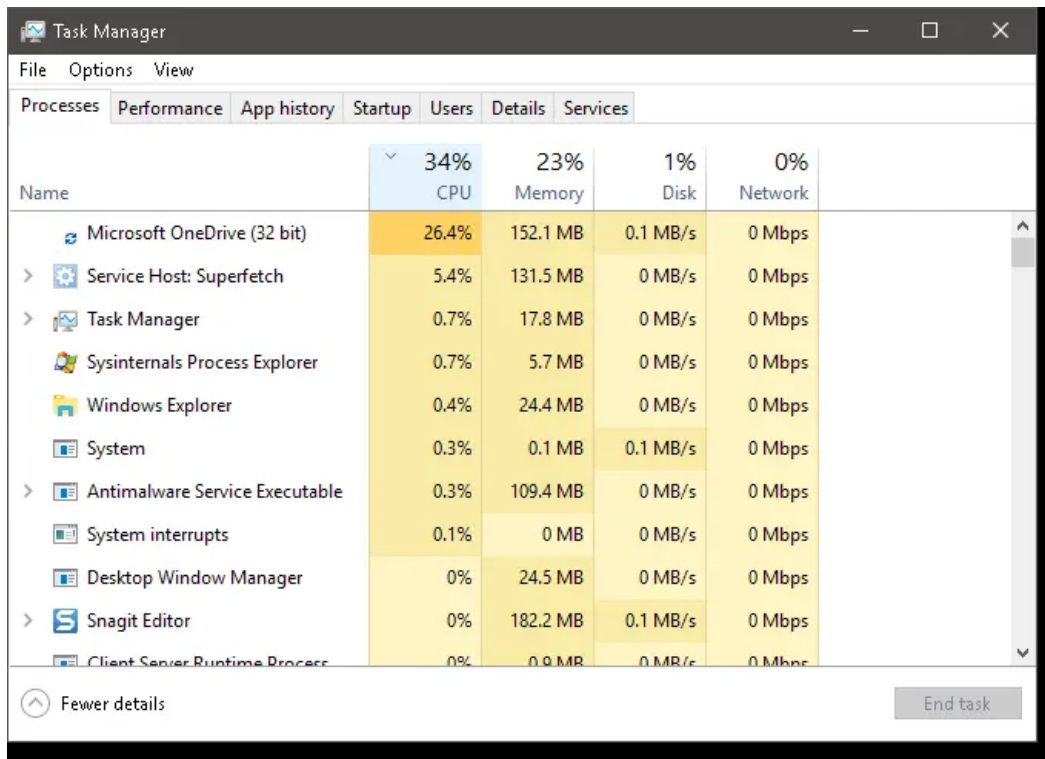


The screenshot shows the Windows Task Manager window with the 'Performance' tab selected. The window title is 'Task Manager'. The menu bar includes 'File', 'Options', and 'View'. Below the menu bar are tabs for 'Processes', 'Performance', 'App history', 'Startup', 'Users', 'Details', and 'Services'. The 'Performance' tab displays a table of system resource usage. The table has five columns: 'Name', 'CPU', 'Memory', 'Disk', and 'Network'. The 'CPU' column shows 30%, 'Memory' shows 22%, 'Disk' shows 1%, and 'Network' shows 0%. The table is divided into two sections: 'Apps (2)' and 'Background processes (61)'. The 'Apps (2)' section lists 'Snagit Editor' and 'Task Manager'. The 'Background processes (61)' section lists several services, including 'Adobe Acrobat Update Service (...)', 'Antimalware Service Executable', 'Application Frame Host', 'AppVShNotify', 'AutoHotkey Unicode 64-bit', and 'Bonjour Service'. At the bottom of the window, there is a 'Fewer details' button and an 'End task' button.

Name	CPU	Memory	Disk	Network
Apps (2)				
> Snagit Editor	0.1%	176.5 MB	0.1 MB/s	0 Mbps
> Task Manager	0.3%	16.9 MB	0 MB/s	0 Mbps
Background processes (61)				
> Adobe Acrobat Update Service (...)	0%	0.9 MB	0 MB/s	0 Mbps
> Antimalware Service Executable	0.6%	110.8 MB	0.1 MB/s	0 Mbps
Application Frame Host	0%	5.9 MB	0 MB/s	0 Mbps
AppVShNotify	0%	1.4 MB	0 MB/s	0 Mbps
AutoHotkey Unicode 64-bit	0%	2.5 MB	0 MB/s	0 Mbps
> Bonjour Service	0%	1.2 MB	0 MB/s	0 Mbps

Not only will you see many more programs listed, but you'll also see the system resources each is using.

Click on the "CPU" column header. This will sort the list of running software in order of decreasing processor usage.



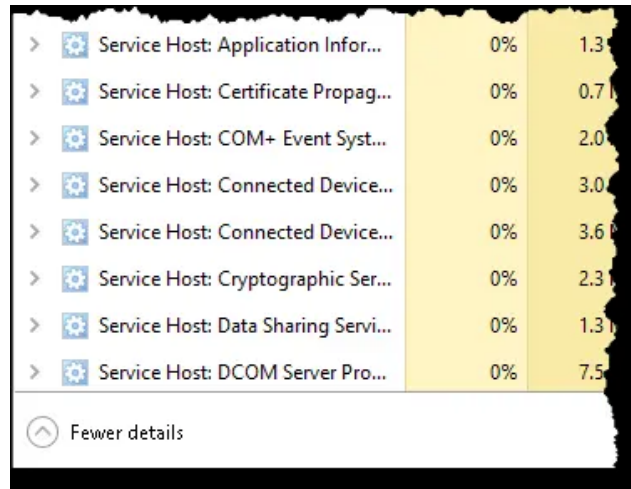
Name	CPU	Memory	Disk	Network
Microsoft OneDrive (32 bit)	26.4%	152.1 MB	0.1 MB/s	0 Mbps
Service Host: Superfetch	5.4%	131.5 MB	0 MB/s	0 Mbps
Task Manager	0.7%	17.8 MB	0 MB/s	0 Mbps
Sysinternals Process Explorer	0.7%	5.7 MB	0 MB/s	0 Mbps
Windows Explorer	0.4%	24.4 MB	0 MB/s	0 Mbps
System	0.3%	0.1 MB	0.1 MB/s	0 Mbps
Antimalware Service Executable	0.3%	109.4 MB	0 MB/s	0 Mbps
System interrupts	0.1%	0 MB	0 MB/s	0 Mbps
Desktop Window Manager	0%	24.5 MB	0 MB/s	0 Mbps
Snagit Editor	0%	182.2 MB	0.1 MB/s	0 Mbps
Client Server Runtime Process	0%	0.9 MB	0 MB/s	0 Mbps


In this example, it's OneDrive—or rather, the OneDrive service—that's the biggest current user of CPU: 26.4%. If this were a quad-core machine, I might suspect OneDrive was completely using a single CPU. Since this is a two-core machine, it's just OneDrive doing its thing, which is not uncommon, particularly after rebooting.

Svchost can be special

One of the common culprits in unexplained CPU usage is something called “Service Host,” or SVCHOST. You can see it as the #2 item in the list above.

Click on the “Name” column heading to sort the list by category and name once again, and then scroll down to Windows Processes. You'll see *many* instances of Service Host running.



>	Service Host: Application Infor...	0%	1.3
>	Service Host: Certificate Propag...	0%	0.7
>	Service Host: COM+ Event Syst...	0%	2.0
>	Service Host: Connected Device...	0%	3.0
>	Service Host: Connected Device...	0%	3.6
>	Service Host: Cryptographic Ser...	0%	2.3
>	Service Host: Data Sharing Servi...	0%	1.3
>	Service Host: DCOM Server Pro...	0%	7.5
 Fewer details			

[Service Host does many things](#),³³ as you can see, but one of the more common culprits over the years has been the Windows Update service. For a variety of reasons, it used to commonly get confused and show up as hogging a CPU. There are several approaches to [fixing Windows Update](#).³⁴

Be it Service Host, OneDrive, or something else, Windows Task Manager is a quick way identify CPU-hogging culprits.

³³ <http://ask-leo.com/C1852>

³⁴ <https://askleo.com/21798>

MORE REASONS

I couldn't limit myself. When I started researching possible causes I kept coming up with ... more causes!

So, while the previous 10 items are the 10 most common and most fixable problems 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.

Hardware Problems

People seem to fall into two camps: those who are ready to replace their entire computer because of a software (not hardware³⁵) problem, and those who fail to ever realize that hardware can, in fact, break.

Hardware fails in several different ways. Often, it's sudden, 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 fail gradually. And “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 involved.

Out-of-date System, Drivers and Applications

Often, the problems we experience are related to problems inherent in the software installed on our machines.

When a system, driver, or 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, but sometimes impacting speed—it's important to keep your system [up to date](#).³⁶

³⁵ <https://askleo.com/12197>

³⁶ <https://askleo.com/21710>

You Haven't Rebooted Lately

Much like a fragmented hard disk, things can get kind of disorganized in a computer that's been left on for a long time. 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. It's good for the machine, and resolves any speed issues that might be related.

Since I leave my computers powered on all the time, in the past I've had some machines reboot automatically once a night. Other computers—those dedicated to a few tasks—don't need to reboot as often, so I let them run until there's some reason to do so. Sometimes a Windows Update forces the issue by requiring a reboot.

Color Depth

This is less of a "problem" and more of an opportunity.

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 able to display, the more memory is required by Windows, as it manages the display, and possibly by applications attempting to display things. This added need for memory can slow things down a bit.

The most common settings are 16-, 24- or 32-bit color, representing 65,000, 16,000,000 million, or 4,000,000,000 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 some modern hardware will not support less than that. However, older hardware can often support less color depth, and it's this older hardware that may benefit from selecting a lower number, such as 16-bit color. This means the computer doesn't have to deal with as much information simply to maintain what's on the screen, which can increase your speed.

You've Never Defragged

This is significantly less of a problem than it once was, but I'll mention it anyway. It's only an issue for people running Windows prior to Windows 7,

with traditional magnetic hard drives (not SSDs). Windows 7 and later versions automatically defrag attached magnetic hard drives weekly, and defragging doesn't apply to SSDs.

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 find the next page. It's much easier and faster to have the pages already gathered 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;" Windows 7's default of once a week is fine. More often, 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 periodically.

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](#).³⁷

That's may simply be 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 is a very small chance that your existing CPU or motherboard can be replaced with one that supports a higher speed or more powerful chip.

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

³⁷ <https://askleo.com/126032>

Things that aren't reasons

There are a few things people point to as reasons they believe their computer is slowing down that aren't reasons at all.

Even worse, over the years we've seen attempts to capitalize on ignorance of how computers work to sell the digital equivalent of snake oil: solutions to speed up your computer that do nothing at all.

Registry

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

While there are circumstances in which the registry can contribute to performance issues, it's not anywhere close as common as those folks would lead you to believe.

Most of the time, ["cleaning" your registry is a waste of time](#).³⁸ Couple that with the very real risk that a registry clean can damage the information stored in the registry and 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" or other third-party RAM management tools try to second-guess Windows' own optimizations, and either do little or nothing to help, 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.

³⁸ <https://askleo.com/2710>

ENDNOTES

Afterword

I hope this book helps you get your machine operating at speeds closer to what you're expecting.

If it's helped you at all—especially if your machine has “perked up” a little after some changes you've made as a result—I consider this a success.

If you find what you believe to be an error in this book, please register your book (the details are in an upcoming section) and then visit the errata page for this book. That page will list all known errors and corrections, and give you a place to report anything you've found that isn't already listed.

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About the Author

I've been writing software in various forms since 1976. In over 18 years at Microsoft, I held both managerial and programming 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!](http://askleo.com) website (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) (askleo.com/who-is-leo)

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