Look at Anna’s Laptop

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Most performance problems are caused by one of only a few resources:

1. CPU (compute resources)
   1. This is a common cause of performance issues
   2. CPU performance can be problematic in the following ways
      1. The CPU can be old or slow
      2. There can be not enough processor cores
      3. One or more processes can require too much computing time
      4. If CPU usage is high, the CPU can get hotter, and the computer may throttle the CPU speed to make sure it doesn’t overheat
         1. This probably won’t happen more if you turn on the minimum CPU percentage we discussed. That setting just makes CPU capacity *available*. The CPU only heats up if programs are actually *using* all of the CPU.
   3. As you know, you can check for high CPU in Task Manager. The Processes tab can show if programs are using a lot of energy, which may cause the CPU to heat up. The Details and the Processes tabs can show which programs are using the most CPU. You can also see which processes are using the most CPU in the Resource Monitor.
2. Disk performance (a type of storage)
   1. This is a common cause of performance issues
   2. There are many different types of disks available, but in general, there are two extremely different kinds to consider: hard disk drives (HDDs) and solid-state drives (SSDs).
   3. HDDs have actual *disk* platters. They are entirely mechanical: each disk spins and has a magnetic read/write head that must physically move over specific parts of each disk to read and write specific data.
   4. SSDs are *called* solid-state disks for historical reasons only, but they are not disks at all. Instead, an SSD is really made from memory chips.
   5. SSDs are much faster than HDDs
      1. SSDs can read and write large files over 100x faster than HDDs
      2. SSDs can read and write small files between 150x and 500x faster than HDDs
   6. SSDs also use less power than HDDs, typically don’t get as hot as HDDs, and new SSDs tend to last longer than HDDs
   7. Disk performance can be problematic in the following ways
      1. The disk can be 100% busy
         1. This is much more likely to happen on an HDD because it takes so much longer to perform the input or output (I/O) operations
      2. I/O requests can be queued up , that is, they may not be run right away
         1. When this happens, the requested data is not read or written for a long time (from the computer’s point of view) and your program might slow down because it can’t proceed until the I/O completes
      3. I would also say that “your disk can be slow,” except that if it is, it will cause one of the two problems mentioned above.
   8. Task Manager’s Performance tab and the Resource Monitor can give you insight into how busy a disk is and whether requests are queuing.
3. Memory (another type of storage)
   1. Memory can be problematic if:
      1. it is slow; or
      2. you don’t have enough of it
   2. You can see how much memory is in use in the Performance tab of Task Manager. Click on the “Memory” label on the left and then look for the value labeled as “Available” on the right. You're probably fine if you have a decent amount of memory available. My laptop has a bunch of memory (32gb) and right now it says it has a bit over 8gb available. It’s OK if most of it is in use. This just means the laptop is trying to be ready for whatever might happen next. As long as there is maybe about 25% or more left (and I’m just guessing at that percentage), you’re good.
   3. Other than that, if *anything* runs “fast enough” on your computer, memory is probably not the driving problem. If everything is a little sluggish even when the CPU and the disk seem happy, and you have available memory, then memory your memory is slower than you want.
4. Network
   1. This is usually not a performance problem, but it can be a pain, so I’ll write some things about it anyway
   2. When this goes wrong, it is sometimes obvious.
      1. No Internet connection
      2. Cables on fire in the front yard
      3. Netflix doesn’t work
      4. All the lights are off for miles in every direction, and there’s a tree in your bedroom
   3. Sometimes it’s not that obvious. Understanding networks takes some time, so it’s good to have some way to check things out. Your Internet provider might have a diagnostic page (Mediacom does, and sometimes they can see the problem and fix it automatically – pretty cool). Here are a couple of things to try on your laptop:
      1. speedtest.net – is your connection much slower than usual?
      2. Windows has two network-related troubleshooters. My Windows 10 laptop is a little atypical because GoDaddy IT modifies our laptops and removes certain features, but I think you can find them if you click the Start Button and search for:
         1. **Find and fix network problems**. Run this, and it will launch a troubleshooter for your Internet connection. If you have trouble finding this, you can also search for **troubleshoot network** to find it.
         2. **Find and fix problems with your network adapter**. This will start a troubleshooter for your computer’s network card. If you have trouble finding this, you can also search for **troubleshoot adapter** to find it.