A LAWYER'S GUIDE FOR BUYING A DESKTOP

If you've shopped for a computer lately, you already know that it can be pretty confusing, particularly if you're looking for a Windows machine (where the options are nearly unlimited). The goal of this article is to explain what to look for, what to avoid and how to make an informed decision. I am specifically not taking sides on the Windows versus Mac debate and this article should be helpful regardless of which operating system you prefer. Further, the term "PC" as used herein refers to either a Windows or Mac computer. PC stands for personal computer which is defined as a computer designed for use by one person at a time. Although Apple's advertisements seem to declare that its computers are something other than PCs, they are not (all MacBooks and iMacs are PCs).

This article is not going to help you find the cheapest computer possible. If your PC is the primary tool you use to produce work product, then it's probably the last thing you should be cutting corners on. There are many compilations of the best "budget" desktop PCs if that's what you're looking for[1]. The following recommendations prioritize power and reliability.

PC configurations and models change constantly so there's no point in identifying a particular model and configuration to buy. Instead, I'm going to describe what I would look for in a new desktop (component-by-component) and endeavor to explain each part of the PC so you'll understand what you're buying. Here we go!

TYPE OF DESKTOP COMPUTERS SUITABLE FOR A LAWYER

You can still buy towers of every size, but many law offices are buying desktop All-In-Ones ("AIO"). An AIO simply integrates the computers case (everything that would normally be inside a tower) into the monitor. So instead of a tower, monitor, keyboard and mouse, you skip the tower. As a result, it takes up a lot less space. For example, all iMacs are AIOs.

The important thing with any desktop PC you buy is that the PC you select is targeting business users and not "gamers"[2] or home users. For example, Lenovo sells multiple lines of desktop computers. ThinkCentre and ThinkStation are aimed at business users. The IdeaCentre is aimed at home users, and the Legion line is designed for gamers.

WHY BUY A DESKTOP INSTEAD OF A LAPTOP

Laptops outsell desktops by a wide margin, but that doesn't mean there's no reason to buy a desktop. They're generally less expensive than comparably-equipped laptops, they're cheaper to repair, you can upgrade them yourself, they have more ports, you can get an optical drive included, and they can be pre-configured to support two or more monitors. My general rule is that if the person using the PC has no need to use it outside of the office, then a desktop is probably the way to go.

WHAT TO KNOW ABOUT PROCESSORS

3/5/7 DESIGNATION: In a nutshell, an Intel i7 processor is more powerful than an i5; and an i5 is more powerful than an i3. With desktops, there are also less powerful Celeron and Pentium processors although I wouldn't

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[1] See The 4 Best Budget Desktop PCs for Under $500 in 2020, by David Beren, March 19, 2020, https://www.lifewire.com/best-desktop-pcs-832103, or The Best Mini Desktop PCs, by Thorin Klosowski, March 8, 2019, https://www.nytimes.com/wirecutter/reviews/best-mini-desktop-pcs/.
[2] See http://www.dictionary.com/browse/gamer.

recommend them. Finally, there are Xeon processors which are faster than i3/i5/i7 processors. They cost a lot more and are overkill for 95% of legal applications.

GENERATIONS: Intel has released seven "generations" of the 3/5/7 processors so the current release is creatively called "10th gen." If you're buying something new and it doesn't indicate that the processor is 10th generation, make sure you ask. You can also tell what generation a processor is by looking at the first number following the 3/5/7 designation. For example, a configuration that includes an i5-6570 processor is 6th generation. The number 6 that begins the four-digit number following the i5 is the indicator that it's a 6th-generation processor. If that number was a 4, it would be 4th generation. Every generation of processors gets a little faster and adds various other benefits. For the full rundown on what the 10th generation processors provide, see the Intel press site at https://www.intel.com/content/www/us/en/products/docs/processors/core/10th-gen-processors.html.

PROCESSOR RECOMMENDATION: If you only use your PC for e-mail, Internet browsing, and light applications like word processing, an i3 would probably be fine. If you're using more taxing applications (such as desktop/server-based case management systems, document management systems, or legal accounting programs), consider a 10th-generation i5 or i7. If you have more demanding applications like photo/video editing or speech recognition, you may want to consider moving up to an i7.

GRAPHICS OR DISPLAY ADAPTER

The graphics adapter is the part of a computer which processes the images so they can be displayed on the screen or monitor. There are two basic architectural approaches for a graphics adapter: integrated and discrete. Integrated means "locating a computer's display circuitry in the chipset on the motherboard rather than on a separate plug-in card." Discrete graphics adapters are typically a separate circuit board inside the computer and are more powerful than integrated adapters. Integrated graphics adapters are typically sufficient for legal users since the applications used are not demanding from a graphics/video perspective. However, you may want to consider a discrete graphics adapter if any of the following apply to you:

- You want to connect a large external monitor (greater than 27");
- You want to connect to a high resolution monitor (4K of 3840 x 2160 pixels or 5K of 5120 x 2880 pixels);
- You want to connect to 2 or 3 monitors simultaneously;
- You need to engage in video editing; and/or
- You run graphics-intensive applications on your computer like computer-aided-design ("CAD") programs or games.

You can do all of the foregoing with integrated video, but the performance of the computer may suffer and/or the computer's fan may run fast, and therefore loud.

Having said all of that, the model of computer you choose may offer you no choice in display adapter. If it's a business computer, it may only offer integrated video. As you can see, there's not a huge price jump to get a much more powerful display adapter.

The following is an image of the discrete graphics card option for a Lenovo ThinkCentre M720 SFF:

Video Adapter	
Integrated Intel HD Graphic card	SELECTED
AMD Radeon 520 2GB DDR5 64bits (2DP) Low Profile	+ $70.00 ~~$150.00~~

On the Apple Mac side, with regard to desktop computers, the closest in starting price to the ThinkCentre above, the Mac mini, does not offer a discrete graphics option. You have to move up to the iMac, where the computer and a 21" monitor are an all-in-one unit. The model with integrated graphics starts at $1,100, while the model with discrete graphics and other niceties, including a 4K screen, starts at $1,300.

MEMORY OR RAM

For normal business usage, I would recommend 16 GB of RAM. If possible, get the memory on <u>one</u> memory chip. Most desktops have 2 or 4 memory sockets on board so if you get all of your memory on one chip, then you can easily add another one later as a an upgrade. This ability to add RAM or other components later is a nice feature of desktops that is rapidly disappearing with laptops, particularly as consumers demand thinner and lighter models.

If you're wavering on the amount of RAM to buy now, remember that it's usually an easy DIY project to upgrade your RAM later. Companies like http://www.crucial.com/ make it exceedingly easy to upgrade RAM because their website allows you to determine exactly what type of memory your computer requires and their prices are very competitive.

HARD DRIVE OPTIONS

TYPES OF DRIVES: There are 3 kinds of hard drives, mechanical (HDD - Hard Disk Drive), solid state (SSD - Solid State Drive) and hybrid (SSHD). In laptops, we strongly recommend SSDs but they're not completely necessary in desktops. Here's a good explanation of the differences between HDD and SSD:

> "The traditional spinning hard drive (HDD) is the basic nonvolatile storage on a computer. That is, it doesn't 'go away' like the data on the system memory (RAM) when you turn the system off. Hard drives are essentially metal platters with a magnetic coating. That coating stores your data, whether that data consists of weather reports, a high-definition copy of the Star Wars trilogy, or your digital music collection. A read/write head on an arm accesses the data while the platters are spinning in a hard drive enclosure.
>
> An SSD does much the same job functionally as an HDD, but instead of a magnetic coating on top of platters, the data is stored on interconnected flash memory chips that retain the data even when there's no power present. These flash memory chips differ from the flash memory in USB thumb drives in the type and speed of the memory. That's the subject of a totally separate technical treatise, but suffice it to say that the flash memory in SSDs is faster and more reliable than the flash memory in USB thumb drives. SSDs are consequently more expensive than USB thumb drives for the same capacities."[3]

It should also be noted that HDDs have a speed rating in terms of RPM. This refers to the speed with which the magnetic platters inside the drive rotate. The faster they rotate, the faster your computer can access information. You should avoid 5,400 rpm drives because they're too slow. Instead, look for a 7,200 rpm drive or faster.

A hybrid drive combines a very small SSD with an HDD in the same device. They're far less expensive than SSDs, and offer modest performance improvements. Having said all of that, if you want maximum performance, then SSD is the way to go. They cost a lot more but they can be worth it if you have a need for speed.

SIZE: For most legal users, we recommend a 256 GB or 512 GB SSD. If you store almost everything on a server, then the smaller size should be fine. If you have larger storage needs, you might be forced to go with an HDD rather than a SSD. It's easy to find 1 TB (1,000 GB) or larger HDD options in a desktop, but more difficult to find them with an SSD.

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[3] <u>SSD vs. HDD: What's the Difference?</u> by Joel Santo Domingo, PCMag, February 17, 2015. For the whole article, see http://www.pcmag.com/article2/0,2817,2404258,00.asp.

SCREEN OPTIONS

MONITOR SIZE: I recommend dual 24" monitors because they're a good deal, and they can reasonably fit on most desks. My favorite monitor is the Dell P2419H because it's high quality and will rotate to portrait. I also like a 16:9 aspect ratio. Anything wider than 4:3 is consider widescreen.

RESOLUTION: For most business applications, a monitor resolution of 1920 x 1080 is fine (and high definition). Of course, you can get higher resolutions than that. The 4K TVs you have heard of are 3840 x 2160 and they make monitors that can support that resolution as well. 5K monitors are also available, although rarer and pricier than either HD or 4k models.

TOUCH: You can buy stand-alone touch monitors and many AIOs offer it as an option. Even if you don't think you'll use it, there's no reason to avoid one of these. It's actually pretty handy when you're reading a document or scrolling down a web page.

OPERATING SYSTEM CONSIDERATIONS

WINDOWS PC: If all of your software is certified to work with Windows 10, then you should definitely go with Windows 10 Pro (not Home), 64 bit.

MAC: There are no operating system choices to make.

KEYBOARDS AND MICE

The standard options included with a new desktop are usually cheap. I think it's worth spending money on a good keyboard and mouse. Logitech and Microsoft make some great options. My favorite keyboard is an ergonomic model called the Microsoft Natural Ergonomic Keyboard 4000. My favorite mouse is the Logitech MX Master Wireless Mouse. If you just want a good keyboard and mouse combo (it's cheaper to buy them together), the Logitech MK710 wireless keyboard and mouse combo is hard to beat.

WEBCAMS

Most desktop PCs don't come with webcams. If you want to get one, my favorite is the Logitech C930e which is high def and works on a Windows or Mac PC.

WARRANTY OPTIONS

RECOMMENDED SYSTEM WARRANTY: Ideally, you want at least a 3 year, next-business day, on-site warranty with 24x7 technical support. If you think you'll be using your computer for longer, then most manufacturers will give you the option to extend your warranty to 4 or 5 years. I generally prefer to cycle out computers every 3 years so I never get a warranty beyond that. Mail-in or carry-in warranties are going to extend your downtime and likely cause you a lot of waiting and frustration. In my opinion, warranties that require me to ship my computer somewhere or take it to a store are unacceptable.

WARRANTIES FROM THE MANUFACTURER ARE BETTER: For example, if I buy a Dell desktop from Amazon.com, they don't offer Dell factory warranties for the computer. Instead, they offer third party warranties and those warranties are, in my personal experience, vastly inferior to the warranties purchased directly from Dell (like Dell's ProSupport warranties).

TECHNICAL SUPPORT: I look for North American-based support from representatives for whom English is their first language. Nothing is more frustrating than trying to explain a problem to someone you can't understand. It's worth asking the question before you buy the computer - where is the support based? If technical support is off-shore and you can't upgrade to something better, then you might want to keep looking.

SECURITY ISSUES

ANTIMALWARE AND FIREWALL SOFTWARE: At a minimum, you need antivirus software and a firewall. Broadly, antivirus software keeps malware off your computer and a firewall keeps hackers out. Windows 10 computers have

both of these things built in, but the built-in options (like Windows Defender) typically rank at the bottom of antivirus reviews. Macs do include a firewall but not an antivirus program so you definitely need to buy one. Some of the big players for Windows or Mac include Bitdefender (my favorite), McAfee, Kaspersky, Webroot and Symantec.

FINGERPRINT READER: Fingerprint (biometric) readers allow you to block unauthorized users of your computer and login quickly without entering a password. Many manufacturers include free encryption software with your system when this option is selected. This allows you to encrypt your computer so it is unusable without a valid fingerprint swipe. This added level of security is well worth the added cost.

HARD DRIVE ENCRYPTION: If you're going to have confidential client information on your desktop PC, then in my professional opinion, you need to encrypt the hard drive. This can be accomplished several ways. If you have a MacBook, it comes with an encryption program called FileVault[4]. If you have Windows 10 Pro, then you have an included encryption program called BitLocker[5]. You can also buy encryption programs for your PC like SecuriKey Pro for Windows or Mac[6]. Finally, you may have an option when configuring a new desktop to choose a self-encrypting hard drive.

BUNDLED OFFICE SUITE
If you get Microsoft Office preinstalled on your new computer, then the software license typically restricts it to being installed only once and only on the computer it came with. For that reason, more lawyers are choosing to get Microsoft Office as part of an Microsoft 365 bundle. You can transfer those installations of Office from one computer to another, you get both the Windows and Mac versions, and you can install it on up to 5 PCs that you use. For more information on this, see http://tinyurl.com/hqvke9z.

OPTICAL DRIVE/DVD
If you need one of these, many desktop PCs can be configured to include one. The same cannot be said for laptops.

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[4] See https://support.apple.com/en-us/HT204837 for more information.
[5] See A Beginner's Guide To Bitlocker, Windows' Built-In Encryption Tool by Ian Paul, August 1, 2016, PCWorld, see http://tinyurl.com/jdc6xkd.
[6] See https://www.securikey.com/.