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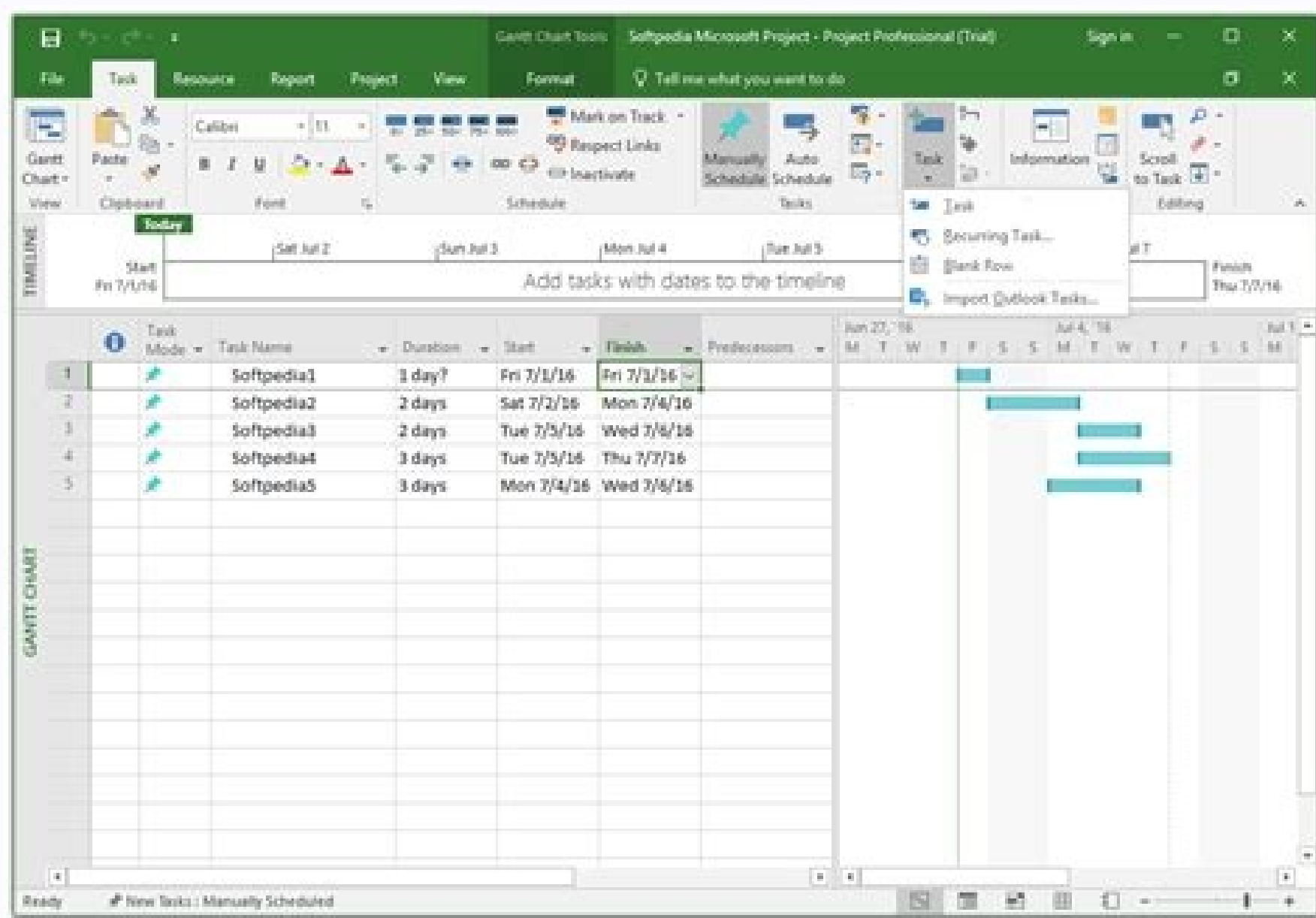
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Most new PCs have been shipping with the 64-bit version of Windows — both Windows 7 and 8 — for years now. 64-bit bit versions of Windows aren't just about taking advantage of additional memory. They're also more secure than 32-bit versions. 64-bit operating systems aren't immune to malware, but they do have more security features. Some of this also applies to 64-bit versions of other operating systems, such as Linux. Linux users will gain security advantages by switching to a 64-bit version of their Linux distribution. Address Space Layout Randomization ASLR is a security feature that causes a program's data locations to be randomly arranged in memory. Before ASLR, a program's data locations in memory could be predictable, which made attacks on a program much easier. With ASLR, an attacker has to guess the correct location in memory when trying to exploit a vulnerability in a program. An incorrect guess may result in the program crashing, so the attacker won't be able to try again. This security feature is also used on 32-bit versions of Windows and other operating systems, but it's much more powerful on 64-bit versions of Windows. A 64-bit system has a much larger address space than a 32-bit system, making ASLR that much more effective. Mandatory Driver Signing The 64-bit version of Windows enforces mandatory driver signing. All driver code on the system must have a digital signature. This includes kernel-mode devices drivers and user-mode drivers, such as printer drivers. Mandatory driver signing prevents unsigned drivers provided by malware from running on the system. Malware authors will have to somehow bypass the signing process through a boot-time rootkit or manage to sign the infected drivers with a valid certificate stolen from a legitimate driver developer. This makes it more difficult for infected drivers to run on the system. Driver signing could also be enforced on 32-bit versions of Windows, but it isn't — likely for continued compatibility with old 32-bit drivers that may not have been signed. To disable driver signing during development on 64-bit editions of Windows, you would have to attach a (per kernel-debugger or use a special startup option that doesn't persist across system reboots. Kernel Patch Protection KPP, also known as PatchGuard, is a security feature only found on 64-bit versions of Windows. PatchGuard prevents software, even drivers running in kernel-mode, from patching the Windows kernel. This has always been unsupported, but it's technically possible on 32-bit versions of Windows. Some 32-bit antivirus programs have implemented their antivirus protection measures using kernel patching. PatchGuard prevents device drivers from patching the kernel. For example, PatchGuard prevents rootkits from modifying the Windows kernel to embed themselves in the operating system. If an attempt at kernel patching is detected, Windows will immediately shut down with a blue screen or reboot. This protection could be put into place on the 32-bit version of Windows, but it hasn't been — likely for continued compatibility with legacy 32-bit software that depends on this access. Data Execution Protection DEP allows an operating system to mark certain areas of memory as "non-executable" by setting an "NX bit." Areas of memory that are supposed to hold data only will not be executable. For example, on a system without DEP, an attacker could use some sort of buffer overflow to write code into a region of an application's memory. This code could then be executed. With DEP, the attacker could write code into a region of the application's memory — but this region would be marked as not-executable and could not be executed, which would stop the attack. 64-bit operating systems have hardware-based DEP. While this is also supported on 32-bit versions of Windows if you have a modern CPU, the default settings are more stringent and DEP is always enabled for 64-bit programs, while it's disabled by default for 32-bit programs for compatibility reasons. The DEP configuration dialog in Windows is a bit misleading. As Microsoft's documentation states, DEP is always used for all 64-bit processes: "System DEP configuration settings apply only for 32-bit applications and processes when running on 32-bit or 64-bit versions of Windows. On 64-bit versions of Windows, if hardware-enforced DEP is available it is always applied to 64-bit processes and kernel memory spaces and there are no system configuration settings to disable it." WOW64 64-bit versions of Windows run 32-bit Windows software, but they do it through a compatibility layer known as WOW64 (Windows 32-bit on Windows 64-bit). This compatibility layer enforces some restrictions on these 32-bit programs, which may prevent the 64-bit version of Windows from functioning properly. 32-bit malware will also be unable to run in kernel mode — only 64-bit programs can do that on a 64-bit OS — so this may prevent some older 32-bit malware from functioning properly. For example, if you have an old audio CD with the Sony rootkit on it, it won't be capable of installing itself on a 64-bit version of Windows. 64-bit versions of Windows also drop support for old 16-bit programs. In addition to preventing ancient 16-bit viruses from executing, this will also force companies to upgrade their ancient 16-bit programs that could be vulnerable and unpatched. Given how widespread 64-bit versions of Windows now are, new malware will likely be capable of running on 64-bit Windows. However, the lack of compatibility can help protect against old malware in the wild. Unless you use creaky old 16-bit programs, ancient hardware that only offers 32-bit drivers, or a computer with a fairly old 32-bit CPU, you should be using the 64-bit version of Windows. If you're not sure which version you're using but you have a modern computer running Windows 7 or 8, you're likely using the 64-bit edition. Of course, none of these security features is foolproof, and a 64-bit version of Windows is still vulnerable to malware. However, 64-bit versions of Windows are definitely more secure. However, 64-bit versions of Windows are definitely more secure. Image Credit: William Hook on Flickr Your computer is probably running a 64-bit version of Windows. But take a look at Task Manager and you'll see that many apps on your system are still 32-bit. Is this a problem? Most modern computers—definitely those sold since around the Windows 7 days—are 64-bit capable and ship with a 64-bit version of Windows. If you're unsure about your own PC, it's easy to check whether you're running 32-bit or 64-bit Windows. There are many differences between 64-bit and 32-bit versions of Windows—enough that if your PC and apps support it, you should be running a 64-bit OS is still going to be more secure and reliable. But, what about those apps? Things get a bit trickier, there. The first thing to know is that 64-bit versions of Windows can run 32-bit apps, but 32-bit versions of Windows can't run 64-bit software. Another little wrinkle—and one that applies only to a very small number of people—is that 32-bit versions of Windows can run old 16-bit apps, but those 16-bit apps will not run on a 64-bit version of Windows. So, let's dive into that a bit more and see when it might matter to you. RELATED: How Do I Know if I'm Running 32-bit or 64-bit Windows? How to Check Which of Your Apps Are Still 32-bit RELATED: Beginner Geek: What Every Windows User Needs to Know About Using the Windows Task Manager You can use Task Manager to see which of your programs are 64-bit and which are 32-bit. To open it, right-click any open area on the taskbar, and then click "Task Manager" (or press Ctrl+Shift+Escape). On the "Processes" tab, take a look under the "Name" column. If you're using a 64-bit version of Windows 8 or 10, you'll see the text "(32-bit)" after the name of any 32-bit app. If you're using a 64-bit version of Windows 7, you'll see the text "*32" instead. In all versions, 64-bit apps have no extra text after the name. Windows also installs 32-bit and 64-bit apps into different places—or at least, tries to. 32-bit apps are usually installed to the C:\Program Files (x86)\ folder on 64-bit versions of Windows, while 64-bit programs are usually installed to the C:\Program Files\ folder. This is more of a guideline, though. There's no rule forcing 32-bit and 64-bit apps into their respective folders. For example, the Steam client is a 32-bit program, and it gets installs properly into the C:\Program Files (x86)\ folder by default. But, all games you install through Steam are installed to the C:\Program Files (x86)\Steam folder by default—even 64-bit games. If you compare your two different Program Files folders, you'll find that most of your programs are probably installed to the C:\Program Files (x86)\ folder. They're likely 32-bit programs. Is Running 32-bit Apps on 64-bit Windows a Bad Idea? RELATED: Why the 64-bit Version of Windows is More Secure On the surface, it might seem like running 32-bit apps in a 64-bit environment is bad—or less than ideal, anyway. After all, 32-bit apps aren't taking full advantage of the 64-bit architecture. And it's true. When possible, running a 64-bit version of the app provides additional security features to apps that are likely to come under attack. And 64-bit apps can access much more memory directly than the 4 GB that 32-bit apps can access. Still, these are differences that you're just not likely to notice regular apps in the real world. For example, you're not going to suffer any kind of performance penalty by running 32-bit apps. In a 64-bit version of Windows, 32-bit apps run under something named the Windows 32-bit on Windows 64-bit (WoW64) compatibility layer—a full subsystem that handles running 32-bit apps. Your 32-bit Windows programs will run about the same as they would on a 32-bit version of Windows (and in some cases, even better), so there's no downside to running these programs on a 64- bit OS. RELATED: Why the 64-bit Version of Windows is More Secure Even if every program you use is still 32-bit, you'll benefit because your operating system itself is running in 64-bit mode. The 64-bit version of Windows is more secure. But 64-bit Programs Would Be Better, Right? As we mentioned earlier, there is an advantage to running the 64-bit version of an app, if one is available. On a 64-bit version of Windows, 32-bit programs can only access 4 GB of memory each, while 64-bit programs can access much more. If a program is likely to come under attack, the additional security features applied to 64-bit programs can help. Many apps offer both 32-bit and 64-bit versions. Chrome, Photoshop, iTunes, and Microsoft Office are a few of the most popular Windows programs, and they're all available in 64-bit form. Demanding games are often 64-bit so they can use more memory. Many apps haven't made the leap, though, and most never will. You can still run most ten-year-old 32-bit Windows programs on a 64-bit version of Windows today, even if their developers haven't updated them since 64-bit versions of Windows came along. A developer that wants to provide a 64-bit version of their program has to do additional work. They have to make sure the existing code compiles and runs correctly as 64-bit software. They have to provide and support two separate versions of the program, as people running a 32-bit version of Windows can't use the 64-bit version. And in many apps, people just wouldn't notice a difference anyway. Let's take the Windows desktop version of Evernote as an example here. Even if they provided a 64-bit version of Evernote, users likely wouldn't notice a difference at all. The 32-bit program can run just fine on a 64-bit version of Windows, and there'd be no noticeable advantages with a 64-bit version. In short, if you have a choice, definitely grab the 64-bit version of your app. If you don't have a choice, get the 32-bit version and don't worry about it. Getting 64-bit Apps How you get 64-bit apps when they're available differs based on the app. Sometimes, when you go to a download page for an app, the page will detect whether you're using a 32-bit or 64-bit version of Windows and automatically direct you to the right installer. Apple iTunes works this way. Other times, you'll download a single installation app that contains both the 32-bit and 64-bit versions of the app. When you launch the installer, it will detect at that point whether you're using a 32-bit or 64-bit version of Windows and install those files. Photoshop for Windows works this way. And still other times, you'll actually get a choice on the app's download page to download the version you want. Sometimes the version will say "64-bit," sometimes it will say "x64," and sometimes both. When you see a choice like this, go ahead and download the 64-bit version. In the end, what's important isn't making sure you're running 64-bit apps—it's making sure you're running apps that work well for you. If there's a 64-bit version of an app, by all means use it. If not, using the 32-bit version is just fine. For most apps, you won't even notice the difference.

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