How-To Geek

How To Migrate Windows 7 to a Solid State Drive

If the thought of reinstalling Windows and all your favorite apps has kept you from upgrading to a Solid State Drive (SSD), we're here to help. Read on as we show you how to migrate Windows 7 to a speedy new SSD without reinstalling everything.

Why Migrate and What Do I Need?

A casual Google search will reveal that geeks across the web are deeply divided about whether or not you should copy an existing installation or start with a fresh installation of Windows. There's very little conclusive evidence that cloning your existing HDD onto an SSD causes any issues and certainly not enough evidence for you to kill an entire day (or even a weekend or longer) installing everything from scratch and tweaking all your applications and settings. Your time is valuable, far too valuable to waste redoing all your work chasing a phantom increase in performance. At the How-To Geek office we've been using the a cloned SSD for some time with no ill effect (and none of the headaches that come with wiping your system and starting from scratch). Migrating is an *enormous* time saver.

So what do you need to get started with our guide? You'll need a few things, all of which are free (save for SSD which, alas, you still won't find for less than a dollar a GB). Here are the things you'll need:

A backup of your data. We can't stress this one enough. It's completely foolish to start messing around with your HDD without a backup of all your important data. Before proceeding you need to backup your data, preferably to a location that will not be connected to the computer you're working on (a network drive, a USB drive you can unplug, etc.). Back your files up to a virtual hard drive, backup to Windows Home Server, or even get backup tips from fellow readers. While you're at it make sure you're backing up the right files from your Windows installation. Whatever you do, though, make sure your files are backed up!

A copy of Defraggler and CCleaner. We're going to do a little tidying before we clone.

A copy of Clonezilla or EaseUS Parition Manager. Read through the guide to determine which is the best fit for you.

An SSD installed in your computer case. We're not going to cover physically installing your drive; however, we have a great guide to installing a new HDD that you can use to get up to speed before continuing.

A Windows 7 system repair disk. This is a just-in-case tool. On the off chance that you're Master Boot Record gets corrupted, you'll be able to pop in the Windows 7 repair disk and fix it in a matter of minutes. Read how to create one here. Don't forget to print off a copy of our guide to repairing the bootloader so you're ready to fix it if you need to. No really. Do it. Burn that CD and print that article—having it on hand will save you the hassle of finding another computer to create the boot CD on if you need it.

Cleaning House Before the Clone
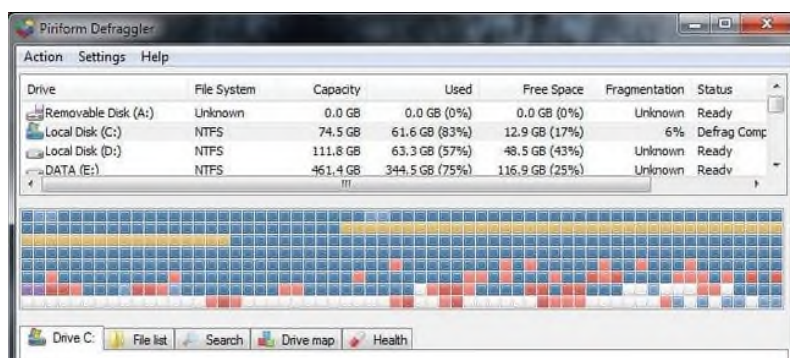
Before we start the cloning process there are several key cleaning steps we need to go through to prepare our hard drive for the migration. We've already said it, but we'll say it again. **Backup your data before proceeding.**

Par back your files. If you have a packed 200GB HDD and a new 120GB SSD, there's no physical way to fit all that data onto the new drive. You need to do some trimming. Copy big media files to a secondary drive, archive large projects just sitting around in your My

Documents folder, look to see if there are any large applications you're no longer using (games are notorious space hogs, uninstall games you're no longer interested in). If you're feeling ambitious, now would be a good time to set up symbolic links to move your My Documents folder to a secondary drive.

SSDs operate better with extra space (their wear-leveling algorithms can operate at peak efficiency with space to spare) so aim to trim your HDD contents back to about 80% of your future SDD's capacity—if you have a 120GB SSD, try to trim your HDD contents back to 90GBs or so).

Run CCleaner. After you've removed files, uninstalled apps you no longer use, and otherwise swept out data that was wasting precious disk space, it's time to run CCleaner. For the unfamiliar CCleaner is a system cleaning tool that deletes all manner of unneeded files (recycling bin files, old temp files, cache files, etc.) that clutter up your system. It's not unusual, on a heavily used system, for CCleaner to find 5GB+ to clean out.

Run Defraggler. Once you've deleted as much as possible (both manually and with CCleaner) it's time to finish tidying the disk. Defraggler, another free app from the same company that produces CCleaner, is a powerful disk defragmentation tool. We're going to give Windows one last defragmentation for the road. Once you switch to using an SSD defragmenting will be a thing of the past. None the less, we want to clone a drive with as little fragmentation as possible. Fire up Defraggler and defragment your primary disk.

Update Your Firmware

SSDs are, technologically, the new kid on the block. Several of the earliest generation SSDs had various bugs and issues which were only banished with significant firmware updates. Each drive company has their own technique for updating firmware—some require you to reboot with a special CD to flash the firmware and some allow you to flash the firmware from within Windows if the drive is not the primary OS drive. OCZ, the manufacturer of the drive we used for this tutorial, has one of the aforementioned in-Windows tools (seen in the screenshot above). Visit the the website of your drive manufacturer to read more about your drive and how to update the firmware. Now is the absolute best time to update the firmware as there is zero risk of data loss (the drive is completely bare).

Aligning The Sectors on Your SSD

At this point you should have your data backed up and you should have your files backed up, the crud cleaned out by CCleaner, and the disk defragmented by Defraggler. Now it's time to perform the most arcane part of the whole process. Traditional hard disk drives have platters inside (physical disks that spin). These hard disk platters are divided into sectors. There are no platters (or even moving parts) inside a Solid State Drive but Windows continues to use the sector-based organization, regardless.

If you install Windows 7 directly onto an SSD (instead of cloning, as we're doing) the installation program makes sure that everything is aligned properly and that the outmoded sector-based system works fine on the SSD. If you *clone* onto an SSD from a HDD, however, there is a very high probability that the alignment will be off. What this means, in practical terms, is that you will radically increase your SSD read/writes and decrease performance because of the poor alignment. You'll be wearing out and slowing down the drive, all over something as tiny as data misalignment.

Many early adopters cloned their disks and then, post cloning, found out that the alignment of their drives were off. Once you've gone to all the trouble of copying your data, the only good way to fix the alignment is to use the GParted Live CD to do so. We're going to make life way easier and cut down on the hassle and number of reboots necessary by setting up the partitions and alignment *before* we clone.

Before you continue, you need to be sure you have your SSD properly installed in your computer. If so, it's time to fire up DISKPART. To properly use DISKPART, we need to open up a command prompt in Windows 7 with elevated privileges. To do so navigate to **All Programs –> Accessories** and right click on **Command Prompt**; select **Run as administrator** (alternately you can type **cmd** in the run box and press **CTRL+SHIFT+ENTER**).

Once the prompt is open type in the following commands, in the following order. **Read the commands and the accompanying notation very carefully or you will erase the wrong disk.**

Diskpart
List disk
Select disk n (where n is your SSD's number as provided by the previous command)
Create partition primary align=1024
Active

Exit

Now your SSD is ready to rock; it's properly set up and aligned.

Cloning Your SSD
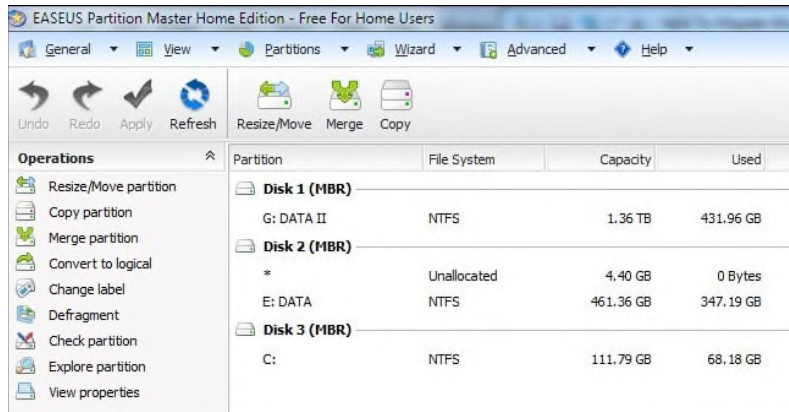
There are two easy and free techniques you can use to clone your SSD drive. When it doubt, use the second technique.

My primary partition is smaller than my SSD. If your SSD drive is bigger than the operating system partition you're cloning (i.e. you've got a 120GB SDD and you're going to clone a smaller partition onto from your current OS disk) then Clonezilla is a great open-source choice. Rather than rehash how to use Clonezilla, we'd recommend you check out our very detailed guide to using it here. Read the whole guide but pay special attention to the Local Device to Local Device cloning; that's the technique you want to use to clone your HDD partition to your SSD partition. It's as easy as rebooting with the Live CD, clicking a few items, and then waiting for a couple minutes while everything copies. No fuss.

My primary partition is bigger than my SSD. If your SSD drive is smaller than the operating system partition you're cloning, Clonezilla won't play nice (it, very strictly, will only go from bigger to smaller and has no tools for shaving down a too-large partition). In this case, since we're already working in Windows, we can use EaseUS Partition Master, a free and simple to use cloning tool—you can use this application whether you fit into either the former or latter partition situation we just outlined, by the way. Partition Master will resize partitions as necessary, the only requirement is that you have a small enough volume of data to fit onto the new SSD. So, for example, you can clone a 200GB partition with 80GB of data onto a 120GB SSD with no problem; Partition Magic will dynamically resize the partition during the cloning process.

To get started run the application and **highlight your current OS disk**. Select **Copy partition** from the left-hand navigation panel. This will launch the Partition wizard which will in turn prompt you to select which disk you want to copy your OS disk to. Select your SSD. **Double check your selection before pressing Next**. Click through until the end of the wizard until you reach the Finish button. Back in the main window click the **Apply** button in the upper left corner. Your computer will reboot and the cloning process will take place.

Once the cloning process has completed, boot down your machine and unplug your original HDD (the source of the clone). Reboot your computer (this is the point where you may need to use the Windows recovery CD if the Master Boot Record has been corrupted). On some motherboards you may need to plug the new primary drive into the exact same SATA port the old primary drive was on—we didn't, but you may.

## Booting Back Into Windows and Tweaking Your SSD

Once you are back into Windows, running off your brand new SSD of course, it's time to go through and toggle a variety of settings. When you do a fresh Windows 7 to SSD installation Windows toggles these settings for you. Ideally Windows 7 should detect the SSD and make the proper changes but we're not going to take any chances when it only takes a few minutes to check. You can re-run the "Windows Experience" program to toggle some of the settings but doing so takes just about as many clicks as checking those settings yourself.

Make sure TRIM is turned on. TRIM is a special set of commands that help SSDs effectively manage empty space on the disk (if you're curious you can read more here). Open up the command prompt and type in the following command:

fsutil behavior query DisableDeleteNotify

This lengthy command has a very simple output, either a 0 or a 1. If you get a 1, TRIM is not enabled. If you get a 0, TRIM is enabled. If you need to enable it type the following command:

fsutil behavior set DisableNotify 0
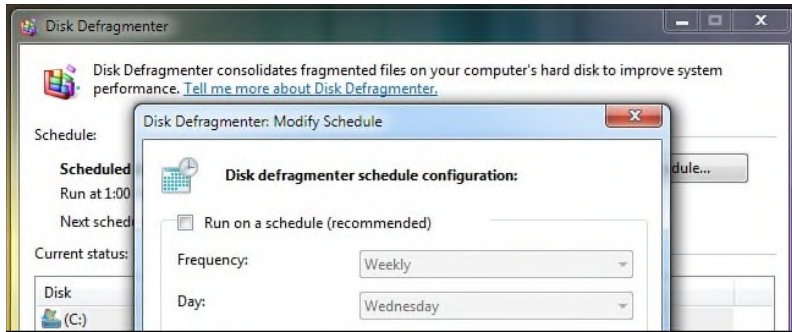
Turn off defragmentation. There is no need to defragment an SSD and doing so on a regular basis will radically shorten the life of your drive. Open the start menu and, in the run box, type **dfrgui** to open the Disk Defragmenter. Click on the **Schedule** button and then uncheck **Run on a schedule (recommended)**. Your days of running a defragmenter are over.
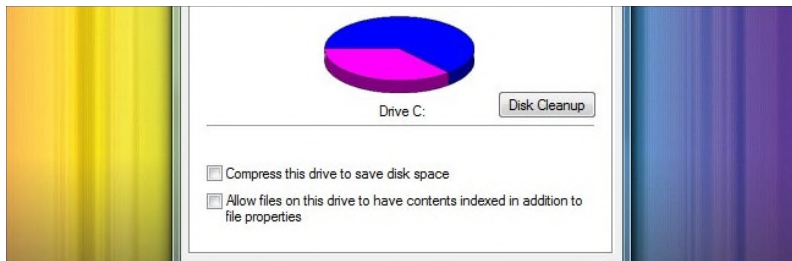
Turn off indexing. Driving indexing is a relic of the HDD age. SDD drives are so lightening fast you don't need a file index to help offset drive lag. You're wasting time and disk read/writes by leaving it on. Go to **My Computer**, right click on your new SSD drive, and uncheck **Allow files on this drive to have contexts indexed...** to turn off the indexing. This will, annoyingly, probably take a little while. Windows is going to scan the entire drive and toggle the file permissions on *all* the files. We got a cup of coffee while we waited.

A word on other SSD tweaks and tricks. Be cautious about tweaking beyond these simple fixes. Many SSD guides suggest increasing performance by turning off the Superfetch (dubious evidence that this tweak improves performance at all) or disabling the page file (decreases writes to the SSD but at a steep cost; if you run out of RAM the applications that need that RAM will crash). The tweaks we've suggested here will definitely increase performance and with no negative side effects. Proceed with caution deploying tweaks you find in other guides and in discussion forum posts. That said…

Congratulations! You've cloned your disk, saved yourself hours of reinstalling Windows and customizing your apps, and you're ready to enjoy a faster and quieter system disk.

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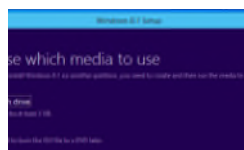
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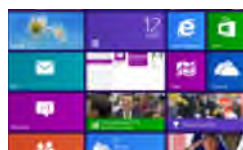
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