Sun City Summerlin Computer Club

Seminar

Upgrading Your Computer With a Solid State Drive

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Where to Find the Materials

- **Sun City Summer Computer Club Website:**
    - **http://www.scs-cc.com/smnr/Solid_State_Drives.pdf**

Seminar Agenda

- **Solid State Drive Basics**
- **Buying a Solid State Drive**
- **TRIM Support (Write performance)**
- **Basic Steps to Upgrade**
- **Upgrading a Desktop PC / Mac**
- **Upgrading a Laptop PC / Mac**
- **Wrap-up / Final Questions**

Solid State Drive Basics

- **SSDs use "Flash" (EEROM) memory chips to store data**
  - **Similar to a USB flash drive, but faster and able to do many more read/write cycles.**
  - **Once written, a block of data persists until erased.**
  - **Once a block of SSD memory has been written, it has to be *erased* before it can be used again. Erasing is relatively slow.**
  - **Data seek and transfer times on a SSD are *very* fast.**
- **Most SSDs combine the memory chips with a controller that presents a SATA III (6 G-bits/sec) controller interface to the PC.**
  - **The SSD drive can be mounted in a 2.5 inch hard drive bay.**
  - **Standard OS software can read/write the drive.**
- **SSD prices have been coming down, but are still high**
  - **"Sweet" spot is 250 G-bytes for about $80 to $90.**
  - **Pays to shop a bit for deals.**
  - **Higher speed drives cost a bit more.**

Buying a Solid State Drive (1)

- **SSD Capacities**
  - **64 GB, 120/128 GB, 250/256 GB, 500/512 GB, 1 TB.**
  - **Larger drives cost more than small (duh!).**
  - **Buy enough, but don't *over* buy – 250 GB is plenty, 500 GB is really nice.**
  - **Windows 8.1 / 10 & apps use up most of a 120 GB drive.**
  - **Ensure your C: drive has about 25% or more free space.**

- **Where to Shop**
  - **www.Amazon.com, www.Newegg.com, www.Frys.com, www.TigerDirect.com, www.Crucial.com, Google Search …**
  - **Office Depot/Max, Best Buy, Frys, Staples**

Buying a Solid State Drive (2)

- **Major SSD Brands**
  - **Samsung, Crucial, Kingston, Intel, PNY, Mushkin, SanDisk …**

TRIM Support for Performance (1)

- ## What is TRIM?
  - http://searchsolidstatestorage.techtarget.com/definition/TRIM
  - Allows the SSD controller to erase deleted data blocks in the background while other read/write activity is happening.
  - Helps keep writes to the SSD at full speed.

- **TRIM has to be supported in the SSD controller (now almost universal) and in the operating system**
  - Win 7, 8 & 10 and recent MacOS releases do.

- **TRIM also requires that the SATA drive controller be running in "AHCI" mode.**
  - This is a setting in the ROM BIOS / UEFI (varies by manufacturer).
  - Allows the OS to notify the SSD which blocks have been deleted.

Solid State Drive Upgrade

TRIM Support for Performance (2)

- **Typical screens for entering the BIOS and changing settings.**

- **You also should disable automatic defragging for a SSD. There's no performance gain, since all data access times are effectively 0.**

Basic Steps to Upgrade

- **Boot into BIOS setup to enable AHCI mode for SATA.**
- **"Clean OS install" (you will reinstall OS, apps and data):**
  - Install the SSD into your desktop or laptop.
    (You will need a mounting bracket and SATA cable.)
  - Boot from your OS setup disk or USB device.
  - Install the OS to your SSD.
  - Install whatever applications you use.
  - Migrate data from your old hard drive as needed.
- **Clone the hard drive's OS to the SSD:**
  - Place the SSD into an external enclosure or dock or a separate drive bay if in a desktop.
  - Use the vendor's or a third party cloning tool to copy your boot partition(s) from the primary hard drive to the SSD.
  - Install the SSD as above.
  - Configure your BIOS to boot from the new SSD drive.

BIO BREAK

Upgrading a PC or Mac Desktop (1)

- **Desktops usually have a free 3.5 inch drive bay and several SATA controller ports.**
  - This allows you to keep your hard drive as storage for large volumes of data and use your new SSD as the boot drive - mainly for the OS and system files.
  - Best of both worlds – high speed but also high capacity.
  - Also easier and faster to clone the hard drive's boot partitions to the SSD. You won't need a separate external enclosure or dock.
  - After you install and boot from the SSD, Windows 7/8/10 *may* require reactivation. If so, just let it go ahead. There should be no problem.
- **Mount the SSD drive in a 3.5 inch bay, using bracket and screws.**
- **Connect the SATA cable and power cable.**
- **When done, the SSD will be the C: drive; your old hard drive will usually get drive letter E:. You can change that if you wish.**

Upgrading a PC or Mac Desktop (2)

- **Additional things you may need for a desktop upgrade:**
  - SATA III data cable – get one rated for SATA III.
    Some SSD kits (more expensive) include the SATA cable.
  - 2.5" to 3.5" adapter rack. Some SSD kits include the adapter.
  - Small screws for mounting the drive and 3.5" adapter rack.
    You will need 8 in all – 4 to mount the drive in the adapter and 4 to mount the adapter in a 3.5" drive bay.
  - *Magnetized* Phillips screwdriver. Helps with putting in the small screws.
- **You will usually have to remove both side panels of your desktop tower to mount the 3.5" adapter in a bay.**
  - Don't lose or mix up those screws with the others.
  - The SATA cable must connect to the SSD and also to a SATA controller port on the motherboard.
  - The SSD's power connector must be connected to a SATA power cable from your PC's power supply.

Solid State Drive Upgrade

Upgrading a PC or Mac Desktop (3)

Desktop with hard drive and SSD installed

Solid State Drive Upgrade

Upgrading a PC or Mac Laptop (1)

- **Step by Step illustrated article:**
    - **http://www.instructables.com/id/Installing-an-SSD-in-Your-Laptop-and-Cloning-Wind/#step1**
- **Most laptops have a single drive bay and slot with SATA and power connectors. So your SSD will *replace* the laptop's hard drive.**
- **"Clean install method":**
    - **Just install the SSD in place of the HD.**
    - **Boot and run your OS setup.**
    - **Install other desired applications.**
    - **Migrate your data from the old HD.**
- **"Clone method":**
    - **Mount your SSD in an enclosure or dock.**
    - **Clone your HD to the SSD using vendor's or third party tools.**
    - **Replace the laptop's HD with the new SSD.**
    - **Boot and run.**

Solid State Drive Upgrade

Upgrading a PC or Mac Laptop (2)

- **Some newer laptops have a mini-SATA (mSATA) bay or a M.2 bay and slot. Check to see if your laptop does.**
  - If so, you have the option to *keep* your laptop's HD as a data drive and also install a mSATA SSD as the boot drive.
  - As with the desktop, this gives you both speed for the OS boot drive, but also a large capacity data hard drive.
  - A mSATA and M.2 SSD are smaller form factors - basically just a circuit card with memory chips, controller and connectors.

- **The setup procedure would most likely be as follows:**
  - Install the mSATA or M.2 SSD card into the laptop's bay.
  - Clone your C: partition from the HD to the mSATA or M.2 SSD.
  - Set up the laptop's BIOS to boot from the SSD; also set AHCI mode for TRIM.
  - Boot up from the new SSD.
  - Possibly delete some of the cloned *data* files from the C: partition, since they also exist on the HD.

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Wrap-up / Final Q and A

**Final
Questions
and
Answers**