**PC Maintenance and Repair – Hard Drives**

A hard drive functions like a record player. The disk, which stores the data, rotates and as it rotates, a head will read or write the data to the disk.

**Amount of Storage** – The amount of data storage on a hard drive is measured in bytes. The current largest hard drive stores 4 TB of data.

Thousands of bytes – (KB) kilobyte

Millions of bytes – (MB) megabyte

Billions of bytes – (GB) gigabyte

Trillions of bytes – (TB) terabyte

**RPM** – Revolutions per Minute –How fast the disk spins. The faster it spins, the faster the location to be read or written to is found and less latency occurs.

7200 rpm – Most desktop PC operate at this speed.

5400 rpm – Most laptops run at this speed. It is slower than regular desktops to preserve battery power.

10000 rpm – Western Digital produces a series of hard drives called “Raptor” that runs at an accelerate rate.

15000 rpm – Some server hard drives are designed to spin faster due to the amount of requests for data.

**Form Factor (Size)** – Hard drives come in two sizes.

**3.5”** – These are designed for desktop PCs. They fit in drive bays. Desktop PCs will usually have room for just one hard drive, but some towers have room for 2 or more.

**2.5”** – These are designed for laptops.

**Cache** - This is extra memory is used to allow the hard drive to "read ahead" and store the next data to be processed. The more cache the better. The range is 2 MB to 64 MB.

**Internal vs. External**

Internal hard drives will be located in a drive bay and provided power from the power supply. It will connect directly into the motherboard.

An external hard drive connects to the computer through two possible interfaces: eSATA or USB. An external hard drive will usually require its own power, unless it connects to an eSATAp port.

**Connection Types**

1. **IDE** – 16 bit data path – Max speed is 133 MBps It used a 40 pin ribbon cable to connect to the motherboard.
2. **USB** – USB can be used to supply both power and data. These are used for external hard drives only.
   1. USB 1.0 – 12 Mbps
   2. USB 2.0 – 480 Mbps
   3. USB 3.0 - 5 Mbps
3. **SATA** – There are five different versions of SATA
   1. SATA 1.0 – Max speed is 1.5 Gbps and 150 MBps. Internal hard drive
   2. SATA 2.0 – Max speed is 3 Gbps and 300 MBps – Internal hard drive
   3. SATA 3.0 – Max speed is 6 Gbps and 600 MBps – Internal hard drive
   4. eSATA – External SATA – External hard drive that connects through an eSATA port and must provide its own power.
   5. eSATAp – External SATA with power – This uses the same SATA port for both data and power.

**Solid State Drives (SSD)**

* Work like a Flash Drive
* Usually connects via SATA connectors.
* No moving components, less heat
* Run silently
* Less susceptible to damage

**Comparing SSDs and Traditional Hard Drives**

|  |  |  |
| --- | --- | --- |
|  | **SSD** | **Traditional** |
| **Cost** | $.45 per GB | .05 per GB |
| **Start-up Time** | Instant | Takes several seconds to "rev" up to speed |
| **Read** | Instant | Has to "spin" to proper part of the disk where data is stored |
| **Overall Speed** | Full SATA speed potential | Full SATA speed potential - latency of moving the disk  RPM helps minimize latency, but doesn't remove it |
| **Storage** | Most SSD are under 1 TB | Can be up to 4 TB |