**COMPUTER ORGANIZATION AND ARCHITECTURE**

**The Difference Between HDD and SSD**

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| **No.** | **About** | **HDD** | **SSD** |
| 1. | Stand For | Hard Disk Drive | Solid State Drive |
| 2. | Speed | HDD has higher latency, longer read/write times, and supports fewer IOPs (input output operations per second) compared to SSD. | SSD has lower latency, faster read/writes, and supports more IOPs (input output operations per second) compared to HDD. |
| 3. | Heat, Eletricity, Noise | Hard disk drives use more electricity to rotate the platters, generating heat and noise. | Since no such rotation is needed in solid state drives, they use less power and do not generate heat or noise. |
| 4. | Defragmentation | The performance of HDD drives worsens due to fragmentation; therefore, they need to be periodically defragmented. | SSD drive performance is not impacted by fragmentation. So defragmentation is not necessary. |
| 5. | Components | HDD contains moving parts - a motor-driven spindle that holds one or more flat circular disks (called platters) coated with a thin layer of magnetic material. Read-and-write heads are positioned on top of the disks; all this is encased in a metal cas | SSD has no moving parts; it is essentially a memory chip. It is interconnected, integrated circuits (ICs) with an interface connector. There are three basic components - controller, cache and capacitor. |
| 6. | Weight | HDDs are heavier than SSD drives. | SSD drives are lighter than HDD drives because they do not have the rotating disks, spindle and motor. |
| 7. | Dealing with vibration | The moving parts of HDDs make them susceptible to crashes and damage due to vibration. | SSD drives can withstand vibration up to 2000Hz, which is much more than HDD. |

**Benchmark statistics - small read/writes**

* HDDs: Small reads – 175 IOPs, Small writes – 280 IOPs
* Flash SSDs: Small reads – 1075 IOPs (6x), Small writes – 21 IOPs (0.1x)
* DRAM SSDs: Small reads – 4091 IOPs (23x), Small writes – 4184 IOPs (14x)

IOPs stand for Input/Output Operations Per Second

**Storage capacity**

Until recently, SSDs were too expensive and only available in smaller sizes. 128 GB and 256 GB laptops are common when using SSD drives while laptops with HDD internal drives are typically 500 GB to 1 TB. Some vendors including Apple offer "fusion" drives that combine 1 SSD and 1 HDD drive that work seamlessly together.

However, with 3D NAND, SSDs are likely to close the capacity gap with HDD drives by the end of 2016. In July 2015, Samsung announced it was releasing 2TB SSD drives that use Sata Connector While HDD technology is likely to cap out at about 10 TB, there is no such restriction for flash storage. In fact, in August 2015, Samsung unveiled the World’s largest hardrive, 16TB SSD drive..