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Lecture : Computer Organization and Architecture

Create a table summary to show the performance comparison between HardDisk and Solid State Drive

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| **Comparison** | **HARDDISK (HDD)** | **SOLID STATE DRIVE (SSD)** |
| Speed | HDD has higher latency, longer read/write times and supports fewer IOPs (input output operation per second) compared to SSD. | SSD has lower latency, faster read/writes, and supports more IOPs (input output operations per second) compared to HDD. |
| Heat, Electricity, Noise | Hard disk srives use more electicity 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 heator noise. |
| Defregmentation | 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. |
| 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. |
| Wight | HDDs are heavier than SSD drives | SSD drives are lighter than HDD drives because they do not have the rotating disk, spindle and motor |
| 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. |

**SSD vs HDD Reability**

1. HDD Reability :

HDD remains by far the most reliable storage device. The hard drives nowhere match the performance of solid state drives.

1. SSD Reability :

For SSD drives, the NAND flash degrades itself after many erasing/writing. We cannot assume HDD is more reliable than SDD drive. Working mechanism is different, and they both fail in a different manner. Users should note that for SSD's temperature range is smaller than hard drives. To maintain longevity and reliability, SSD should be operated in a controlled environment.

**SSD vs HDD Lifespan**

1. HDD Lifespan

The hard drives have an endurance level of 5-6 years, depending upon the usage and wear and tear.

1. SSD Lifespan

They are much more reliable in a real-time environment. Watching movies or opening files does not affect the lifespan of SDD. But it depends on how many times the SSD is used for writing the data. The lifespan of SSD drive is limited by wear on the drive and its ability to store data. New researches have enabled the SSD drives to have a long lifespan. Experts believe the SSD drives will last longer than hard drives.

HDD and SSD Data Recovery

1. HDD Data Recovery

The usage of magnetic recording to store data is what makes HDD different from SSD. For hard drives more or less the make is similar and recovery is not a complicated process. They are still susceptible to firmware corruption, electrical damage or controller failure. Hard drives on the other exhibit signs of failure, like the constant crashing of the system, clicking sound or taking time to access file & folders. Hard Drive recovery is less intricate. HDD was the primary storage device for users for many years. Various research & advancements have done to improve the quality, failure rates, etc.

1. SSD Data Recovery

SSDs don't provide indications, such as abnormal noises, that they are close to failure. It just doesn't boot. Both hard drives and SSDs can have bad sectors that lead to data loss. But for the latter, it takes an only a small percentage to make the drive inaccessible.