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HDDs and SSDs: Which is Right for Your Needs?

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In the world of electronics, digital information is what drives the operation of devices we all use on a daily basis. This information must be retained so that these systems can execute their tasks in a desired way. It is especially important in gaming and the realm of personal computers that this information be stored in a convenient location to be called upon at any moment. Therefore, we have devices known as hard disk drives (HDDs) and solid-state drives (SSDs) that are designated for this purpose. While both devices are prominent in many systems, there are key differences between the two options that are paramount to achieving the desired results from said system. I will be writing to highlight these differences and enlighten readers on where each of the two drives shine, and to describe what these devices are made of and how they operate.

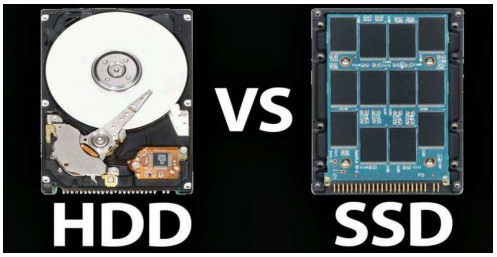

Figure 1: Introductory side-by-side

For the longest time, hard disk drives had been the default storage device for computers of all types. Like most electronics, the original versions were massive and incredibly expensive, but decreased in time and price throughout the years to what we have now. HDDs are used far less commonly today as we have just about reached the limit of downsizing and optimization for a device of that type. However, this does not mean that they are obsolete. HDDs are still much more affordable than the relatively newer solid-state drives which are rapidly advancing as the HDDs once did. SSDs use tiny memory chips to store information which allows them to compact ever further. HDDs use disks that are far larger than these conveniently sized chips. As can be seen in figure 2, HDDs take up quite a bit of space because of the mechanisms needed to make use of these disks. In addition, these chips are capable of holding absurdly large amounts of data with some even reaching 100 Terabytes. Granted, these cost thousands of dollars, but HDDs followed the exact same path during their development, so we should expect that one day this will become a trivial feat for all to enjoy.

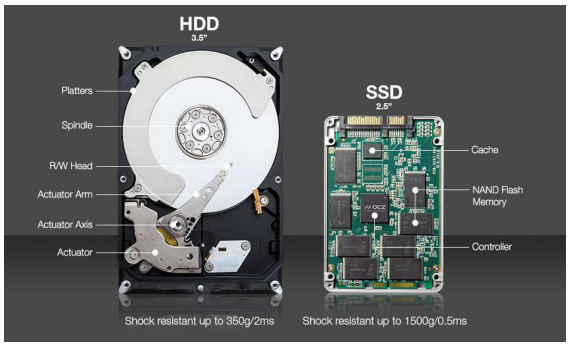

Figure 2: Highly detailed side-by-side comparison of an HDD vs. SSD

In terms of reliability, we are usually considering factors such as life expectancy, resistance to potentially harmful elements, likelihood of acting up, or failing to function properly. SSDs are superior in essentially every way to HDDs because of the lack of moving parts and mechanical components. These parts are very susceptible to breaking, wearing out over time, overheating, or freezing over due to extreme temperatures,

shattering when handled roughly or dropped to the ground, and proclivity to even just one component failing to function, rendering the entire system useless. This is a long list of issues that would terrify potential buyers if they had this information at hand.

Figure 3: An HDD that has been through some bad times

Fortunately, SSDs eliminate all of these problems as the integrated circuit design allows for a more compact, sturdy figure as well as being free from any harmful elements that would typically damage fragile mechanics. Therefore, the negation of these issues leads to SSDs having a considerably longer lifespan than HDDs. It is highly unlikely that a circuit would burn out or "break" in some way before an HDD has its disk or actuator wear out. As great as SSD reliability sounds, they are still prone to failure as they too are imperfect devices and will one day be challenged by a further advancement in technology looking to take its place.

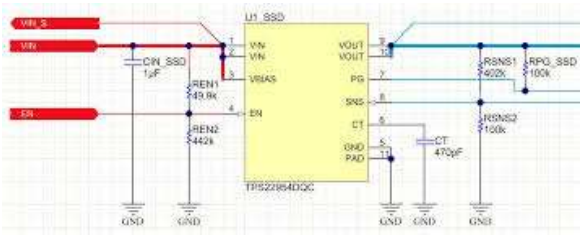

Figure 4: SSD Power Delivery Design - use of circuitry simplifies the overall design

The decision to use either drive ultimately comes down to what the user wishes to store, how much space will be required, and how fast they want to transfer data. Since SSDs are so much more expensive than HDDs, it is recommended that a person only acquires what they need and upgrade if it proves insufficient. However, people whose livelihoods rely on what's stored on their computers should most definitely invest in a powerful SSD. SSDs are almost always considered to be the superior option, but HDDs are actually pretty decent for the average gamer or PC user. Soon enough, we should have advanced to a point where the differences are irrelevant and everyone will have access to top notch storage devices.

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References

Brant, T. (2020, September 02). SSD vs. HDD: What's the Difference? Retrieved October 15, 2020, from https://www.pcmag.com/news/ssd-vs-hdd-whats-the-difference

SSD vs HDD: Which is Better for you? (n.d.). Retrieved October 15, 2020, from https://www.crucial.com/articles/about-ssd/ssd-vs-hdd

Ngo, D. (n.d.). Storage talk: Why you should get an SSD and keep your HDD, too. Retrieved October 15, 2020, from https://www.cnet.com/news/storage-talk-why-you-should-get-an-ssd-and-keep-your-hdd-too/

SSD vs. HDD Performance Overview. (2019, April 10). Retrieved October 27, 2020, from https://www.solarwindsmsp.com/blog/ssd-vs-hdd