Solid-State Drive (SSD)

An SSD is a type of non-volatile memory, meaning it maintains its memory even if the system isn't powered.

Parts of the SSD

The main components that make-up the SSD is the flash memory, which stores the data through logic gates like NOR and NAND, and the flash controller, which manages the data stored and communicates between the computer and the flash memory. Unlike the traditional logic gates, when the system isn't driven with power, they lose their capacity to hold data, meaning they are volatile, the logic gates used for SSD's are floating gate transistors (FGRs) which holds electric charge unlike that of the traditional logic gates.
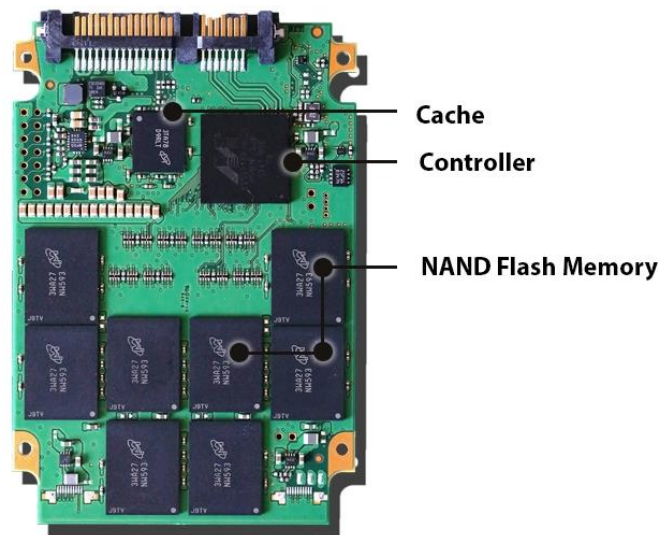
How Data is Stored in an SSD

Unlike Hard Disk Drives which stores the data into rotating disks called platter, SSD's store the data into arrays of NAND chips, which can retain their charge without being driven by a power source. These NAND Chips are made up of a floating gate transistors which hold charge when supplied power is removed.
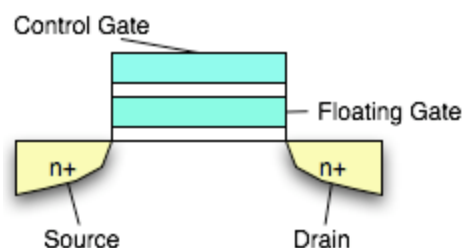
Unlike traditional MOSFETs, floating-gate transistors have an additional electrode between the gate and the semiconductor. By running high currents through the device, electrons can be forcibly

directed through the insulating layer and gets retained in the floating gate. Thus connecting to the gate and drain parts of the semiconductor, which acts like a normal MOSFET. But unlike normal MOSFETs, when the supplied power is removed, the floating gate retains its charge because it is insulated from the control gate as well as the source and drain.

Speed

The typical read and write speeds of an SSD is around 550MB/s and 520MB/s, respectively. But that depends on factors such as the size of the data being read or written, the randomness of the data being read or written, mixture of reads and writes, and other factors. But typically the speed is greater than that of the HDD.

Capacity

The capacity of an SSD is determined by how many NAND chips it contains. Which makes it more expensive per GB compared to the HDD. Typical SSD capacity can range from 120GB to 4TB.

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