SSD-SOLID STATE DRIVE

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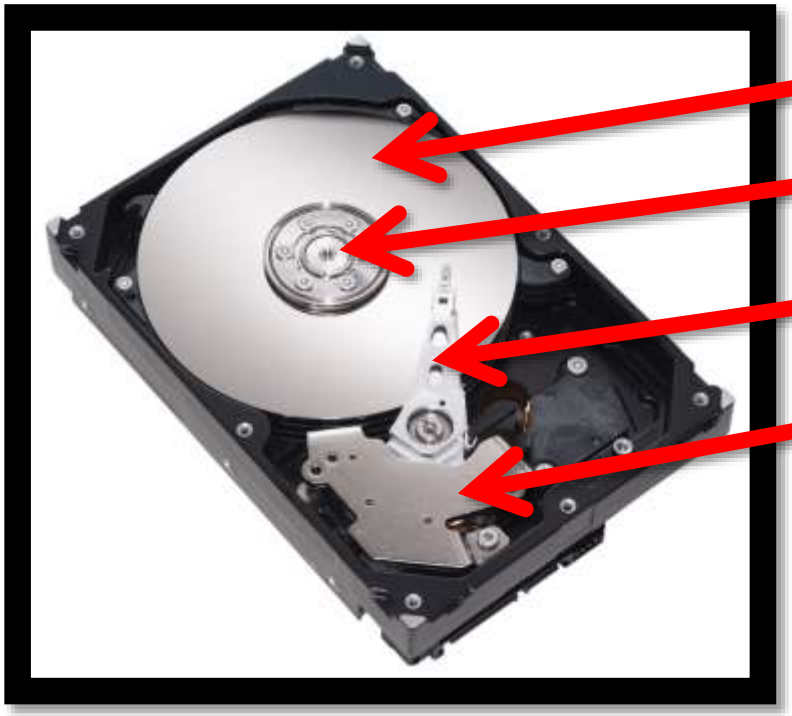
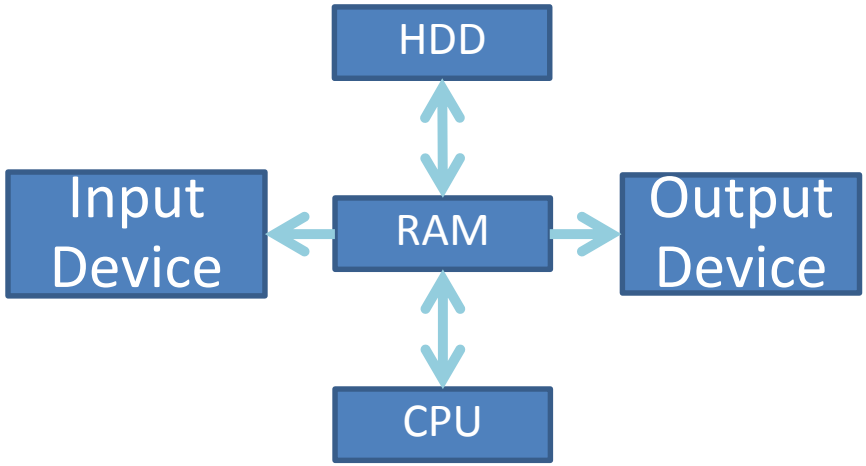
Hard Disk
what is Hard disk?





INTRODUCTION

▪ SSD Technology

- A solid-state drive (SSD) is a data storage device that uses solid-state memory to store persistent data.
- SSDs do not have any moving mechanical components, which distinguishes them from traditional magnetic disks such as HDDs or floppy disks.
- SSDs use NAND-based flash memory or DRAM to store data.

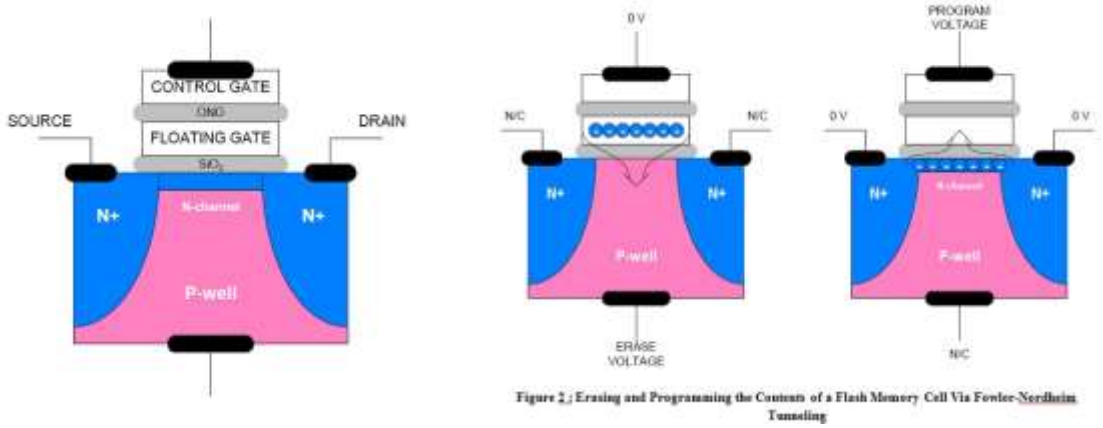


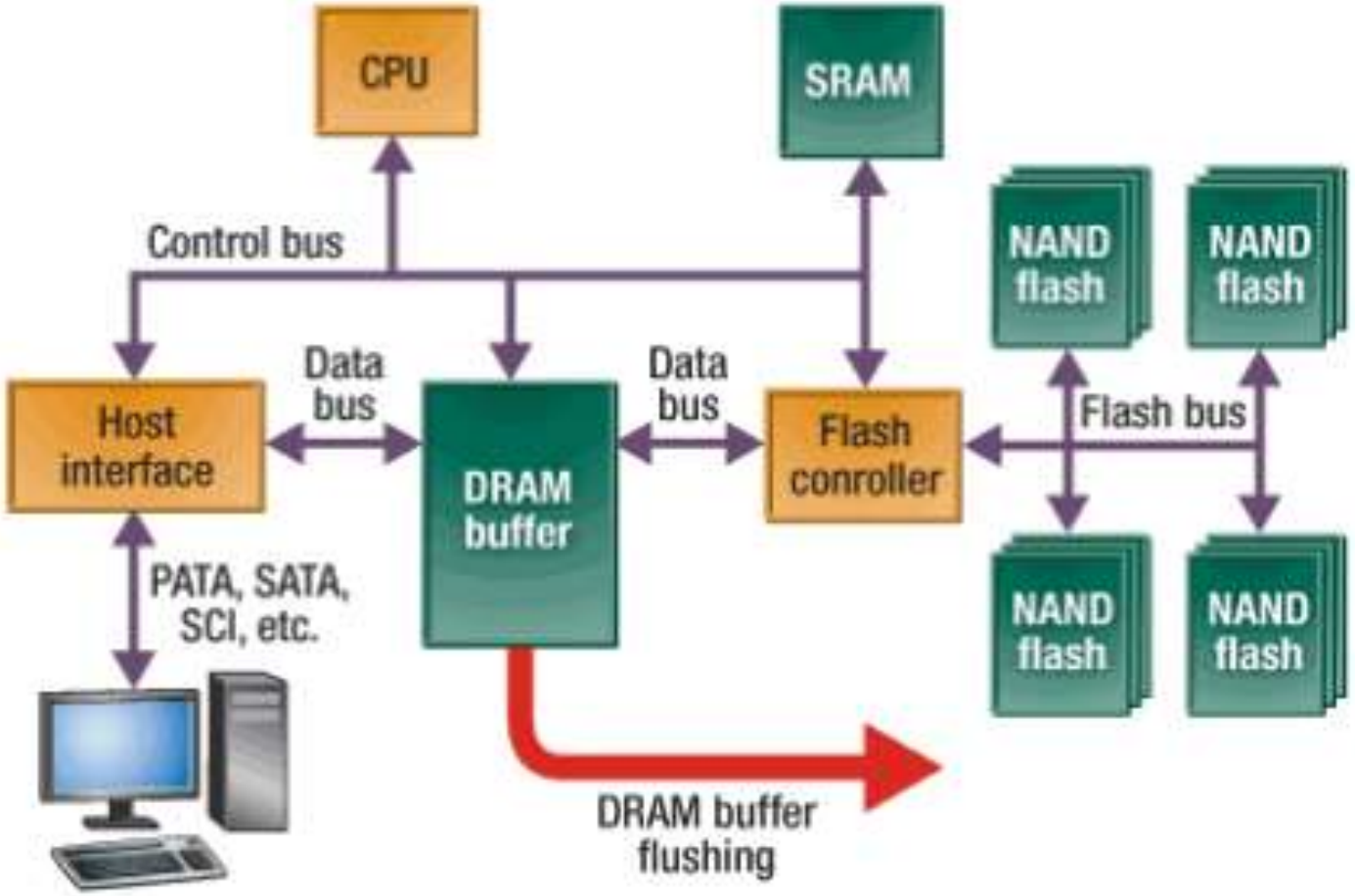
Figure 2 : Erasing and Programming the Contents of a Flash Memory Cell Via Fowler-Nordheim Tunneling

The problems with today's Hard Disks?

▪ Hard Disk Drives

- Processors have increased in speed by orders of magnitude over the years.
- But spinning hard disk drives (HDD) have not.
- Performance gap between how fast processors demand data and how quickly HDD responds.
- HDD speed lags behind processors because it is constrained by physical components.

ARCHITECTURE OF SSD



Simple block diagram of SSD architecture

Memory

Flash memory-based SSDs:

- use non-volatile NAND flash memory
- Ability to retain the data without a constant power supply
- lower cost compared to DRAM
- Flash memory SSDs are slower than DRAM solutions.

DRAM-based SSDs:

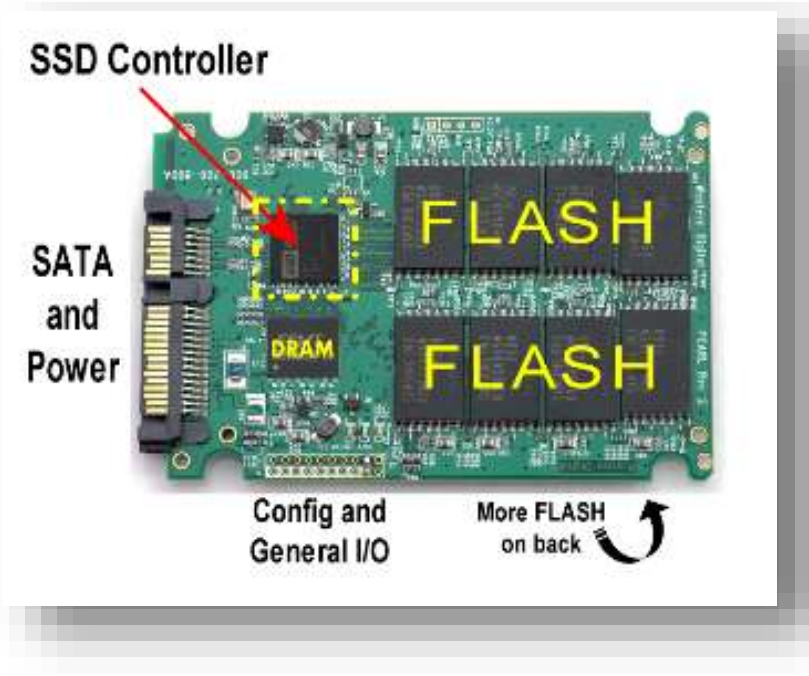
- Based on volatile memory such as DRAM
- internal battery or an external AC/DC adapter is needed to hold the data
- ultrafast data access
- primarily to accelerate applications
- Higher cost compared to NAND flash memory

CONTROLLER

- The controller is an embedded processor and executes firmware-level code.

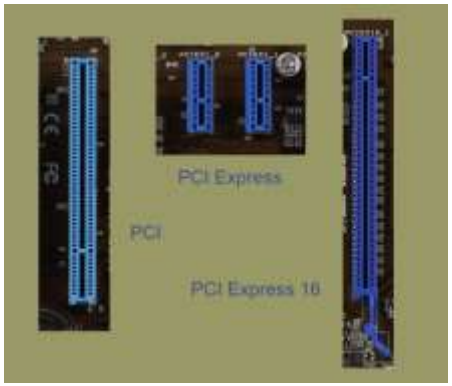
Functions:

- Error correction (ECC)
- Wear leveling
- Bad block mapping
- Read scrubbing and read disturb management
- Read and write caching
- Garbage collection
- Encryption



HOST INTERFACE

- **Serial ATA (SATA)**
- **SAS - Serial attached SCSI (generally found on servers)**
- **PCI Express**
- **USB**
- **Parallel ATA (IDE) interface (mostly replaced by SATA)**



Technical Comparison of SSD & HDD

Solid-state drive	Hard disk drive
Random access time 0.1 ms	Random access time 5~10 ms
Read latency time Very low	Read latency time high
100MB/s to 500MB/s	50MB/s to 100MB/s.
High Reliability SSDs have no moving parts to fail mechanically.	Low Reliability HDDs have moving parts and are subject to sudden failure;
small and light in weight.	relatively large and heavy
In 2013 SSDs were available in sizes up to 512GB,	In 2013 HDDs of up to 4TB were available.
power consuption 2 watts	12 watts.
As of 2013 NAND flash SSDs cost about Rs.31000 for 500GB	As of 2013 HDDs cost about Rs.3200 for 500GB drives

ADVANTAGES OF SSD

- High performance – significantly faster than a standard HDD
- Faster seek time – up to 60x faster than HDD
- Lower power – Lesser power consumption ,cooler operation
- Silent operation – ideal for post production environments
- Lighter weight – perfect for portable devices.
- Ability to endure extreme shock, high altitude, vibration and extremes of temperature.
- Immune to magnets.
- SSDs are random access by nature and can perform parallel reads on multiple sections of the drive

DISSADVANTAGES OF SSD

- They are more expensive than traditional hard drives.
- They currently offer less storage space than traditional hard drives.
- Slower Write Speed on low-end Models(MLC based types).

SSD APPLICATIONS

- Servers
- Hybrid SDD
- Desktop computers
- Laptops
- Ultrabooks
- HD Camcorders
- Smart Tv
- CCTV Digital Video Recorder (DVR)
- Set-Top Boxes
- Gaming Consoles


Thank You
intel