Introduction to Information Technology

CSC109

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Chapter 3
Computer Memory

Covers

- ✓Memory representation
- ✓Memory hierarchy
- ✓Registers, cache memory
- ✓Primary memory
- ✓RAM
- ✓ROM
- ✓Secondary memory
- ✓Access Types of Storage Devices
- ✓Magnetic Tape
- ✓Magnetic Disk
- ✓Optical Disk
- ✓Magneto-Optical disk
- ✓Using Computer Memory

3.2 Memory Representation

- Computer Memory are used to store data.
- Basic unit of memory is Binary digits or bits
- A bit ; 0 or 1
- Computer handle data in combinations of bits;
- Group of 8 bits – Byte
- Group of Bytes – Word
- One byte can store 2^8 bits, i.e., 256 different combinations of bits
- range 00000000 to 11111111

1 bit = 0 or 1

1 Byte (B) = 8 bits

1 Kilobyte (KB) =1024 bytes

1 Megabyte (MB) = 1024KB

1 Gigabyte (GB) = 1024 MB = 1024 *1024 KB

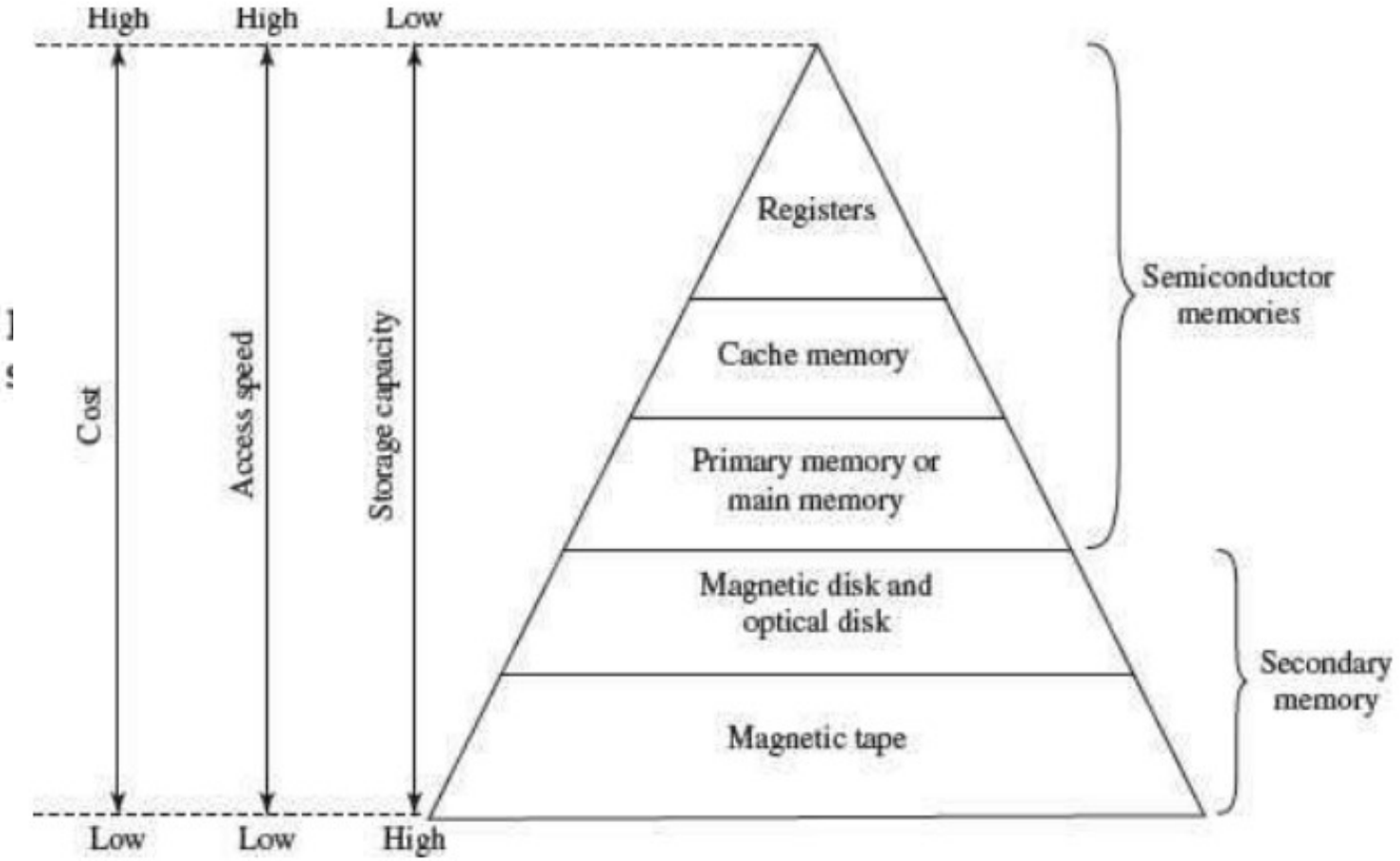
1 Terabyte (TB) = 1024 GB = 1024 * 1024 *1024 KB

3.3 Memory Hierarchy

Characterized on the basis of

- ✓ Capacity- the amount of information that the memory can store
- ✓ Access time- the interval between read/write request and the availability of data
- ✓ What we want?

3.3 Memory Hierarchy Cont..



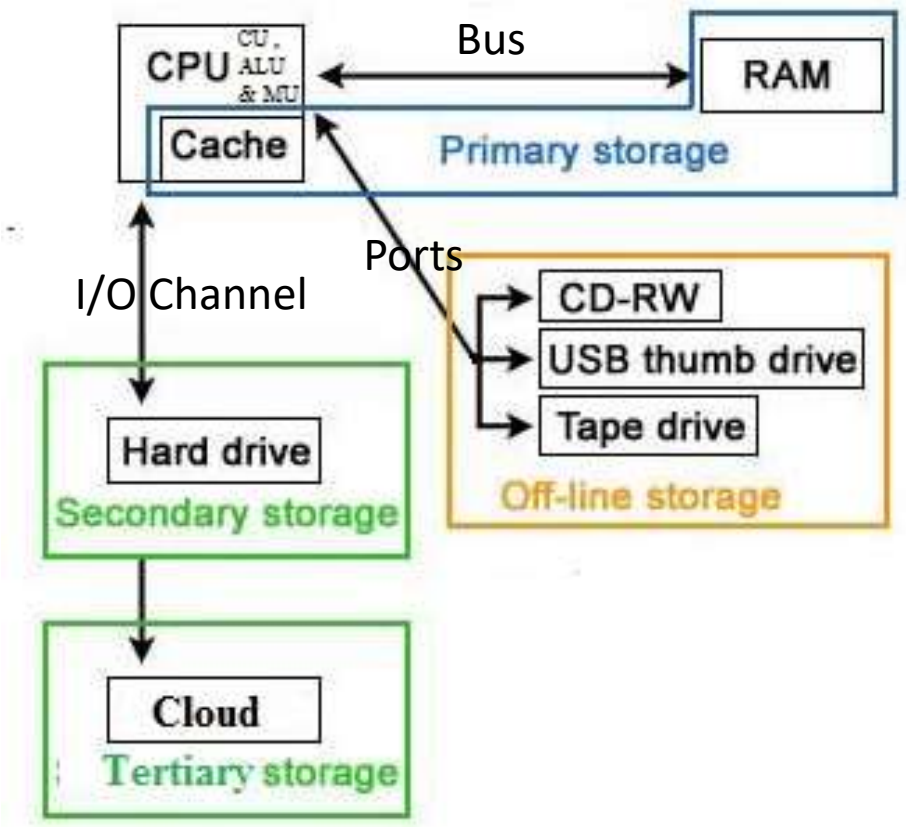
Categories

- **Internal;**

Used by CPU to perform Task

- **External/Secondary**

also called the secondary memory. store the large amount of data and the software .



Key Features

Internal/Primary/Main Memory

(1) limited storage capacity,

(2) temporary storage,

(3) fast access, and

(4) high cost.

Registers, cache memory, and primary memory

RAM Support

- 32 or 64 bit CPU (OS)
- RAM limit of operating system
- RAM limit of motherboard

Windows 8 64 bit Enterprise	512GB
Windows 8 64 bit Pro	512GB
Windows 8 64 bit	128GB
Windows 8 32 bit	4GB
Windows 7 64 bit Ultimate	192GB
Windows 7 64 bit Enterprise	192GB
Windows 7 64 bit Professional	192GB
Windows 7 64 bit Home Premium	16GB
Windows 7 64 bit Home Basic	8GB
Windows 7 32 bit (except Starter)	4GB
Windows 7 32 bit Starter	2GB
Windows Vista 64 bit Ultimate	128GB
Windows Vista 64 bit Enterprise	128GB
Windows Vista 64 bit Business	128GB
Windows Vista 64 bit Home Premium	16GB
Windows Vista 64 bit Home Basic	8GB
Windows Vista 32 bit (except Starter)	4GB
Windows Vista 32 bit Starter	1GB
Windows XP 64 bit	128GB
Windows XP 32 bit	4GB
Mac OS X 64 bit	96GB
Linux 64 bit	1TB
Linux 32 bit	4GB
Linux 32 bit (with PAE)	64GB

Key Features

External/Secondary Memory /auxiliary Storage

(1) very high storage capacity

(2) permanent storage (non-volatile)

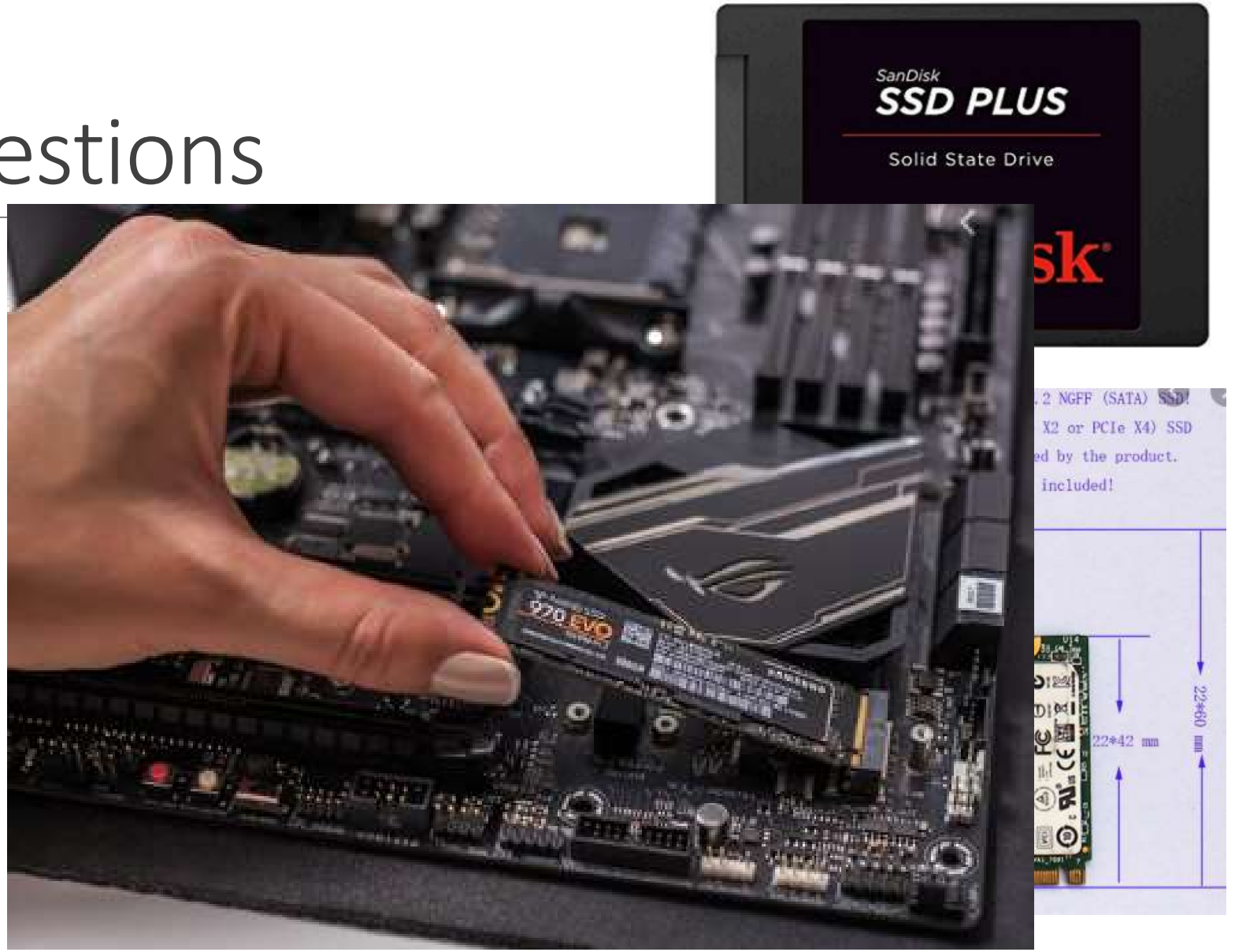
(3) slower access

(4) stores data and instructions that are not currently being used by CPU but may be required later for processing

(5) cheapest

Consist of two parts—drive and device

Questions


SanDisk
SSD PLUS
Solid State Drive
970 EVO
2 NGFF (SATA) SSD
X2 or PCIe X4) SSD
ed by the product.
included!
22*42 mm
22*80 mm

CPU Register

CPU Working Memory?

Number of registers in a CPU and the size of each register affect the power and speed of a CPU.

More the number of registers and bigger the size of each register (8 bits to 64 bits), the better it is.

Cache Memory

placed in between the …… and the …..
When the CPU needs an instruction or data during processing, it first looks in the cache.
cache hit/ cache miss

Cache Controller

The two main factors that affect the performance of cache are its **….**
And…….

3.6 Primary Memory