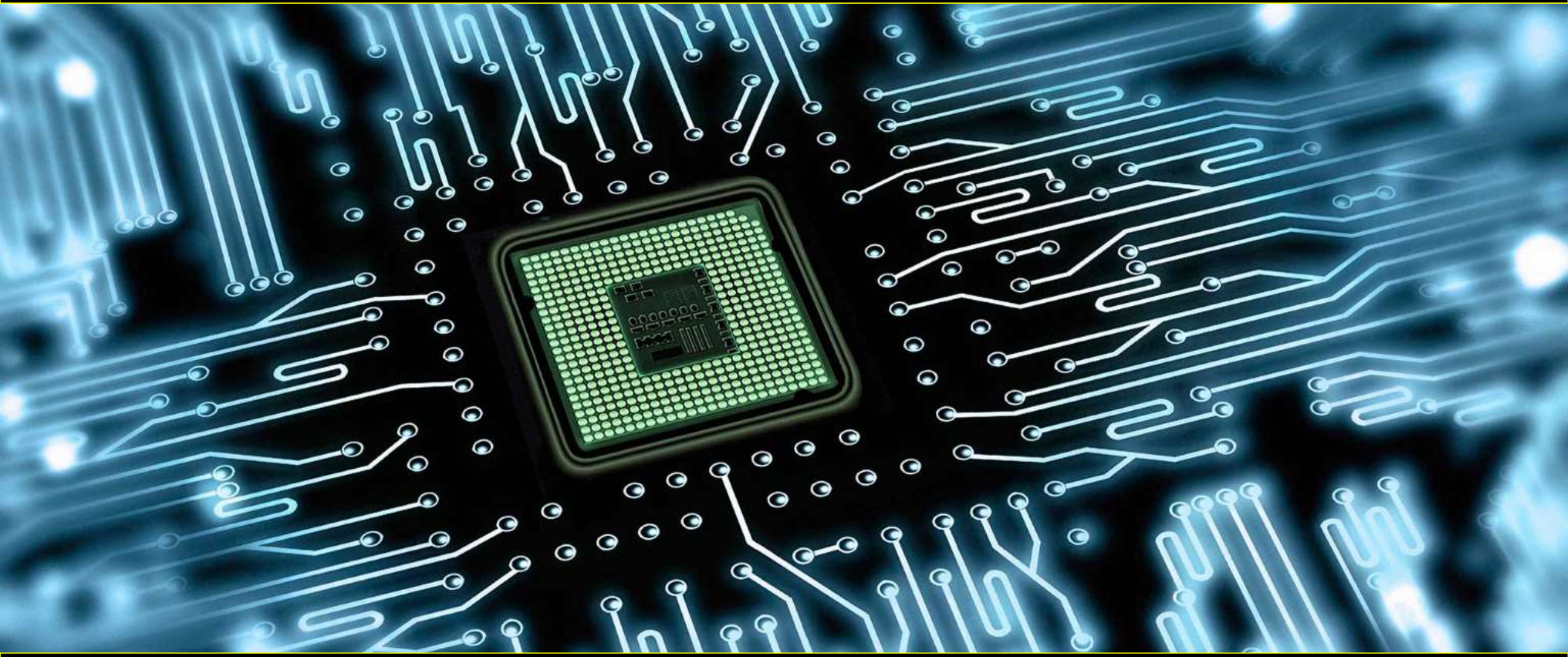
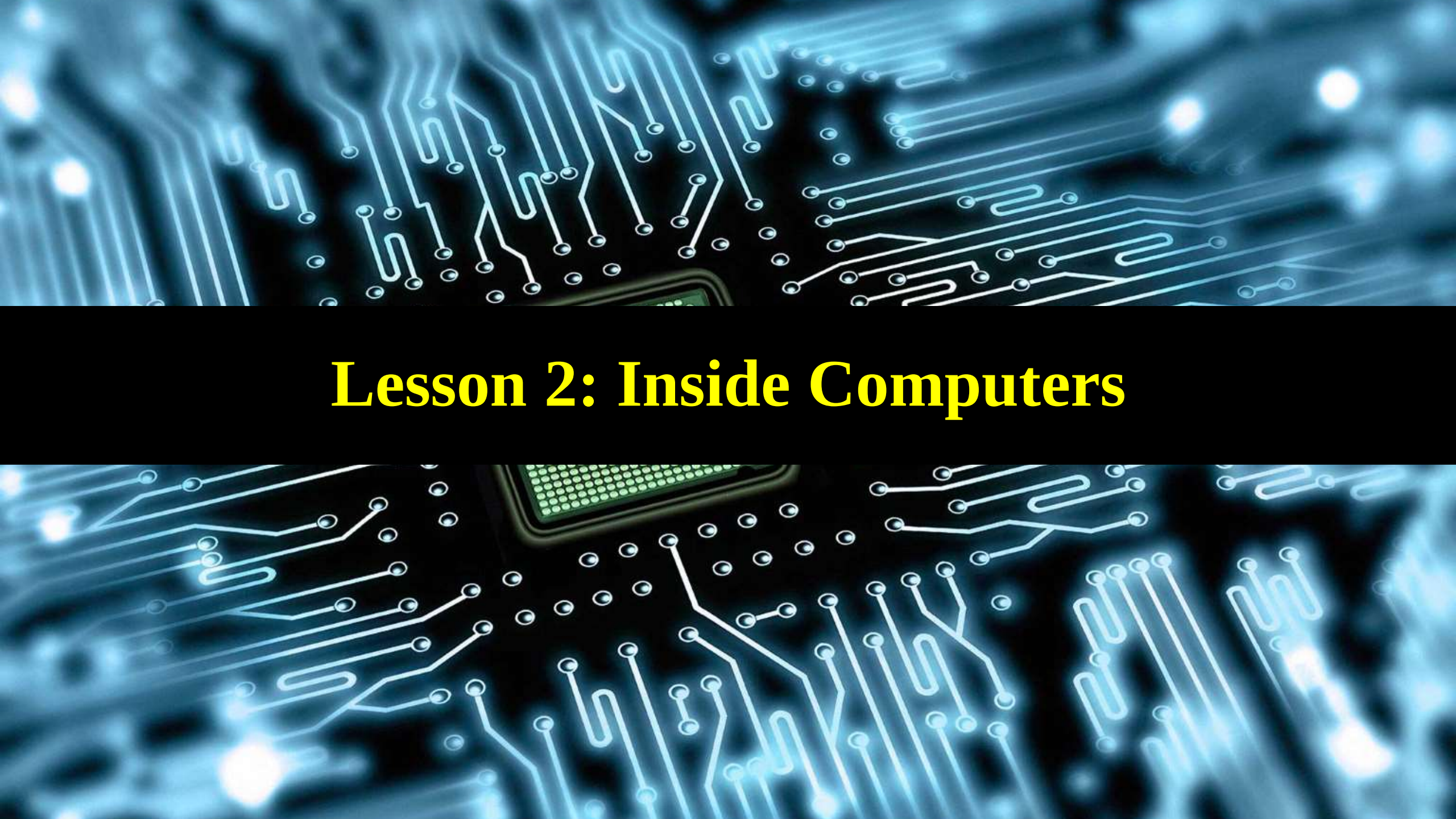
MODULE II: HARDWARE BASICS

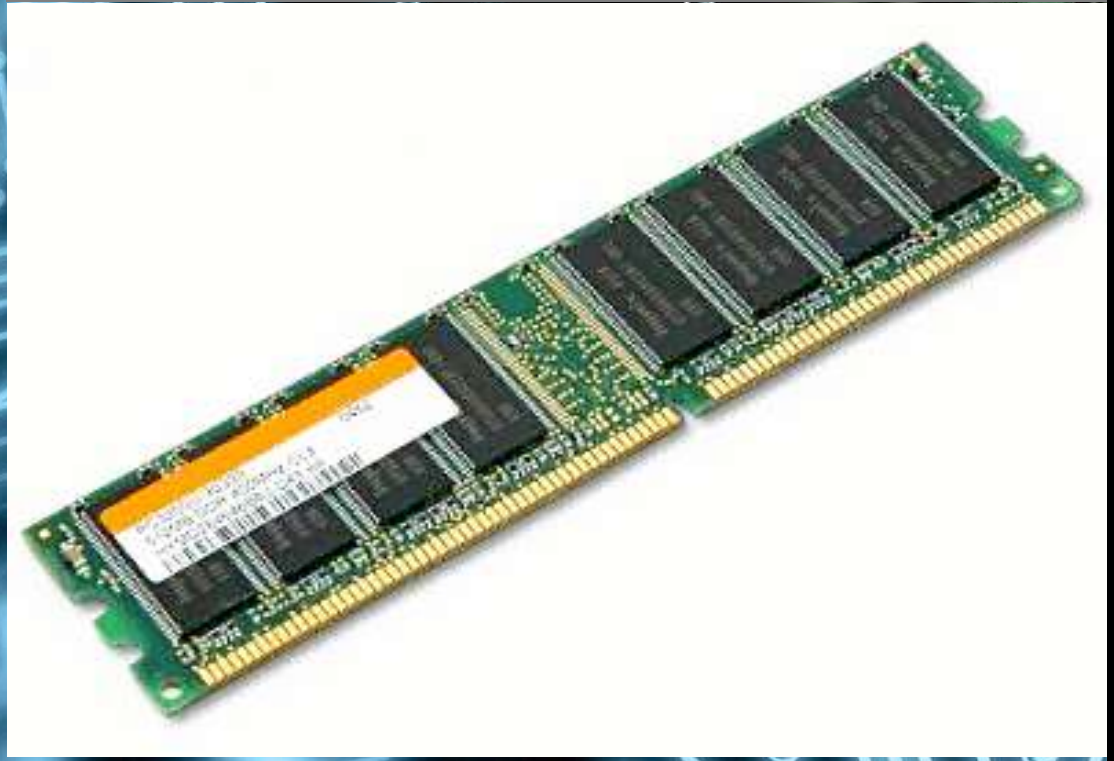




Lesson 2: Inside Computers

COMPUTER MEMORY

RAM



- "Random Access memory"
- It's a primary memory
- Read/Write memory
- Used for temporary storage of program that is running
- Data get lost when the computer turned off
- it is called volatile memory

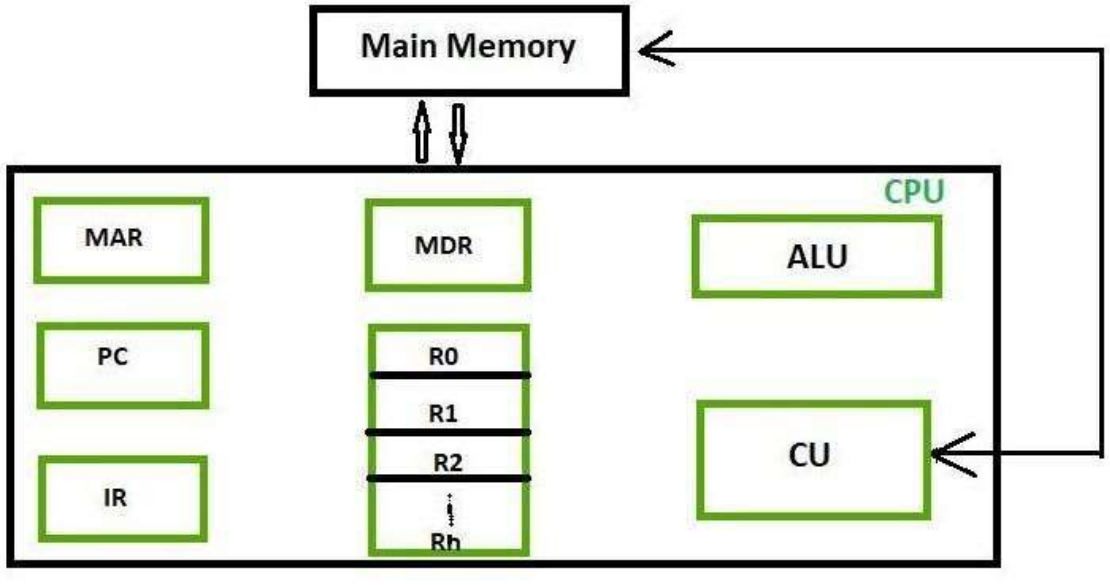
Contd…

ROM

- "Read Only memory"
- It's a primary memory
- Contains programs and information essential to operations of the computer
- Information in ROM is permanent, cannot be changed and is not lost when the power is turned off.
- It is a nonvolatile memory

Contd…

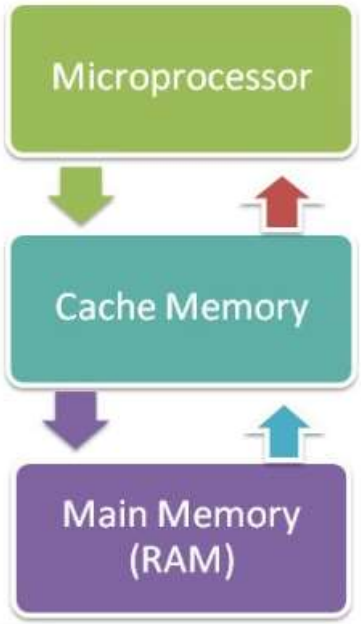
REGISTERS



- Register memory is the smallest and fastest memory in a computer.
- It is located in the CPU in the form of registers.
- A register temporarily holds frequently used data, instructions and memory address that can be quickly accessed by the CPU.

Contd…

CACHE MEMORY



- It is small in size but faster than the main memory
- The CPU can access it more quickly than the primary memory
- It holds the data and programs frequently used by the CPU
- So if the CPU finds the required data or instructions in cache memory it doesn't need to access the primary memory (RAM)
- Thus, it speeds up the system performance.

Contd…

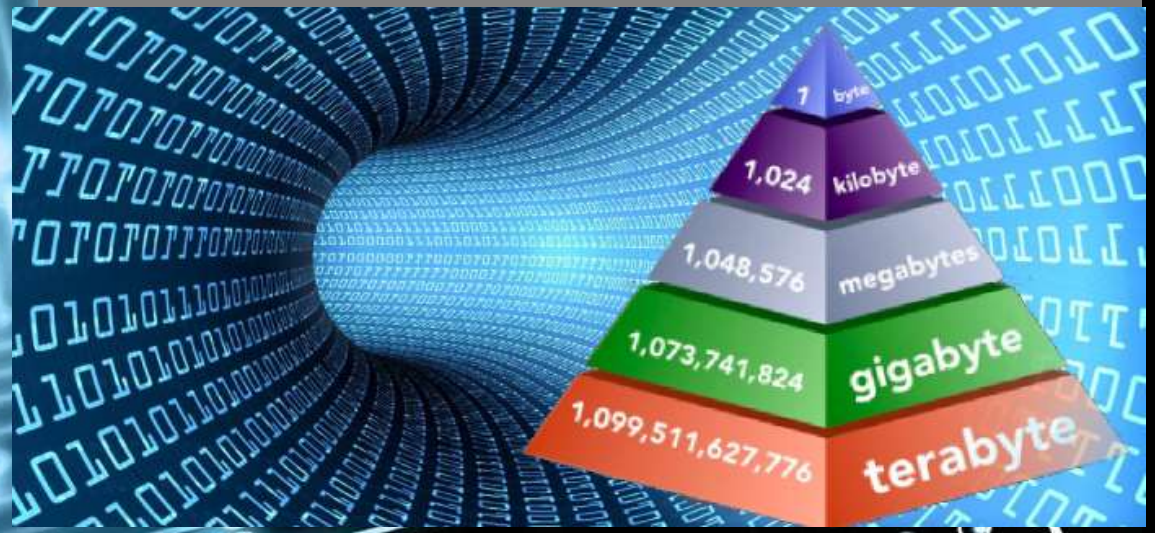
SECONDARY MEMORY

- Hard disk
- Optical Disk
- Pen drive

- The storage devices in the computer or connected to the computer are known as secondary memory of the computer
- It is non-volatile in nature so permanently stores the data even when the computer is turned off
- The CPU can't directly access the secondary memory
- First the secondary memory data is transferred to primary memory then CPU can access it

Contd…

MEMORY UNITS



- Bit: binary digit that can have the value 0 or 1.
- Byte: 8 bits
- Nibble: half a byte (4-bits)
- word: 2 bytes (16-bits)
- Kilobyte (K): 2^{10} bytes (1024 bytes)
- Megabyte(MB): 2^{20} bytes (Over 1M)
- Gigabyte (GB) : 2^{30} bytes (Over 1Billion)
- Terabyte(TB) : 2^{40} bytes (Over 1Trillion)

EXERCISES

1. How many bytes is 24 Kilobytes
2. How many nibbles are 16 bits ?
3. How many bytes are 32 bits
4. if a word is defined as 16 bits, how many words is a 64-bit data item ?
5. What is the exact value of 1 meg?

6. How many K is 1 meg ?

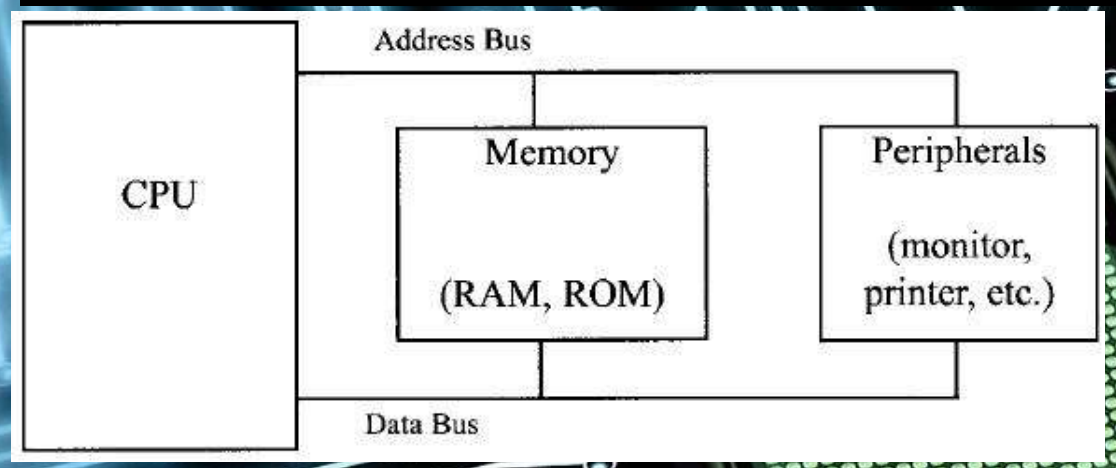
7. What is the exact value (in decimal) of 1 giga?

8. How many K is 1 giga ?

9. How many meg is 1 gigga ?

10. if a given computer has a total of 8 megabytes of memory, how many bytes (in decimal) is this ? How many kilobytes is this ?

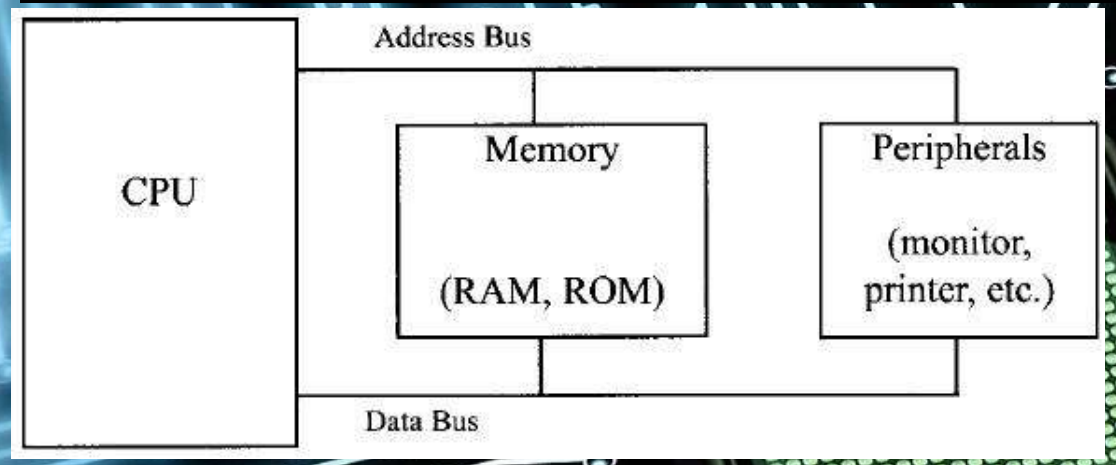
INTERNAL ORGANIZATION OF COMPUTER



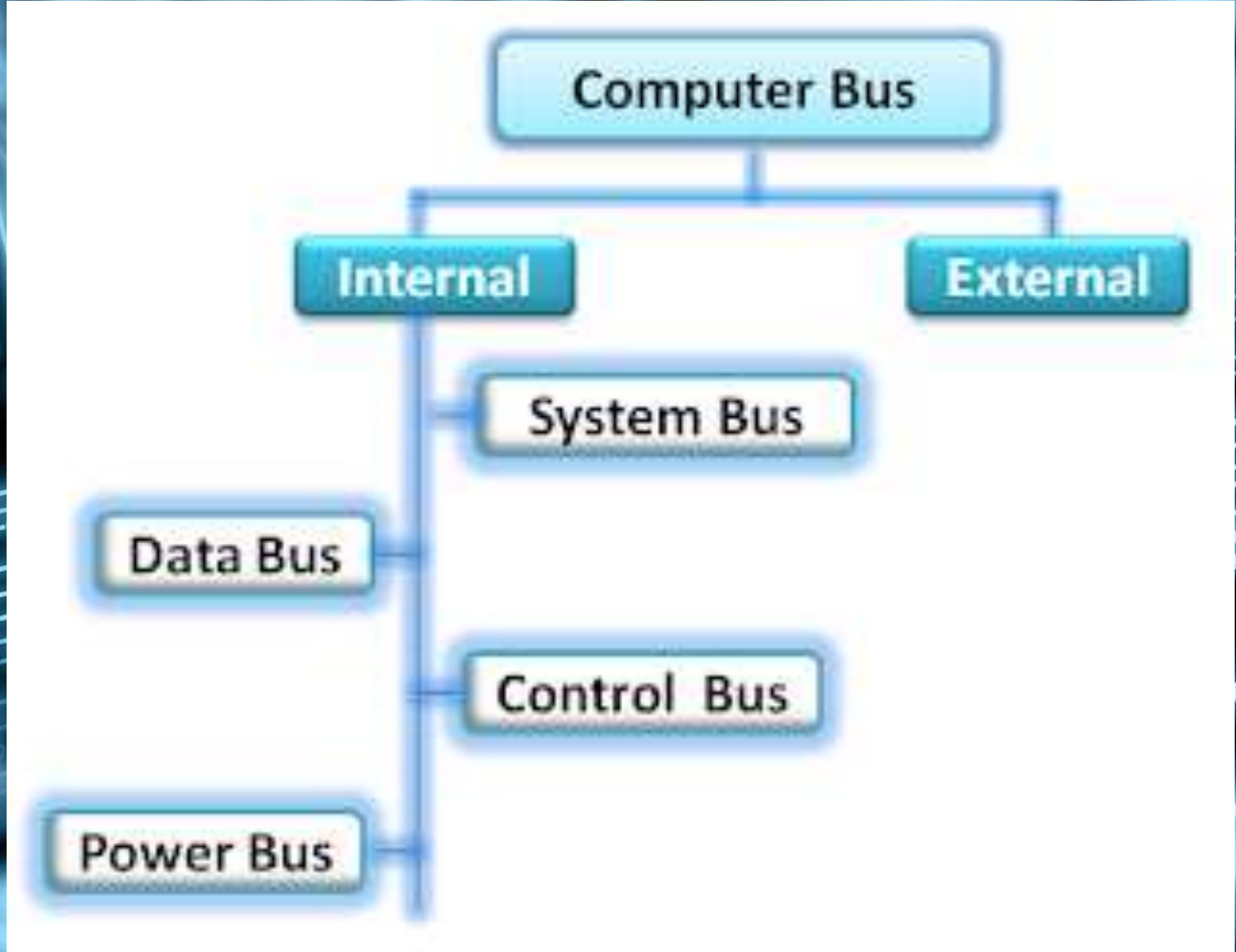
- The internal working of every computer can be broken down into 3 parts:

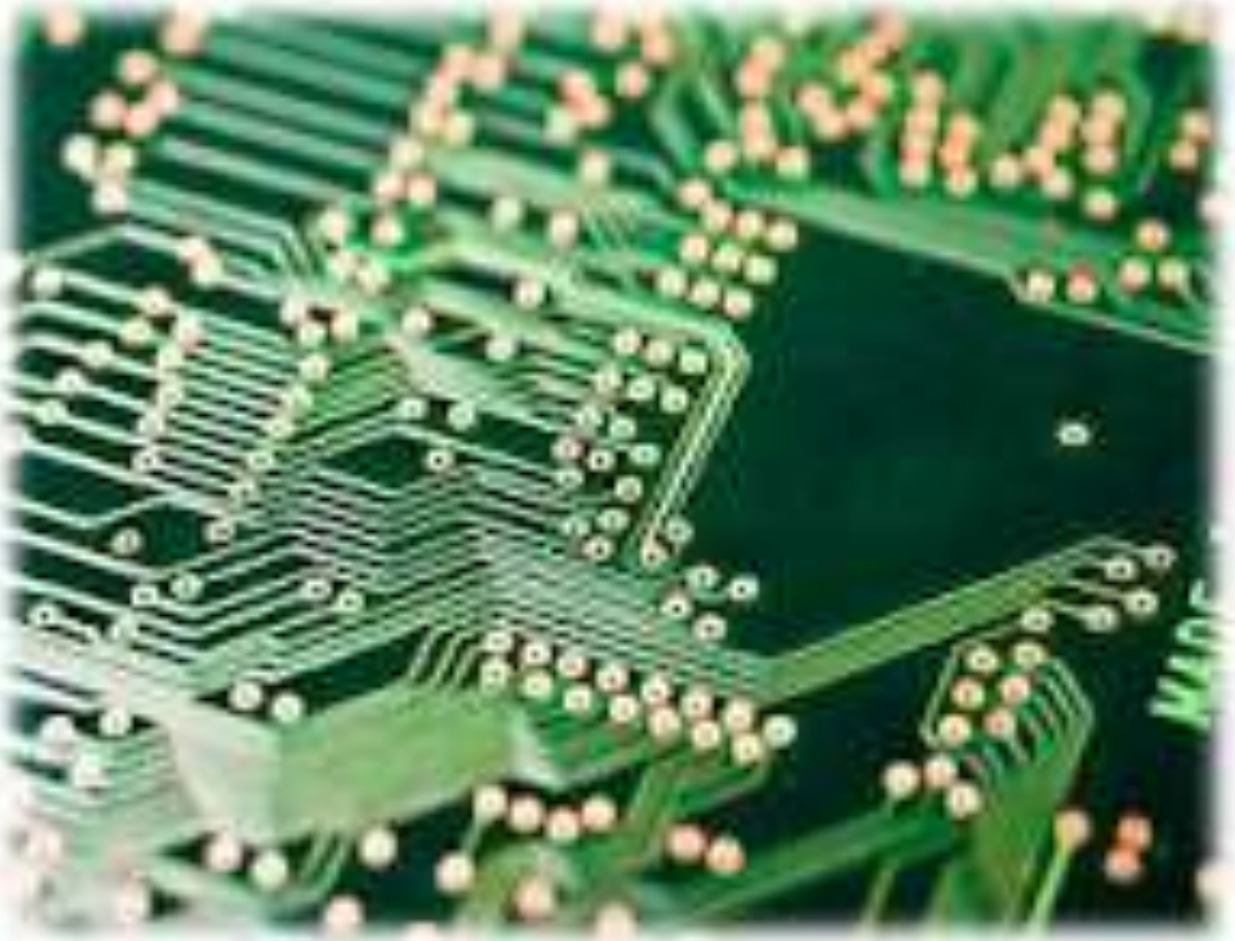
1. CPU
2. MEMORY
3. I/O (Peripherals)

Contd…



- The **CPU** execute (process)
- Information is stored in the **memory**
- **I/O devices** provides means of communicating with CPU
- The CPU is connected to memory and I/O through strips of wire called **Bus**
- The bus carries information from place to place inside a computer .


Computer Bus
Internal
External
System Bus
Data Bus
Control Bus
Power Bus



HERE YOU CAN SEE THE LINES OF GOLDEN COLOR ARE CALLED THE INTERNAL BUS.

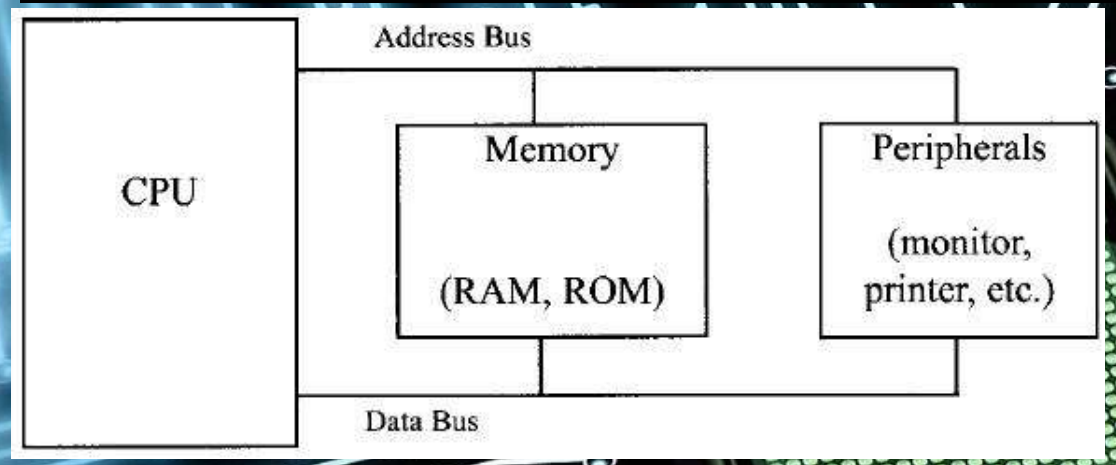
THOSE EXTERNAL BUSES ARE CONNECT BETWEEN INTERNAL BUSES AND THE INTERNAL DEVICE OF A COMPUTER SYSTEM

Internal Bus

External Bus

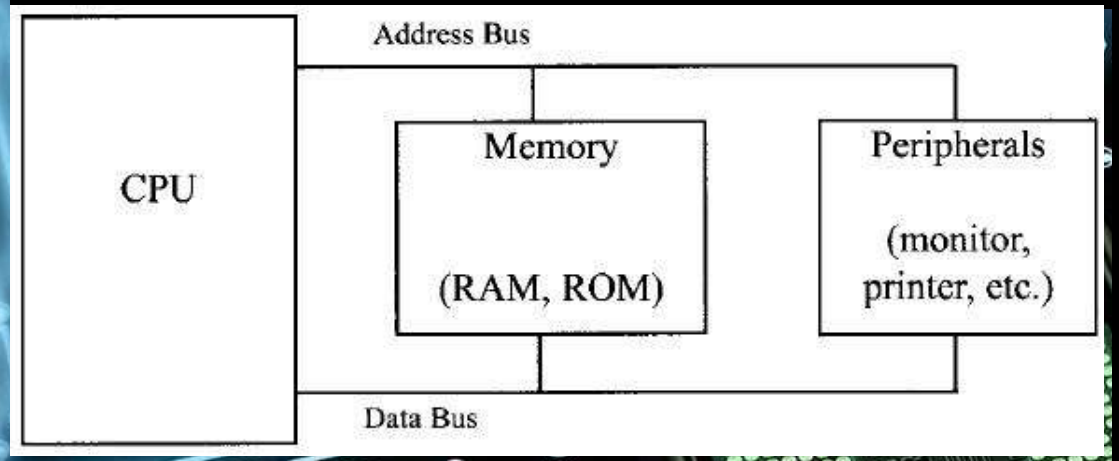
Ordinary Cabal

Contd...



- in every computer, there are 3 types of buses: **Address bus, data bus, and control bus**
- For a device to be recognized by the CPU, it must be assigned an address
- The address assigned to a given device must be unique, no two devices are allowed to have the same address

Contd...



- The CPU puts the address (in binary) on **the address bus**, and the decoding circuitry find the device.
- The CPU uses the **Data bus either** to get data from that device or to send data to it.
- The **control buses** are used to provide read or write signals to the device to indicate if the CPU is asking for information or sending information.
- Of the three buses, the address bus and the data bus determine the capacity of a CPU.

END