

COMPUTING BASICS



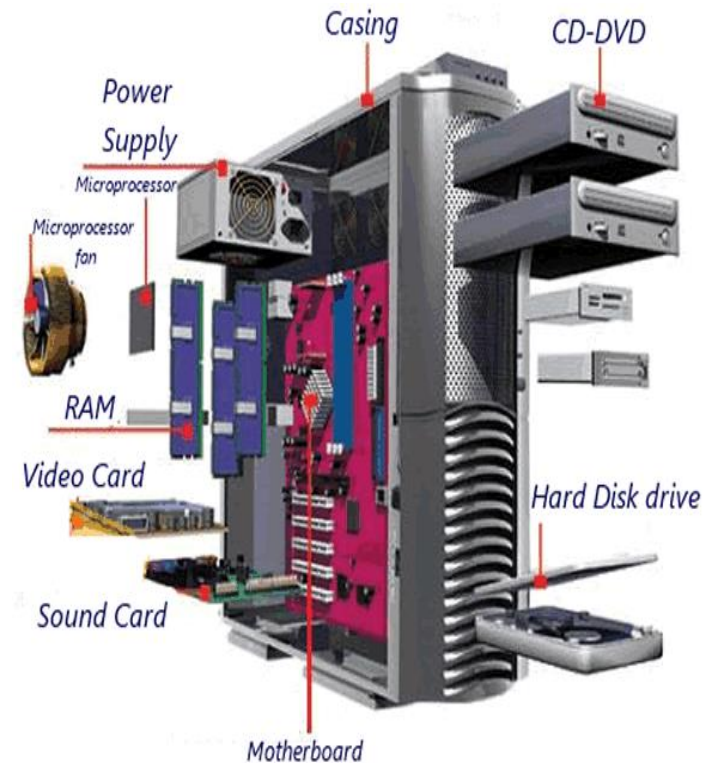
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Outline

- Computer Basics
- Programs and Languages

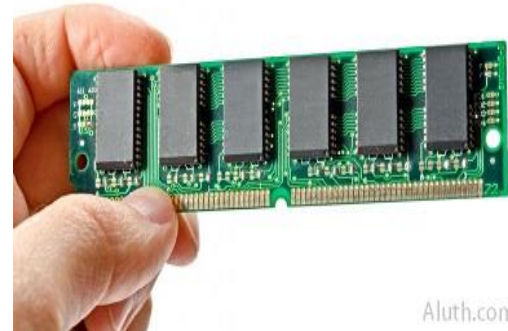
Hardware and Memory

- Most modern computers have similar components including
 - Input devices (keyboard, mouse, touchscreen, etc.)
 - Output devices (display screen, printer, etc.)
 - A processor
 - Two kinds of memory (main memory and auxiliary memory).



Main memory

- Working memory used to store
 - The current program
 - The data the program is using
 - The results of intermediate calculations
- Usually measured in megabytes or gigabytes (e.g. 8GB RAM)
 - RAM is short for *random access memory*
 - A *byte* is a quantity of memory



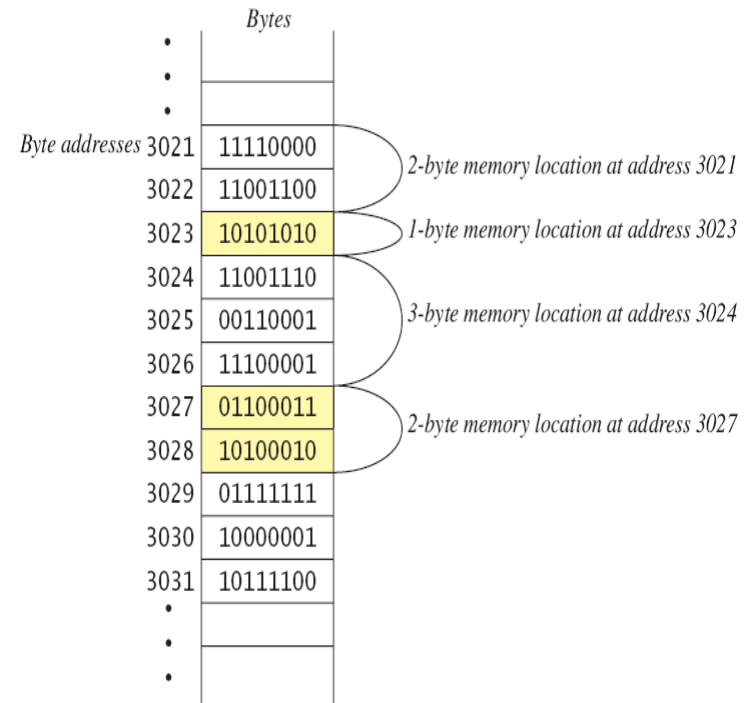
Bits, Bytes, and Addresses

- A *bit* is a digit with a value of either 0 or 1.
- A *byte* consists of 8 bits.
- Each byte in main memory resides at a numbered location called its *address*.



Main Memory

- Data of all kinds (numbers, letters, strings of characters, audio, video, even programs) are encoded and stored using 1s and 0s.
- When more than a single byte is needed, several adjacent bytes are used.
 - The address of the first byte is the address of the unit of bytes.
- When the computer is turned off, main memory is erased (**volatile memory**).



Auxiliary Memory

- Auxiliary memory uses devices such as a hard drive, USB drive, etc.
- Data (files) need to be “saved” to the auxiliary memory
- Data is still stored in bits and bytes
- When the computer is turned off, this data does not go away (**persistent storage**)

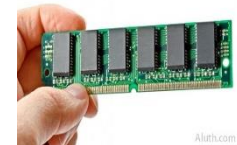
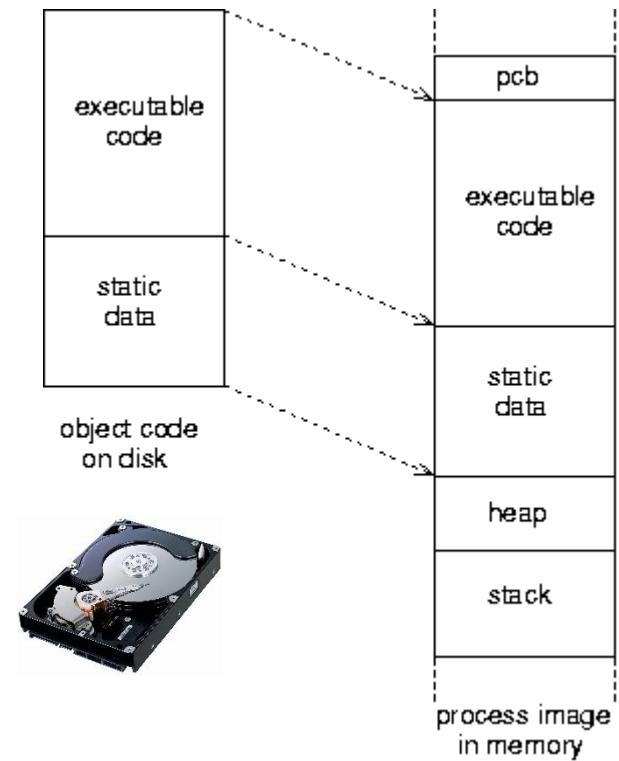
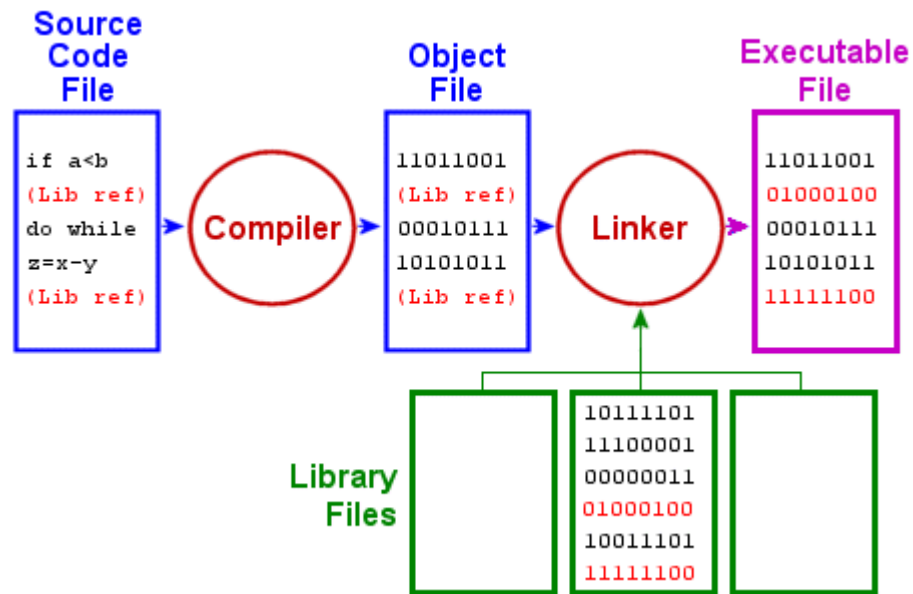


Programs

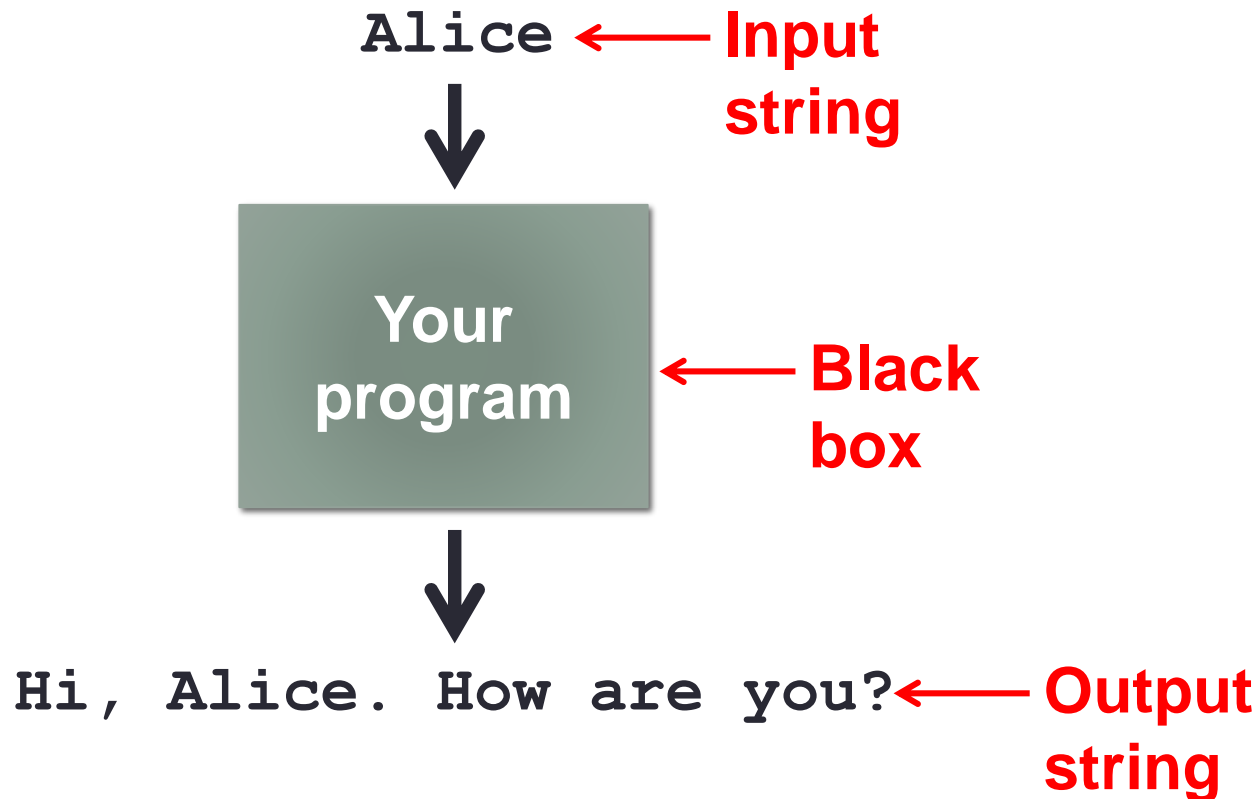
- A *program* is a set of instructions for a computer to follow.
- We use programs almost daily (email, word processors, video games, bank ATMs, etc.).
- When the computer follows the instructions it is *running* or *executing* the program.



Executing a Program



View of Programming from 10,000 Feet



Languages

- **Machine language**
 - Low level, what the hardware understands
 - Tedious and error-prone to write
 - Specific to a particular type of computer
- **Natural language**
 - Imprecise and ambiguous
 - Hard to convert to instructions for the hardware
- **High level programming language**
 - Good balance between the two extremes

Summary

- Computer Basics
- Programs and Languages

