



Career Prospective & Scope of CSE

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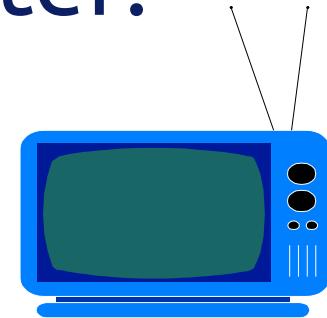
• Which one is the computer?



Rock



Calculator



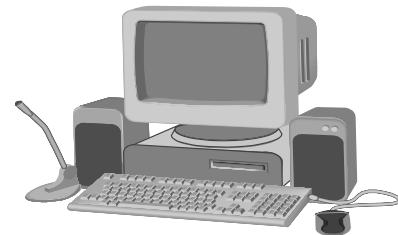
Television



Modern Airplane



Washing
Machine



Computer

• Is a rock a computer?



- Does not act or process
- Takes no input and produces no output
- Computers must be able to handle *input* and *output*

- Is a washing machine a computer?



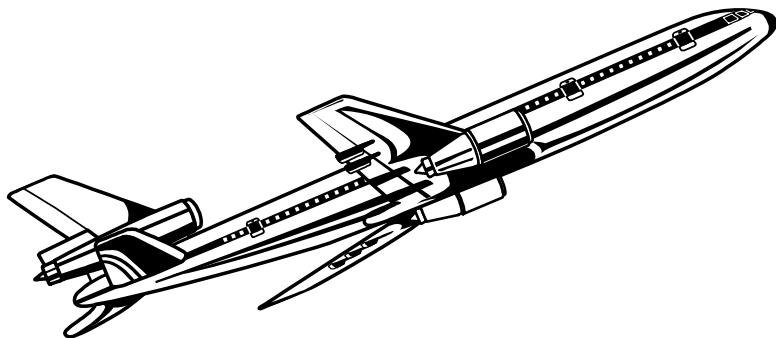
- Input: dirty clothes
- Output: clean clothes
- Does not handle information
- Computers input and output *information*

• Is a television set a computer?



- Input: information from cables or radio waves
- Output: information as sound and picture
- Does not process information
- Computers *process* information by computing new results and answering queries

• Is a modern airplane a computer?



- Input: information from radio waves
- Output: manipulations to the airplane
- Can only handle specific information necessary for flight control

Computers are *general purpose* they can perform many different tasks

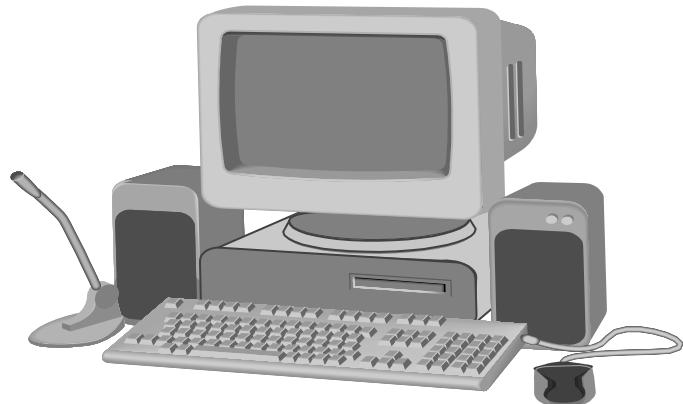
• Is an ordinary calculator a computer?



- Input: numbers and mathematical operations
- Output: answer
- Handles any numeric task
- Cannot remember which buttons are pressed
- Computers are *programmable* so they can remember sequences of operations

• Definition of a Computer

- a general purpose,
- programmable,
- information processor
- with input and output



Uses of Computer

Computers in Daily Life

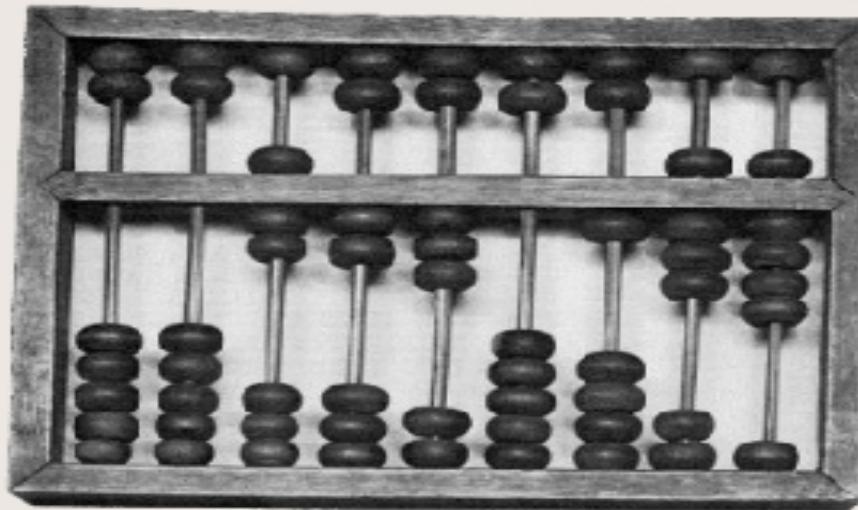
- Accounts
- Games
- Educational
- On-line banking
- Smart ID cards
- Supermarkets
- Working from home (Tele-working)
- Internet





Abacus 3000 BC

The Abacus, a simple counting aid,
was most likely invented in
Babylonia.



the slide rule 1622

- The **slide rule** is a mechanical precursor of the pocket calculator. It was invented in England by William Oughtred and was very commonly used until the 1970s when it was made obsolete for most purposes by electronic calculators.

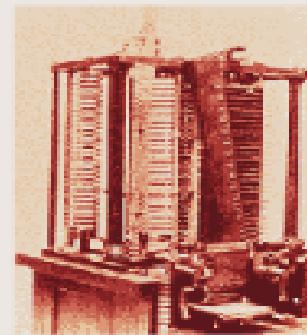


1623 - 1833

- 1623: **Wilhelm Schickard**, a professor at the University of Tübingen, Germany, builds the first mechanical calculator. It can work with six digits, and carries digits across columns



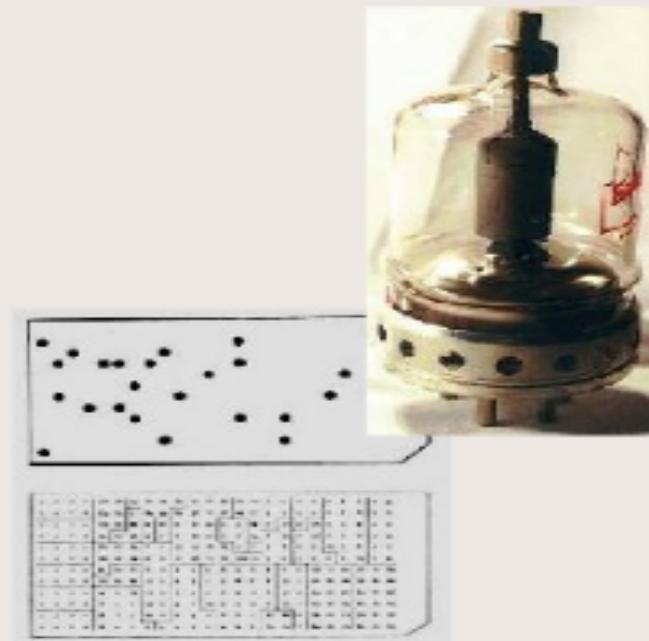
- 1640: **Blaise Pascal** invents the first commercial calculator, a hand powered adding machine
- 1673: **Gottfried Leibniz** builds a mechanical calculating machine that multiplies, divides, adds and subtracts
- 1780: American **Benjamin Franklin** discovers electricity
- 1801: a Frenchman, **Joseph-Marie Jacquard** builds a loom that weaves by reading punched holes stored on small sheets of hardwood.

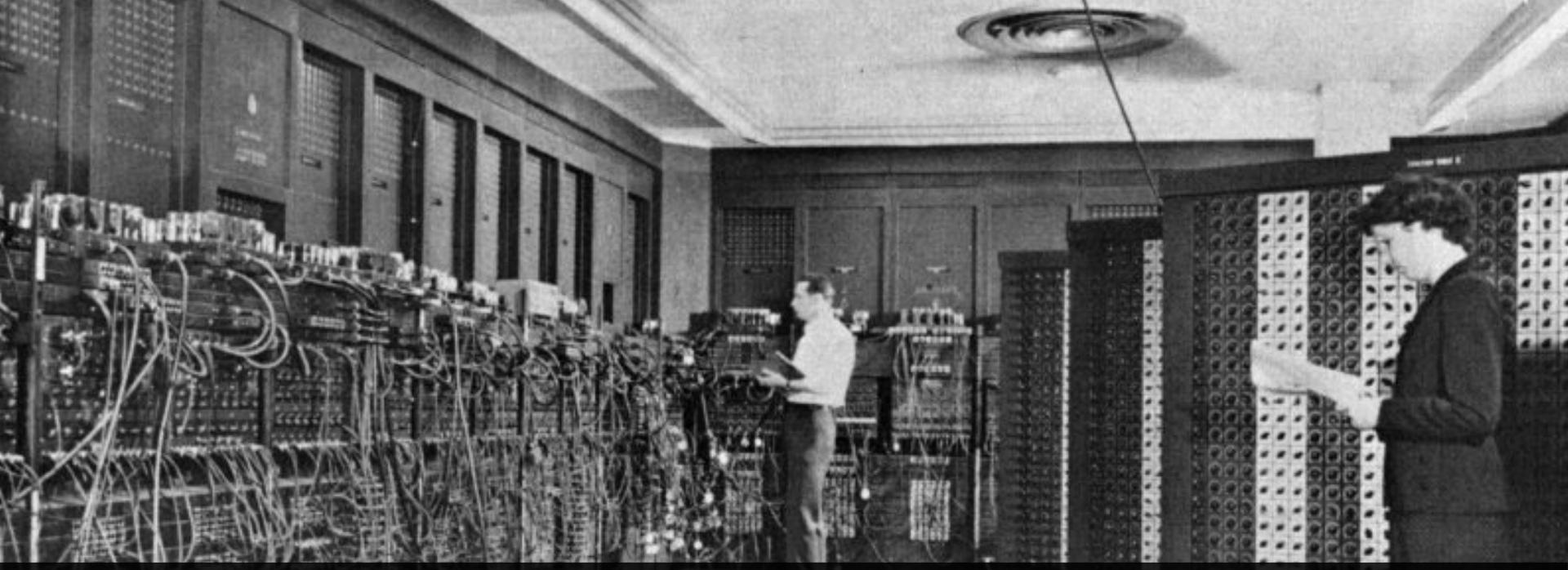


- 1833: **Charles Babbage** designs the Analytical Machine that follows instructions from punched-cards. It is the first general purpose computer

First Generation Computers 1940-1956: Vacuum Tubes

The first computers used vacuum tubes for circuitry and magnetic drums for memory, and were often enormous, taking up entire rooms. They were very expensive to operate and in addition to using a great deal of electricity, generated a lot of heat, which was often the cause of malfunctions. First generation computers relied on machine language to perform operations, and they could only solve one problem at a time. Input was based on punched cards and paper tape, and output was displayed on printouts.





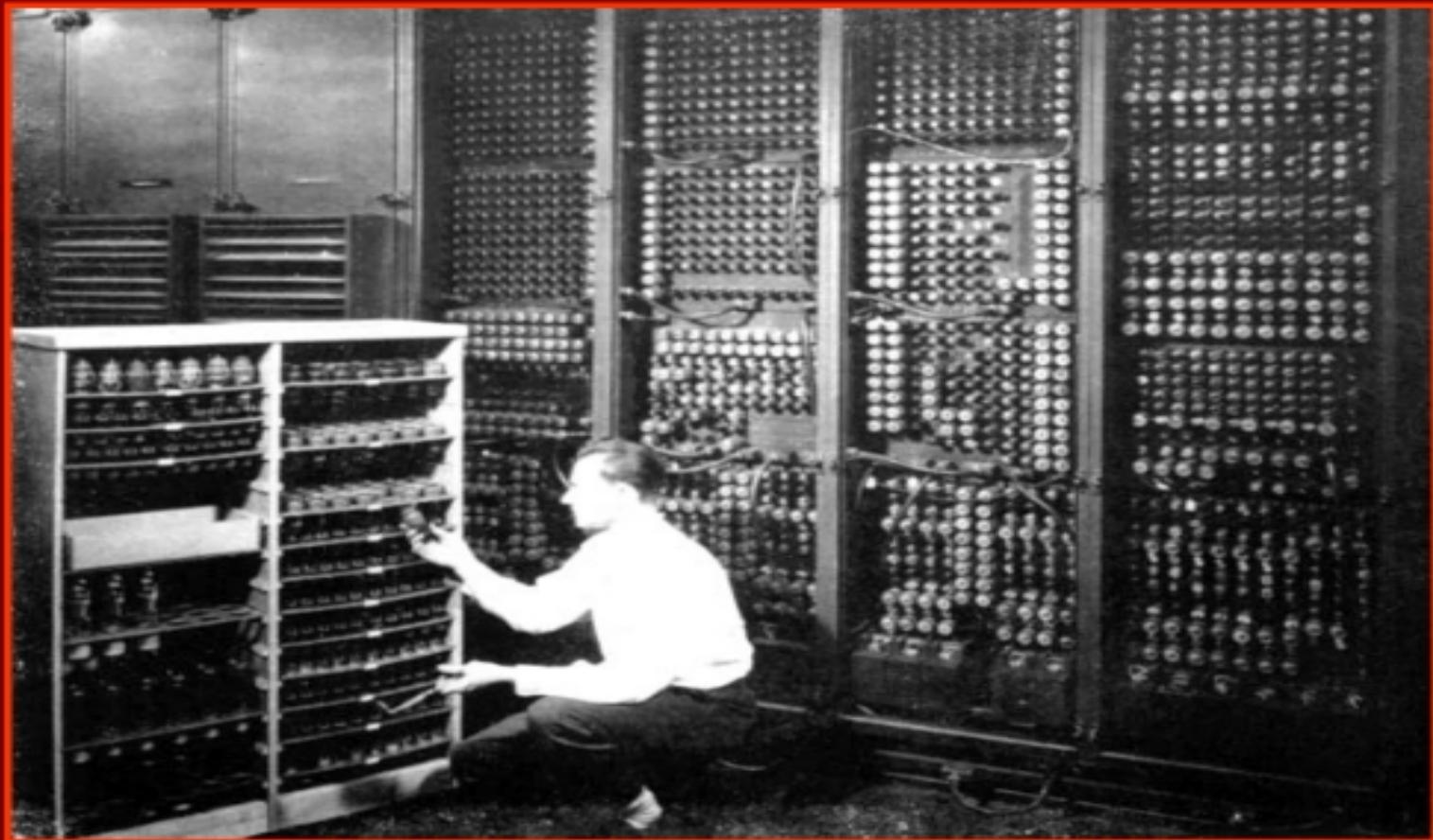
First computer: 1943

A portrait painting of Ada Lovelace, a woman with dark hair styled up, wearing a white lace-trimmed collar over a dark dress. She is looking slightly to her right. The background is dark and indistinct.

Ada Lovelace

First computer: 1943

First computer program: 1843



The ENIAC computer, University of Pennsylvania, 1945

ENIAC

Cost: about
\$486,000

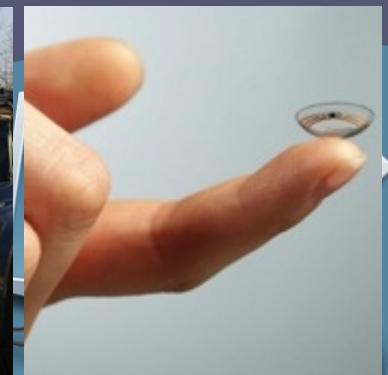


Size: over 100 feet long, filling a
30 ft. x 50 ft. room.

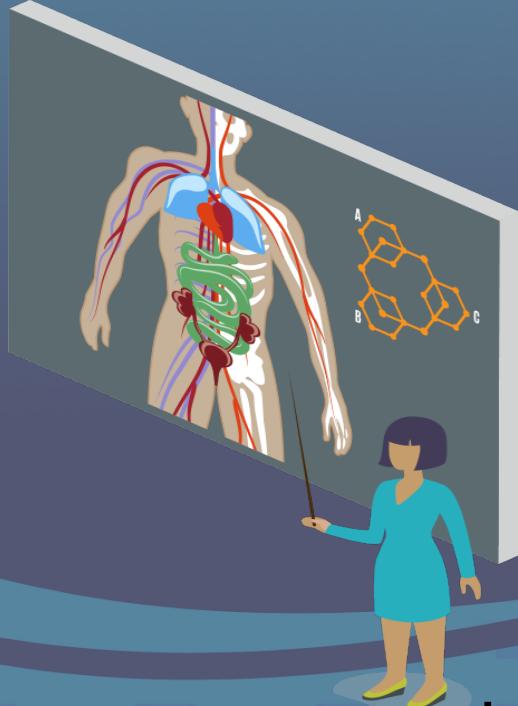
Height: 10 feet. Depth: about 3
feet. Weight: about 30 tons.



Technology affects *every* field:



Every 21st century student should have a chance to learn about *algorithms*, how to make *apps*, or how the *internet* works.



Just like they learn about the *digestive system*, or *electricity*.

Fields of Computer Science



Fields of Computer Science

Mathematical foundations

- ◆ Coding Theory
- ◆ Game Theory
- ◆ Graph Theory
- ◆ Number Theory



Fields of Computer Science

Computer Network and security

- ◆ Computer Network
- ◆ Data Communication
- ◆ Cyber Security
- ◆ Cryptography



Fields of Computer Science

Distributed Systems

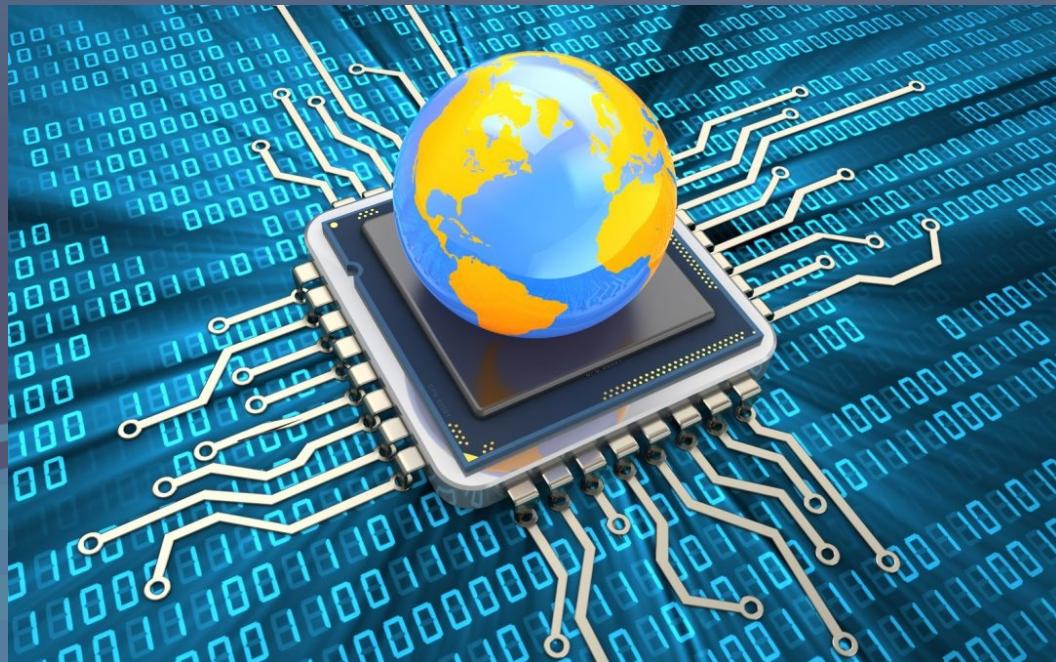
- ◆ Parallel computing
- ◆ Concurrency
- ◆ Distributed computing



Fields of Computer Science

Computer architecture

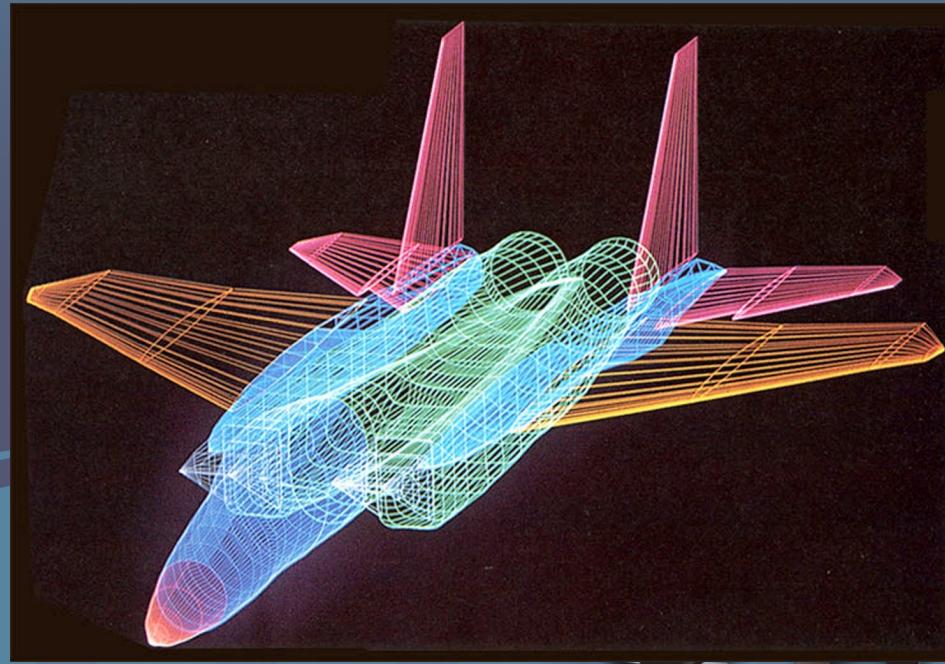
- ◆ Digital Logic Design
- ◆ Microprocessor
- ◆ Computer architecture
- ◆ Operating systems



Fields of Computer Science

Computer graphics

- ◆ Computer vision
- ◆ Image Processing
- ◆ Information visualization



Fields of Computer Science

Software engineering

- ◆ Algorithm design
- ◆ Software engineering
- ◆ Computer programming
- ◆ Human computer interaction



Fields of Computer Science

Languages and compilers

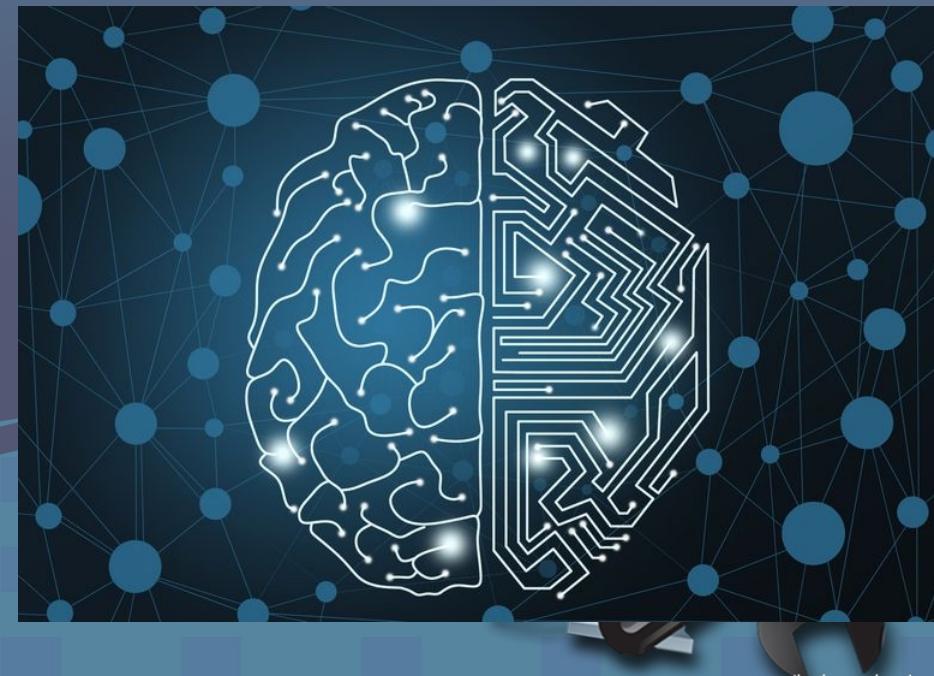
- ◆ Compiler design
- ◆ Automata theory
- ◆ Object oriented programming
- ◆ Type Theory



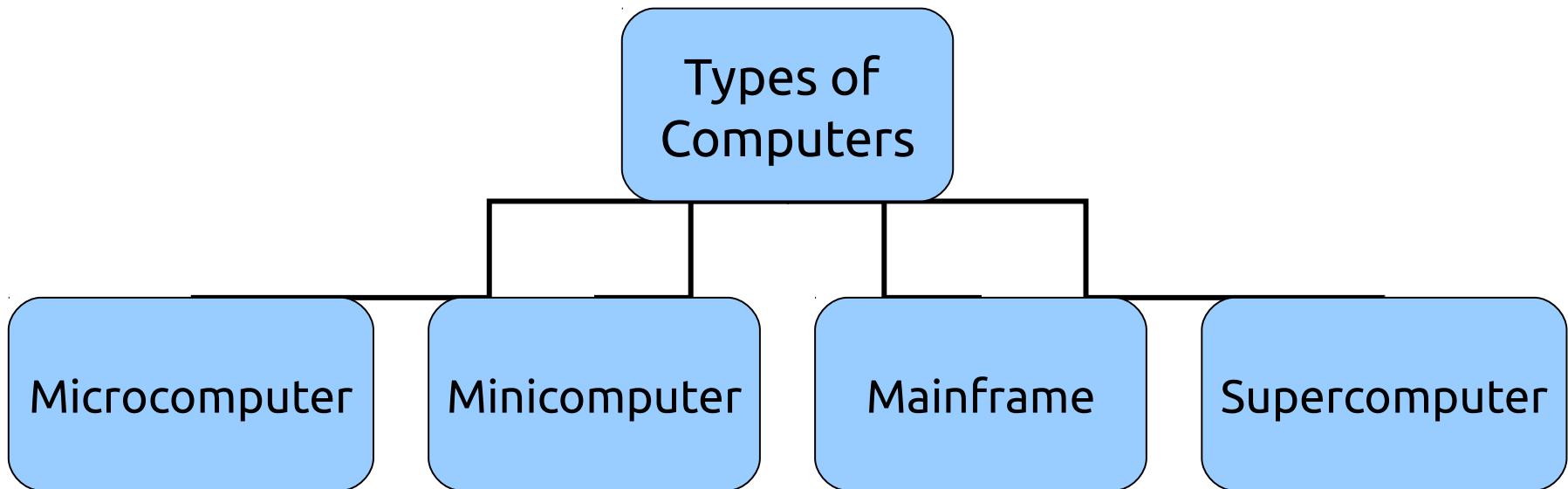
Fields of Computer Science

Artificial intelligence

- ◆ Artificial intelligence
- ◆ Computer vision
- ◆ Natural language processing
- ◆ Machine learning
- ◆ Robotics



• Types of Computers



• Microcomputer

- Can be classified into:
 - **Desktop PCs**
 - sits on desks, rarely moved, large and bulky.
 - Memory capacity, graphics capacity and software availability vary from one computer to another
 - Used both for business and home applications

- Microcomputer

- **Portable PCs**
 - Can be moved easily from place to place
 - Weight may varies
 - Small PCs are popular known as laptop
 - Widely used by students, scientist, reporters, etc

Microcomputer Model

Desktop



Laptop



Notebook



Subnotebook



Palmtop



- **Microcomputer**
- **Advantages**
 - Small size
 - Low cost
 - Portability
 - Low Computing Power
 - Commonly used for personal applications
- **Disadvantages**
 - Low processing speed

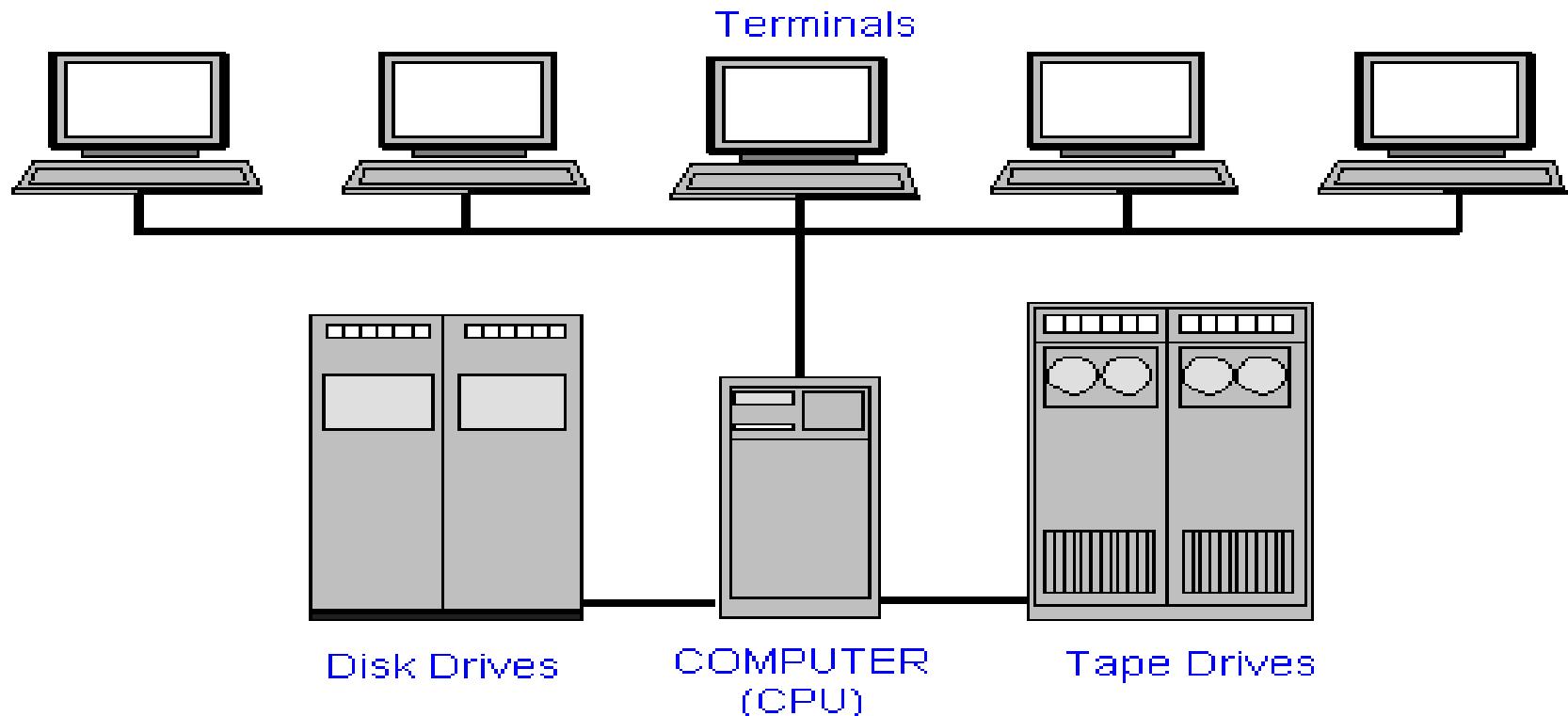
• Uses of Microcomputer

- Word Processing
- Home entertainment
- Home banking
- Printing
- Surfing the internet
- etc

- Microcomputer

- Medium sized computer
- Also called the minis
 - e.g. IBM36, HP9000, etc
- Computing power lies between microcomputer and mainframe computer





• MiniComputer

- Characteristics
 - Bigger size than PCs
 - Expensive than PCs
 - Multi-User
 - Difficult to use
 - More computing power than PCs
 - Used by medium sized business organizations, colleges, libraries and banks.

• Uses of Minicomputer

- Control of Automated Teller Machine (ATMs)
- Payroll
- Hospital patients registration
- Inventory Control for supermarket
- Insurance claims processing
- Small bank accounting and customer details tracking

- Minicomputer
- **Advantage**
 - Cater to multiple users
 - Lower costs than mainframes
- **Disadvantage**
 - Large
 - Bulky

• Mainframe

- Known as **enterprise servers**
- Occupies entire rooms or floors
- Used for centralized computing
- Serve distributed users and small servers in a computing network

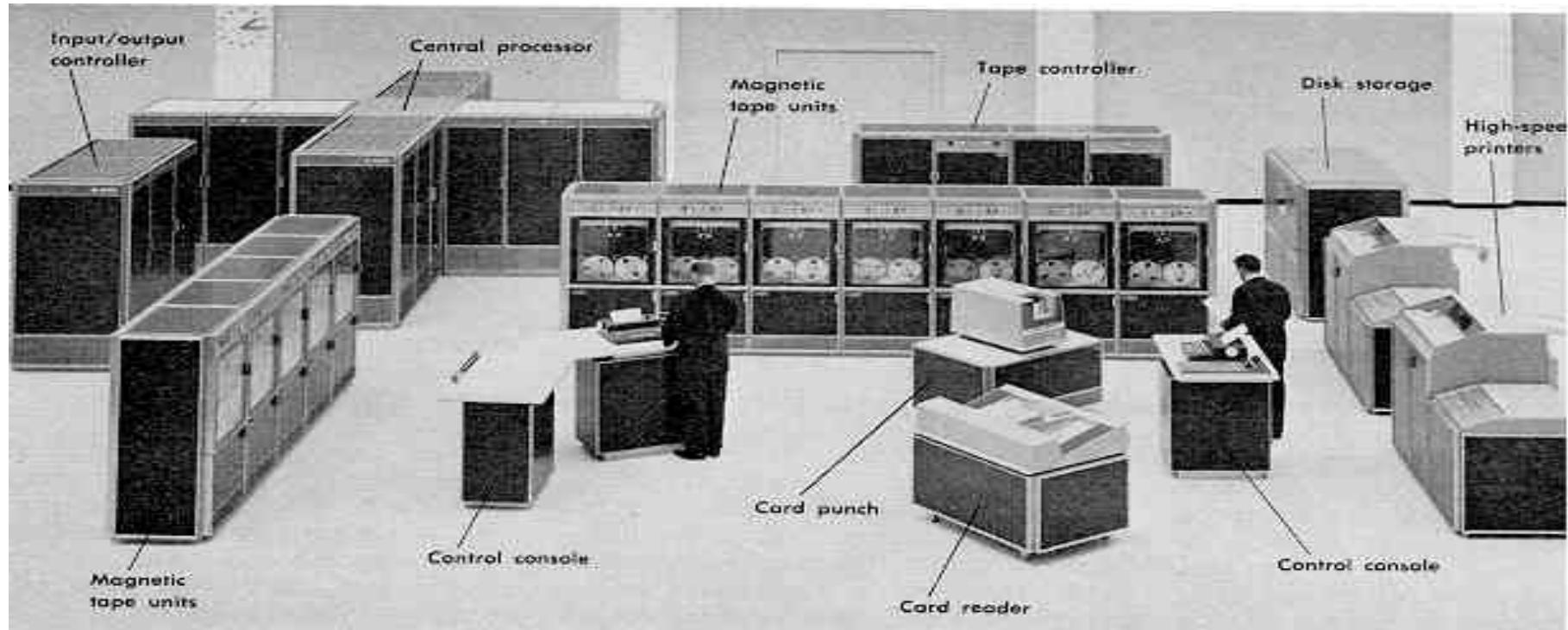


• Mainframe

- Large, fast and expensive computer
- Cost millions of dollar
 - e.g. IBM3091, ICL39, etc
- Characteristics:
 - Bigger in size than minicomputers
 - Very expensive
 - Support a few hundred users simultaneously (Multi-Users)
 - Difficult to use
 - Have to be kept in a special air-conditioned room
 - Used in big business organizations and government departments

• Areas where mainframes are used

- Big banks with hundreds of branches located all over the world
- Big universities with thousands of enrollment
- Natural gas and oil exploration companies
- Space Vehicle control
- Weather forecasting
- Animated Cartoon
- Some mainframes are designed to be extremely fast and called super computers. It is used for space launching, monitoring and controlling.





Mainframe

- **Advantage**
 - Supports many users and instructions
 - Large memory
 -
- **Disadvantage**
 - Huge size
 - Expensive

• Supercomputer

- Fastest and expensive
- Used by applications for molecular chemistry, nuclear research, and advanced physics
- Consists of several computers that work in parallel as a single system



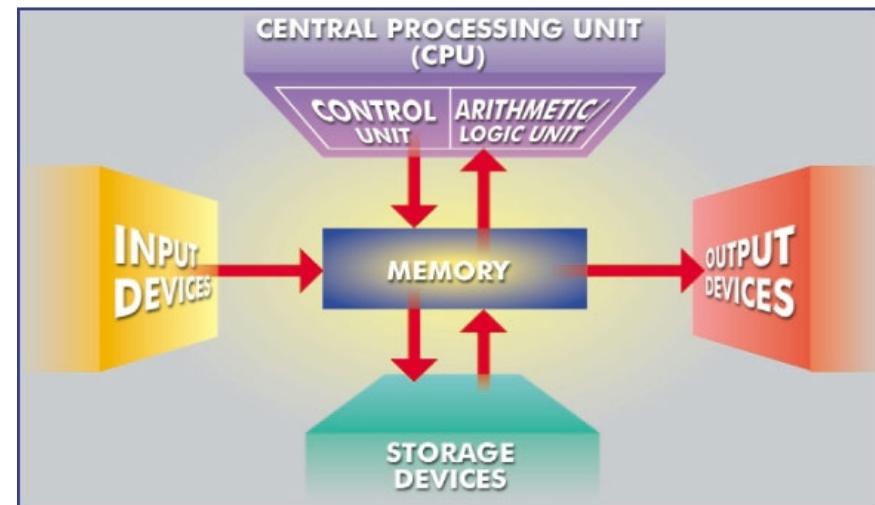
- Supercomputer
- **Advantage**
 - Speed
- **Disadvantage**
 - Generate a large amount of heat during operation

• Why Is A Computer So Powerful?

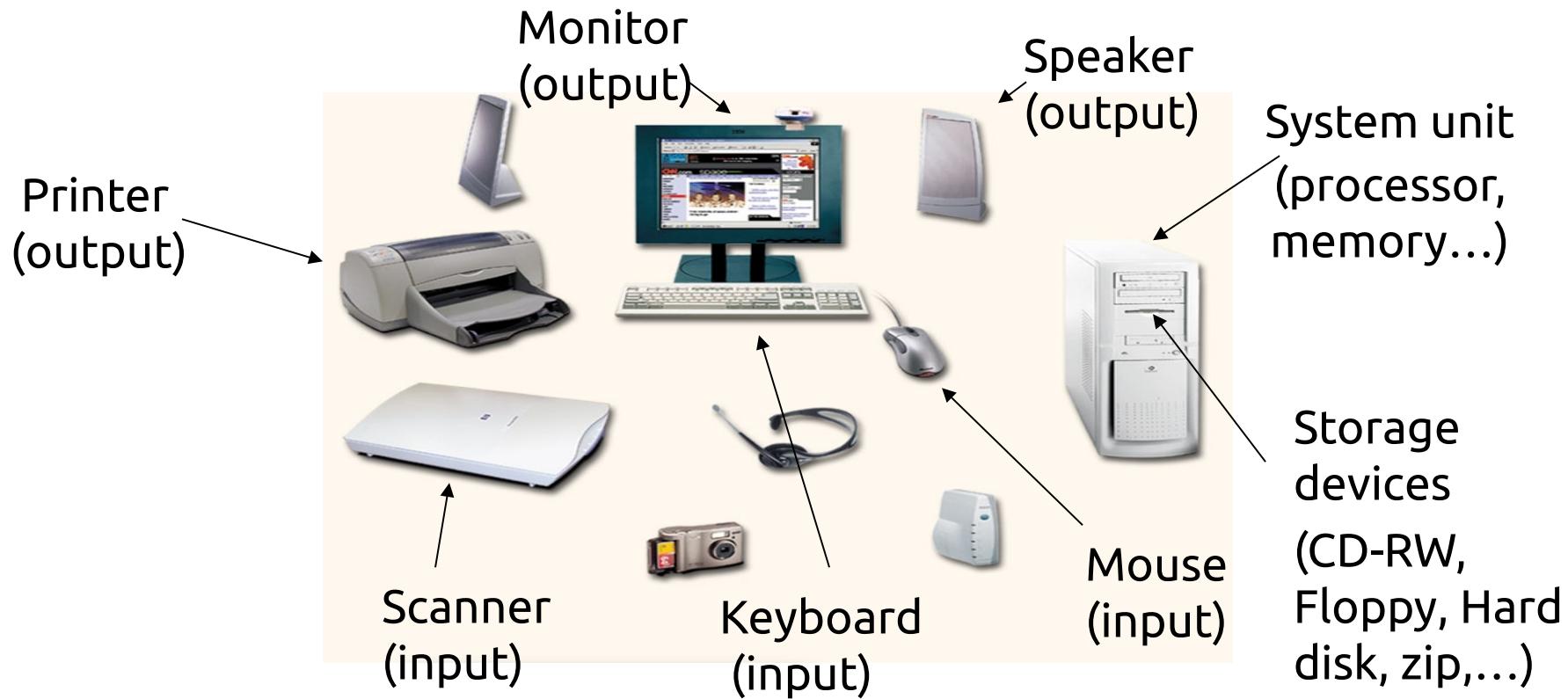
- The ability to perform the information processing cycle with amazing speed.
- Reliability (low failure rate).
- Accuracy.
- Ability to store huge amounts of data and information.
- Ability to communicate with other computers.

• What Are The Primary Components Of A Computer ?

- Input devices.
- Central Processing Unit (containing the control unit and the arithmetic/logic unit).
- Memory.
- Output devices.
- Storage devices.



• Devices that comprise a computer system



- What Do Computers Do?
- Input, Process, Output, & Store data



• Data and Information

- All computer processing requires **data**
- Computers manipulate data to create information. **Information** is data that is organized, meaningful, and useful.
- During the output Phase, the information that has been created is put into some form, such as a printed report.
- The information can also be put in computer storage for future use.



COMPUTER SYSTEM

KEYBOARD



PROCESSOR



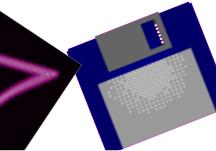
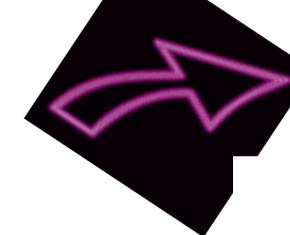
MONITOR



PRINTER



Storage
devices



• Input Devices

Data are facts, numbers and characters that are entered into the computer via keyboard.

Other types of input devices are mouse, joystick, light pens, scanners, camera, etc.



• Computer Input Devices

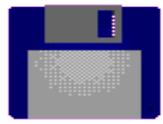
- Keyboard
- Mouse/Trackball
- Joystick
- Light pen
- Pointing Stick
- Touchpad
- Touch screen
- Bar code reader
- Scanner
- Microphone
- Graphics Tablet
- Digital Cameras



• Processor Unit



Two main parts:

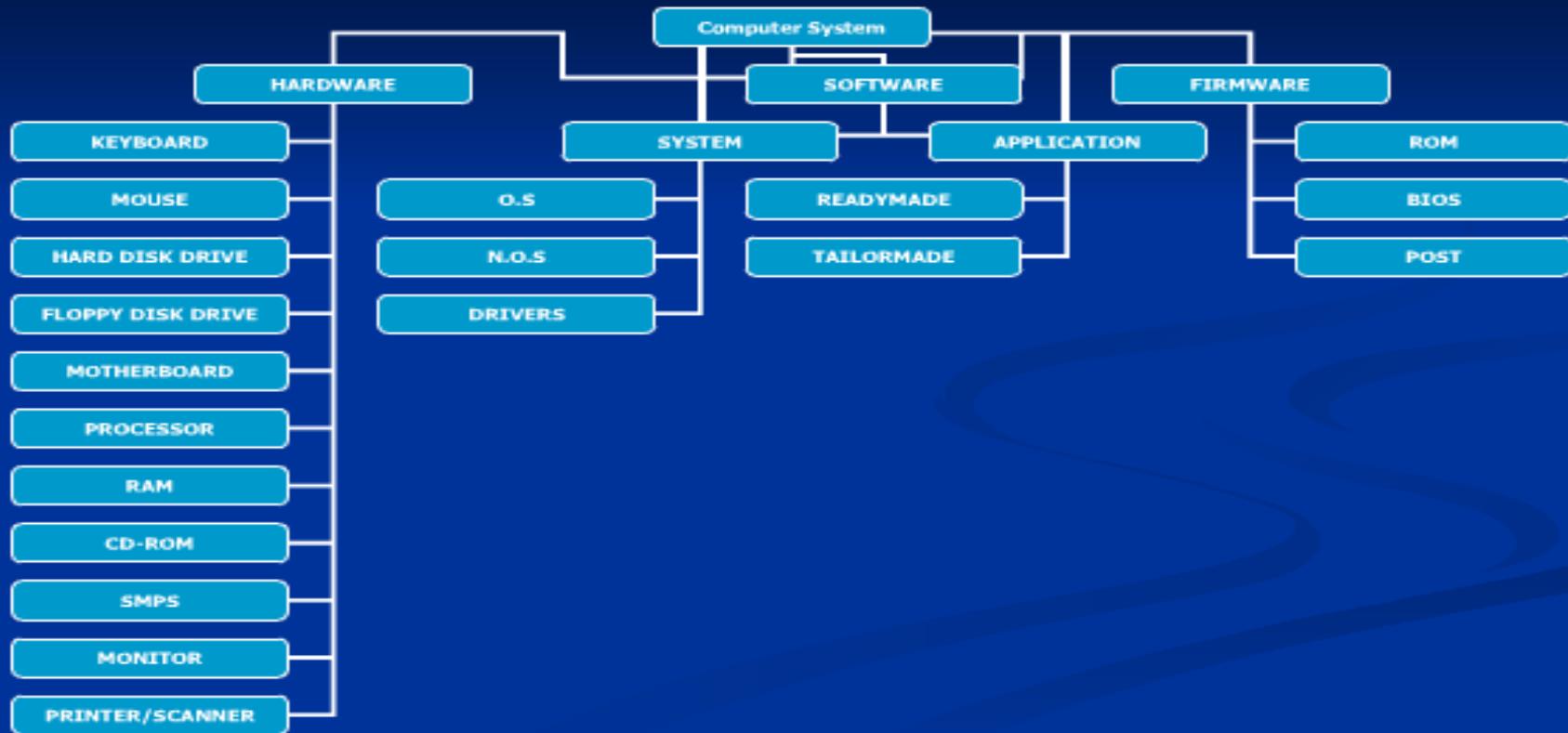


CPU – where the actual processing takes place
Main memory – where data are stored.



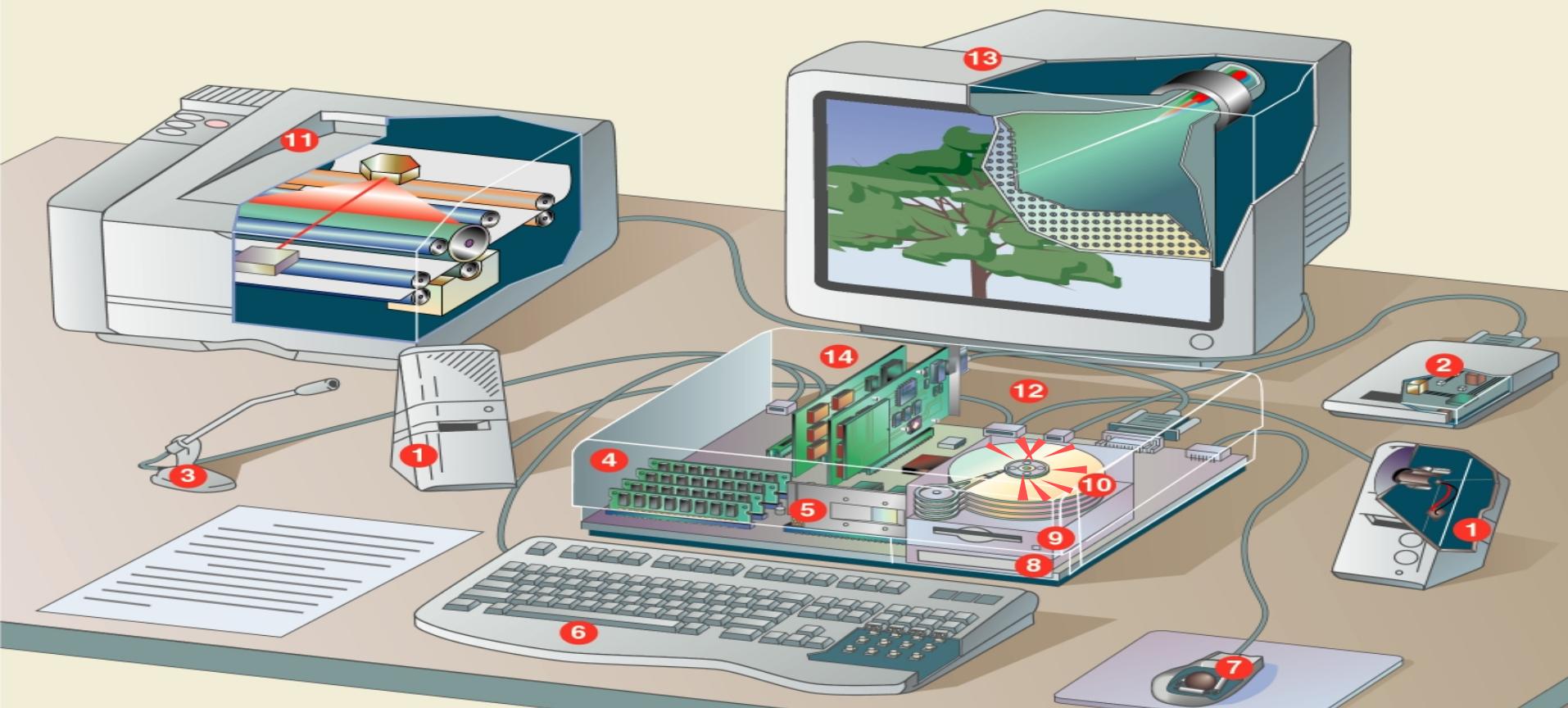
The contents of main memory can be transferred to auxiliary storage devices

Computer System



What is a Hardware?

- Hardware is the general term that is used to describe physical artifacts of a technology.
- A computer's hardware consists of electronic devices; the parts you can see and touch.



1 Speakers
2 Modem
3 Microphone
4 RAM
5 CPU
6 Keyboard

7 Mouse
8 CD-ROM drive
9 Diskette drive
10 Hard drive
11 Printer

12 Ports
13 Monitor
14 Expansion board

Classification of Hardware

