

# IT111 - Introduction to Information Technology Bachelor of Science in Information Technology

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## Lecture 1 - Introduction



مجموعة جامعة  
الجميع الذكية  
للتعليم القابضة

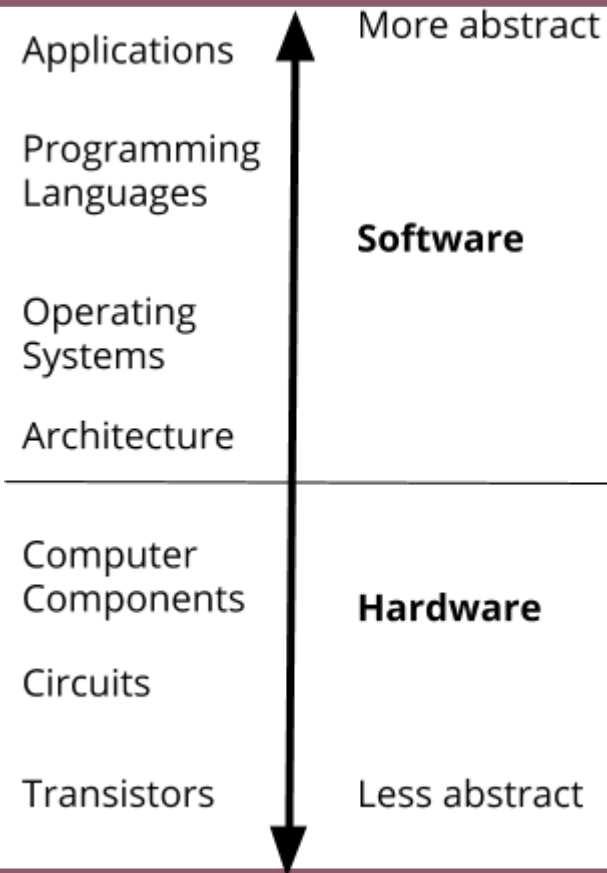
**Upon successful completion of this course, students should be able to:**

1. Explain why it is essential to learn about computers today and discuss several ways computers are integrated into our business and personal lives.
2. Define a computer and describe its primary operations.
3. List some important milestones in computer evolution.
4. Identify the major parts of a personal computer, including input, processing, output, storage, and communications hardware.
5. Define software and understand how it is used to instruct the computer what to do.

# What Is a Computer and What Does It Do?

- Computer: A programmable, electronic device that accepts data, performs operations on that data, and stores the data or results as needed
  - Computers follow instructions, called programs, which determine the tasks the computer will perform
- Basic operations
  - Input: Entering data into the computer
  - Processing: Performing operations on the data
  - Output: Presenting the results
  - Storage: Saving data, programs, or output for future use
  - Communications: Sending or receiving data

# Introduction to Computers



- Any program you run on your computer

- Microsoft Word.

- Google Chrome.

- Note application.



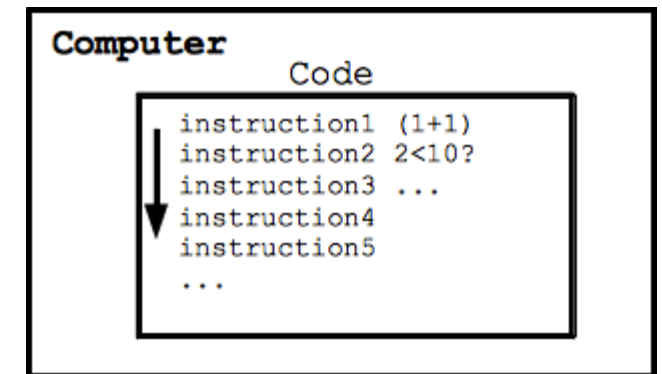
- .exe (Windows) or .app (Mac) file.
- Can use without knowing how it works behind the scenes (**abstraction**).
- Programs are written in **code**, the next layer of abstraction.

- **Strengths of Computers:**
- Very fast (billions of operations per second).
- Very accurate.
- **Weaknesses of Computers:**
- Literal.
- Only simple operations.
  - Addition.
  - Comparison.
  - Equality.



# Introduction to Code: How Computers Work

- Code is a series of instructions.
- Each instruction is an operation.
- Computer follows each instruction, one after another.
- Programs are comprised of millions of instructions.



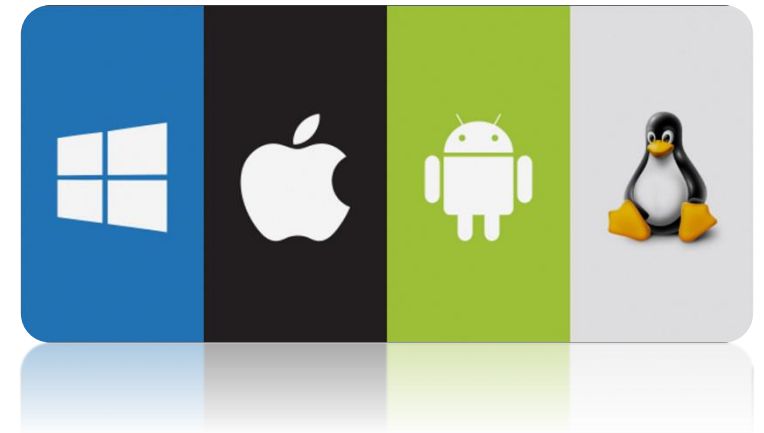
# Programming Languages

- Code is written in a **programming language**.
- Gives the "rules" (syntax and commands) for the code.
- What programming languages have you heard of?
- Each has strengths and weaknesses and specializations (just like human languages).
- High-level (closer to how humans think) vs. low-level (closer to computers, but much faster).



# The Operating System

- Starts running when the computer "boots up"
- Manager/supervisor:
  - Starting/runs/stopping programs.
  - Manages all shared resources (like **memory**).
- Can run multiple programs at once.
- Other responsibilities:
  - File system.
  - Manages windows.
  - Some basic programs.



# History of Computer

- The computer was born not for entertainment or email but out of a need to solve a serious number-crunching crisis.
- By 1880, the U.S. population had grown so large that it took more than seven years to tabulate the U.S. Census results.
- The government sought a faster way to get the job done, giving rise to punch-card based computers that took up entire rooms.

# History of Computer

- Today, we carry more computing power on our smartphones than was available in these early models.
- The following brief history of computing is a timeline of how computers evolved from their humble beginnings to the machines of today that surf the Internet, play games and stream multimedia in addition to crunching numbers.

# History of Computer

- **1985:** The first dot-com domain name is registered, years before the World Wide Web would mark the formal beginning of Internet history. The Symbolic Computer Company registers Symbolics.com. More than two years later, only 100 dot-coms had been registered.
- **1996:** Sergey Brin and Larry Page develop the Google search engine at Stanford University.



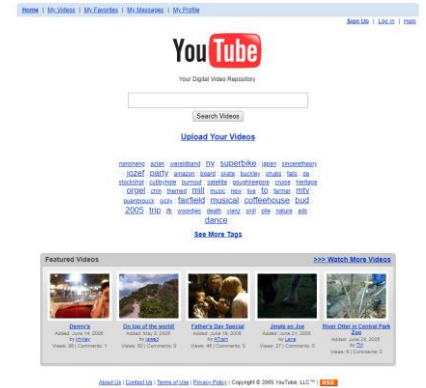
# History of Computer

- **1999:** The term Wi-Fi becomes part of the computing language and users begin connecting to the Internet without wires.
- **2004:** Mozilla's Firefox 1.0 challenges Microsoft's Internet Explorer, the dominant Web browser. Facebook, a social networking site, launches.



# History of Computer

- **2005:** YouTube, a video sharing service, is founded. Google acquires Android, a Linux-based mobile phone operating system.
- **2007:** The iPhone brings many computer functions to the smartphone.



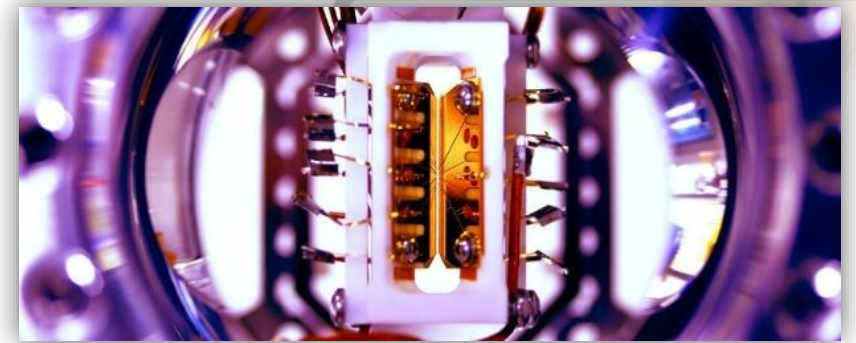
# History of Computer

- **2009:** Microsoft launches Windows 7, which offers the ability to pin applications to the taskbar and advances in touch and handwriting recognition, among other features.
- **2010:** Apple unveils the iPad, changing the way consumers view media.
- **2012:** Facebook gains 1 billion users on October 4.



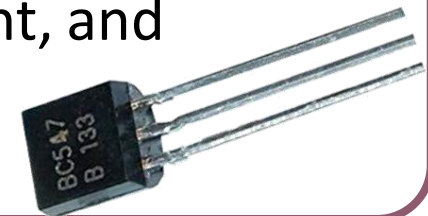
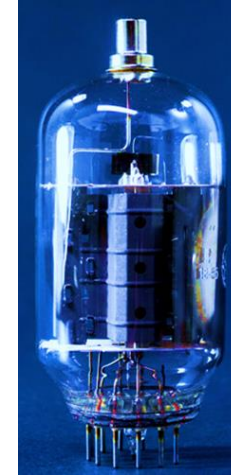
# History of Computer

- **2015:** Apple releases the Apple Watch. Microsoft releases Windows 10.
- **2016:** The first reprogrammable quantum computer was created



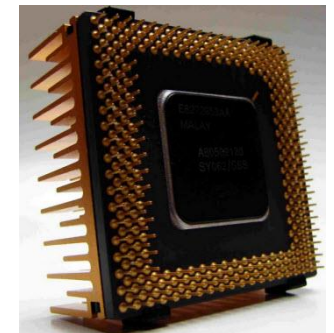
# Computers Then and Now

- First-generation computers ( 1950-1959)
  - Enormous and powered by vacuum tubes.
  - Used a great deal of electricity and generated a lot of heat.
  - ENIAC and UNIVAC.
- Second-generation computers (1959-1965)
  - Used transistors.
  - Computers were smaller, more powerful, cheaper, more energy-efficient, and more reliable.



# Computers Then and Now

- Third-generation computers (1965-1975)
  - Used integrated circuits (ICs).
  - Minicomputers appeared on the market.
- Fourth-generation computers (1975-1985)
  - Use microprocessors.
  - First desktop calculator
  - Use keyboards, mice, monitors, and printers.
  - Use magnetic disks, flash memory, and optical disks for storage.
  - Computer networks, wireless technologies, Internet introduced.



# Computers Then and Now

- Fifth-generation (1985 and the future)
  - Infancy stage.
  - Appearance of laptop and improvement in secondary storage
  - May be based on artificial intelligence (AI).
  - Likely use voice and touch input.



- **Hardware** refers to the physical parts of the computer.
  - Internal hardware
    - Located inside the main box (system unit) of the computer.
  - External hardware
    - Located outside the system unit.
    - Connect to the computer via a wired or wireless connection.



- **Software** refers to the set(s) of instructions given to the computer to execute one or more tasks.
  - Software is sometimes referred to as programs.
  - E.g., Microsoft Office, Firefox.

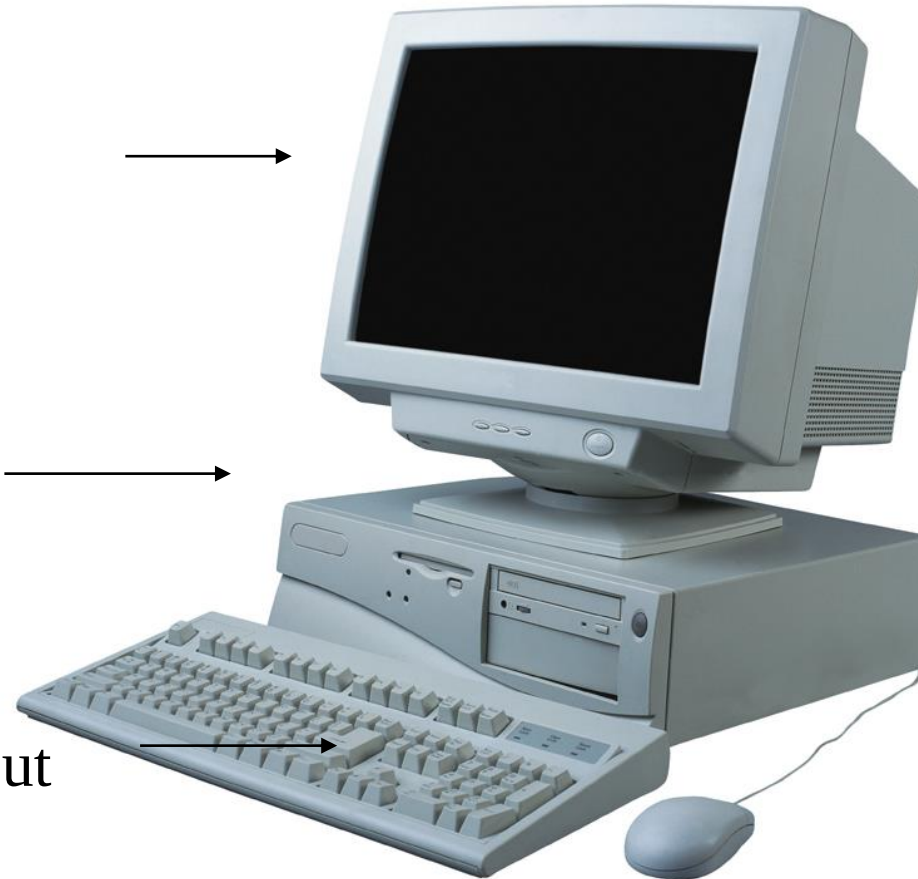


# Parts of a Modern Computer

Monitor: for displaying output

System Unit: CPU, Memory,  
Hard drive,...

Keyboard and Mouse: for input



# Parts of a Modern Computer

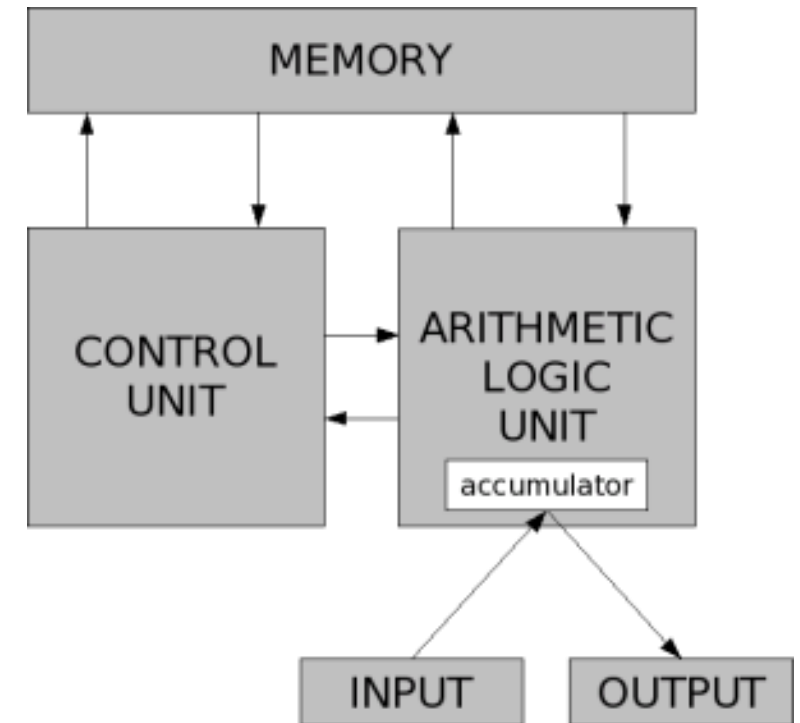
- **Central Processing Unit (CPU):** microchip that performs core computation. It usually contains the ALU and CU.
- **Memory (primary storage):** microchips that store data which can be accessed while computer is switched on.
  - **Random Access Memory (RAM)** is volatile and modifiable.
  - **Read-Only Memory (ROM)** cannot be changed.

# Parts of a Modern Computer

- **Hard drive (secondary storage):** store data on magnetic discs permanently i.e., the data is not lost when the computer is switched off.
- **Input/Output devices:** transfers data from operator to machine.

# The Von Neumann Architecture

- This describes how a conceptual computing device works:
  - Memory stores data and instructions.
  - Control Unit (CU) obtains and executes instructions.
  - Arithmetic Logic Unit (ALU) does calculations.
  - Input is process of getting data into machine.
  - Output is process of obtaining data from machine.



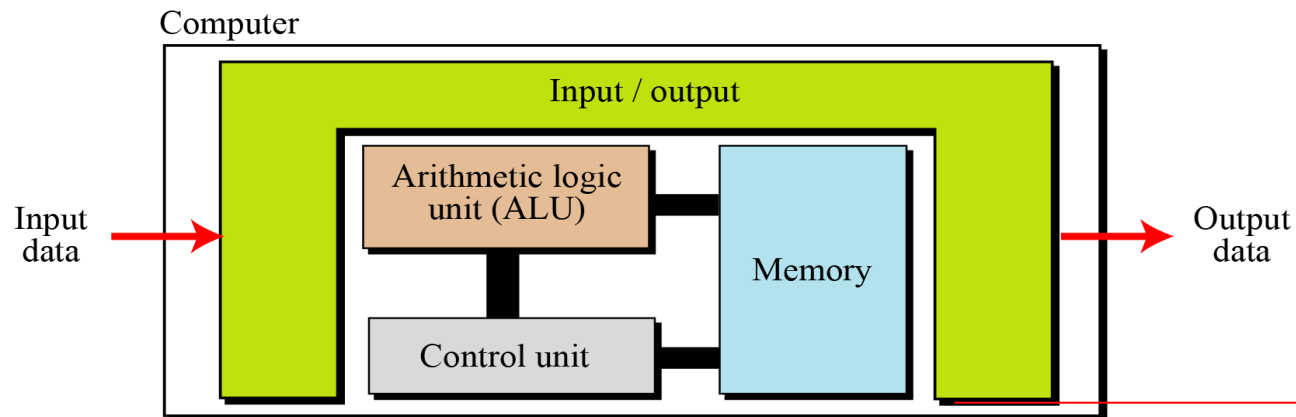
# The Von Neumann Architecture

## Memory

Memory is the storage area. This is where programs and data are stored during processing.

**The arithmetic logic unit (ALU)** is where calculation and logical operations take place. For a computer to act as a data processor, it must be able to do arithmetic operations on data (such as adding a list of numbers). It should also be able to do logical operations on data.

**Control unit** The control unit controls the operations of the memory, ALU, and the input/output subsystem.



# The Von Neumann Architecture

## Sequential execution of instructions

A program in the von Neumann model is made of a finite number of instructions.

In this model, the control unit:

- 1- **Fetches** one instruction from memory: The program instruction is fetched
- 2- **Decode**: The instructions are decoded so the control unit and ALU can understand them
- 3- **Executes**: The instructions are carried out

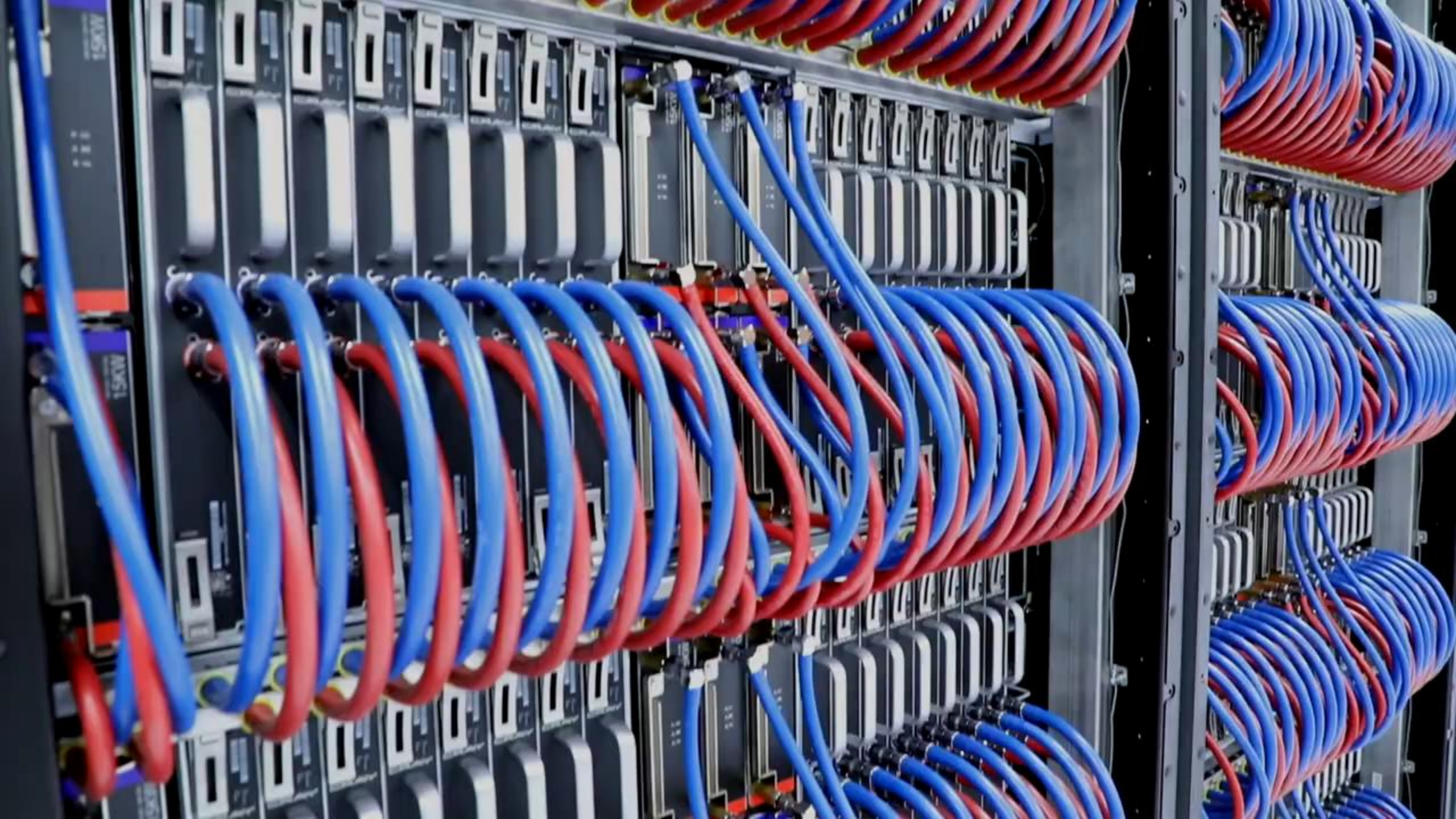
# Data vs. Information

- Data
  - Raw, unorganized facts.
  - Can be in the form of text, graphics, audio, or video.
  - Raw data alone is insufficient for decision making
- Information
  - Data that has been processed into a meaningful form.
  - Information is sufficient for decision making
- Information processing
  - Converting data into information.

# Types of computers: Supercomputers

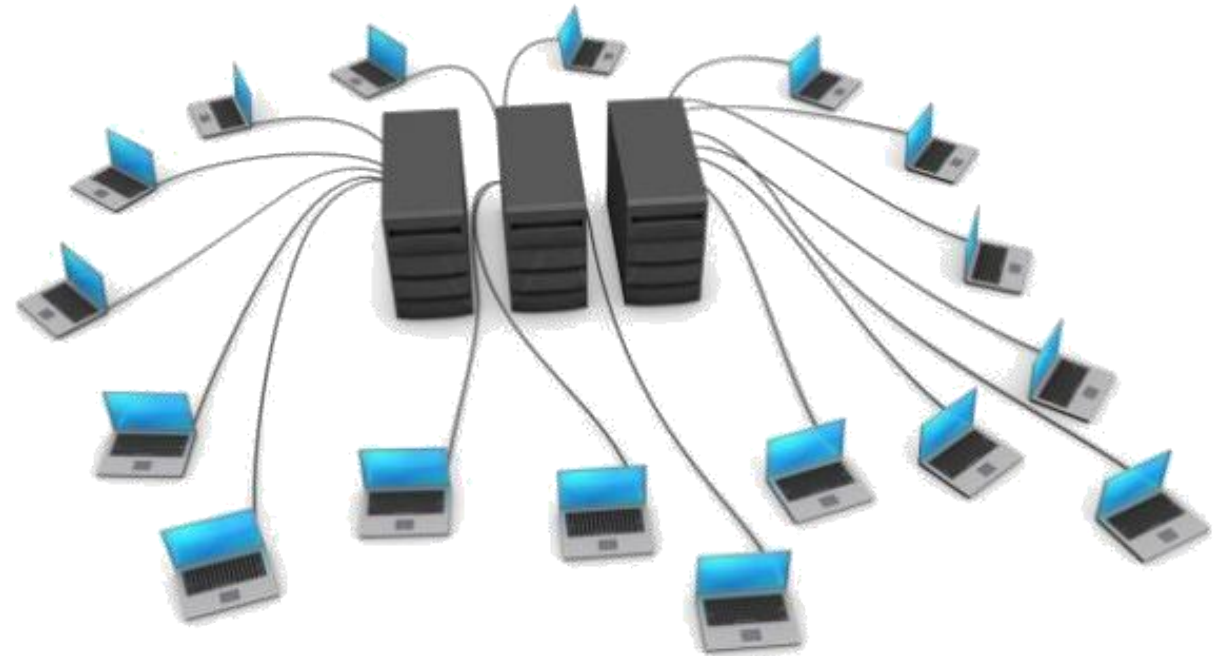
- Priced from \$100 million to over \$1 billion.
- High-capacity machines with thousands of processors.
- Multi-user systems.
- Used for weather forecasting, designing aircraft, scientific projects, etc.
- Frontier is the most powerful supercomputer today in 2022 .





# Types of computers: Mainframes

- Priced from \$5,000 to \$5 million.
- Water-cooled or air-cooled.
- Used by banks, airlines, colleges, and the like for millions of transactions.



# Types of computers: Workstations



# Types of computers: Workstations

- Expensive, powerful personal computers.
- Required for scientific, mathematical, engineering, computer-aided design (CAD), computer-aided manufacturing (CAM).
- Used for designing cars and movie special effects.



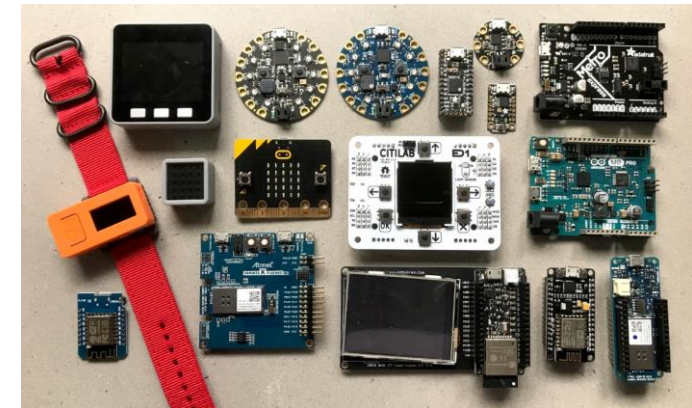
# Types of computers: Microcomputers

- Personal computers that cost \$500 to \$5,000.
- Used either stand-alone or in a network.
- Types include desktop, tower, notebooks (laptops), netbooks, tablets.



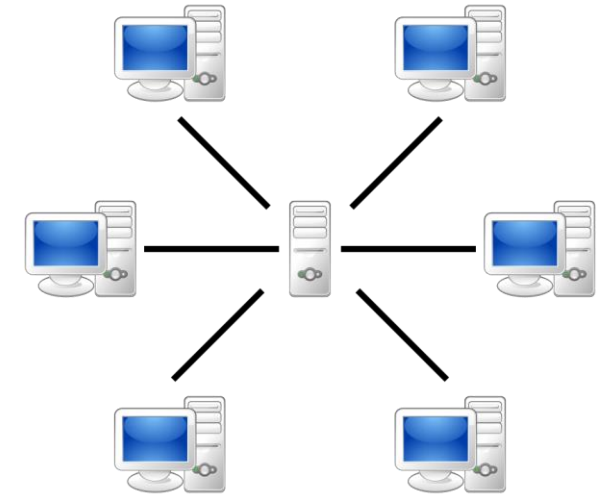
# Types of computers: Microcontrollers

- Tiny, specialized microprocessors inside appliances & automobiles.
- They are in microwaves, programmable ovens, blood-pressure monitors, air bag sensors, vibration sensors, MP3 players, digital cameras, keyboards, car systems, etc.



# Types of computers: Servers

- The word **server** describes the way a computer—whether mainframe, workstation, or PC—is used.
- A central computer connected (wired or wirelessly) to other computers on a client/server network.
- Purpose: Hold data and programs for clients to access and to supply services for clients.
  - Clients are other computers, such as PCs or workstations, on which users run applications



# Computer Networks and the Internet

- Computer network: A collection of computers and other devices that are connected together.
  - Users can share hardware, software, and data
  - Users can communicate with each other
- Network servers: Manage resources on a network
- Clients: Access resources through the network server

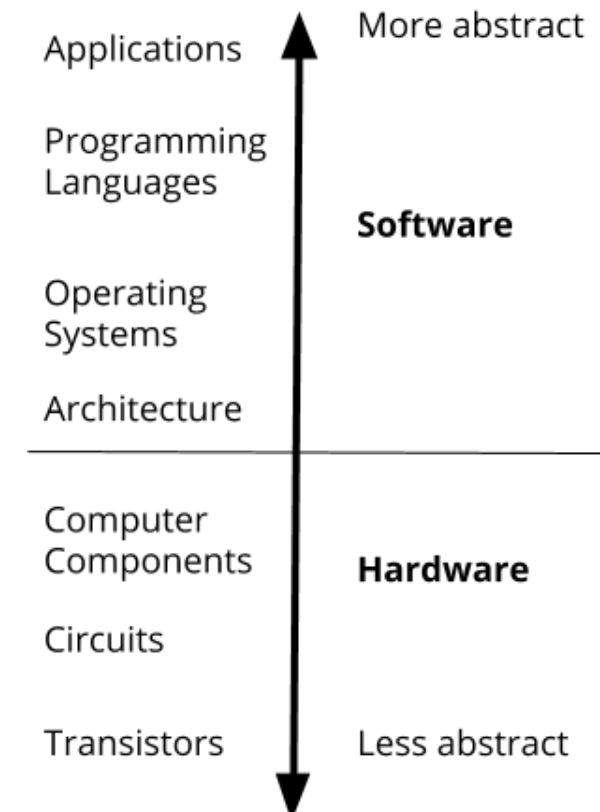
# Computer Networks and the Internet

- Computer networks exist in many sizes and types
  - Home networks
  - University and small business networks
  - Large corporate
  - The Internet

# What Are the Internet and the World Wide Web?

- Internet: The largest and most well-known computer network in the world.
- World Wide Web: One resource (a vast collection of Web pages) available through the Internet.
  - Web sites contain Web pages stored on Web servers.
  - Web pages viewed using a Web browser (Internet Explorer, Chrome, Safari, Firefox, Opera, etc.)

- **Applications:** Any program you run on your computer.
- Programs are comprised of millions of instructions.
- **The Operating System:** Starts running when the computer boots up. Manager/supervisor Can run multiple programs at once .



# Review: History

- History

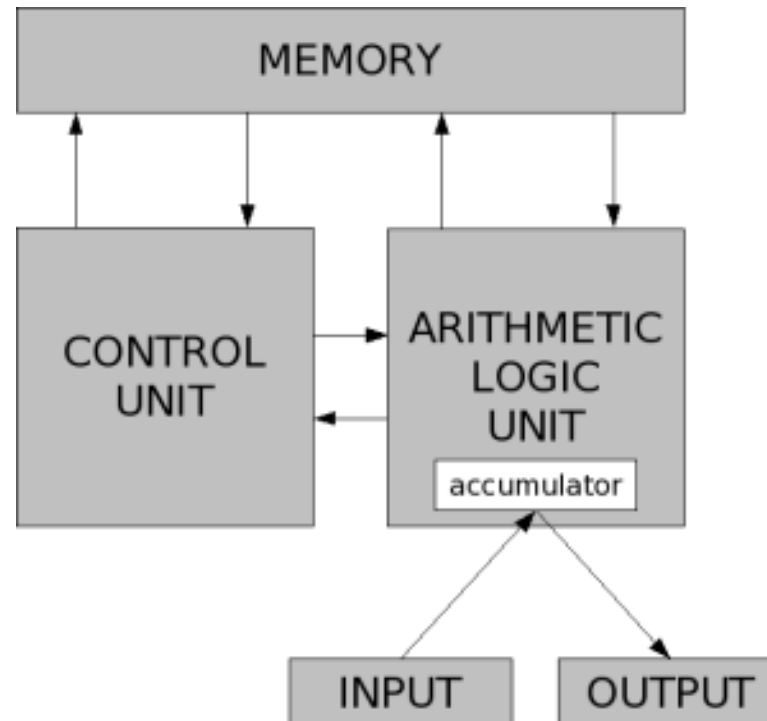
| Date | event              | Date | event                       |
|------|--------------------|------|-----------------------------|
| 1985 | First Dot-com      | 2009 | Windows 7                   |
| 1996 | Google             | 2010 | iPad                        |
| 1999 | Wi-Fi              | 2012 | 1 billion users of Facebook |
| 2004 | Facebook - Firefox | 2015 | Apple Watch                 |
| 2005 | YouTube - Android  | 2016 | Quantum Computer            |

# Review: Generations

- Computers generations:
- First: vacuum tubes.
- Second: transistors.
- Third: ICs, Keyboards and monitors.
- Fourth: microprocessors, printers, mouse, magnetic disks, flash memory, and optical disks, wireless, Internet.
- Fifth: AI, voice and touch, optical computers.

# Review: Von Neumann Architecture

- Von Neumann Architecture



- Most modern computers are Von Neumann machines.

# Review: Memory

- Random Access Memory (RAM).
- Read-Only Memory (ROM).
- Hard drive.

# Review: Types of computers

- **Supercomputers:** (weather forecasting, designing aircraft).
- **Mainframes:** (banks, airlines, colleges).
- **Workstations:** powerful personal computers (designing cars, drugs, movie special effects).
- **Microcomputers:** (desktop, laptops, tablets, mobile).
- **Microcontrollers:** *embedded computers*(microwaves, air bag sensors, MP3 players, digital cameras, keyboards, car systems).
- **Servers:** central computer Hold data and programs for clients.



Thank you