

# KONSEP PERANGKAT KERAS KOMPUTER(1)

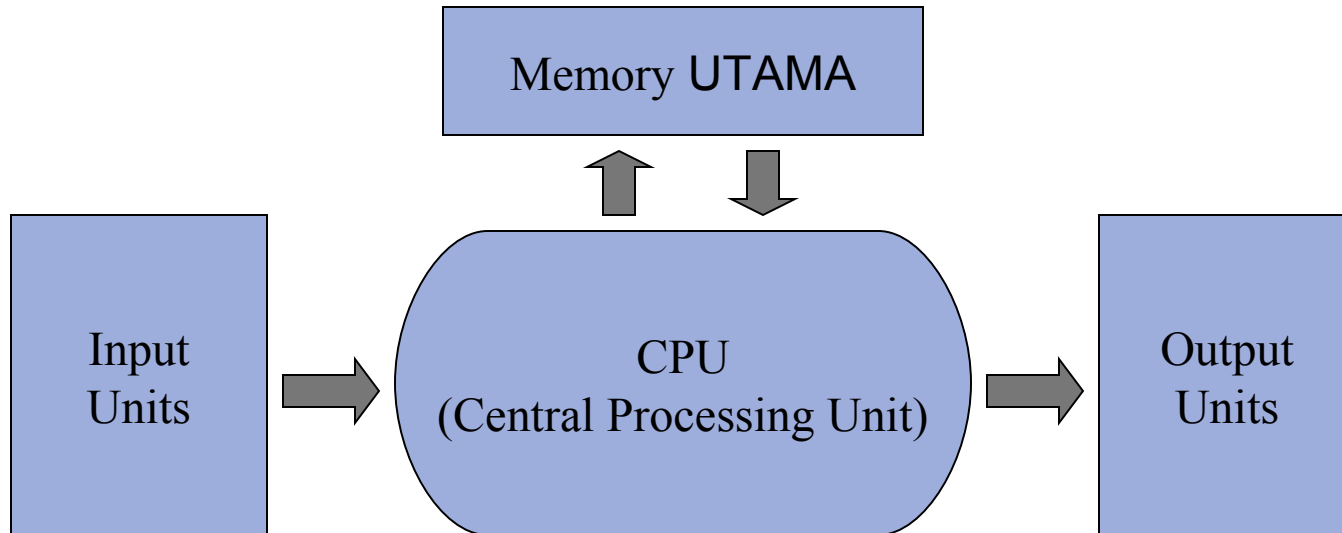
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Source: The Computer Continuum

# Basic Concepts of Computer Hardware

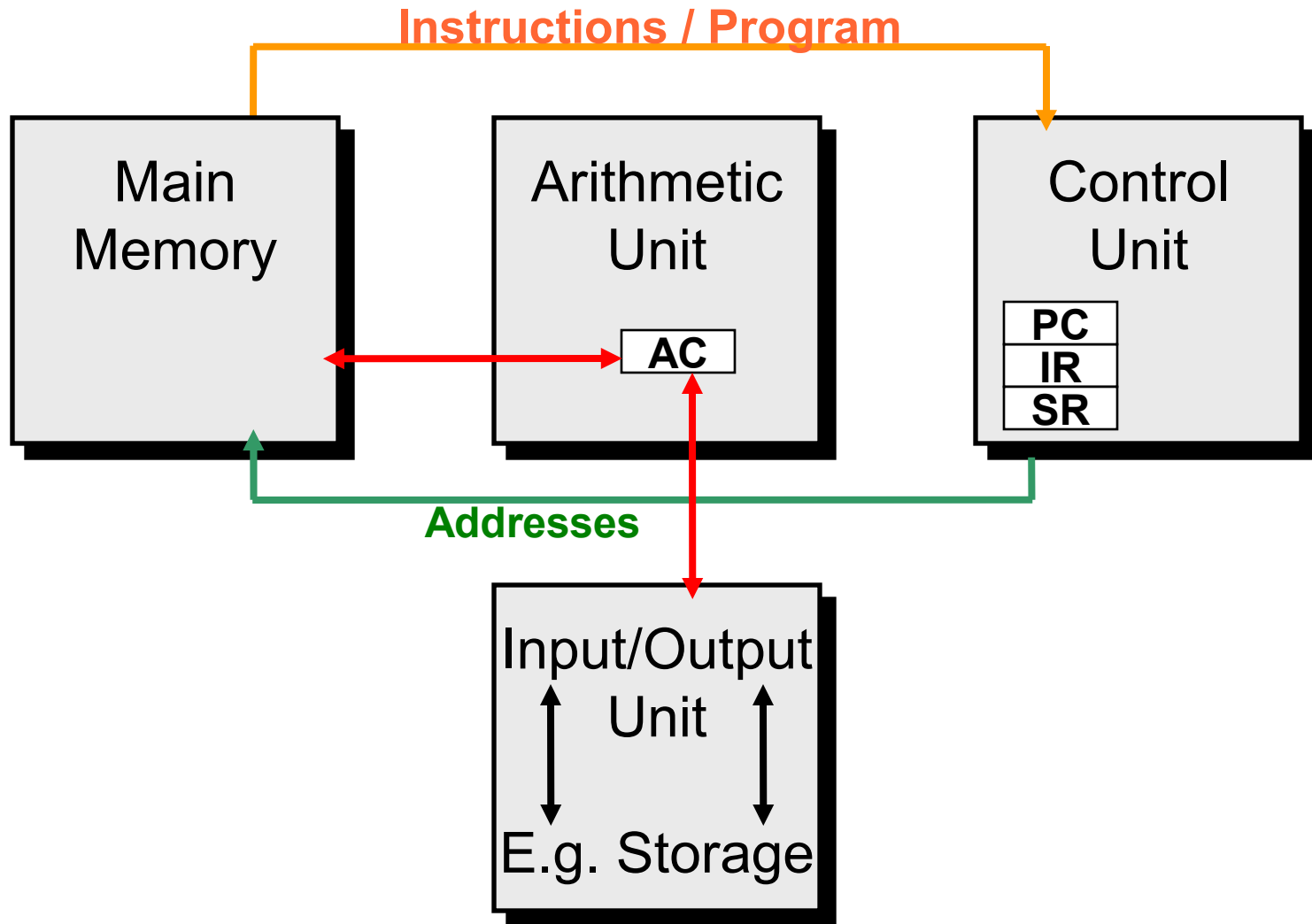


- This model of the typical digital computer is often called the **von Neumann** computer.
  - Programs and data are stored in the same memory: **primary memory**.
  - The computer can only perform one instruction at a time.

# The von Neumann architecture

- General purpose machine
  - Independent of applications
  - Flexible & Programmable
- 4 main units
  - Control unit (Instruction counter)
  - Arithmetic unit (Accumulator)
  - Input/Output unit (Connection to the outside)
  - Main memory
- Interconnected by simple buses

# Von Neumann – Overview



# Von Neumann – Details (1)

- System structure is application independent
  - Fully programmable
- Programs and Data are stored in the same memory
  - Main Memory
  - Can be manipulated by the machine
- Main memory is divided into cells
  - Equal size
  - Consecutively numbered (addresses)

# Von Neumann – Details (2)

- Program is composed of a sequence of instructions
  - Read one after the other from main memory
- Program execution can be altered
  - Conditional or unconditional jumps
  - Change the current execution
  - Done by loading new value into PC register

# Von Neumann – Details (3)

- Usage of binary numbers
  - Just two values allowed per digit: 0/1
  - Easy to implement: voltage yes or no

# Von Neumann – Today

- Still the dominant architecture in current systems
  - Used in all popular systems / chips
- Only minor modifications
  - Control und Arithmetic unit combined  
Result: CPU (Central Processing Unit)
  - New memory paths between memory and I/O  
Direct Memory Access (DMA)
- Additions to the concept
  - Multiple arithmetic units / Multiple CPUs
  - Parallel processing



# Basic Concepts of Computer Hardware

- Input/Output (I/O): Refers to the process of getting information into and out of the computer.
  - Input: Those parts of the computer receiving information to programs.
  - Output: Those parts of the computer that provide results of computation to the person using the computer.

# Sources of Data for the Computer

- Two types of data stored within a computer:
  - **Original data or information:** Data being introduced to a computing system for the first time.
    - Computers can deal directly with printed text, pictures, sound, and other common types of information.
  - **Previously stored data or information:** Data that has already been processed by a computer and is being stored for later use.
    - These are forms of binary data useful only to the computer.
    - Examples: Floppy disks, DVD disks, and music CDs.

# Input Devices

- Two categories of input hardware:
  - Those that deal with original data.
  - Those that handle previously stored data.

# Input Devices

- Input hardware: Those that deal with original data.
  - Keyboard
  - Mouse
  - Voice recognition hardware
  - Scanner
  - Digital camera
- Digitizing: The process of taking a visual image, or audio recording and converting it to a binary form for the computer.
  - Used as data for programs to display, play or manipulate the digitized data.

# Input Devices

- Connecting Hardware to the computer:
  - Hardware needs access through some general input/output connection.
    - **Port:** The pathway for data to go into and out of the computer from external devices such as keyboards.
      - There are many standard ports as well as custom electronic ports designed for special purposes.
      - Ports follow standards that define their use.
        - » SCSI, USB: Multiple peripheral devices (chain).
        - » RS-232, IDE: Individual peripheral devices.
    - **Peripheral device:** A piece of hardware like a printer or disk drive, that is outside the main computer.

# Input Devices

- Connecting Hardware to the computer:  
(continued)
  - Hardware needs software on the computer that can service the device.
    - **Device driver:** Software addition to the operating system that will allow the computer to communicate with a particular device.

# Input Devices

- Common Basic Technologies for Storing Binary Information:
  - Electronic
  - Magnetic
  - Optical

# Input Devices

- Electronic Circuits
  - Most expensive of the three forms for storing binary information.
  - A flip-flop circuit has either one electronic status or the other. It is said to flip-flop from one to the other.
  - Electronic circuits come in two forms:
    - Permanent
    - Non-permanent



# Input Devices



- Magnetic Technology
  - Two parts to most of the magnetic forms of information storage:
    - The **medium** that stores the magnetic information.
      - Example: Floppy disk. Tiny spots on the disk are magnetized to represent 0s and 1s.
    - The **device** that can “read” that information from the medium.
      - The drive spins the disk.
      - It has a magnetic sensing arm that moves over the disk.
      - Performs nondestructive reading.

# Input Devices

- Optical
  - Uses lasers to “read” the binary information from the medium, usually a disc.
    - Millions of tiny holes are “burned” into the surface of the disc.
    - The holes are interpreted as 1s. The absence of holes are interpreted as 0s.



# Input Devices

- Secondary Memory Input Devices
  - These input devices are used by a computer to store information and then to retrieve that information as needed.
    - External to the computer.
    - Commonly consists of floppy disks, hard disk drives, or CD-ROMs.
  - Secondary memory uses binary.
    - The usual measurement is the byte.
      - A byte consists of 8 binary digits (bits). The byte is a standard unit.

# Input Devices

- The four most important characteristics of storage devices:
  - Speed and access time
  - Cost / Removable versus non-removable
  - Capacity
  - Type of access

# Input Devices

- **Speed (Access time)** - How fast information can be taken from or stored onto the computer memory device's medium.
  - Electronic circuits: Fastest to access.
    - 40 billionths of a second.
  - Floppy disks: Very slow in comparison.
    - Takes up to 1/2 second to reach full speed before access is even possible.

# Input Devices

- **Capacity** - The amount of information that can be stored on the medium.

<i>Unit</i>	<i>Description</i>	<i>Approximate Size</i>
1 bit	1 binary digit	
1 nibble	4 bits	
1 byte	8 bits	1 character
1 kilobyte	1,024 bytes	≈1/2 page, double spaced
1 megabyte	1,048,576 bytes 1 million bytes	≈500,000 pages
1 gigabyte	1,073,741,824 bytes 1 billion bytes	≈5 million pages
1 terabyte	1 trillion bytes	≈5 billion pages

# Input Devices

- **Type of Access**

- **Sequential** - Obtained by proceeding through the storage medium from the beginning until the designated area is reached (as in magnetic tape).
- **Random Access** - Direct access (as in floppy and hard disks).