

Hardware: Input, Output & Storage Devices

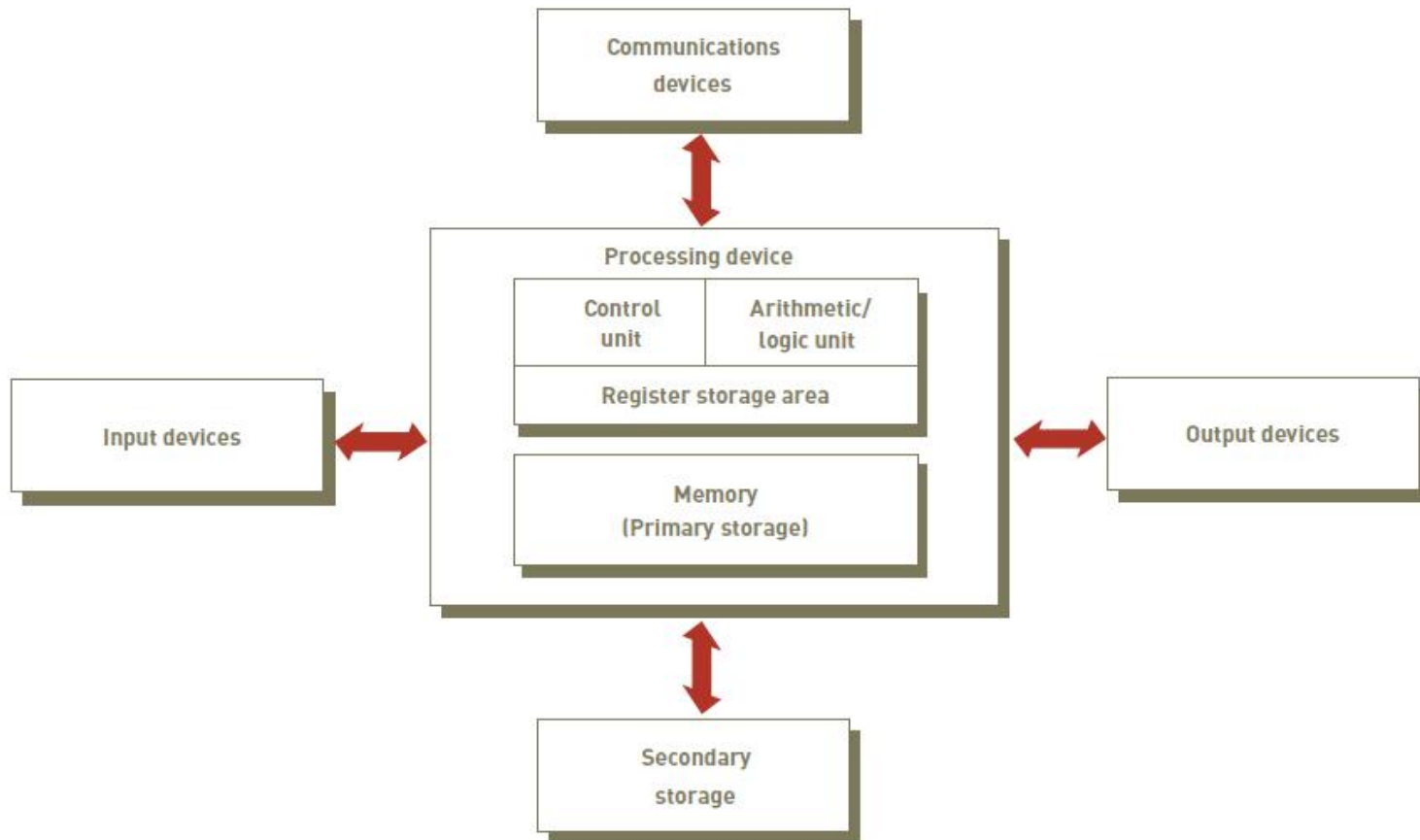
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What is Hardware?

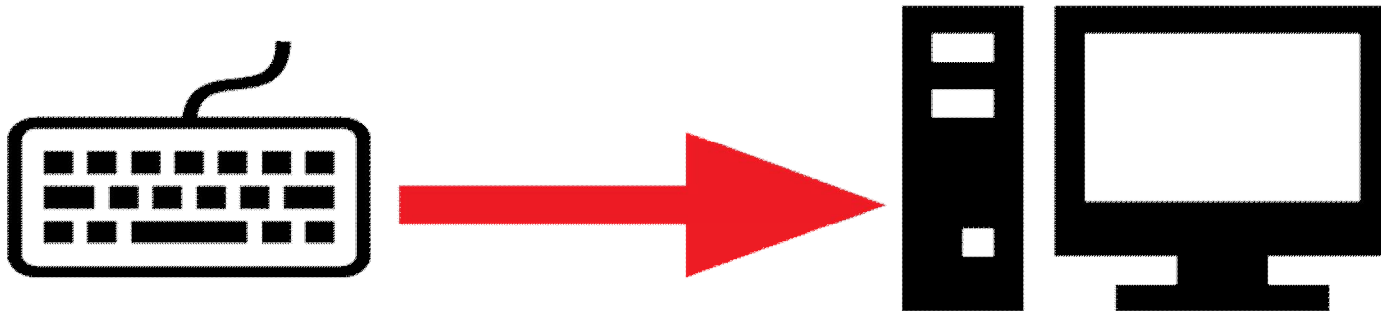
Hardware is the physical parts of a computer system

In other words, the parts
of the computer you can
touch



What is an Input Device?

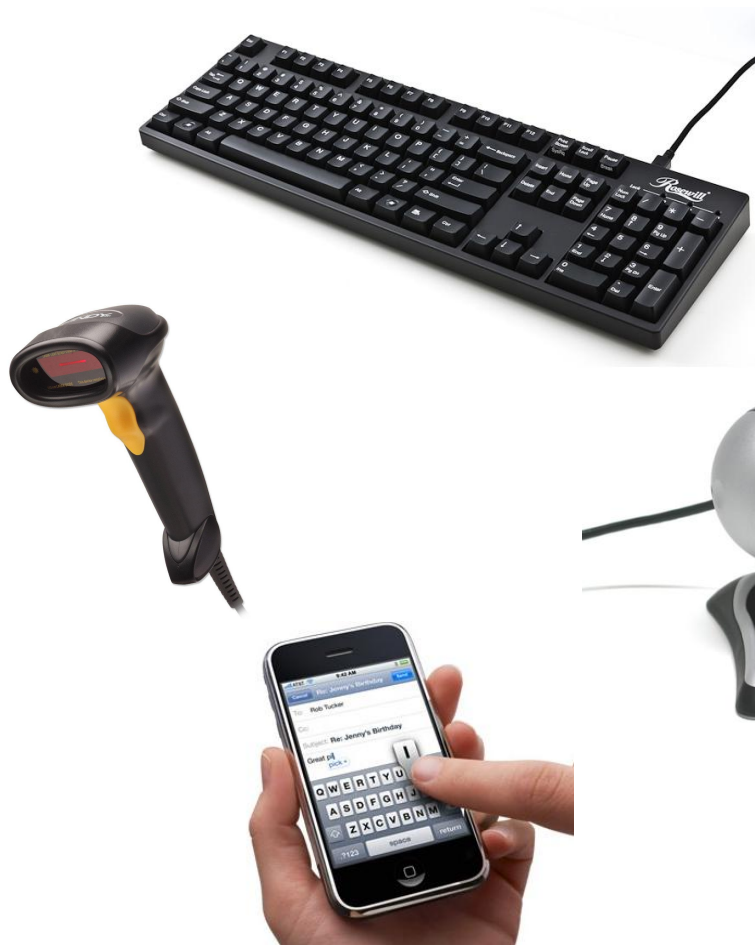
An input device is a piece of hardware that allows the user to put data into a computer system



- Devices used to input general types of data:
 - Personal computer input devices
 - Speech recognition technology
 - Digital cameras
 - Scanning devices
 - Optical data readers
 - Magnetic ink character recognition (MICR) devices
 - Magnetic stripe card

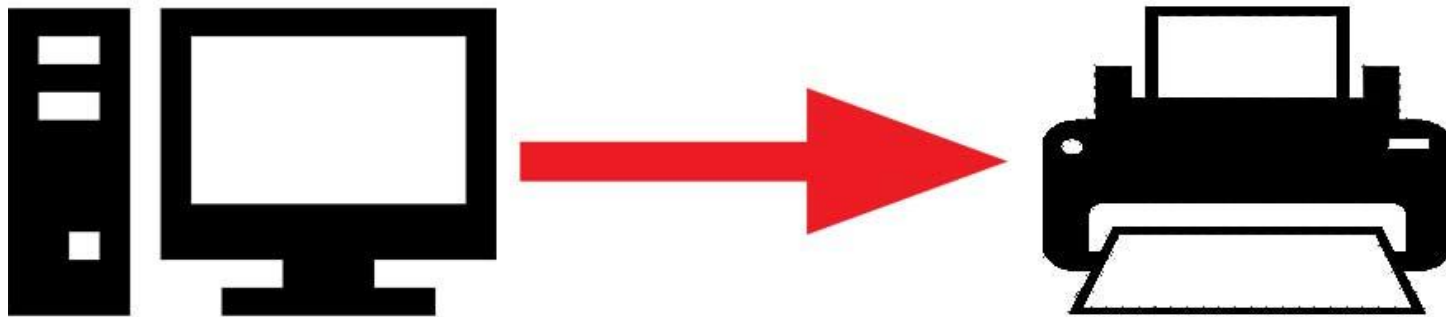
• Devices used to input general types of data (continued):

- Chip-and-PIN cards and contactless cards
- Point-of-sale devices
- Automated teller machine (ATM) devices
- Pen input devices
- Touch-sensitive screens
- Bar-code scanners
- Radio frequency identification chips



What is an Output Device?

An output device is a piece of hardware that allows the user to receive data from a computer system



- Display monitors used to display output from computer
- Plasma display:
 - Uses thousands of smart cells (pixels) consisting of electrodes and neon and xenon gases that are electrically turned into plasma to emit light
- LCD displays:
 - Flat displays that use liquid crystals
 - Brighter, flicker-free, and do not emit radiation

- OLED displays
 - Uses layer of organic material sandwiched between two conductors
 - Provide sharper and brighter colors than LCDs and CRTs
- Power usage
 - Plasma (most), LCD, OLED (least)
- Digital audio player:
 - Can store, organize, and play digital music files

- Printers and plotters:
 - Laser printers and inkjet printers
 - Plotters used for general design work
- Digital Audio Players
 - MP3 players compress sound sequence into small file while preserving original level of sound quality
- E-books:
 - Digital media equivalent of a conventional printed book



What is a Storage Device?

- This allows a user to install programs and save their files on a computer
- The device retains this information when the power is switched off, this means it is a permanent storage.
- There are three categories of storage devices.



Hardware

There are three categories of storage devices

Magnetic

Works by magnetising and demagnetising the surface of a spinning disk.



Example: Hard Drive

Optical

Works by altering parts of a disc that can or cannot reflect a laser beam.



Example: CD/DVD/Blu-Ray

Solid State

Uses flash memory and has no moving parts.



Example: USB Stick/SD Card

Secondary Storage

- Compared with memory, offers the advantages of nonvolatility, greater capacity, and greater economy
- On a cost-per-megabyte basis:
 - Secondary storage is considerably less expensive than primary memory
- Types used, access methods, storage capacities, and portability required of secondary storage media determined by the information system's objectives

- Magnetic tapes:
 - Primarily for storing backups of critical organizational data
- Magnetic disks:
 - Direct-access storage device
- Redundant array of independent/inexpensive disks (RAID):
 - Method of storing data that generates extra bits of data from existing data

- Virtual tape:
 - Used for less frequently needed data
- Optical secondary storage devices:
 - Compact disc read-only memory (CD-ROM):
 - Storage capacity is 740 MB
 - Digital video disc (DVD):
 - 6 x capacity of CD
 - Blue-ray high-definition video disk:
 - 3 x capacity of DVD

- Solid state secondary storage devices:
 - Store data in memory chips rather than magnetic or optical media
 - Have few moving parts, so they are less fragile than hard disk drives
 - Disadvantages of SSD
 - High cost per GB of data storage
 - Lower capacity compared to current hard drives

Enterprise Storage Options

- Network-attached storage (NAS):
 - Hard disk storage that is set up with its own network address rather than being attached to a single computer.
- Storage area network (SAN):
 - Special-purpose, high-speed network that provides direct connections among data-storage devices and computers.

Computer 1



Computer 2



Computer 3



Storage device 1



Storage device 2



Storage device 3



- Storage as a service:

- A data storage model where a data storage service provider rents space to people and organizations

- Providers for enterprises:

- AT&T, Aviva, Amazon.com, EMC, Google, Microsoft, ParaScale

- Providers for individuals

- Box.net, Carbonite, SugarSynch, Symantec, Mozy