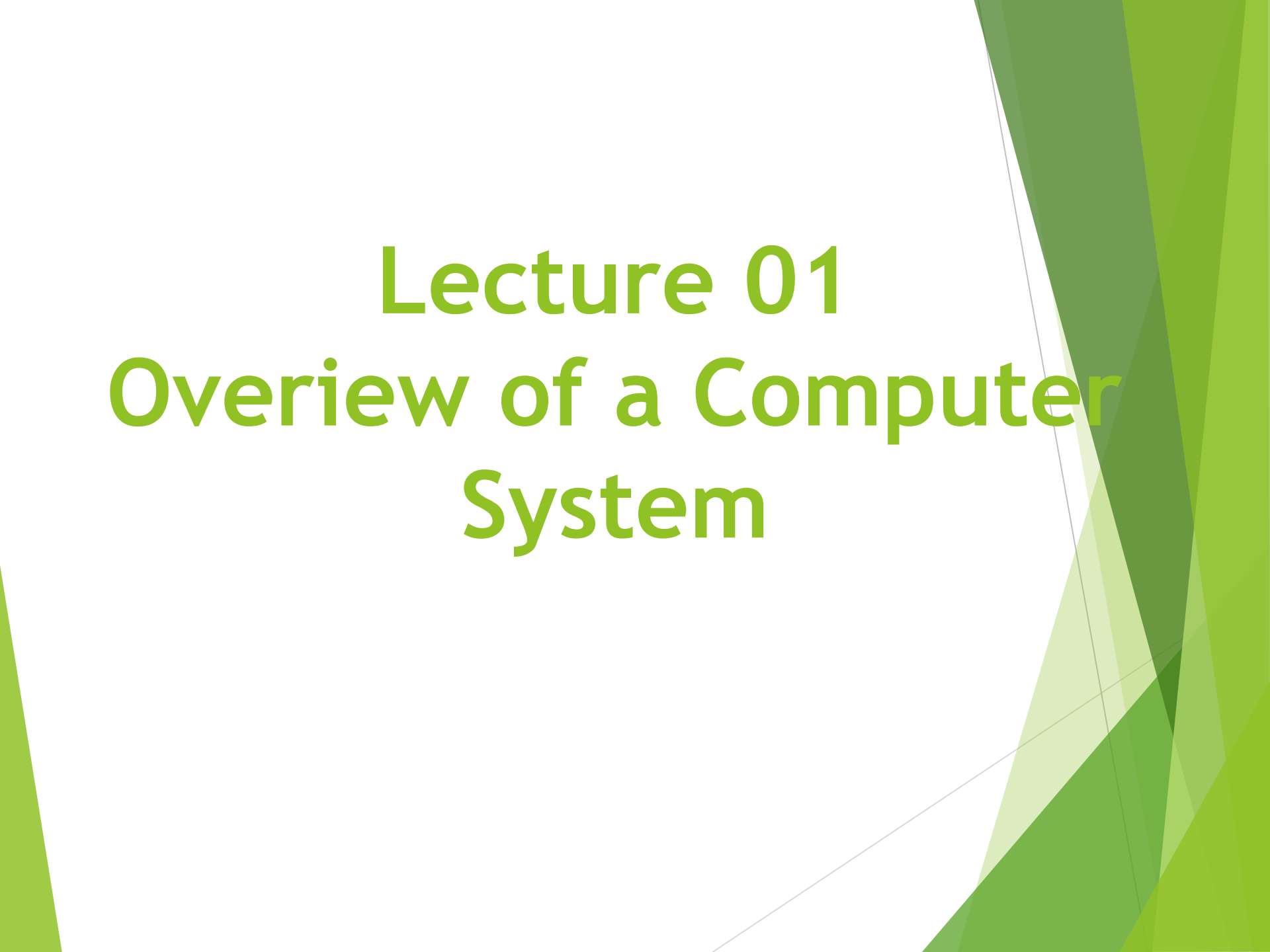


Essentials of ICT

ICT1113

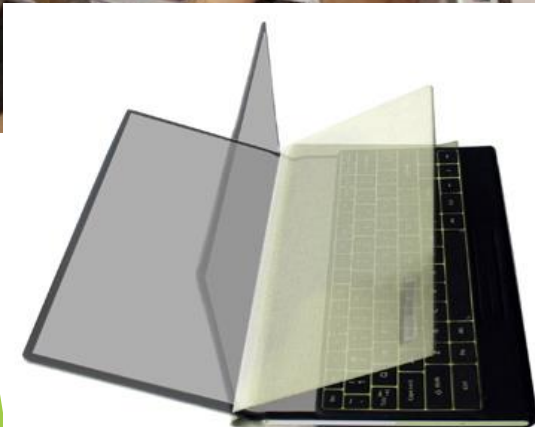
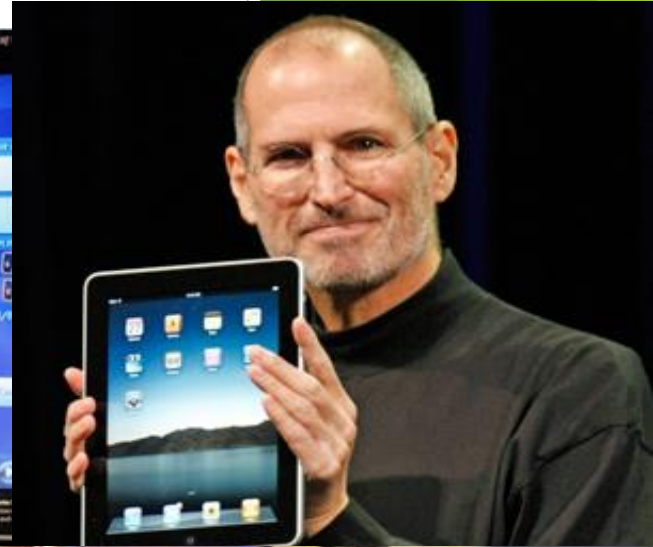
Waruni Hewage
Dept. Of ICT
Faculty of Technology
University of Ruhuna

The background features abstract, overlapping green geometric shapes, primarily triangles and polygons, in various shades of green, creating a modern and dynamic look.

Lecture 01

Overview of a Computer System

Computers???



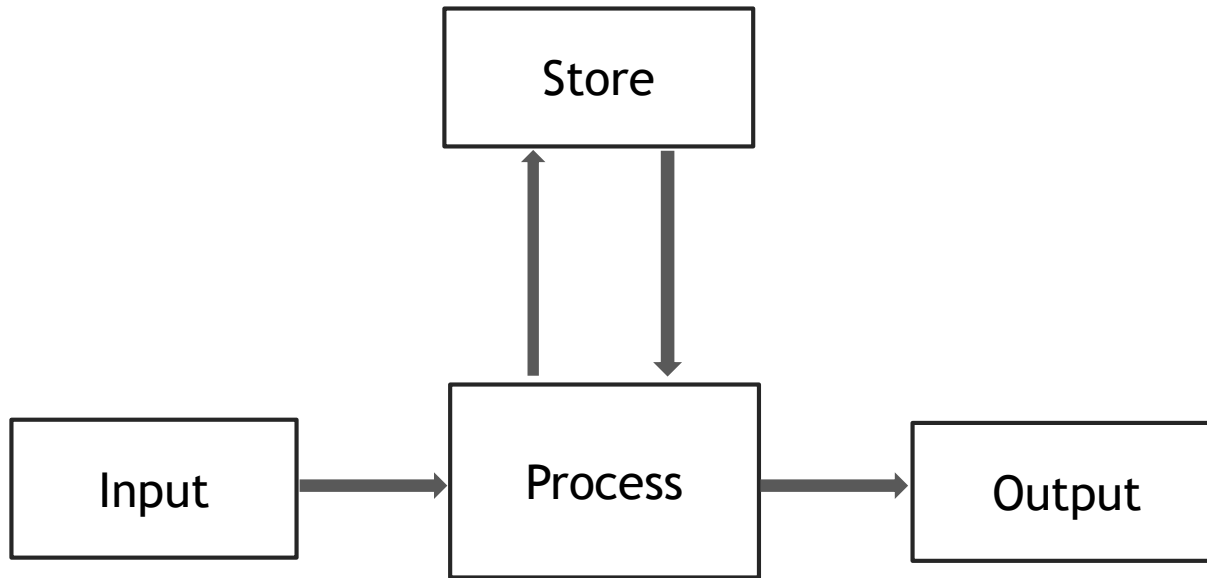
What is a Computer?

- ▶ Anything that transforms information in a purposeful way
- ▶ **General purpose device** that can be programmed to carry out a finite set of arithmetic or logical operations
- ▶ **Programmable machine** that receives input, stores and manipulates data, and provides output in a useful format
- ▶ A device that takes in **raw data as input** and **processes it** and provides **information as the output**, computer also has the **ability to store data and information**

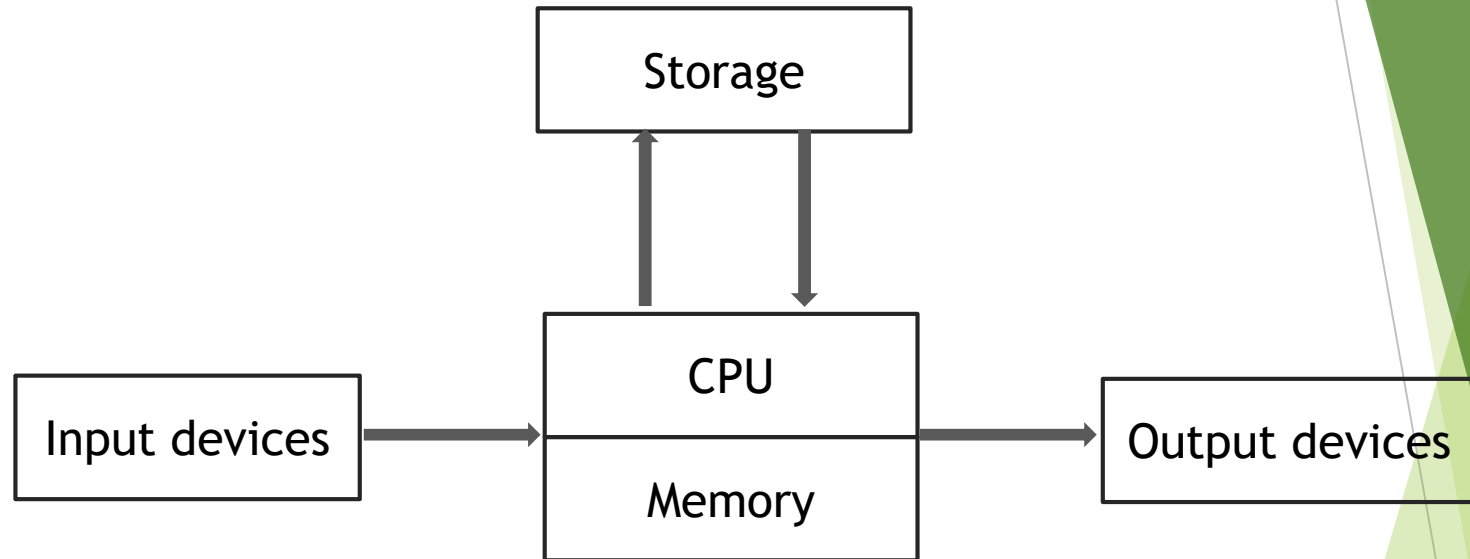
Computer

- ▶ A device that
 - ▶ takes in raw facts (data) as **input**
 - ▶ **processes** it
 - ▶ provides information as the **output**
 - ▶ has the ability to **store** data and information

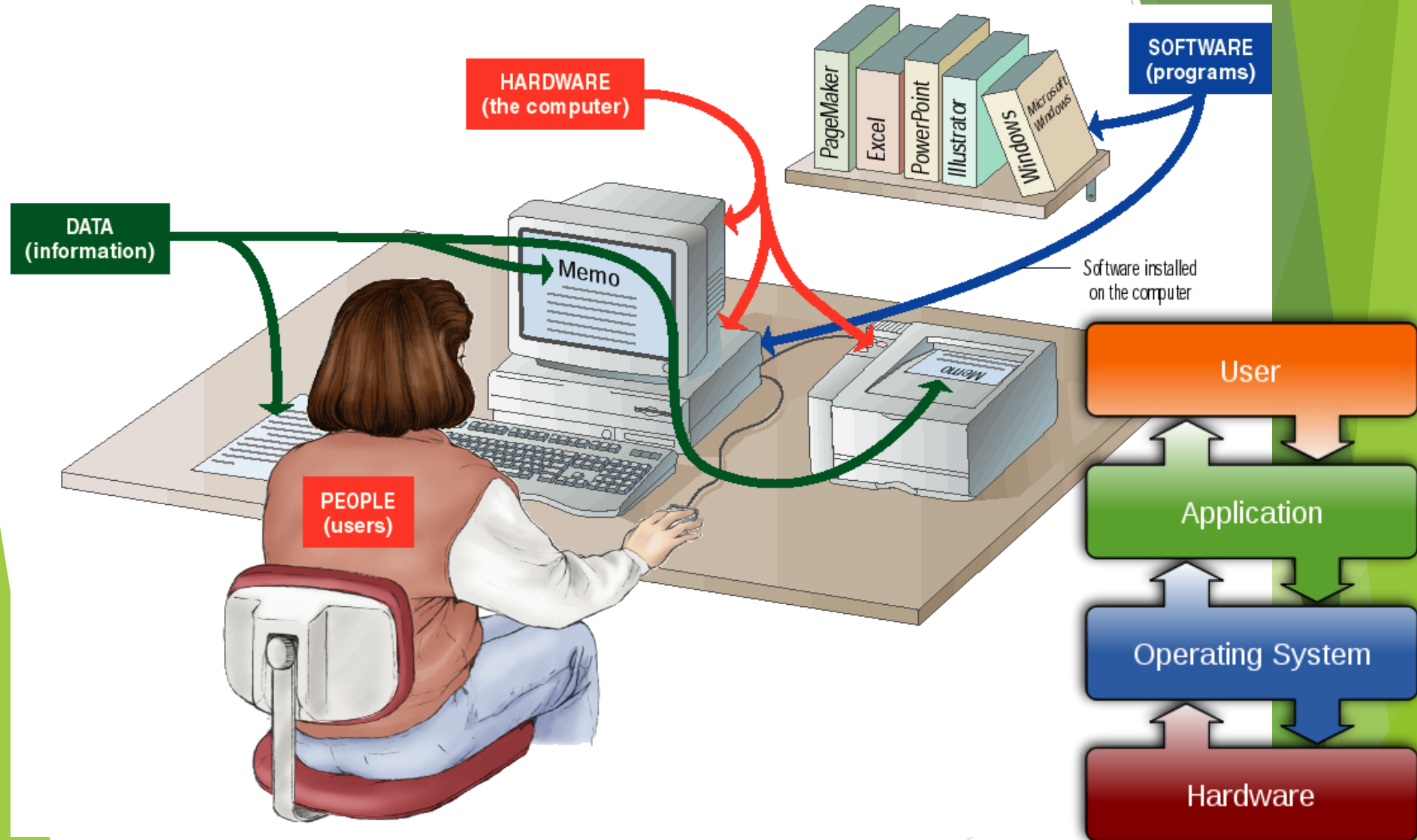
Functional Organization of a Computer System



Physical Organization of a Computer System



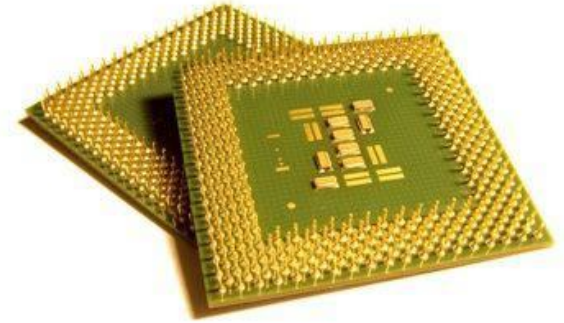
Computer System



Computer Hardware

- ▶ Parts you can see and touch
- ▶ Electronic and mechanical equipments that make up a computer
- ▶ Categorization:
 - Processor, memory and integrating devices
 - Input devices and output devices
 - Storage devices

The Processor



- ▶ **Central Processing Unit (CPU)**
 - ▶ Receives data from input devices
 - ▶ Processes data ,produces information and provides an output
 - ▶ Stores information in storage device
 - ▶ Controls the various devices of a computer
- ▶ carries out the instructions of a computer program by performing the basic arithmetical and logical, input/output operations of the system

Processor Manufacturers

- ▶ Intel : Core i7 , Xeon, Pentium, Celeron , Atom, Core 2 Duo, ...
- ▶ Advanced Micro Devices Inc. (AMD) : Athlon, Phenom, Sempron,...
- ▶ Centaur Technologies: VIA Nano , VIA C7-D , Duron ,...
- ▶ Sun Micro Systems : SPARC chip- processors for the Sun systems
- ▶ IBM : PowerPC
- ▶ Motorola : Motorola 6800
- ▶ Microchip



Memory

Two basic types :

Random Access Memory (RAM)



- Main Memory is also referred to as the RAM Device that temporarily store data
- RAM can be read from and also written into
- Volatile :lose their contents when the power is turned off
- Main types: SRAM and DRAM

Read Only Memory (ROM)



- A type of memory which can only be read from
- Non-volatile
- BIOS (Basic Input Output System) ROM- the most common ROMs in the computer
- Read -only

Input and Output Devices

- Devices that are used to interact with the user

Input Devices

- Any device that can feed data or information to a computer
- Helps the user to provide commands to the processor
 - keyboard, mouse or trackball and joystick
- Processor receives data and information via input devices
 - microphone, scanner and digital cameras

Output Devices

- Output information to the user
- All information which is outputted can either be seen, heard or felt
 - display information: Monitor or LCD panel and projectors
 - audible output : Speakers
 - can be felt: feedback joystick

- Certain devices have functionality that fall into both input and output categories
 - touch-screen display, feedback joystick

Storage Devices

▶ Punch cards

- ▶ a card with holes punched representing 1s and 0s

▶ Magnetic storage devices

- ▶ hard disk , floppy disk, external hard disks, ZIP disk, magnetic tape

▶ Optical storage devices

- ▶ CD ROM , DVD ROM

▶ Semiconductor memory

- ▶ RAM, flash-drive , Memory stick

Integrate Together...

- The processor, Memory, Input / Output devices and storage devices need to be integrated together to function
- These components have to be placed on a board called the Main-board or the Motherboard



Motherboard form factors

Implies the **dimensions** where the screw holes, CPU, RAM, input/output connectors, expansion slots are located and the type of power connectors



Standard-ATX



Micro-ATX



Mini-ITX



Nano-ITX



Pico-ITX

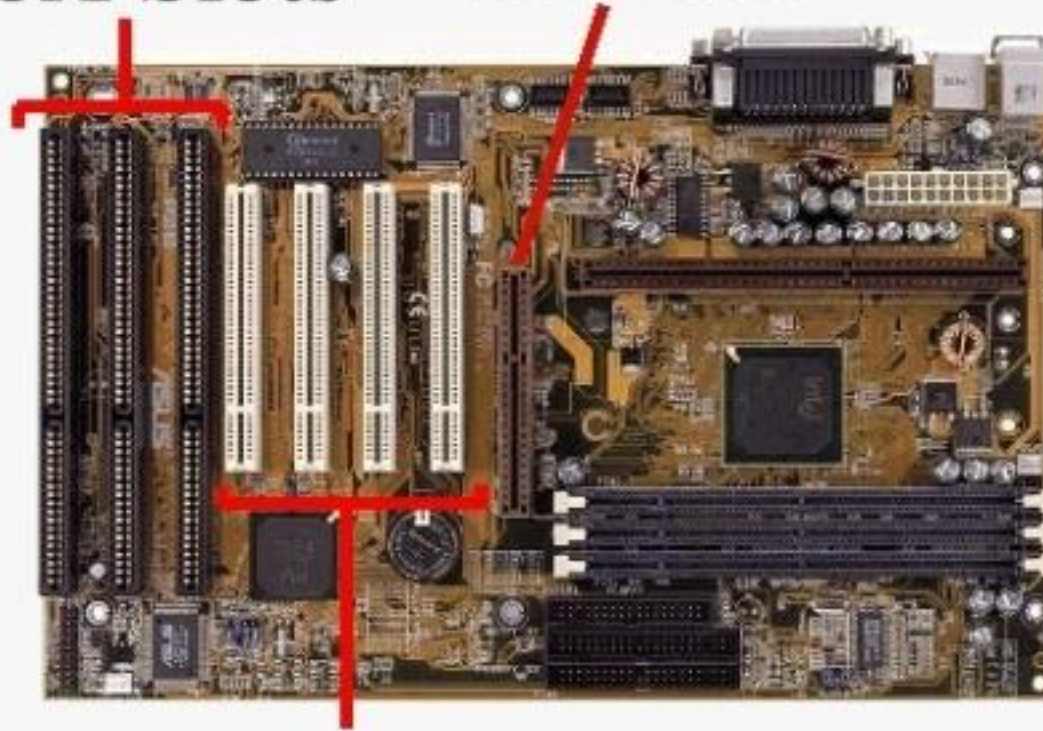


Expansion cards and other components

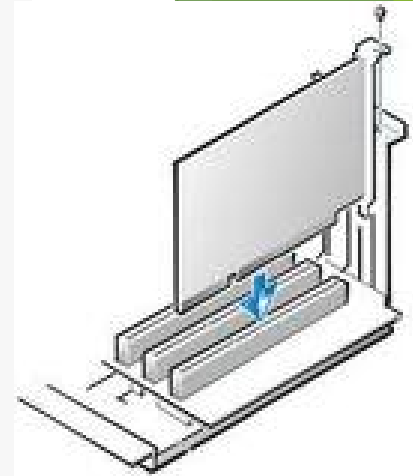
- Some additional circuit boards may be required to integrate additional devices if they are already not embedded into the motherboard
 - ▶ These circuits are commonly referred to as cards
 - ▶ They are plugged into expansion slots available on the motherboard

ISA Slots

AGP Slots



PCI Slots



ISA : Industry Standard Architecture

PCI :Peripheral Component Interconnect

AGP: Accelerated Graphics Port

Cables to connect devices

- ▶ There are additional cables that are required to connect devices
- ▶ Some of the most common cables are;
 - ▶ Hard disk and floppy drive ribbon cables
 - ▶ CD/DVD drive analog audio cable
 - ▶ Video cable
 - ▶ Printer cable
 - ▶ USB cables
 - ▶ FireWire cables



Technologies to connect devices

- ▶ There are technologies to connect computers to external devices
- ▶ Create direct connection between the computer and the external device
- ▶ Some of the most common technologies:
 - ▶ Blue-tooth (wireless)
 - ▶ IrDA (infrared)
 - ▶ Wi-Fi (wireless)



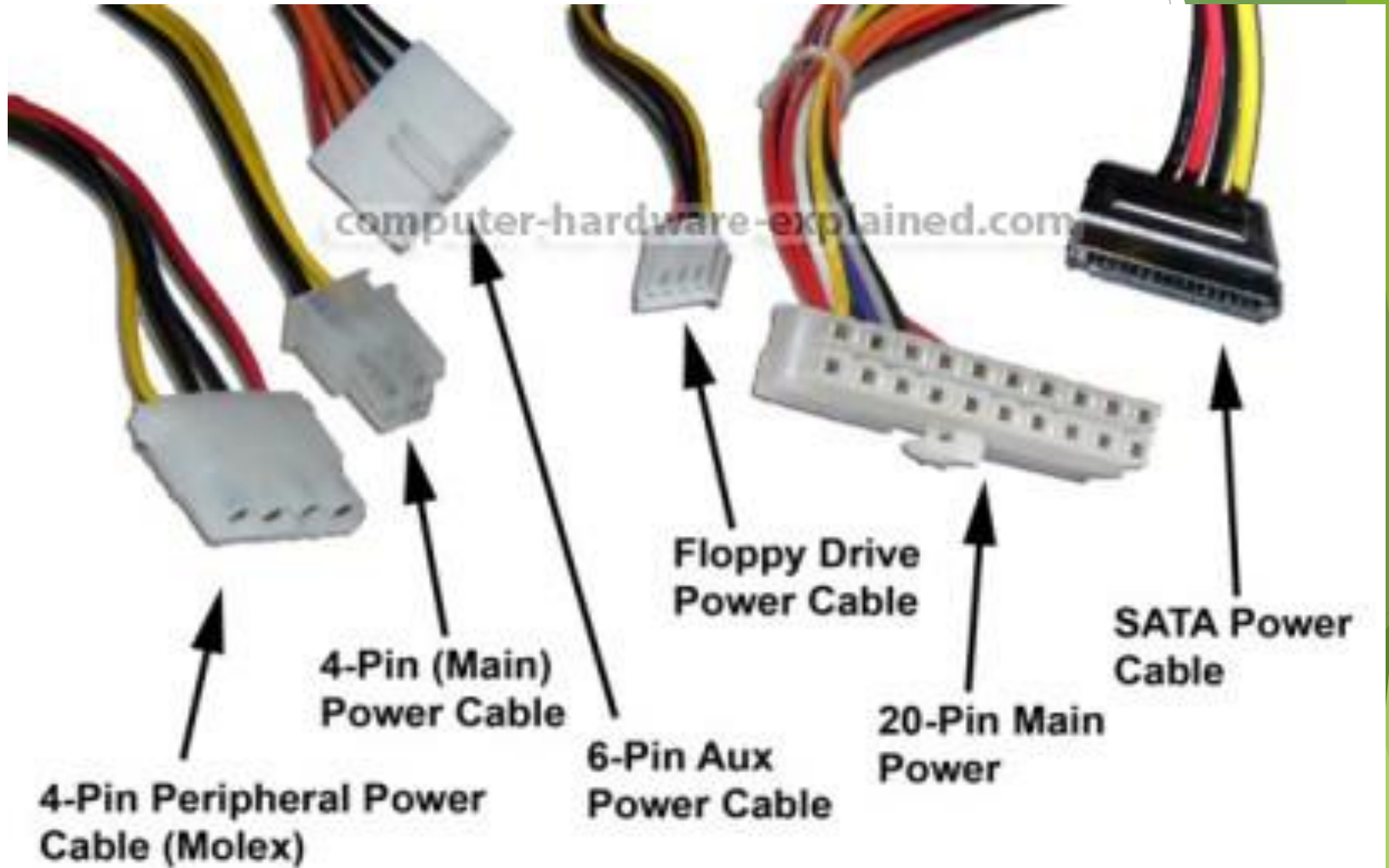
Chassis and Power supply

- ▶ All of the components of a computer system require power to function
 - ▶ power supply unit(PSU) provide the power
- ▶ Computer systems are encased in an enclosure.
 - ▶ Chassis provide the enclosure
- ▶ Additional cables are required to connect the power supply to the wall power outlet
 - ▶ power cables
- ▶ Cables are required to connect devices to the power supply
 - ▶ power connectors

Power connectors

- ▶ Power connectors
 - ▶ in different shapes and sizes
 - ▶ also supply different voltages
 - ▶ usually have special shapes or keys :
avoid incorrect connection

Power connectors



Chassis /computer case

- ▶ Enclosure that contains most of the components of a computer

consist of space for the,

- ▶ motherboard
- ▶ power supply
- ▶ input/output connectors
- ▶ expansion cards
- ▶ expansion bays
- ▶ wires to connect to the motherboard
- ▶ indicator Light Emitting Diodes (LEDs)



Chassis

- ▶ Usually made from steel, aluminium and/or plastic
- ▶ Various sizes
 - ▶ defined using form factors
 - ▶ according to the requirement different form factors may be used (e.g. tower, flatbed)

Chassis

► Tower chassis

- taller and much more spacious
- mini-tower , mid-sized tower and Full-size tower



ATX tower casing

► Flatbed chassis

- more compact and saves occupying space



slim-desktop flatbed casing

Software

▶ Machine language

- ▶ lowest level programming language
- ▶ directly executed by the computer
- ▶ every processor or processor family has its own machine code instruction set

▶ Assembly language

- ▶ implements a symbolic representation of the binary machine codes
- ▶ specific to a certain physical (or virtual) computer architecture

▶ High level programming language

- ▶ more portable across platforms

Eg: C/C++, Java, Visual Basic

Software

▶ Two fundamental types,

- ▶ System software
- ▶ Application software

▶ System software

- ▶ Control the system hardware and interact with application software
- ▶ manage and integrate a computer's capabilities
- ▶ *operating system and utilities*

▶ Application software

- ▶ help the user to perform single or multiple related specific tasks
- ▶ there are hundreds of thousands of application software in the world

Operating Systems

- ▶ Master control program

manages hardware and provides services for efficient execution of application software

- ▶ Some of the most popular Oss :

- ▶ Disk Operating System (DOS)
- ▶ Linux (Distributions: Debian, Ubuntu, Fedora, RedHat, Taprobane (SriLankan))
- ▶ Windows(Win98,WinMe,Windows 2000,Windows XP,Windows 7 ,Windows 8 ...)
- ▶ Mac OS :GUI based OS by Apple for their Macintosh machines
- ▶ UNIX (Unix System V, Solaris, SCO)

Utility Programs

- ▶ Help to enhance the capabilities of the system
 - ▶ some are embedded within the distribution of the OS or can be purchased or freely downloaded from the Internet
- ▶ Some of the main utility programs
 - Hardware Utilities
 - Virus Detection and Recovery Utilities
 - File-Compression Utilities
 - Spam and Pop-Up Blocker Utilities
 - Network and Internet Utilities
 - Server and Mainframe Utilities
 - Backup Utilities
 - Firewall
 - Intrusion Detection

Application software

- ▶ Helps the user to perform singular or multiple related specific tasks
- ▶ Allows people to increase their productivity
- ▶ May be used for a wide range of tasks

EX:

Word processing programs

Spreadsheet programs

Database management programs

Presentation programs

Database Applications

Online Information services

Graphics Programs

Project management software

Financial management programs

Desktop publishing (DTP) programs

Media players

Games

Simulation software

Software license

- ▶ governing the usage or redistribution of software
- ▶ categories:
 - ▶ **proprietary licenses**
 - ▶ constraints on what can be done with the software
 - ▶ restriction of access to the original source code.
ex: license for Microsoft Windows
 - ▶ **Free and open source licenses**
 - ▶ grant the right of users to use, study, change, and improve its design through the availability of its source code
 - ▶ the official definitions of free software by the Free Software Foundation and of open source software by the Open Source Initiative basically refer to the same software licenses, with a few minor exceptions

Computers are powerful ...

- ▶ Speed
- ▶ Accuracy
- ▶ Storage
- ▶ Communications

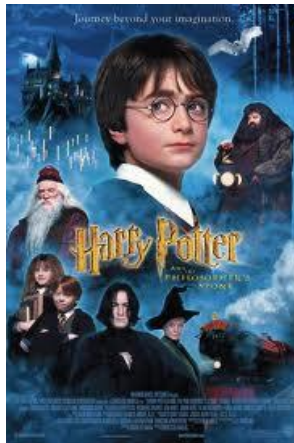
Computers allow users to **generate correct** information **quickly, hold** the information so it is available at any time, and **share** the information with **other computer users**.

Are computers smarter?

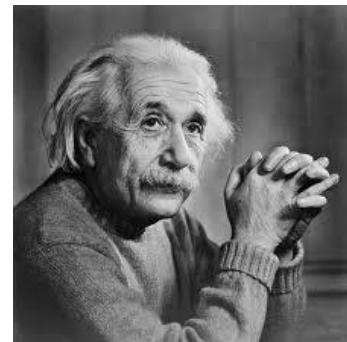
- ▶ Analyze new and unfamiliar situations
- ▶ Experiment with different approaches until find the best way to move forward
- ▶ Recognize patterns
- ▶ Make conclusions from observations
- ▶ Computers rely on sets of pre-installed instructions



Independent Thoughts



Creativity



Generation of New Ideas



Presentation 01 - Modern Day Computers

► Topics

- Supercomputers - Introduction & Uses →1
- Supercomputers - Examples →5
- Mainframe computers - Introduction & Uses →7
- Mainframe computers - Characteristics & Examples →9
- Minicomputers →2
- Network servers →10
- Personal computers - Desktop computers & Workstations →6
- Personal computers - Notebook computers & Tablet PCs →3
- Personal computers - Hand-held personal computers & Smart phones →8
- Artificial Intelligence →4

Presentation 01 - Modern Day Computers

► Instruction

- 10 groups
- 5 students per each group
- 10 minutes per each presentation (Time Management)
- One/Two students can represent the group when presenting / But all the members should present and be ready to answer for the questions
- Proper dress code
- Date: 8th of February 2018
- PowerPoint Presentation ???

Questions ???

