



Applications of Information and Communication Technology(ICT)

Lecture 2

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Lecture Outline

- Types of Computer
- Uses of Computers in society
- Basic Computer System Architecture
- Computer Memory
- Primary Storage
- Secondary Storage
- System Software
- Application Software



Types of Computer

- Since the invent of the first computer, there are different computers in size and processing
- There are some major types of Computer
 1. Supper computer
 2. Mainframe computer
 3. Mini computer
 4. Micro computer



Types of Computer (Conti.)

- Super Computer
 - The most power full computer
 - Handle large and complex problems/calculations
 - Process trillion of operation per second
 - Found in research organization



Types of Computer (Conti.)

- **Super-computer** are the most powerful in terms of the performance and data processing. These are specialized and task specific. Computer used by large organizations. These computers are used for research and exploration purpose, like NASA (National Aeronautics and Space Administration) uses super computers for launching space shuttles, controlling them and for space exploration purposes. Super-computer are very expensive and very large in size. It can be accommodated in large air-conditioned rooms and some super computers are spanning an entire building. Presently China's "Tianhe 2" is the world faster super-computer. It can perform 100 pita flops i:e Quadrillions of floating-point operations per second. Super-computer mostly use for space exploration, earthquake studies weather frosting and nuclear weapon testing.



Types of Computer (Conti.)

➤ Mainframe Computer

- Designed for huge volume of data
- Used for large organization
- Handle thousand of users
- Users access through a terminal



Types of Computer (Conti.)

- **MAINFRAME COMPUTER:** Main frame are not as powerful as super-computer but certainly they are quite expensive and many large firms and GOVT ORG uses main frame to run their business operations. Main frame can also be accommodated in large air-conditioned rooms because of its size, Main frame are not fastest in term of data processing and storage capacity as super-computer. However, it can also process and store large amount of data. Mainframe mostly uses in banks, educational institutions and insurance companies to store data about customers, students and insurance policy Holders.



Types of Computer (Conti.)

➤ Mini computer

- Also known is mid range computer
- Used for small business
- Not too much faster as compared to super-computer



Types of Computer (Conti.)

- **MINI COMPUTERS:** Minicomputer is used by small business and firm's microcomputer is also called "**MID RANGE COMPUTER**". These are small machines and can be accommodated on a disk mini-computers are not faster in processing and data storage as compared to super-computer and main frame computer. Minicomputer is not designed for a single user minicomputer can be used by companies and organization for specific purposes.



Types of Computer (Conti.)

➤ Micro Computer

- Also known is individual computer
- Desktop computer
- Cell phone
- Personal digital assistant (PDA)
- Tablets



Types of Computer (Conti.)

- Micro computer are widely used and fastest growing computers. These computers are the cheapest as compared to other three types of computers. Micro computers are specially designed for general usage like entertainment, education and work purposes. Micro computer can also be called a personal computer (PC). Because it be used by a single uses.



Uses of Computers

➤ Computer in Home

- Many homes have multiple computers
- Many Pakistanis homes have internet
- Computer are used for:
 - Online shopping
 - Entertainment
 - Communication
 - Learning

➤ Computers in small business

- Makes business more profitable
- Allows owner to manage



Uses of Computer (Conti.)

➤ Computers in Technology

- Advancement in any technological field without computer is unthinkable
- All technology is dependent on computer
- Applications areas
 - Energy monitoring
 - Construction
 - Agriculture
 - Automobile
 - Textile
 - Transport



Uses of Computer (Conti.)

➤ Computer in Business

- A computer has high speed of calculation, accuracy, reliability or versatility, which has made it an integrated form in all business organization.
- Uses of computer in business
 - Payroll calculations
 - Budgeting
 - Sales analysis
 - Financial forecasting
 - Managing employee database
 - Maintenance of stock



Uses of Computer (Conti.)

➤ Computer in Banking

- Now-a-days banking is almost totally dependent on computer banking provide the following facilities through computer was
 - Online accounting facilities which include checking current account balance, Making deposit and overdrafts, Checking interest charges, shares and trust records.
 - ATM machine which are completely automatic are making easier for customers to deal with bank.



Uses of Computer (Conti.)

➤ Computer in Health Care

- Computer has become an important part in hospitals, Labs, and dispensaries they are being used in hospitals to keep the record of patients and medicines. It is also used in scanning and diagnosing different diseases ECG, EEG, ULTRASOUND, CT SCAN etc. are also done by computerized machines
- New treatments possible
- Scheduling of patient is improved
- Delivery of medicine is safer
- X-Ray, CT Scan etc. machine is running with the help of computer
- E-Healthcare, relationship between healthcare organization (Hospitals) and patient
 - Application of internet and related technology
 - Improve access, efficiency, effectiveness, quality of health process



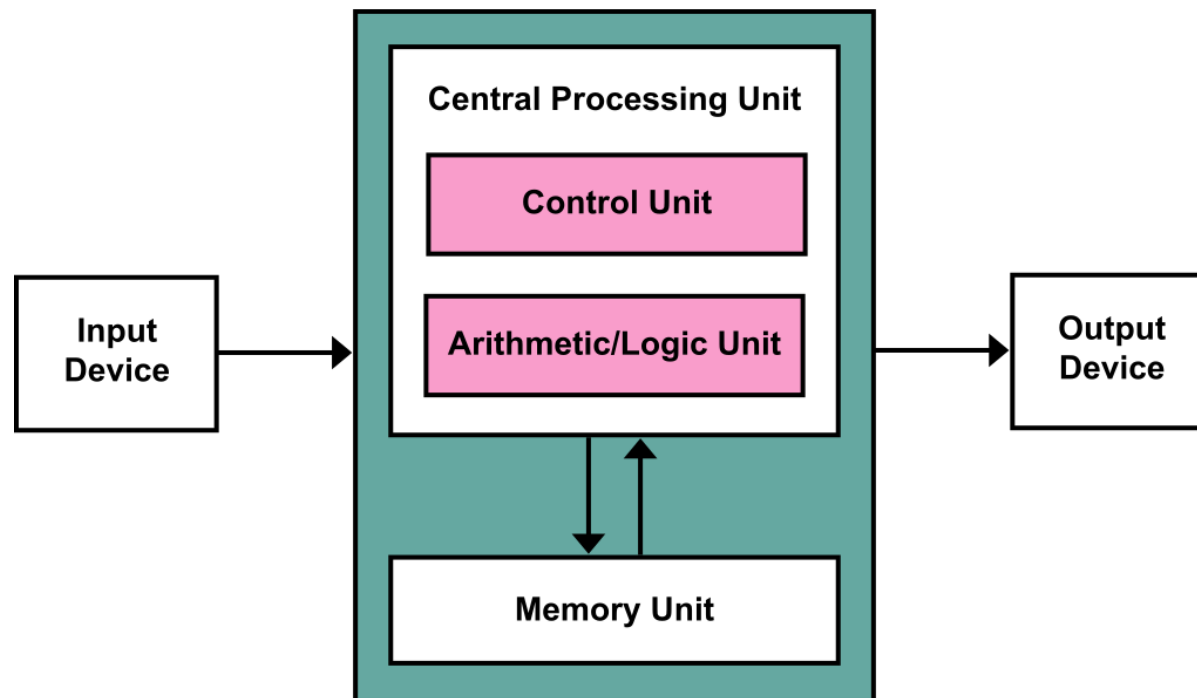
Uses of Computer (Conti.)

➤ Military

- Computers are largely used in defense modern tasks, Missiles weapons etc. Some of the military area where computer has been use is.
 - Missile control
 - Military communication
 - Military operation and planning
 - Smart weapon

Computer Architecture

- Computer is basically a machine that simplifies complicated task
- should maximize performance and reduce costs as well as power consumption
- different components in the Computer System Architecture are Input Unit, Output Unit, Storage Unit, Arithmetic Logic Unit, Control Unit etc.



Source: https://en.wikipedia.org/wiki/Von_Neumann_architecture#/media/File:Von_Neumann_Architecture.svg



Computer Architecture (Conti.)

- **Input Unit:** The input unit provides data to the computer system from the outside. So, basically it links the external environment with the computer. It takes data from the input devices, converts it into machine language and then loads it into the computer system. Keyboard, mouse etc. are the most used input devices.
- **Control Unit:** This unit controls all the other units of the computer system and so is known as its central nervous system. It transfers data throughout the computer as required including from storage unit to central processing unit and vice versa. The control unit also dictates how the memory, input output devices, arithmetic logic unit etc. should behave.



Computer Architecture (Conti.)

- **Arithmetic Logic Unit:** All the calculations related to the computer system are performed by the arithmetic logic unit. It can perform operations like addition, subtraction, multiplication, division etc. The control unit transfers data from storage unit to arithmetic logic unit when calculations need to be performed. The arithmetic logic unit and the control unit together form the central processing unit.
- **Storage Unit:** Storage unit contains many computer components that are used to store data. It is traditionally divided into primary storage and secondary storage. Primary storage is also known as the main memory and is the memory directly accessible by the CPU. Secondary or external storage is not directly accessible by the CPU. The data from secondary storage needs to be brought into the primary storage before the CPU can use it. Secondary storage contains a large amount of data permanently.



Computer Architecture (Conti.)

- **Output Unit**: The output unit provides the results of computer process to the users i.e.; it links the computer with the external environment. Most of the output data is the form of audio or video. The different output devices are monitors, printers, speakers, headphones etc.



Memory

- Memory is the most essential part of the computer system.
- Computer memory is a storage device / place which is used for Data / Information Storage.
- Memory is used for both the instruction to be executed and data.
- The CPU access each location in the memory by using the unique number, called Memory Address.



Types of Memory

➤ **Primary Memory:**

- Primary storage is also known as the main memory and is the memory directly accessible by the CPU. Some primary storage devices are...
- Directly Communicate with CPU.

➤ **RAM (Random Access Memory)**

- RAM is random access memory. It is volatile i.e., the data in RAM is lost when the power is switched off. RAM is the major form of primary memory as it is quite fast. However, it is also quite expensive.
 - **SRAM:** Stands for Static Random Access Memory.
 - Data remains in SRAM as long as there is power supply.
 - **DRAM:** stands for Dynamic Random Access Memory.
 - data can be stored in the DRAM only when it is refreshed frequently.



Types of Memory (Conti..)

➤ ROM (Read Only Memory)

- ROM is read only memory. This memory cannot be changed, it can only be read as required. Since ROM is unchangeable memory, it is used by data and programs that are frequently required and seldom changed, like the system boot program.
- PROM: Programmable Read only memory.
 - It can be modified once by use.
 - It can be programmed only once and is not erasable.
- EPROM: Erasable Programmable Read Only Memory.
 - It can be erased and reprogramed many times.
 - Data can be erased with the help of Ultra Violet rays.
 - Normally uses in Micro-controller.
- EEPROM: Electrically Erasable Programmable Read Only Memory.
 - It can programed and erased electrically.
 - Normally uses in BIOS system.



Types of Memory (Conti..)

➤ Cache Memory:

- Cache is used to store data and instructions that are frequently required by the CPU, so it doesn't have to search them in the main memory. This is a small memory that is also very fast.
- This temporary storage area, known as a cache, is more readily available to the processor than the computer's main memory source. It is also called *CPU memory* because it is typically integrated directly into the CPU chip or placed on a separate chip with a bus interconnect with the CPU.



Types of Memory (Conti..)

➤ **Cache Memory (Conti..):**

- Cache memory is a high speed memory, which is small in size.
- It acts like buffer between CPU and the main memory.
- It holds the data and programs which are frequently used by the CPU.
- There are three level of cache memory.

➤ **Level 1 (L1).**

- Memory is presented inside the CPU.
- It can work as the same speed as of the CPU.
- Each core of CPU have its own L1 cache.

➤ **Level 2 (L2).**

- It can be present inside or outside the CPU and slower than L1 cache.
- Each core of CPU can have its own L2 cache or they can share single L2 cache.

➤ **Level 3 (L3).**

- It is located outside the CPU, and slower than L1 & L2.
- It is share by all the core of a CPU.



Types of Memory (Conti..)

➤ Computer Registers

- Registers are a type of computer memory used to quickly accept, store, and transfer data and instructions that are being used immediately by the CPU. The registers used by the CPU are often termed as Processor registers.
- A processor register may hold an instruction, a storage address, or any data (such as bit sequence or individual characters).
- The computer needs processor registers for manipulating data and a register for holding a memory address. The register holding the memory location is used to calculate the address of the next instruction after the execution of the current instruction is completed.



Types of Memory (Conti..)

Register	Symbol	Number of bits	Function
Data register	DR	16	Holds memory operand
Address register	AR	12	Holds address for the memory
Accumulator	AC	16	Processor register
Instruction register	IR	16	Holds instruction code
Program counter	PC	12	Holds address of the instruction
Temporary register	TR	16	Holds temporary data
Input register	INPR	8	Carries input character
Output register	OUTR	8	Carries output character



Types of Memory (Conti..)

- The Data Register (**DR**) contains 16 bits which hold the operand read from the memory location.
- The Memory Address Register (**MAR**) contains 12 bits which hold the address for the memory location.
- The Program Counter (**PC**) also contains 12 bits which hold the address of the next instruction to be read from memory after the current instruction is executed.
- The Accumulator (**AC**) register is a general purpose processing register.
- The instruction read from memory is placed in the Instruction register (**IR**).
- The Temporary Register (**TR**) is used for holding the temporary data during the processing.
- The Input Registers (**IR**) holds the input characters given by the user.
- The Output Registers (**OR**) holds the output after processing the input data.

Source: <https://www.javatpoint.com/computer-registers>



Types of Memory (Conti..)

➤ Secondary Memory:

- Secondary or external storage is not directly accessible by the CPU. The data from secondary storage needs to be brought into the primary storage before the CPU can use it. Secondary storage contains a large amount of data permanently. The different types of secondary storage devices are....

➤ Hard Disk:

- Hard disks are the most famously used secondary storage devices. They are round, flat pieces of metal covered with magnetic oxide. They are available in many sizes ranging from 1 to 14-inch diameter.

Types of Memory (Conti..)

- Floppy Disk:
 - They are flexible plastic discs which can bend, coated with magnetic oxide and are covered with a plastic cover to provide protection. Floppy disks are also known as floppies and diskettes.





Types of Memory (Conti..)

➤ Memory Card:

- This has similar functionality to a flash drive but is in a card shape. It can easily plug into a port and removed after its work is done.

➤ Flash Drive:

- This is also known as a pen drive. It helps in easy transportation of data from one system to another. A pen drive is quite compact and comes with various features and designs.

➤ SSD (Solid State Drive):

- A storage device containing non-volatile flash memory, used in place of a hard disk because of its much greater speed



Software

- Software refers to a set of instructions, programs, or data that enables a computer or other hardware to perform specific tasks. It is a broad term that encompasses everything that is not hardware. that is, the physical components of a computer system. Software is intangible and consists of code, scripts, algorithms, and data that instruct the computer on how to perform various operations.



Types of Software

➤ System Software

- It is general-purpose software.
- System Software maintains the system resources and gives the path for application software to run.
- Low-level languages are used to write the system software.
- System Software programming is more complex than application software
- Without system software, the system stops and can't run.

➤ Operating Systems (OS): Controls and manages hardware resources, providing a user interface and facilitating communication between software and hardware. Examples include Windows, mac OS, Linux, and Android.

➤ Device Drivers: Enable communication between the operating system and hardware devices like printers, graphics cards, and input devices.

➤ Utilities: Tools that perform specific tasks related to system management, maintenance, and optimization.



Types of Software (Conti..)

➤ **Application Software**

- it's a specific purpose software.
- Application software is built for specific tasks.
- high-level languages are used to write the application software.
- Application software programming is simpler in comparison to system software.

➤ **Types of Software Based on Distribution and Licensing:**

• **Proprietary Software:**

- Developed and distributed by a company, and users typically need to purchase a license.
- Examples include Microsoft Office, Adobe Creative Cloud, and many commercial applications.

• **Open-Source Software:**

- Developed collaboratively, and the source code is freely available for users to view, modify, and distribute.
- Examples include the Linux operating system, the Apache web server, and the Firefox web browser.



Types of Software (Conti..)

- **Productivity Software:** Tools that help users create, edit, and manage documents, spreadsheets, presentations, and databases. Examples include Microsoft Office, Google Workspace, and LibreOffice.
- **Web Browsers:** Software for accessing and interacting with content on the internet, such as Chrome, Firefox, Safari, and Edge.
- **Media Players:** Applications for playing audio and video files, like VLC Media Player, iTunes, and Windows Media Player.
- **Graphics Software:** Programs for creating and editing visual content, including Adobe Photoshop, Illustrator, and Corel DRAW.
- **Development Tools:** Software used by developers to create applications, websites, and software solutions. Examples include Integrated Development Environments (IDEs) like Visual Studio, Eclipse, and X code.
- **Gaming Software:** Video games and related applications that entertain users and often involve interactive experiences.
- **Communication Software:** Tools for communication, such as email clients (Outlook, Thunderbird), instant messaging apps (WhatsApp, Slack), and video conferencing platforms (Zoom, Microsoft Teams).



Comparison Chart of Sys. And App. Software

Parameter	System Software	Application Software
Definition	System Software is the type of software which is the interface between application software and system.	Application Software is the type of software which runs as per user request. It runs on the platform which is provide by system software.
Development Language	In general, System software are developed using low-level language which is more compatible with the system hardware in order to interact with.	In case of Application software, high level language is used for their development as they are developed as some specific purpose software.
Necessity	System software are essential for operating the computer hardware. Without these software, a computer even may not start or function properly.	Application software are not essential for the operation of the computer. These are installed as per the user's requirements.



Comparison Chart of Sys. And App. Software (Conti..)

Usage	System software is used for operating computer hardware.	Application software is used by user to perform specific task.
Installation	System software are installed on the computer when operating system is installed.	Application software are installed according to user's requirements.
User interaction	System software are specific to system hardware, so less or no user interaction available in case of system software.	Users can interact with an application software with the help of a User Interface (UI).
Dependency	System software can run independently. It provides platform for running application software.	An application software cannot run independently. It cannot run without the presence of system software.
Examples	Examples of system software include operating systems, compilers, assemblers, debuggers, drivers, etc.	Examples of application software include word processors, web browsers, media players, etc.



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