

The word “**computer**” comes from word compute, which means to calculate. “A **computer** is a programmable machine (or more precisely, a programmable sequential state machine) that operates on data and is used for wide range of activities”.

A computer is a tool, which can be used to read and write text, draw and look at images, and send and receive e-mail.

Definition: “An electronic and electromechanical device capable of receiving data, processing the data inputted, and generating the output in the form of information”.

Characteristics of Computers

1. **Speed** : It can calculate millions of calculations in seconds.
2. **Accuracy** : Computer results are highly accurate.
3. **Memory** : Computers have a large amount of memory to hold a very large amount of data or information.
4. **Programmed Intelligence**: They are programmed in such a way that they can perform those operations which have been fed into them.
5. **Diligence**: Computer is free from problems like lack of concentration, and confusion like humans.
6. **Versatility**: We can perform many different types of tasks on a computer..
7. **Power of Remembrance**: Unlike humans, a computer can store things for an unlimited period of time.

Computer Categories

- **Super computers** :The fastest type of Computer. Supercomputers are very expensive and are employed for specialized applications. That require immense amounts of mathematical calculations. For example, weather forecasting requires a supercomputer.
- **Mainframe Computers** Mainframe is an industry term for a large computer. The name comes from the way the machine is build. And because of the sheer development costs, mainframes are typically manufactured by large companies such as IBM, Hitachi. Their main purpose is to run commercial applications of Fortune 1000 businesses and other large-scale computing purposes

- Workstations :minicomputers which are nodes on a computer network and which can be used to perform a number of tasks by using their own resources as well as by tapping into the other devices which are shared on the network.
- Notebooks (laptops) and Desktop Computers

Use of Computers in Business

Information Technology, like language, affects us on many levels and has fast become integral to all of our lives. Today it has become one of the important part of our life.

There were generally four major business applications for computers in the nineteen sixties and seventies.

The computer as a clerk : These computers would handle large amounts of repetitive clerical work. Most of the early business computers fit into the "clerk" category and many today still do.

The computer as an information system : These computers would try to gather, predict, and store data.

The computer with the first drafting technology : These computers were used for designing crude and small buildings or crude vehicles and aircraft.

The computer as a controller : They were fed information that responded with programs that were already installed. The programs would help a computer decide on raising or maintaining certain information such as investing in stocks.

Modern computers are still used for determining merger decisions, architectural design etc..

Evolution of Computers

Computer was invented because of man search for fast and accurate calculating devices. Blaise pascal invented first mechanical addong machine in 1642.

Charles babbage is considered the father of modern Computers.

The Marks I computer(1937-44)

This was the first fully automatic calculating machine.it was electro mechanical device based on punched card machines.

- The Atanasoff computer(1939-42)
- The ENIAC(1943-46)
- The EDVAC(1946-52)
- The EDSAC(1947-49)
- The UNIVAC I(1951)

*In depth from P.K Sinha

Generation of Computers



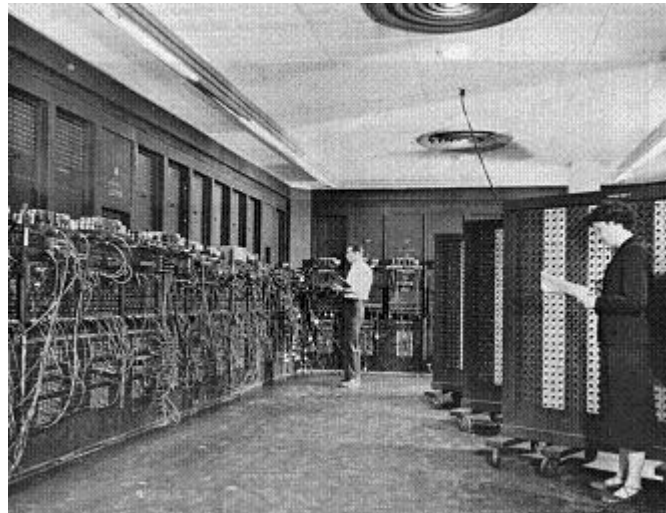
The history of computer development is often referred to in reference to the different generations of Computing Devices. Each generation of computer is characterized by a major technological development that fundamentally changed the way computers operate, resulting in increasingly smaller, cheaper, more powerful and more efficient and reliable devices.

First Generation - 1940-1956: Vacuum Tubes



The first computers used vacuum tubes for circuitry, taking up entire rooms. They were very expensive to operate and in addition to using a great deal of electricity, generated a lot of heat, which was often the cause of malfunctions. First generation computers relied on [machine language](#) to perform operations, and they could only solve one problem at a time. Input was based on punched cards and output was displayed on printouts.

The UNIVAC and [ENIAC](#) computers are examples of first-generation computing devices.



Second Generation - 1956-1963: Transistors



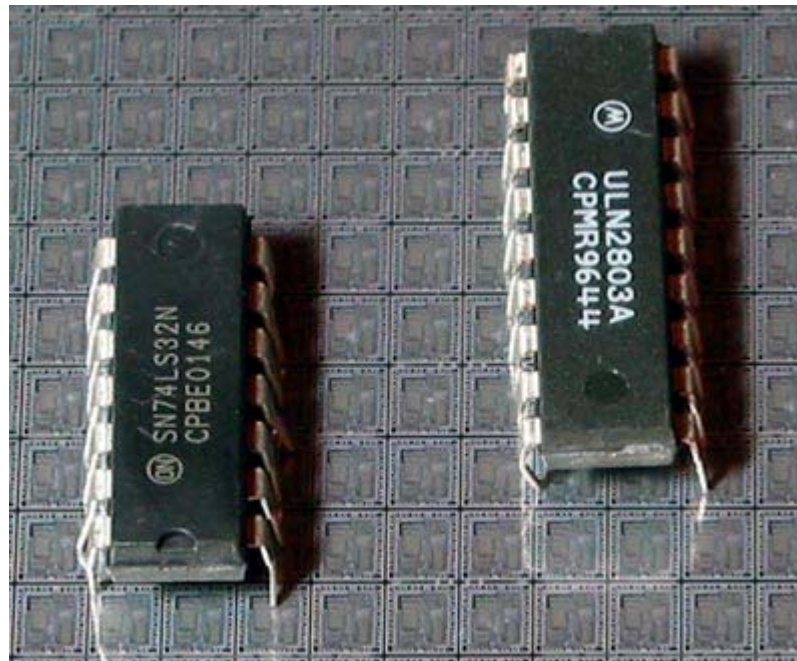
Transistors replaced vacuum tubes. The transistor was far superior to the vacuum tube, allowing computers to become smaller, faster, cheaper, more energy-efficient and more reliable than their first-generation predecessors. Second-generation computers still relied on punched cards for input and printouts for output.

Second-generation computers moved from binary machine language to assembly languages. High level programming language were also being developed at this time, such as early versions of COBOL and FORTRAN..



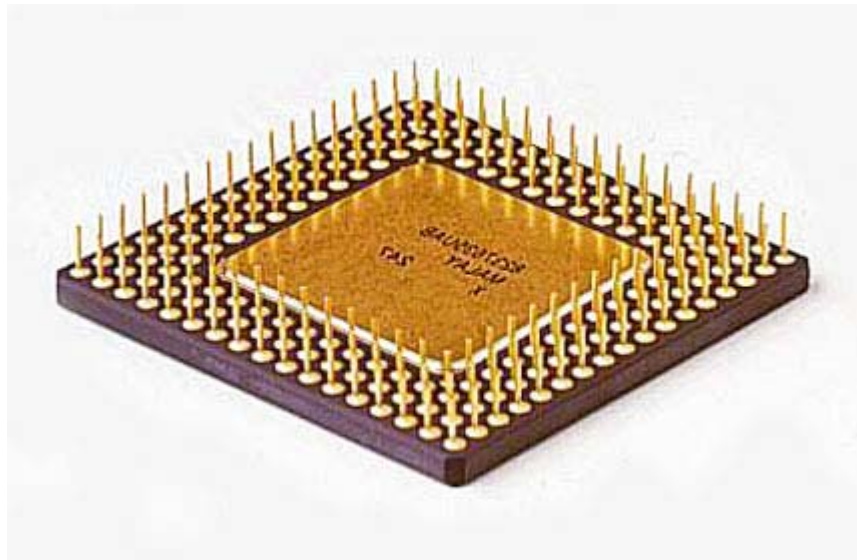
Third Generation - 1964-1971: Integrated Circuits

The development of the Integrated circuit (IC) took place. Transistors were miniaturized and placed on Silicon Chips, called Semi conductors, which drastically increased the speed and efficiency of computers. Instead of punched cards and printouts, users interacted with third generation computers through keyboards and monitors and interfaced with an Operating System.



Fourth Generation - 1971-Present: Microprocessors

The Microprocessor brought the fourth generation of computers, as thousands of integrated circuits were built onto a single silicon chip. Chip developed in 1971, located all the components of the computer . In 1981 IBM introduced its first computer for the home user, and in 1984 Apple introduced the Macintosh. As these small computers became more powerful, they could be linked together to form [networks](#). Fourth generation computers also saw the development of [GUIs](#), the [mouse](#) and [handheld](#) devices.



Fifth Generation - Present and Beyond: Artificial Intelligence

Fifth generation computing devices, based on [artificial intelligence](#), are still in development, though there are some [applications](#), such as [voice recognition](#), that are being used today. The goal of fifth-generation computing is to develop devices that respond to [natural language](#) input and are capable of learning.



Input and Output Technologies

- Input technologies allow people and other technologies to put data into a computer. The two main types of input devices are:
 - **Human data-entry** devices include keyboards, mouse, touch screen, voice recognition etc.
 - Source-data automation devices input data with minimal human intervention (e.g. barcode reader),
OCR, OMR, MICR, Digitizer, Electronic card Reader, speech recognition Devices.
 - Speed up data collection.
 - Reduce errors.
 - Gather data at the source of a transaction or other event.
- * In depth from fundamental from lucas

Input and Output Technologies (Continued)

- Output generated by a computer can be transmitted to the user over several output devices and media.
 - Includes monitors, printers (inkjet, dot-matrix, Drum printer, chain/band printer, laser printer) and voice.

* In depth from fundamental from leon/p.k sinha

Computer Hardware

- **Hardware** refers to the physical equipment used for the input, processing, output and storage activities of a computer system.
- **Central processing unit (CPU)** manipulates the data and controls the tasks performed by the other components.
- **Primary storage** internal to the CPU. temporarily stores data and program instructions during processing.

Hardware

- **Secondary storage** external to the CPU; stores data and programs for future use.
- **Input technologies** accept data and instructions and convert them to a form that the computer can understand.
- **Output technologies** present data and information in a form people can understand.

1.2 The Central Processing Unit

Central processing unit (CPU) performs the actual computation or “number crunching” inside any computer.

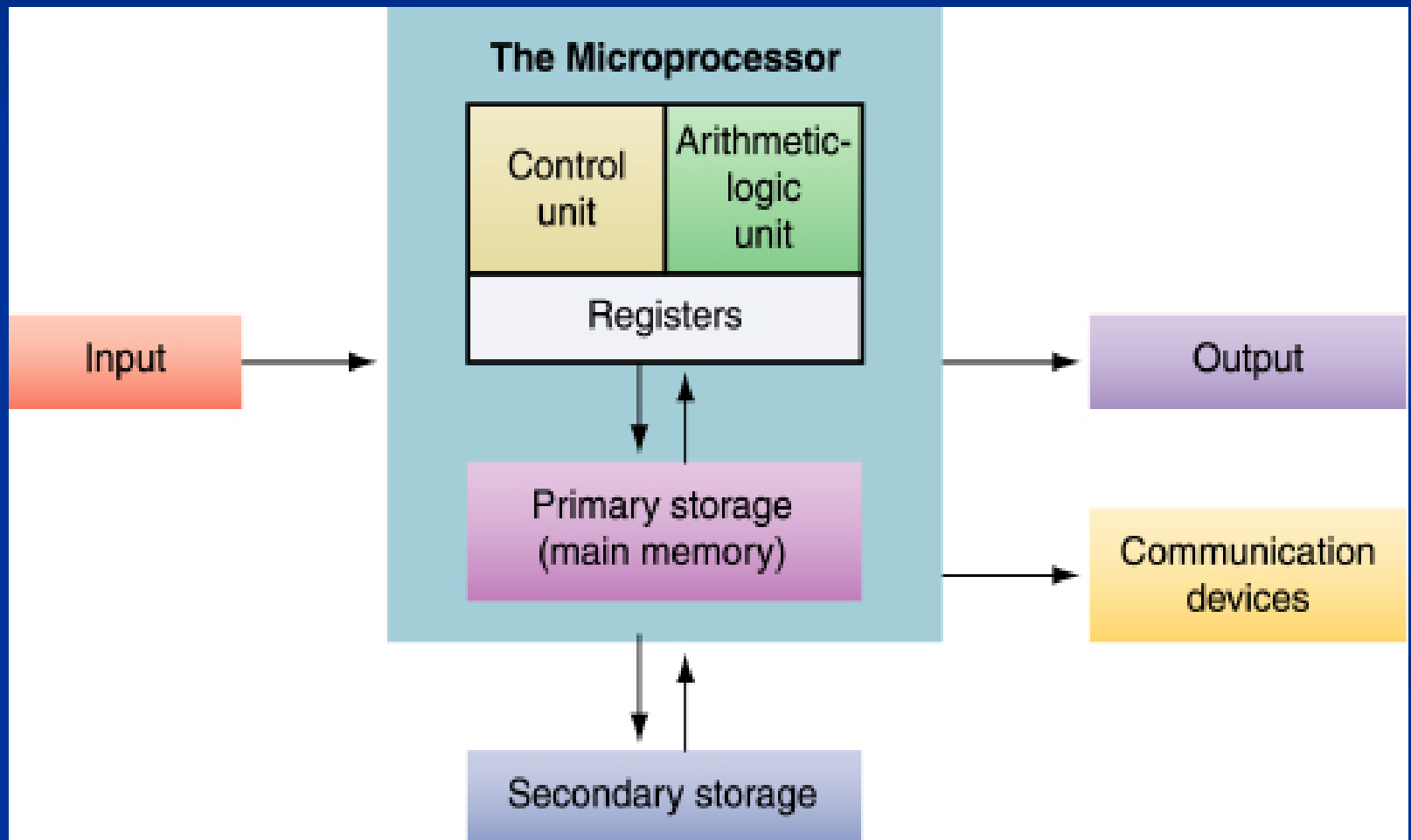
Control unit(CU)

It maintains order & control and supervises the data flow within the devices. It directs the operations.

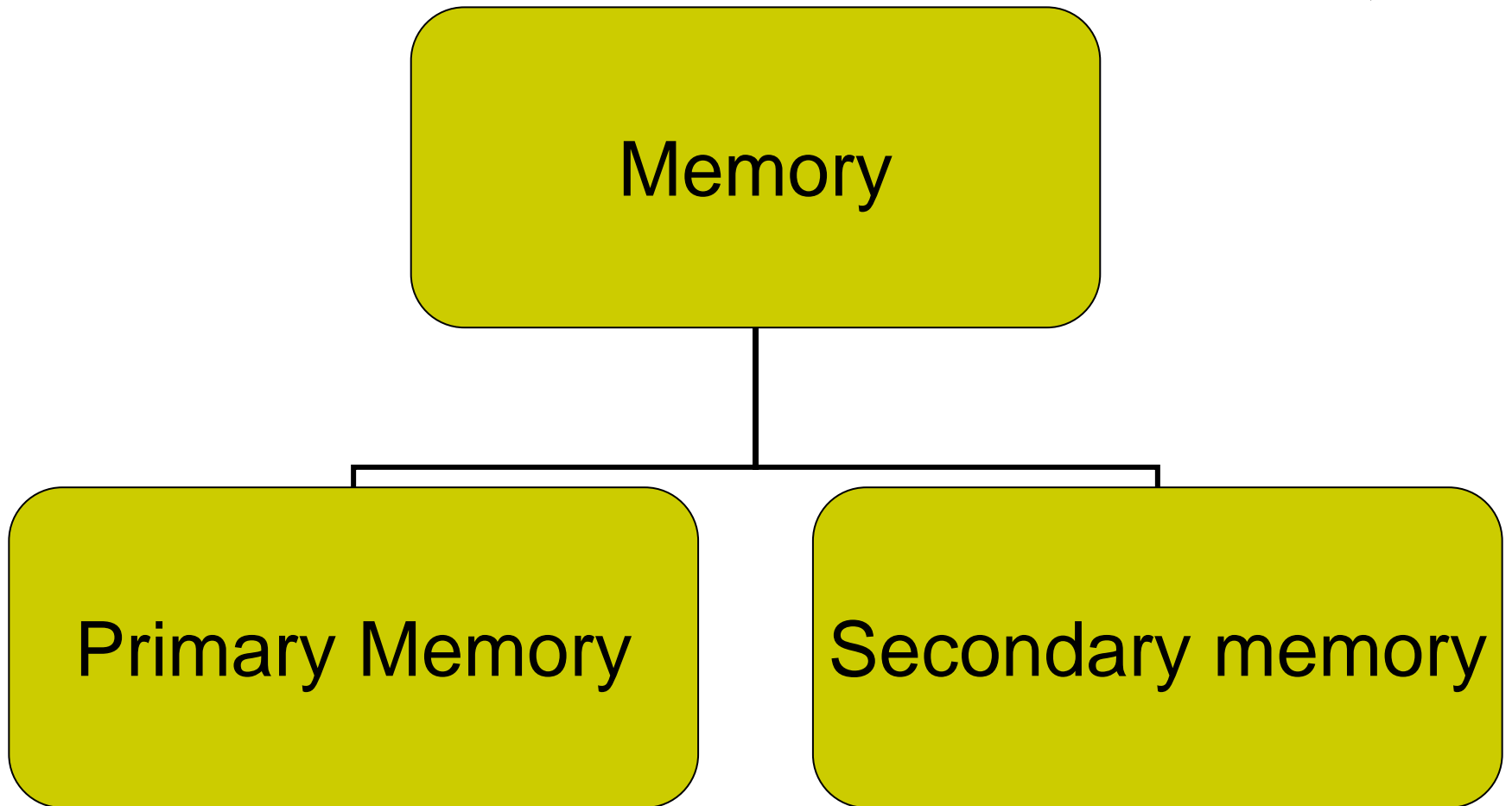
CPU (Continued)

- **Arithmetic-logic unit (ALU)** performs the mathematic calculations and makes logical comparisons.
- **Registers** are high-speed storage areas that store very small amounts of data and instructions for short periods of time.

How the CPU Works



1.3 Computer Memory

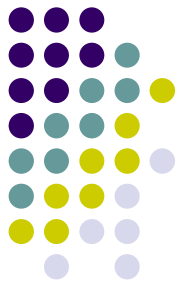


Primary Storage



- **Primary storage** takes place in chips mounted on the computer's main circuit board, called the motherboard.
- **Primary storage** or *main memory* stores three types of information for very brief periods of time:
 - Data to be processed by the CPU.
 - Instructions for the CPU as to how to process the data.
 - Operating system programs that manage various aspects of the computer's operation.

Main Types of Primary Storage



- **Registers:** registers are part of the CPU with the least capacity, storing extremely limited amounts of instructions and data only immediately before and after processing.

Cache memory: Programs can be larger than memory so Program loaded into memory as needed Active program and data “swapped” to a disk until needed

Primary Storage (Continued)

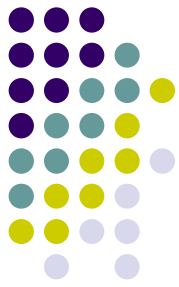


- **Read-only memory (ROM):** Type of primary storage where certain critical instructions are safeguarded; the storage is nonvolatile and retains the instructions when the power to the computer is turned off.
- an integrated circuit programmed with specific data when it is manufactured. ROM chips are used not only in [computers](#), but in most other electronic items as well.

ROM Types



- There are five basic ROM types:
- **ROM**
- **PROM**
- **EPROM**
- **EEPROM**
- **Flash memory**

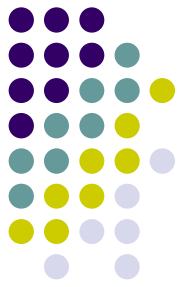


- **PROM**

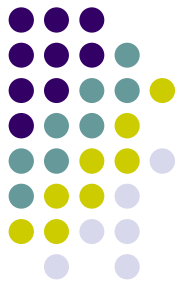
There are 2 types of ROM-manufactured programmed and user programmed. A manufactured ROM is one in which data is burnt in by manufacturer of electronic equipment. for example a PC manufacturer store system boot program permanently.

While in user programmed Rom is a one in which user can load and store read only program and data. its possible for a user to customize a system by converting programs to micro programs and storing them in user programmed ROM chip. such are called PROM.

EPR0M



- Working with ROMs and PROMs can be a wasteful business. Even though they are inexpensive per chip, the cost can add up over time. **Erasable programmable read-only memory (EPR0M)** addresses this issue. EPR0M chips can be rewritten many times. Erasing an EPR0M requires a special tool that emits a certain frequency of [ultraviolet \(UV\) light](#). EPR0Ms are configured using an EPR0M programmer that provides voltage at specified levels depending on the type of EPR0M used. EPR0M's come in several sizes both in physical packaging as well as storage capacity. While parts of the same type number from different manufacturers are compatible as long as they're only being read, there are subtle differences in the programming process.



EEPROM

- **EEPROM** (also written **E2PROM** and pronounced e-E-PROM or simply e-squared, which stands for **E**lectrically **E**rasable **P**rogrammable **R**ead-**O**nly **M**emory, is a type of non volatile memory used in computers and other electronic devices to store small amounts of data that must be saved when power is removed.

When larger amounts of static data are to be stored (such as in USB flash drives a specific type of EEPROM such as flash Memory is more economical than traditional EEPROM devices.

RAM Random access memory



- It's a main memory. its a volatile memory means when computer is off main memory is empty. so main memory is a volatile so data is saved on nonvolatile secondary storage device such as hard disks, tape device etc.

Secondary Storage

- Memory capacity that can store very large amounts of data for extended periods of time.
 - It is nonvolatile.
 - It takes much more time to retrieve data because of the electromechanical nature.
 - It is cheaper than primary storage.
 - It can take place on a variety of media

Secondary Storage (Continued)

- **Magnetic tape:** A secondary storage medium on a large open reel or in a smaller cartridge or cassette.

Secondary Storage (Continued)

- **Hard Drives:** A form of secondary storage that stores data on platters divided into concentric tracks and sectors, which can be read by a read/write head that pivots across the rotating disks.
- **Magnetic diskettes:** A form of easily portable secondary storage called floppy disks.

Optical Storage Devices

- **Optical storage devices:** A form of secondary storage in which a laser reads the surface of a reflective plastic platter.
- **Compact disk, read-only memory (CD-ROM):** A form of secondary storage that can be only read and not written on.
- **Digital video disk (DVD):** An optical storage device used to store digital video or computer data.

More Storage Options

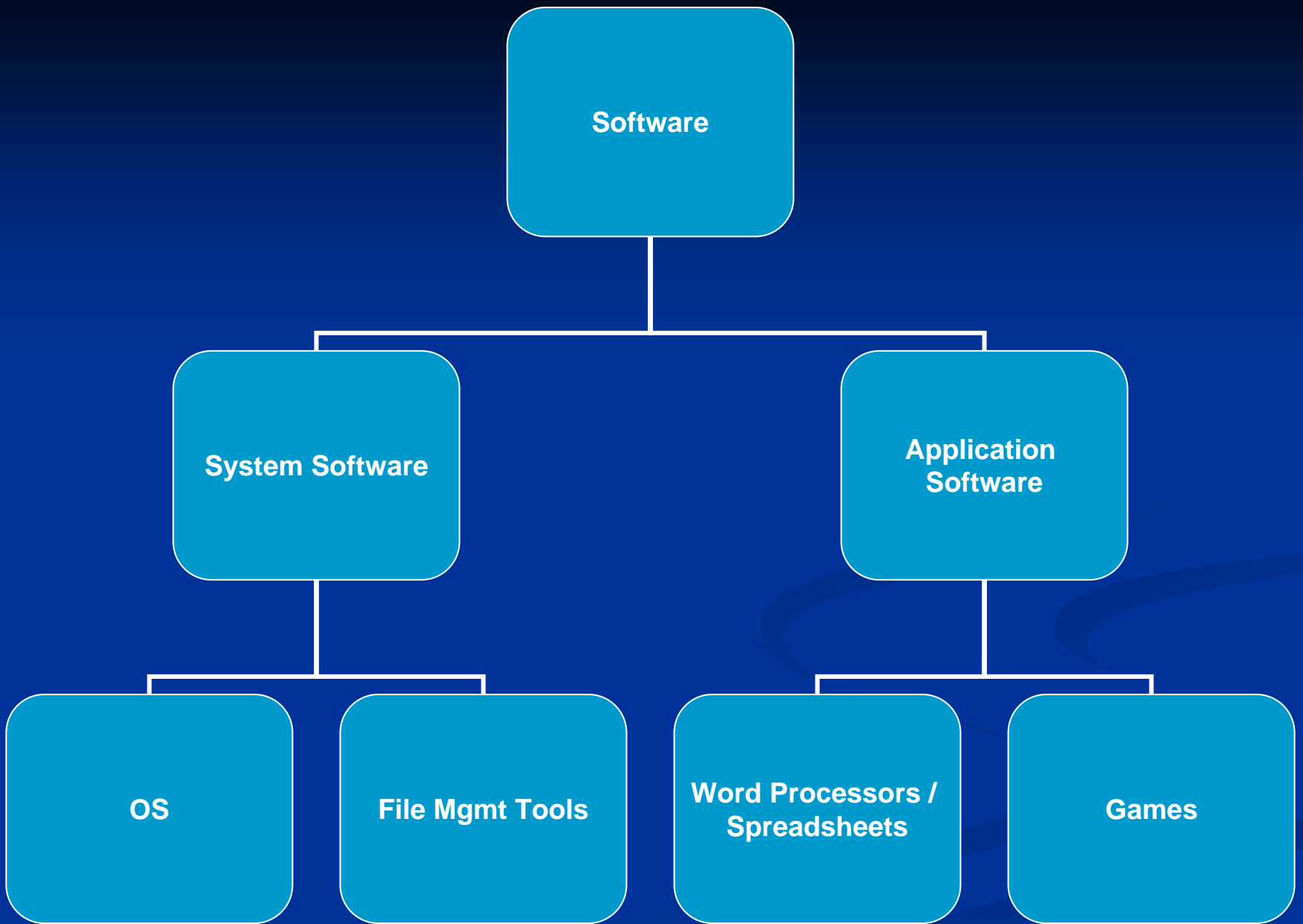
- **Memory cards:** Credit-card-size storage devices that can be installed in an adapter or slot in many personal computers

Memory Capacity

- **Bit:** Short for binary digit (0s and 1s), the only data that a CPU can process.
- **Byte:** An 8-bit string of data, needed to represent any one alphanumeric character or simple mathematical operation.

Hierarchy of Memory Capacity

- ***Kilobyte*** (KB): approximately one thousand bytes.
- ***Megabyte*** (MB): approximately one million bytes (1,048,576 bytes, or $1,024 \times 1,024$).
- ***Gigabyte*** (GB): actually 1,073,741,824 bytes ($1,024 \times 1,024 \times 1,024$ bytes).
- ***Terabyte***: One trillion bytes.
- ***Petabyte***: Approximately 10^{15} bytes.
- ***Exabyte***: Approximately 10^{18} bytes.



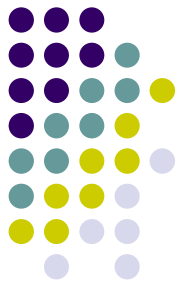
The Major Types of Software

Software program: Series of statements or instructions to the computer

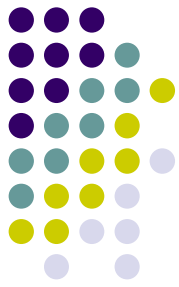
System software: Generalized programs, manages computer's resources

Application software: Programs written to perform functions specified by end users

An Operating System?



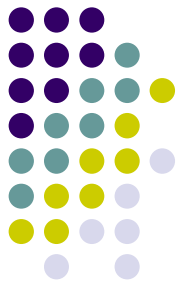
- What is an Operating System?
 - A program that acts as an intermediary between a user of a computer and the computer hardware.
- What is the purpose of an operating system?
 - To provide an environment in which a user can execute programs.
- What are the goals of an Operating System?
 - The primary goal of an Operating System is to make the computer system convenient to use.
 - The secondary goal is to make the computer system efficient to use



Commonly known as OS. Its an integrated set of programs that controls the resources (CPU, memory, I/O devices etc) of computer system.

Its objective are

- Make a computer easier to use.
- Manage the resource of a computer.



Functions of the operating system

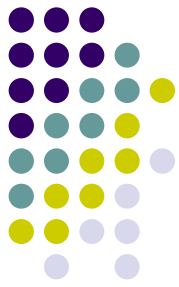
Allocates and assigns system resources

Schedules use of computer resources

Monitors computer system activities

Provides locations in primary memory for data and programs

Controls the input and output devices



Main function of OS:

Process management:

It take care of creation & deletion of processes, scheduling of system resources to different processes requesting them.

Security:

Protect resources and information of computer system.

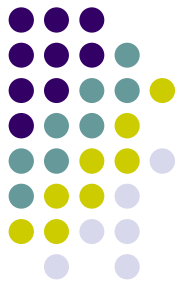


- **Memory management**

It take care of allocation & de allocation of memory space to programs.

- **File management**

It take care of file related activities such as retrieval, sharing & protecting of file.



Security

Security modules protect the resources and information of a computer system against destruction and unauthorized access.

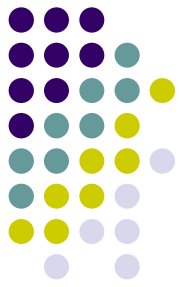
Command interpretation

It takes care of interpreting user commands and directing system resources to process the commands.

Function of Operating System



- **OS as Extended machine**
 - Computer Architecture shows that computer is made up of chips and wires.
 - Increase portability
 - Allow greater protection
 - Implication is that it is much faster and easier to program with less errors



GUIs in PC operating systems

Windows XP

Microsoft's Windows 98 and Me

Windows 2000

Windows server

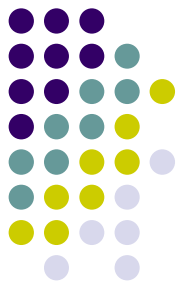
UNIX

Linux: open-source software



Different operating systems:

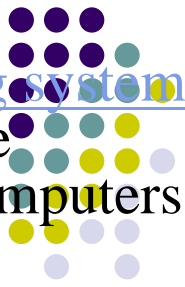
Microsoft windows: graphical user interface (GUI)- provides icons that you can directly manipulate on the screen using a pointing device and pull-down menus that you can use to easily issue a command. Uniform look to applications- scroll bars, buttons, dialog boxes. You can run more than one program at a time in separate windows and you can easily transfer data between them. Copy some data from one application to the clipboard and paste it to another. Windows 95 is current version. Apple computers pioneered the idea of an operating system based on a GUI .



UNIX - developed by Bell laboratories in 1969. Popular in research environments and universities. Started on mainframes and minicomputers but also available for personal computers. Supports multitasking and multiple users. Not inherently a GUI. Because the programming language C is part of UNIX, enables programmers to create programs that can easily be transported from one type of computer to the other (portable software).

Dos

MS-DOS (short for Microsoft Disk Operating System) is an [operating system](#) commercialized by [Microsoft](#). Its basically based on command line interface (CLI). It was gradually replaced on consumer desktop computers by operating systems offering a [graphical user interface](#) (GUI).



Example of DOS command

Assuming we are on C drive then

```
C:\dir
```

This command will show dir on c drive.

```
C:\date
```

This command will show date.

```
C:\time
```

This command will show time.

```
C:\tree
```

This command will show you the entire structure of the dir and file in form of tree.

```
C:\student>cd..
```

This command will take you to the root directory.