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Module : 01 Basics of ICT and functional units of computers.

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<h1 style="text-align:center">Basics of ICT and functional units of computers</h1>

I. Objectives

The objectives of this module are to impart knowledge on the below mentioned aspects:

- Introduction to ICT in libraries
- Developments in computer, communication and network technology
- Need and purpose of ICT in libraries
- Drastic changes occurred due to ICT and Internet with reference to information resources and services

II. Learning outcome

After completion of this lesson, you will be acquainted with basic concepts, characteristics of ICT and its applications, advantages and disadvantages, and components of ICT. You would will learn about evolution of computers from generation one to generation five based on their size, components and processing capacity. You were also introduced to the computer system and its functional units including input unit, output unit, CPU and memory units, motherboard, ports, etc.

III. Structure of the Module

1. Introduction
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1. Introduction

Past three decades have witnessed unprecedented developments in computer and communication technology. Computers are being used increasingly to automate various activities in libraries with a suitable off-the-shelf general or specific-purpose software package that are now available in a wide range. Tremendous storage and processing potential of computers are being fully realized through existing communication and networking technologies. The two technologies are interdependent, inseparable and share a symbiotic relationship. The computer's ability to store and process vast amount of information, and communication technology with its ability to transmit this information from one location to another converged to form "information technology" or "informatics" or "Information and Communication Technology".

The information technology refers to mosaic of technologies, products and techniques combined to provide new electronic dimensions to information and retrieval activities. The term information technology represents convergence of three strands of technologies, namely computer, microelectronics and communications. Information technology is used to describe products and services that came-up with rapid changes in computer and communication technologies and their fusion. Thus, technologies which improve the efficiency and effectiveness of an information system or service fall under the purview of information technology. Some of these technologies are available to the libraries for many years, while a few are now emerging as important tools for overcoming the barriers in the access and dissemination of information. In order to understand the drastic changes that occurred in library and information centres due to the advent of ICT, it is necessary to understand various developments undergone by computer, communication and network technology.

2. Generation of Computers

2.1 First Generation

The computers manufactured using vacuum tubes are called the first generation computers. Electronic Numeric Integrator and Calculator (ENIAC) was first such computer that had a formal dedicated ceremony on 15 February, 1946. It was able to produce the tables by carrying the huge number of calculations involved, accurately and to the required precision and, because it was electronic, at a speed which made it all possible. Universal Automatic Computer (UNIVAC 1), IBM 360, IBM 701 are some of the examples of first generation computers.

2.2 Second Generation

The computers that were manufactured using transistor became very small in size, efficient in terms of speed and memory increased several thousand times.Tiny magnetic rings called magnetic cores were used as memory components. Magnetic disc storage was also used. Some high level languages such as Formula Translator (FORTRAN), Algorithm language (Algol), String Oriented Symbolic Language (SNOBAL) were in use during that time. IBM 1401, TDC 12 are some examples of second generation computers.

2.3 Third Generation

Small chips consisting of the capacity of 300 transistors were invented. These chips were also called as Integrated Circuit Chips (IC Chips). The computers designed using IC chips were still smaller in size and efficient in speed and memory capacity. Due to good amount of memory capacity high level languages like FORTRAN IV and Common Business Oriented Language (COBOL) were in use. TDC 316, TDC 332 and IBM 370 are some examples of third generation computers.

2.4 Fourth Generation

In 1971 a young scientist Ted Hoff designed 1 cm chip that had brought a drastic change in computers. The microprocessor is designed by integrated chips having large quantity of circuits, with large scale integration (LSI) or very large scale integration (VLSI). When computers are manufactured using LSI and VSI circuits they are known as fourth generation computers (Xavier, C., 2001).The first phase of fourth generation was in between 1971-85. Fourth

generation saw the coming age of UNIX operating system and time shared interactive systems. These systems became user friendly and highly reliable. The effective cost of computing came down. Computers also became all pervading. Second phase (1986-2000) was the age when various programming languages like java, C++ etc., evolved along with computer networks (Rajaraman. V., 2001).Intel 8086 to Intel 80486 DX2 is examples of fourth generation computers.

2.5 Fifth Generation

The fifth generation computers (FGC) will use Artificial Intelligence (AI). Natural Language processing, Pattern recognition, Character recognition, Speech recognition, Image recognition and processing, Medical diagnosis are some of the areas in the fields of AI (Xavier, C., 2001). AI includes robotics, neural networks, game playing etc. Main features of FGC are user friendly interfaces with multimedia features and availability of very powerful and compact computers at cheaper rates etc. (tutorialspoint.com, n.d.).

3. Classification of computers

Computers can be classified in several ways. Actually the classification is arbitrary and it is impossible to rationally classify these broad ranges of available machines. Following paragraphs describes classification of computers according to specific criteria.

3.1 Classification of computers on the basis of their functionality

3.1.1 Analog Computers

Analog computers only work with continuous numerical data in analog quantities. These computers are used for processing control applications. The physical quantitieslike pressure, temperature etc., are represented by different electric lines with corresponding voltages. If the temperature in a particular room increases, then the voltage in the corresponding wire increases. These wires are interconnected with proper circuit design. Analog computers have very low memory but high speed. Examples: Thermometer, speedo meter of a car etc.

3.1.2 Digital Computers

Digital computers can process numerical and non-numerical data. The input and output of digital computers is based on 'ON / OFF' signals. Digital Computers process information which is based on the presence of absence of an electrical charge. Their memory is high but speed is low compared to analog computers. For example these are the computers that we program and use. These computers accept digital data, process them and give the output in a printed form.

3.1.3 Hybrid Computers

These computers use the principles of both analog and digital computers. The hybrid computer has the accuracy of a digital computer and speed of an analog computer. For example, a petrol pump contains a processor that converts fuel flow measurements into quantity and price value. In hospital intensive care unit (ICU), it is used to measure heartbeat. Generally it is used in scientific and industrial applications.

3.2 Classification according to efficiency

Classification is based on the Central Processing Unit (CPU) speed, word length, and directly addressable memory capacity, variety of peripherals used, the software used and the cost. The below mentioned are different types of computers based on above explanation.

3.2.1 Micro Computers

A microcomputer has a microprocessor chip as its CPU. It usually had a floppy disc drive as peripheral memory. Some microcomputers have a word length 16 bits and 32 bits. The speed of microcomputers is in the order of 100 kilo instructions per second (kips). The microcomputer called Super Power in Server Alpha 8400 based on Alpha 21164 chip operates 1 billion instructions per second (1 BIPS).

3.2.2 Mini Computers

The mini computer will have only one CPU with many terminals and keyboards. So that it can be used by multiple users at a time. Mini computers are as faster as micro computers. They have memory capacity around 10 mega bytes. Auxiliarymemory of 10 GB is also attached. Some examples of mini computers are PDB-8, PDB-11, PDB 11-70, Picard 3000 and Super – 16.

3.2.3 Super Mini Computers

The mini computers that use 32 bit CPU chips are called super-mini computers. They have a speed of 1 million instructions per second and memory capacity of 512 KB to 1 GB. They have all high level languages. VAZ – 11 and MC-3000 are some super–mini computers.

3.2.4 Main Frame Computers

They are also called midi computers that use 32 bits, 48 bits or 64 bits CPU chips with memory capacities from 1 mega byte to 16 GB. DEC-10, DEC-20, CDC-CYBER 170 is some main frame computers. These systems have a speed of 10 million instructions per second.

3.2.5 Maxi or Super Computers

Super computers are the most sophisticated computers that are used for weather prediction, crystallographic calculations, complex molecular structural calculations and designing of supersonic aircrafts. These computers use 64 bit word length chips and they have a speed of several billion operations per second. Their memory capacities are several Giga bytes.

Examples are CRAY, SUPER-CRAY, CYBER 205 and SUPER SX I (Xavier, C., 2001).

3.3 Classification of computers based on mode of use

Till recent years the computers were classified as mentioned above. However, with drastic changes in technology (as all computers use microprocessor as their CPU) based on mode of use, computers can be classified as Palmtops, Laptop PCs, Desktop PCs and Workstations.And based on interconnected computers they can be classified as distributed computers and parallel computers.

3.3.1 Palmtop PCs

Computers with capabilities nearly that of PCs which can be held in a palm are known as Palmtops. They accept handwritten inputs using an electronic pen which can be used to write on a Palmtop's screen (besides a tiny keyboard), have small disk storage and can be connected to a wireless network. A palmtop computer has also facilities to be used as a mobile phone, Fax and email machine.

3.3.2 Laptop PCs

They are also known as portable computers. Theyshould run with batteries hence designed to conserve energy.Laptops can be connected to networks Wireless connectivity can be provided. Currently, even Laptops are equipped with Dual Core which is a 64-bit processor with 64-bit data path and processing speed of 3.0 GHz.

3.3.3 Personal Computers (PCs)

The most popular PCs are desktop machines. Early PCs had Intel 8088 microprocessors as their CPU. The PC market moved from the 8088, 80286, 80386, 80486, Pentium, Pentium-II, III, IV and now to Intel Dual Core and Quad Core. The new Intel Dual Core can execute any piece of code that ran on the original 8088, but the Dual Core runs about 3,000 times faster.Currently, PCs are equipped with Dual Core which is a 64-bit processor with 64-bit data path and processing speed of 3.0 GHz.

3.3.4 Workstations

They are also desktop machines which are more powerful as they are provided with high speed processors that can execute more than 10 times of that of PCs. Earlier workstations normally used RISC processors but currently they are using x86-64 microprocessor with various combinations of multi-user operating systems like Microsoft Windows, GNU/Linux distribution, Apple Mac OS X etc., Examples are Dell Precision T35000, HPZ820, an x86-64 based workstation.

3.3.5 Distributed Computer System

It refers to multiple computer systems working on a single problem. In distributed computing, a single problem is divided into many parts and each part is solved by different computers. As long as the computers are networked, they can communicate with each other to solve the problem. The advantage of distributed computer system is maximizing performance by connecting users and IT resources in a cost-effective, transparent and reliable manner. Distributed computer system first stared with the use of data entry terminals on main frame computers, then moved into minicomputers and is now possible in personal computers and client-server architecture with more tiers (Techopedia, n.d.).

3.3.6 Parallel Computers

It is a type of computing architecture in which several processors execute or process an application or computation simultaneously. It helps in performing large computations by dividing the workload between more than one processor, all of which work through the computations at the same time. Most supercomputers employ parallel computing principles to operate. The primary objective of parallel computing is to increase the available computation power for faster application processing or task resolution (Techopedia, n.d.).

4. Functional units of computer

Computers are made of processor, peripherals and the memory. The functional units of computer are Central Processing Unit (CPU), Memory, Input, Output andStorage devices.

The following are the components in the central unit of the computer:

- **Motherboard**: CPU, RAM, cache, ROM, chips with BIOS and start-up programs. Chip sets (controllers), Ports, buses and expansion slots

- **Drives:** Hard disk, floppy disks (no more existing), CD/DVD-ROM etc.
  Expansions cards: Graphics card (video adapter), network controller, SCSI controller, Sound card, video and TV card, internal modern and ISDN card.

- **Peripherals**: Keyboard and mouse, Joystick, Monitor, Printer, Scanner, Loudspeakers, External drive, External tape station, External modem

4.1 Motherboard

The motherboard is the main circuit board in a PC. It contains the circuits' andcomponents that run the PC. Major components found on motherboard are:

- **CPU:** It is the brain of every PC. Every scheduling, computation and control occurs here.

- **BIOS:** Basic Input Output System is a non-volatile memory that contains configuration information about the PC. It contains all the codes required for the CPU to communicate with the keyboard, mouse, video display, disk drives and communication drives. When a PC is powered on it uses the BIOS 'boot code' to set many required functions that bring the PC to a point where it is ready to work.

- **RTC:** The Real Time clock chip keeps date, day and time in 24 hour format just like your watch. The PC uses this clock to 'time stamp' files as they are created and modified.

- **Chip Set:** These are the large chips that integrate many functions that used to be found in separate smaller chips on the motherboard. They save space and cost.
  The functions performed by these chip sets often broken into two devices with one providing an interface from the CPU to memory and the other providing controllers for IDE, ISA, PCI and USB devices.

- **Primary Connectors:** The primary connectors of a computer system include:

  - **Power**: A 20 pin connector accepts a plug from the power supply. This plug carries DC power to all the circuits on motherboard.

  - **Keyboard:** AMini-din 6-pin connector found at the back of the motherboard is where the mouse plugs in.

  - **Display:** This connector is not integrated into the motherboard but is included in this list since its function is absolutely necessary.

- **Serial Connectors** of a PC are as mentioned below

  - **Standard Serial Connector:** This connector has been around in PCs since they first appeared. It was originally located on ISA expansion type cards.

  - **USB- Universal Serial Bus:** It is designed to power devices connected to it.

- **Parallel Connectors** are as mentioned below:

  - **Standard Parallel:** This connector has been around in PCs since they appeared. It is usually used to connect your printer to the PC and moves data at about 1 MB/s.

  - **SCSI:** Small Computer System Interface moves data at a maximum of up to 80 Mb/s. It is not integrated into most PC motherboards but can be added to a PC as an expansion card.

  - **Expansion Card Connectors:** The CPU connects to expansion card connectors through one of the chip set ICs. These connectors allow special function cards to plug into ad work with the PC.

  - ISA (Industry Standard Architecture Connectors), PCI (Peripheral Component Interconnect) and AGP (Accelerated Graphics Port) are the expansion connectors of most of the PCs.

Points to remember

- The external devices available are all connected to the system unit called CPU via cables.

- Each cable plugs into a specific port on the system unit. The ports are usually on the back of the system unit. But some times they can be on front or side as well.

4.2 Drivers

A drive is a medium that is capable of storing and reading information that is not easily removed like a disk. Different drives in a computer system are as follows.

4.2.1 Hard disk

The Hard Disk drivers are usually installed in one of the 3-1/2 inch internal drive bays in the PC. Data to and from the motherboard is carried on a 40-pin IDE (Integrated Drive Electronics), cable. Data is stored magnetically on multiple rigid disks that are stacked up like pancakes. The sensors float just a few microns above the rotating disk surface and can read and write data at very high rates. Most commercially available hard drives rotate at 5400 or 7200 RPM (revolution per minute) which translates to 90 or 120 revolutions per second respectively.

4.2.2 Compact Disk Drive

Data is stored on the surface of the disk. A laser attached to an arm that moves back and forth across near the disk surface and send light toward the disk surface which is coated with of a thin layer of aluminum. CDDhave become the predominant removable storage media for PCs and can store 700 Mbytes of data. Data to and from the motherboard is carried on a 40-pin IDE (Integrated Drive Electronics) cable. There are two types of Compact Disk drives available for PCs.

- CD-ROM (read only memory) is the older type. As the title implies it can only read CDs. It can read any standard CD ad most CD-R type disks.

- CD-RW (rewritable) unit can read and write CD-R and CD-RW type disks. It can also read standard CD type disks.

4.2.3 DVD

It is also known as Digital Versatile Disk drive and is installed in one of the external 5 ¼ inch drive bays in the PC. It is designed to optically access data stored on a DVD. A laser moves back and forth near the disk surface and accesses data at a very fast rate. There are two types of DVD drives that typically go into PCs. DVD-ROM (Read Only Memory) can read DVDs and CDs and DVD-RAM (Random Access Memory) units can read and write DVDs. A standard DVD can store up to 4.7 Gbytes on one side of the disk.

4.2.4 USB Flash Drive

It works slightly differently as it use memory cards to store information on.USB drives are solutions to store data quickly, fast and huge in size.USB drives are also known as flash drive. They are plug-and-play portable storage devices that use flash memory and are light weight. The advantages of USB drives are light weight, small size, fast speed, low prize, huge capacity, plug and play functionality. The disadvantages are easy to be theft, carriers of viruses etc.

4.3 Peripherals

Peripherals are auxiliary devices that connect and work with computer such as a mouse, key board, printer etc. i.e., they add a functionality. The following paragraphs describe various peripherals and how they help to work more with the computer.

4.3.1 Keyboard

The keyboard is the first input device developed for the PC. It is used to type information into the computer or input information. There are many different keyboard layouts and sizes with the most common for Latin based languages being the QWERTY layout (named for first six letters). The standard keyboard layout provides 104 keys organized as four groups - Alphanumeric keys (A-Z, 0-9), Location keys (home, end etc), Numeric keypad, Function keys (F1-F12). Data is transferred to PC over a short cable with a circular 6-pin Mini-din connector that plugs into the back of the motherboard.

4.3.2 Mouse

The mouse is the most common 'pointing device' used in PCs. It became prevalent from the evolution of the GUI operating system. By default the left used to select items. The right button is assigned as a context or alternate menu. A single wheel is normally set to scroll up and down on the active page.

4.3.3 Monitors

For long time CRT's were dominant displays for use with desktop PCs. They are relatively big and bulky. Data is transferred to the display on a cable with a 15-pin D-shell connector that plugs into a connector on the video card which in turn plugs into one of the PC's expansion slots. LCD technology is the latest one and fastly replacing CRTs.

4.3.4 Printers

The printer takes the information form the screen and transfers it to paper or a hard copy. There are many different types if printers with various levels of quality. To name a few are: Dot Matrix, Inkjet, Laser, Plotters, Thermal printers etc.

4.3.5 Modem

Modem is used o translate information transferred through telephone lines or cable. Computers take digital signal from analog line via modem. Computers give digital signal to modem and it converts it into analog form. A high speed connection also requires a modem but because the information is transferred digitally it isn't required to change the signal from digital to analog but is used to create the connection with.

4.3.6 Scanners

They allow transfer the pictures and photographs to computer. A scanner 'scans' the image from the top to the bottom, one line at a time and transfers it to the computer as a series of bits or a bitmap. The basic principle of a scanner is to analyze an image and process it in some way. Image and text capture (optical character recognition or OCR) allows to save information to a file on computer. There are various types of scanners based on the technology they adapted. Some of them are Flatbed scanner, sheet-Fed scanner, handheld scanner, Drum scanner etc.

4.3.7 Cards

Cards are components added to computers to increase their capability. When adding a peripheral device make sure that computer has a particular slit needed by the device. Different types of cards are Sound cards, Color cards, Video cards, Network cards.

4.4 Hardware Sections

Inside the computer there are different parts referred to as hardware. The following paragraphs explain the different hardware components in a PC.The hardware section can be primarily divided into three sections: Input, output and processor.

4.4.1 Input unit

These are the devices that allow the user to enter data and instructions inside the computer. Input unit is formed by the input devices attached to the computer. It takes the input and coverts it into binary form so that it can be understood by the computer. The below mentioned are input devices – keyboard, mouse, floppy disc (are obsoleted), scanner, MICR (used for authenticating Cheque in banking), Bar Code Reader (for identification articles through unique Bar Code), OCR – Optical Character Reader (Hardcopy to computer) etc.

4.4.2 Output Unit

The device that will give the processed data or information to us is called the output device. The output unit is formed by the output devices attached to the computer. Examples of output devices are printers, plotters, speech synthesizers, coders etc.

4.4.3 Processor

Processor is the brain of whole computer system. Without it all peripherals, memory are of no use. The CPU is the main controlling centre of computer. It guides, directs and governs its performances; mainly it is divided into three parts: Control Unit, Arithmetic Logical Unit and Memory.

4.4.3.1 Control Unit

It controls and coordinates ALU and Memory unit. It extends control until the required operations are done properly by ALU and memory. It contributes significantly in the program execution.

4.4.3.2 ALU (Arithmetic Logical Unit)

The ALU handles all the mathematical and logical calculations and functions executed by the CPU. For example when two numbers get multiplied, these numbers are sent from memory to ALU where multiplication takes place and the result is put back in the memory.

4.4.3.3 Memory Unit

Memory Unit is a very small portion of CPU that stores temporary instructions and data in CPU during execution. Memory is a reservoir of quick semiconductor and electromechanical storage that helps CPU to overcome its own shortage space. Memory of a computer is like a predefined working place where temporarily keeps information and data to facilitate its performance. When the task is performed, it clears its memory and memory space is then available for the next task to be performed. When power is switched off everything stored into the memory gets erased, this is known as volatile memory. If memory doesn't get erased when power is off, then it is known as non-volatile memory. Memories are divided into two basic categories. They are primary memory and secondary memory.

- **Primary Memory**: It is fixed on motherboard. It is comparatively small memory used for manipulation and temporary storage. It is for immediate processing needs and makes big difference in final output. It is made of fast semiconductors. Examples are RAM and ROM

- **Secondary Memory**: It is a permanent storage medium. Hard disk drives, floppy discs (obsolete), CD/DVD ROM are examples of secondary memory. It uses variety of technology like optical, magnetic, Blu-ray (digital-optical) technology etc.

- **Please Note**: Software, System Software, and Application Software, Operating Systems, Networking have been discussed in other modules.

5. Need and purpose of ICT in libraries

The application of information technology in libraries results in increased operational efficiency. The IT increases productivity of library staff. It relieves professional staffs from mundane jobs that involve a lot of duplication so that their efforts can be fruitfully used for user-oriented library services. It improves quality of services rendered by the library.Use of information technology ensures ease of functioning, accuracy and economy in human labour with greater speed. The exponential growth of information has made manual system redundant giving way to computerized information storage and retrieval tools. Effective and efficient handling of huge

quantum of information is only possible by using computers, which have the added advantage of being highly accurate and efficient that adds value to information. The new information technology facilitates improved management of physical and financial resources. The advances in technology and its availability at lower cost, has also raised expectations of users from librarians and libraries. The information technology, on one hand, facilitate wider access to information for the library users, on other hand, it facilitates wider dissemination of information products and services generated by the libraries. The availability of networks facilitates resource sharing and high-speed communication with other libraries.

The impact of ICTs on operations of LICs can be viewed from information / data management of collection; organization and access / service to users.

5.1 Collection Management

The emergence of Internet, particularly the World Wide Web (WWW) as a new media of information delivery, has been coupled with availability of powerful hardware, software and networking technology. Increasing number of publishers is using the Internet as a global way to offer their publications to the international community of scientists and technologists resulting in large-scale appearance of STM electronic journals on the web. The Internet and web technology provides an unparalleled media for delivery of information with greater speed and economy. Moreover, the web-based electronic information products not only eliminated paper, physical storage and transportation costs, it also offers a hosts of other possibilities for incorporating multimedia and hyper-link features to electronic documents hitherto impossible on paper media. The web-based electronic information products are exerting ever-increasing pressure on the traditional libraries, which, in turn, are committing larger portions of their budgetary allocation for either procuring or accessing web-based online or full-text search services, CD ROM products, online databases, multi-media products, etc. The libraries and information centres, as consumers of electronic journals and online databases, are benefiting greatly from this technology-driven revolution.The information products of technological revolution, in turn, triggered major shifts in the traditional practices and policies of buying, storing and accessing journals.

5.2 Information Processing and Retrieval

The changing forms and formats of knowledge paved way for new methods of its organization. Copy cataloguing, shared cataloguing are the buzz words today to have bibliographical control of the library holdings. However the technical issues involved are more complex than it appears to be. Further development is organizing digital and web resources using Metadata schemas.

5.3 Information Services

The ever growing internet collections provide access to top-quality databases, literature search through subject gateways, downloadable audio books and music and instant messaging reference services like 'Ask A Librarian', 'Online Reference', Real time Reference service, 'Digital Reference services' etc. Owing to these developments library's services underwent change, focusing more on the facilitation of information transfer and information literacy rather than providing controlled access to it.

Rapid changes in information technologies during past three decades have drastically changed the functions and activities of information professionals in libraries. Most functions in modern libraries are being performed using software packages that are now available off-the-shelf. Several libraries have their catalogues available on the Internet with a web-based search interface along with links to resources either acquired through external agencies or created in-house. Most libraries are connected to the Campus network and subscribe to electronic resources to serve the information requirement of their academic community. Several libraries have taken-up small-scale digitisation projects for part of their collection. The librarians and information professionals are required to develop skills that are required to use, develop and maintain IT-based services and products used by today's libraries.

6. Summary

Dramatic reductions in the size and cost of computer components and equally impressive gains in the speed, storage capacity and reliability of hardware components have expanded their use rapidly in all activities and functions of a library and information centre. Notable reductions in the size of microprocessors combined with dramatically enhanced capacity have added new dimensions to the computer new hardware technology. Initially, small silicon chips contained only few components and circuits, but the average number of components has doubled each year since 1965. Early small-scale integration efforts first gave way to large-scale integration (LSI) chips that contained thousands of components, very large-scale integration (VLSI) chips that contained hundreds of thousands of components and circuits, and now ultra large-scale integration (ULSI) chips come with millions of components and circuits.

A microprocessor, also known as Central Processing Unit (CPU) of a computer, is a complete computation engine that is fabricated on a single chip. Microprocessors are manufactured by different companies like Intel, Advanced Micro Devices (AMD), Motorola, etc. However, most widely-used microprocessors are manufactured by Intel. The first microprocessor used in a PC was Intel 8080. Introduced in 1974, it was a complete 8-bit microprocessor on a single chip. Intel 8088 used in the IBM PC in 1979, was the first microprocessor that made its presence felt in the market. The PC market moved from the 8088, 80286, 80386, 80486, Pentium, Pentium-II, III, IV and now to Intel Dual Core and Quad Core. The new Intel Dual Core can execute any piece of code that ran on the original 8088, but the Dual Core runs about 3,000 times faster.

The capacity of a microprocessor is measured in terms of the number of bits it can send or receive and the number of bits it can process internally. The 8088 was an 8/16 bit processor, indicating that it can send or receive 8 bits of data and internally process 16 bits of data at a time. The 80286 was a 16/16 bit processor and 80386 chip had a 32-bit processor with a 32-bit data path and, as a result, was much faster than either the 8088 or the 80286 chip. The 80486 chip, introduced by Intel in late 1989, had a 32-bit processor. It has architectural enhancements; hence it performed better than the 80386 chip. The Pentium is a 32-bit processor with a 32-bit data path. It is three times faster than the 80486. The Pentium II and III had a 32-bit processor with a 64-bit data path. It was three times faster than the Pentium. The Pentium IV is a 32-bit processor with a 64-bit data path, and was introduced in 2000. It is four times faster than the Pentium. Currently, PCs and laptops are equipped with Dual Core which is a 64-bit processor with 64-bit data path and processing speed of 3.0 GHz.

Computers are classified into a number of generations based on the electronic technology used in constructing the computer, the associated system software and applications. Computers may be classified based on their mode of use and the way individual computers are interconnected. Based on the nature of use computers are classified as Palmtop computers, Laptop computers, Personal computers, Workstations, Mainframes or Supercomputers. Based on interconnection, computers are also classified as distributed computers and parallel computers.Computers are made of processor, peripherals and the memory. The functional units of computer are Central Processing Unit (CPU), Memory, Input, Output and Storage devices. The emergence of Internet, particularly the World Wide Web (WWW) as a new media of information delivery, has been coupled with availability of powerful hardware, software and networking technology. Rapid changes in information technologies during past three decades have drastically changed the functions and activities of information professionals in libraries. The application of information technology in libraries results in increased operational efficiency. The IT increases productivity of library staff. It relieves professional staff from mundane jobs that involves a lot of duplication so that their efforts can be fruitfully used for user-oriented library services. It improves quality of services rendered by the library.

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