UNIT 1 COMPUTER BASICS

Structure

1.0 LEARNING OUTCOMES

After reading this Unit, you will be able to:

- know about different types of computers;
- describe basics of personal computer hardware and software;
- identify personal computer storage and peripheral devices;
- explain basics of systems software and applications software;
- highlight about different types of computer software and their applications in different areas;
- discuss how to organise data into computer files; and
- describe how to use Ubuntu operating system

1.1 INTRODUCTION

This Unit introduces you to the basics of computer concepts and terminology to help you understand and identify fundamental elements of computer hardware and software.

From the motherboard to microprocessor to RAM, hard disk drives and to the speakers, this Unit will tell you what each hardware device does and how they all work together to make your personal computer (PC) work. Such a general understanding of computer hardware is indeed useful in several different scenarios; for example, in investigating PC's ability to perform any given task; in trying to decide what might be done to improve your PC's current performance; and lastly and in trying to decide what you need to do to upgrade your PC. This Unit will also enrich your understanding of computer software and related applications. In particular you will learn about systems software and applications software and why do we need them to use the Internet, send e-mail, to create a résumé, or run your computer hardware. In brief, the Unit will help you in building and enriching your fundamental understanding of computer hardware and software in the context of personal computers as well as help you learn how to organise data and information into computer files.

1.2 WHAT IS A COMPUTER?

We all recognise that computers have changed the way we now work, play, communicate and learn. We now use computers to type documents, send e-mail and browse the internet. We have also come to recognise that computers process and manage data at an incredible speed and accuracy. Hence it is common to see using computers to handle spreadsheets, accounting, database management, presentations, games and more. We also use computers now for recording, analysing, sorting, summarising, calculating, disseminating and storing data.

One wonders what makes computer such an incredibly perfect and powerful machine. You must understand that a computer is nothing but a programmable machine that responds to instructions to store, retrieve and process data with unimaginable speed and accuracy. It is an electronic device that manipulates information or data through programming. A computer has four functions to perform: i) accept data, ii) process data, iii) produce output and iv) store results. The main characteristics of a computer are speed, accuracy, automation, storage, endurance and versatility. Computers of all types and makes essentially comprise two basic parts: hardware and software.

- Hardware is any part of your computer that has a physical structure, such as the computer monitor, keyboard, or mouse.
- Software is any set of instructions that tells the hardware what to do. It is what guides the hardware and tells it how to accomplish each task.

1.3 TYPES OF COMPUTERS

Computers can be generally classified by physical size, performance power and application areas as follows, though there is considerable overlap:

- **microcomputer:** a small computer based on the microprocessor technology that enables manufacturers to put an entire 'central processing unit' on one chip.
  - **personal computer:** a small, single-user computer based on a microprocessor.
  - **workstation:** a powerful, single-user computer. A workstation is like a personal computer, but it has a more powerful microprocessor and a higher-quality monitor.
- **minicomputer:** a multi-user computer capable of supporting from ten to hundreds of users simultaneously.

- **mainframe:** a powerful multi-user computer capable of supporting many hundreds or thousands of users simultaneously.
- **supercomputer:** an extremely fast computer that can perform hundreds of millions of instructions per second.

Desktop Computers

Desktop computers are popularly known as personal computers (aka PCs). They can be small, medium, or large in style and usually sit on a desk. Once you add a monitor, mouse and a keyboard, you have what is typically known as a desktop computer. Most desktop computers are easy to upgrade and expand, or add new parts. Another benefit of desktop computers is their lower cost. If you compare a desktop and a laptop with the same features, you will most likely find that the desktop computer is priced lower.

Portable Computers

Laptop computers: The second type of computer that you may be familiar with is a **laptop computer** or laptops as they are often referred to. Laptops are battery or AC-powered personal computers that are **more portable** than desktop computers, allowing you to use them almost anywhere. Since a laptop is smaller than a desktop, it is more difficult to access the internal components. That means you may not be able to upgrade them with as much ease as in a desktop. However, it is usually possible to add more **RAM** or a bigger **hard drive**. Other examples of portable computers are Netbooks, palmtops or handheld PCs.

Netbook: Netbook computer is a portable personal computer similar to laptop computer. It is usually smaller, lighter and less powerful than a laptop computer. Many features of netbook are similar to laptop, although it has less computation capacity than laptop. Normal Netbook is about 10 to 11 inches screen size. Netbook is used for internet access, word processing, reading e-books/ e-journals, listening to music and other basic applications.

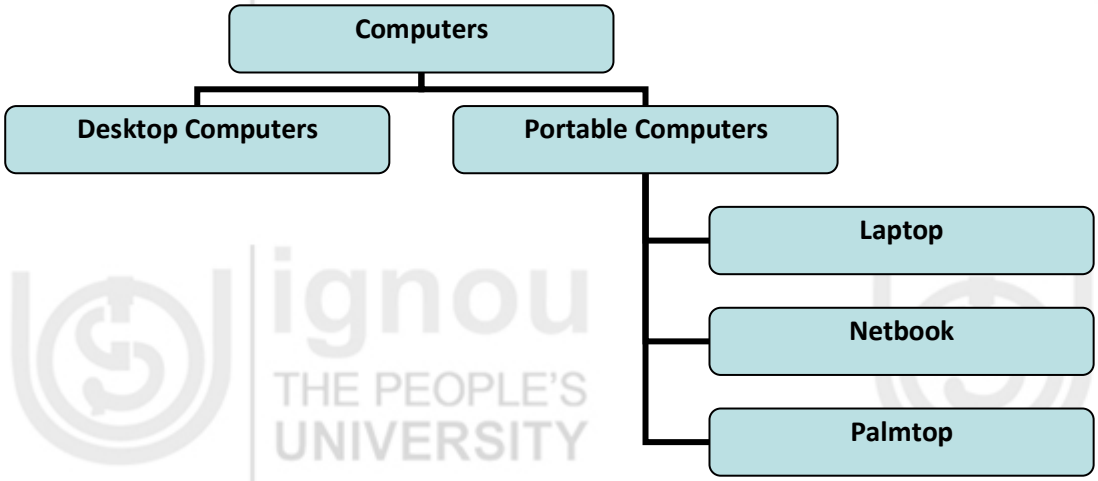

Fig. 1.1: Types of Computers

Palmtop: Palmtop is a mobile handheld wireless computing device. It is usually smaller, lighter and less powerful than netbook computer. Palmtop is popularly known as personal digital assistant (PDA), as it functions as a personal information manager. It is also used to read digital documents including e-books and e-journals. It is used for web browsing or accessing internet or intranet resources. Some PDAs have touch-screen display. Some palmtop e-book reading devices (e.g., Amazon Kindle, Apple iPad, Sony e-Book Reader) are also available, which usually don't contain other computing applications.

1.4 PERSONAL COMPUTER HARDWARE

Hardware refers to the physical parts, devices and equipments that make up the computer system. It means that a computer is not just a single monolithic machine, but a system made up of many parts working together. Hardware includes not only the computer proper but also the cables, connectors, power supply units and peripheral devices such as the keyboard, mouse, audio speakers and printers. Therefore, computer hardware is a general term that is used to describe all physical parts or components of a computer system. A general purpose computer is an integration of four main components, namely, Central Processing Unit, memory, mass storage devices and input/output devices.

A personal computer is the whole machine, including the case, the CPU, main memory, the fan, storage drives, controllers for video display and sound and other essential components. In modern computers it is increasingly common to integrate these peripherals into the motherboard. Other components such as external storage and inputs/outputs as peripheral devices are typically attached to the motherboard via edge connectors and cables.

1.4.1 Major Hardware Components

Central Processing Unit

The Central Processing Unit (CPU) is made up of Control Unit and Arithmetic and Logic Unit (ALU). It is the brain of the computer, the main functional component that processes instructions and performs operations as per requirements of the computer user. The CPU is often referred to as a "computer on a chip" or microprocessor.

Microprocessors are rated by the clock speed. The clock speed determines how many instructions per second the processor can execute. This speed is always stated in Hz (one Hz, or Hertz, is one calculation). A common speed these days is a 2.0GHz processor. This means that the processor can make 20,000,000,000 calculations per second — 2000 × 1,000,000 (Mega) × 1 (Hz) calculations per second.

CPU gets raw data from an input device or a memory device or a storage device. Two CPUs with the same clock speed will not necessarily perform equally. The more cache memory your processor has built into it, the faster it will perform. Microprocessors are therefore also rated by the built in cache memory.

Motherboard

A motherboard is printed circuit board (PCB) that holds components integral to the computer such as the central processing unit (CPU), the RAM, the chipset and expansion slots. It also has connections for ports such as USB and PS/2. It also holds BIOS (that controls the basic communication functions between components) and CMOS battery that keeps the clock ticking when your PC is turned off. The motherboard provides connections for the computer keyboard, disk drives, monitor and other devices. It is the function of the motherboard to supply all of the components plugged into it with power. In addition, the motherboard also provides special sockets where additional memory or primary storage can be added. There are several special receptacles located on the motherboard. These sockets are called expansion slots and allow you to plug in special electronic circuit boards that perform additional processing functions. The motherboard is rightly called the backbone of a computer.

Random Access Memory (RAM)

It is the systems main memory that CPU (microprocessor) uses to temporarily store data when a program is running. Unlike auxiliary memory such as a hard drive, RAM is

volatile, meaning that it only stores data as long as computer power is on. When a software application is launched, the executable program is loaded from hard drive to the RAM. The microprocessor supplies address into the RAM to read instructions and data from it. RAM is needed because hard drives are too slow to operate with the speed of a microprocessor.

Expansion Cards

An expansion card is an electronic circuit board that adds more functionality to a desktop computer. These cards are installed into the expansion slot of a computer motherboard and they allow the computer to perform additional functions not offered by the motherboard. Graphic card, sound card and network card are common examples: a new graphic card added will enhance the three dimensional graphics processing power of a computer while a new sound card may improve a computer's audio input. A network card is used to connect your computer to a network such as a home network or the Internet using an Ethernet cable with a RJ-45 connector.

Ports on a Desktop Computer

Every computer has ports that are used to connect a number of external devices like printers, modems, keyboards and mouse. There are three different kinds of ports: parallel, serial and Universal Serial Bus (or USB). **Serial ports** transmit data one bit at a time. To send one byte (or eight bits), it must send each bit individually. This means the serial port will normally operate slower than the parallel port. Serial ports are commonly used to connect a mouse or modem to the computer. **Parallel ports** send several bits at a time to the device, usually a printer. In this way, the port can transfer an entire byte or character (that is, eight bits) at a time. This provides very fast information transfer. The most common use of the parallel port is to connect a printer to the computer. **USB ports** support data transfer rates of 480 Mbps (or 480 million bits per second). A single USB port can be used to connect many peripheral devices, such as mouse, modems and keyboards. In older PC models, you may only have parallel and serial ports. USB ports are a fairly new feature; it became widespread and is expected to completely replace parallel and serial ports.

Power Supply Unit

A power supply unit (PSU) is the component that supplies power to a computer. It converts alternating current (AC) electric power to low-voltage direct current (DC) power for the internal components of the computer. Power supply units used in computers are nearly always switch mode power supplies (SMPS). The SMPS provides regulated direct current power at the several voltages required by the motherboard and accessories such as disk drives and cooling fans.

Computer Case

A computer case (also known as a box) is a box that has bits of computer in it. The computer case serves mainly as a way to physically mount and contain all of the actual computer components. Cases typically come bundled with a power supply.

1.4.2 External Storage Devices

Hard Disk Drive

Hard disk drive is a major magnetic storage device having large size data storage capacity. A HDD consists of a pack of circular magnetic disks mounted on a central hub which rotates. Data is recorded on both sides of each disk stored in tracks and sectors. It allows direct access as well as serial mode access. Data in HDD are readable, writable, erasable and re-writable. Nowadays HDDs of personal computers have storage capacity

between 80 GB to 1 TB. Personal computers contain internal hard disk drives to meet local requirements of secondary storage. External hard disk drive has become very popular among computer users, as it is portable and detachable. External HDD may store as much data as an internal HDD. External HDD usually has a USB connector for easily connecting with personal computers.

Floppy Disk Drive

Floppy Disk is a portable light-weight magnetic storage media, which contains a thin magnetic disk inside a square or rectangular plastic shell. 3½-inch high density floppy disks became very popular in late 1980s until the year 2000. Data in floppy disk are readable, writable, erasable and re-writable. Each disk has 1.44 megabyte (MB) storage space. However, floppy disk has been phased out by other portable high capacity storage media such as USB flash drive, DVD.

Optical Disc Drive

It is also known as ODD, CD drive, DVD drive, BD drive, disc drive. Optical drives retrieve and/or store data on portable optical media like CDs, DVDs and BDs (Blu-ray discs).

Compact Disc (CD) is a kind of optical storage disc used to store digital data. There are different kinds of CDs, namely CD-ROM (read only memory), CD-R (recordable), CD-RW (re-writable) and Video Compact Disc (VCD). Data on CD-ROM (read only memory) can only be read and not written; CD-R (recordable) can record data only once and then functions as a CD-ROM; CD-RW can write and erase data multiple times. VCD usually stores video files and can be viewed on television set using a VCD player.

Standard CDs have a diameter of 12 cm and can store up to 700 MB of data. A CD drive is attached with a personal computer to read, write, erase and re-write data on CDs. A 50x CD-ROM drive will read at a maximum rate 50 times faster than the very first, 1x CD-ROM drives. The original speed rating of 1× means that the drive could read a maximum of 150 Kilobytes of data from the disk every second. Knowing this, we can figure out that a 50× drive will read from the disk at a maximum rate of 7500 Kilobytes (or 7.5 Megabytes) per second.

Figure 1.2 shows a mapping of major external storage devices in present time.

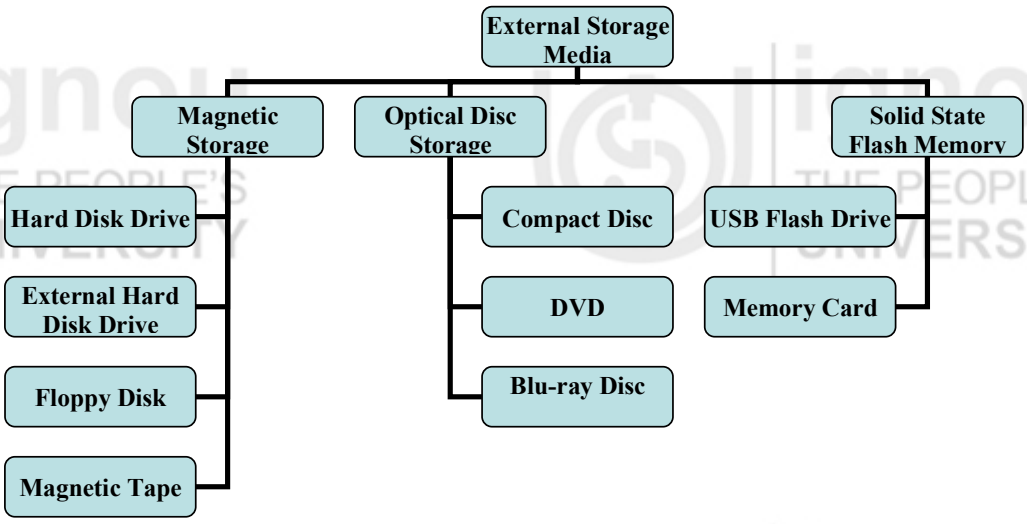

Fig. 1.2: Types of External Storage Media used in Computers

DVD

Digital Video Disc (DVD), also known as Digital Versatile Disc, is more sophisticated optical disc storage media that is capable of storing almost seven times as much data of compact discs. Its main uses are video and data storage. There are different kinds of DVDs in existence, namely DVD-ROM (read only memory), DVD-R (recordable) and DVD-RW (re-writable), which have functionalities similar to respective type of CDs. Standard DVDs have a diameter of 12 cm and can store up to 4.7 GB of data in a single layer disc. A double layer DVD can store up to 8.5 GB of data. A DVD drive is required in a personal computer to read, write, erase and re-write data on DVDs.

Blu-ray Disc

Blu-ray Disc (BD) is more advanced optical disc storage media that is capable of storing almost six times as much data of DVDs. It was initiated to meet storage requirements of high definition television (HDTV) contents. Standard BDs have a diameter of 12 cm and can store up to 25 GB of data in a single layer disc. A double layer BD can store up to 50 GB of data. There are two kinds of BDs, namely BD-R (recordable) and BD-RE (re-writable), which have functionalities similar to respective type of DVDs. A BD drive is required in a personal computer to read, write, erase and re-write data on BDs.

USB Flash Drive

USB Flash Drive is a portable very light-weight storage media, which contains flash memory data storage device integrated with a USB (universal serial bus) interface. It uses solid state semiconductor memory. It has an attachment of USB 1.1 or 2.0 interface. It has a great storage capacity (commercially available flash drive has storage capacity between 1 to 32 GB and beyond). Flash drive is also popularly known as pen drive or thumb drive. Data in USB drive are readable, writable, erasable and re-writable. It weighs less than 30 grams. It has greater writing and reading speed as compared to floppy disks, CD-ROMs and DVDs. It allows data to be written or erased about 1 million times and data to be retained about 10 years (data retention cycle) in ideal condition. It has become very popular to the end users, as this device does not require any special equipment or software to access; it is very affordable, ultra light, portable and interoperable in any computer environment. Figure 1.3 shows a picture of a USB Flash Drive, which has 16 GB capacity.

Fig. 1.3: USB Flash Drive

Source: the gizmofreak.wordpress.com/2011/10/usb-flash-drive-the gizmofreak.jpg

1.4.3 Computer Peripherals – Input Devices

A personal computer uses a combination of devices or peripherals for creating, accessing and disseminating of information and knowledge. As you now understand, computer makes use of several input and output devices to fulfil requirements of its end user. For example, for typing some texts into computer system, a user needs a computer keyboard. Similarly, if the user wants to get a printed copy of typed texts, s/he needs a computer printer. All these equipments are popularly known as input output (I/O) devices. Figure 1.4 gives an indicative list of commonly used I/O devices in libraries or modern offices. There are several other specialised I/O devices, used by advanced users, but not shown in this Figure.

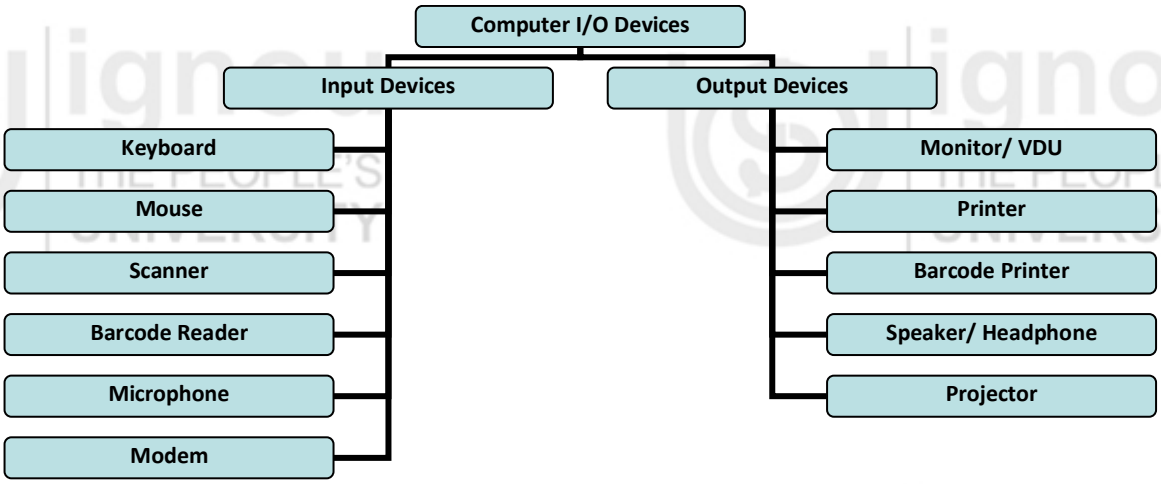

Fig. 1.4: Types of Computer Input/ Output Devices

Computer Keyboard

Computer keyboard is most used input device for entering alphanumeric characters into the computer applications. As its name implies, computer keyboard contains keys for alphanumeric characters, punctuation symbols, few special characters, function keys, screen navigation keys and simple mathematical operation keys. It has similar layout of typewriter keyboard. Usually keyboard is used to type texts and numbers into a text editor, word processor, database and other computer applications. When a computer user punches an alphanumeric key on a keyboard, it gets displayed on screen or monitor of the computer. Traditional keyboards contain 101 keys. Some special keyboards contain more than 101 keys that depend on applications or operating systems' requirements. Alphanumeric characters are printed or engraved on a keyboard, where each key is given a key value. For example, if 'Q' is printed on a key that implies user can type 'Q' or 'q' using that key. However, for typing uppercase letters, user needs to use additional *shift* key or to turn *caps lock* on. Many computer users also use bilingual or multilingual keyboards, where same keyboard is used for typing alphabets in English as well in another language. Keyboard cable is connected with a computer system by a PS/2 connector. Some keyboards also use USB connector. Keyboard requires pre-installation of driver software for functioning in a computer system.

Fig. 1.5: Multimedia Keyboard with a USB connector

Source: http://joey.ubuntu-rocks.org/blog/2007/11/18/zareasons-ubuntu-keyboard/

Fig. 1.6: Layout of a Bi-lingual Keyboard for typing English and Hindi Texts

Source: http://www.thefullwiki.org/Inscript

Computer Mouse

Computer mouse is a commonly used pointing device for using in a computer with graphical user interface (GUI). Mouse helps in navigating the graphics and texts as appeared on screen and helps in reaching a particular screen point with a cursor for further input. Commonly used mouse contains mainly three components – two buttons and a scroll wheel. Mouse becomes functional when mouse driver software is installed in the computer. When mouse cursor moves along X and Y axes on the screen, the driver software in the system converts the signals into motion. Usually left button is used for selecting an on-screen item by single click or double clicks (a click is generated when user presses the button gently). Then user choice is converted into the signal for appropriate action by the program or software. Right button usually derives short menu list, depending on software you use. Scroll wheel is used for fast navigation along the whole document. Mouse is connected with a computer system through cable and a PS/2 connector. Some mice also use USB connector.

Scanner

Scanner is an input device for converting physical documents into digital documents. The process of conversion of physical documents into digital documents is known as digitisation. Scanner is a vital tool for library digitisation activities. Scanner is also used

as an office tool to produce digital copy of important documents. Several types of scanners are available in the market. Flatbed document scanner is popularly used in a library for carrying out day-to-day scanning activities. Flatbed scanner consists of a glass platen, bright light source and moving panel of optical sensors. Flatbed scanner scans a document in face-down mode. Flatbed scanner is physically connected to computer through a USB connector. USB connector transfers captured scanned images to computer. Scanner also requires an energy source, where power input is given to it through a power cable. Any scanner requires pre-installed scanning software to scan physical object and converting into a digital object. Example of popular scanning software is Omniscan. Scanning software captures page-wise image of the document and stores as a digital image. Sometimes images of a textual document are converted into searchable/editable digital texts using Optical Character Recognition (OCR) software. OCR software is mainly available for English and European languages. OCR software for Indian languages is still at the stage of development.

Barcode Reader

Barcode is a machine readable representation of identification data, given in an array of dark parallel lines of different widths. Barcode reader is a handheld device to capture identification data available on barcode for a document or an object or a product. Barcode reader is also known as barcode scanner. In an automated library environment, unique barcode is assigned for every user or document. Many publishers also assign unique barcodes for books, journals and other published documents. In the circulation section of a library, barcode reader is used to facilitate efficient and quicker book lending services.

Fig. 1.7: Barcode of a Document and a Barcode Reader

Source: www.livronauta.com.br; www.barcode.co.uk

Microphone

In a multimedia computer, user can record her/his voice or can make voice communication through internet. For this purpose, a microphone is used and attached with the computer. A microphone is an acoustic sensor that converts sound into an electrical/ digital signal. Usually a multimedia computer has a comprehensive sound system, consists of speakers and microphone. Microphone is an input device for interactive voice communications. Microphone is also popularly known as mic or mike.

1.4.4 Computer Peripherals – Output Devices

Modem

Modem (modulator-demodulator) is a device that modulates an analogue carrier signal into digital signals and also demodulates such a digital carrier signal into analogue signals. Modem is used to connect stand-alone personal computers with internet. Modems are available in various types such as DSL (Digital Subscription Line) and wireless. DSL

modem is usually used in a fixed place, where a computer is stationed. DSL modem requires a combination of a telephone cord, Ethernet cable and AC power adaptor to connect with a computer. Nowadays wireless USB modem has become very popular among laptop users, although it is also used by desktop computer users. USB modem is very handy as it is portable and mobile USB modem consists of a USB connector to connect to a computer. In our country situation, DSL modem is usually faster than USB modem.

Fig. 1.8: Wireless USB Modem and DSL Modem

Source: www.tataphotonplus.co.in; www.thinkdigit.com

Computer Monitor

Computer monitor (aka Video Display Unit – VDU) is most used output device for displaying processed data as well as input data on screen. Computer monitor displays entered text or images or graphics whenever user enters it using a keyboard or mouse or any other input device. It also displays information retrieved from an information system or a storage device. Computer monitor facilitates interaction between a user and an information system through a graphical user interface (GUI). GUI of an information system is designed to make human computer interactions with the information system at ease. Computer monitors in desktop computers are made of a cathode ray tube (CRT), while more modern computer monitors use a thin film transistor liquid crystal display (TFT-LCD). TFT-LCD monitor is lighter, takes less table space than CRT monitor. TFT-LCD monitor also has greater energy efficiency than CRT monitor and are more popular. Table 1 gives a comparison between TFT-LCD monitor and CRT monitor.

Fig. 1.9: Use of TFT-LCD Monitor in a Modern Desktop Computer

Source: http://www.hcl.in/

Fig. 1.10: CRT Monitor for a desktop computer, having a bulky cabinet

Source: http://www.dell.in/

Table 1: TFT-LCD Monitor vs. CRT Monitor
TFT-LCD monitor is lighter than CRT monitor.
CRT monitor is bulkier than TFT-LCD monitor.
TFT-LCD monitor takes less table space than CRT monitor.
TFT-LCD monitor consumes less power/electricity than CRT monitor.
TFT-LCD monitor generates less heat than CRT monitor.
TFT-LCD monitor is more energy efficient and environment-friendly than CRT monitor.
Image quality of TFT-LCD monitor is better than CRT monitor.
TFT-LCD monitor is costlier than CRT monitor.

Computer Printer

Computer printer is a peripheral device that prints texts or graphics on a physical media such as on paper or transparency sheet. Computer printer helps in converting a digital document from a computer into a visually viewable physical document. Nowadays, computer printer is connected to a local computer through a USB cable. A printer also gets power supply through a dedicated power cable. Usually four types of printers are used, namely, laser printer, inkjet printer, dot matrix printer and barcode printer.

Laser printer is a commonly used computer printer that rapidly produces high quality graphics and images on plain paper. It uses rotating drums to make impressions on paper with electronically charged dry ink molecules. In small or medium sized libraries, black and white laser printer is used as it's per page printing cost is very low.

Fig. 1.11: Laser Printer

Source: www.indiamart.com

Inkjet printer is another commonly used computer printer that creates digital image by propelling variable sized ink droplets on paper. Colour inkjet printer usually requires a set of ink cartridges (a kind of special container of ink) or print-heads of four basic colours, viz., black, cyan, magenta and yellow. Inkjet printer is also used in photo printing on photographic papers. Although an inkjet printer is cheaper than a laser printer, its per page printing cost is higher than a laser printer as it requires high consumption of ink cartridges.

Fig. 1.12: Inkjet Printer

Source: www.latestviews.com

Dot matrix printer is an early computer printer, where print head runs back and forth along a band of ink-soaked cloth ribbon and prints by impact on a paper. In this printer, continuous papers can be used to print in a batch. It is also useful to create carbon copies (duplicate copies) in a single go at the time of producing original copy. Dot matrix printer was used to print card catalogues from a catalogue database in a batch mode.

Fig. 1.13: Dot Matrix Printer

Source: www.thegeekport.com

Barcode printer is a small printing device to print barcode labels or tags that can be attached to physical objects. It uses thermal printing mechanism, similar to laser printing process. Desktop barcode printer is used in libraries to print barcode labels for books, periodicals and patrons' cards.

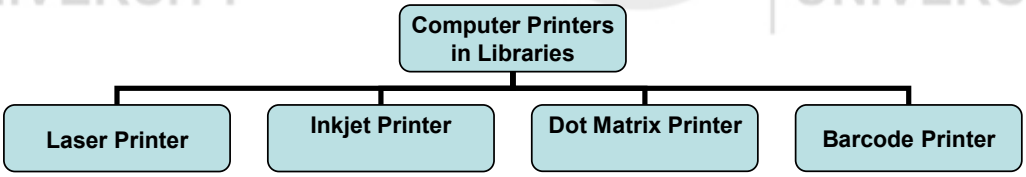

Fig. 1.14: Types of Computer Printers

Speaker/ Headphone

A multimedia computer makes use of audio visual materials for learning, entertainment and communication purposes. Computer speaker is an output device in a personal computer to produce amplified audio outputs. A speaker is connected with a computer through stereo jack plug. A speaker may also make use of USB connector. Amplifier speaker usually requires an AC adapter to make use of external power source for making high quality sounds. A headphone is a substitute of a computer speaker that is mainly used to hold small loudspeakers close to a user's ears. Headphone sometimes attaches with a microphone to make two-way voice communications.

Projector

A computer projector is a computer peripheral and an output device for displaying video, images or computer data on a screen or other flat surface. A video projector or popularly known LCD (liquid crystal display) projector is frequently used in classroom and seminar hall to display speaker's presentation and visual materials to a larger audience. These visual materials are usually stored in a multimedia computer, which generates an enlarged view through this projector. Projector is also used in libraries for different purposes. Projector is connected with computer through a VGA connector. Projector is also connected with a stable power source.

Self Check Exercise

Note: i) Write your answers in the space given below.

ii) Check your answers with the answers given at the end of this Unit.

1) What is the difference between disk storage and disc storage?

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2) What is the difference between DVD-Video and DVD-ROM?

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3) Which of these computer components are considered input devices?

A. Keyboard **B.** Mouse **C.** Printer **D.** Monitor **E.** Both A and B

4) Scanners are considered an input device?

A. True **B.** False

5) A DVD can hold less information than a CD.

A. True **B.** False

6) The computer component that allows you to connect to the internet?

A. Sound Board **B.** ROM **C.** Hard Drive **D.** Modem

7) Memory that forgets everything when it's turned off?

A. ROM **B.** RAM **C.** Hard Drive **D.** Flash Drive

8) Another name for the CPU is?

A. Central Production Unit

B. Brain of the computer

C. Central Privilege Unit

D. None of the above

9) The mother board's job is to _____.

A. hold all the circuits and components together;

B. send power to all the components;

C. tells the computer what to do;

D. display information

10) ROM is temporary memory.

A. True

B. False

11) When you save information directly to your computer you are saving to your _____?

A CD Drive

B. Hard Drive

C. DVD Drive

D. CPU

12) The component that allows you to display graphics on the computer.

A. Video Card **B.** Port **C.** BIOS **D.** Modem

13) Which one of these devices would be best to save a movie?

A. CD **B.** Flash Drive **C.** Floppy Disk **D.** DVD

14) Which one of these components are not considered hardware?

A. Monitor **B.** Printer **C.** Scanner **D.** Microsoft Word

15) Which saving device allows you to save directly to the computer?

A. DVD **B.** CD **C.** Floppy Disk **D.** Hard Drive

16) The BIOS is responsible for _____.

A. displaying graphics

B. writing programs

C. waking up the computer

D. none of the above

17) Which of these three computer components are considered input devices?

a. Monitor b. Scanner c. Mouse d. Keyboard e. Speakers f. Printer

A. a, b, c

B. d, e, f

C. a, c, d

D. b, c, d

E. a, c, f

18) Which of these three computer components are considered output devices?

a. Monitor b. Scanner c. Mouse d. Keyboard e. Speakers f. Printer

A. a, b, c

B. d, e, f

C. a, b, e

D. b, e, f

E. a, e, f

19) Hard Disk Drive is a magnetic storage media. **A**. True **B**. False

20) DVD is an optical storage media. **A**. True **B**. False

21) Floppy Disk is an optical storage media. **A**. True **B**. False

22) Laser printer is less expensive than common inkjet printer. **A**. True **B**. False

23) LCD Projector is an input device. **A**. True **B**. False

24) Keyboard is an input device. **A**. True **B**. False

25) Example of solid state flash memory is primary memory. **A**. True **B**. False

26) Example of solid state flash memory is USB thumb drive. **A**. True **B**. False

27) External hard disk drive is usually connected with computer through PS/2 connector.

A. True **B**. False

28) Desktop computer usually does not require a touch screen monitor.

A. True **B**. False

29) CPU performs arithmetic operations through control unit. **A**. True **B**. False

30) Right button of a mouse derives a menu list. **A**. True **B**. False

31) Barcode reader scans whole document. **A**. True **B**. False.

1.5 PERSONAL COMPUTER SOFTWARE

Software and related applications refer to the computer programs that tell the hardware what to do. Software can be divided into two general classes: systems software and applications software. Software contains the electronic instructions and information for a computer, including everything from a computer's operating system to computer games.

1.5.1 Systems Software

Systems software consists of low-level programs that interact with the computer at a very basic level. This includes operating systems, compilers, utilities and device drivers for managing computer resources.

Operating System

An operating system (or OS) is an interface between hardware and the user facilitating sharing of limited computer resources and the management and coordination of activities. It is the foundation of your computer's software. Operating system is responsible for everything from the control and allocation of memory to recognising input from external devices and transmitting output to computer displays. It also manages files on computer hard drives and control peripherals, like printers and scanners. It allocates computer resources to the software you use, control how applications communicate with each other and how the computer communicates with you. It is the backbone of a computer, managing both software and hardware resources, designed to run applications and other programmes on a computer. Figure 1.15 gives a pictorial diagram of an operating system, where user is located at the top layer or outer layer, whereas hardware resources are located at core area.

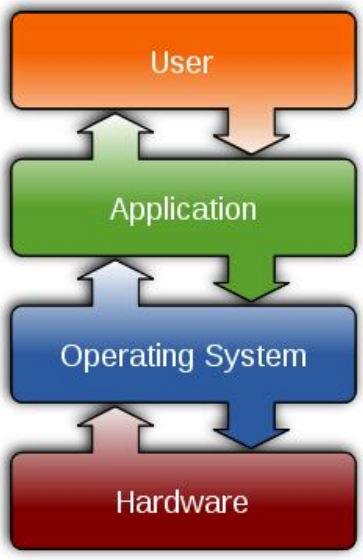

Fig. 1.15: Pictorial Diagram of Operating System

Source: http://en.wikipedia.org/wiki/Operating_system

A list of utilities available in a common operating system is described below:

- *Process management*: Operating system runs a single or multiple processes simultaneously to deliver various applications as and when required by a user. Operating system prioritises processes. It also maintains a queue of processes to run simultaneously or in a batch.
- *Memory management*: Operating system manipulates data residing on the primary memory and secondary storage devices. It also fetches required data from secondary storage devices to primary memory to run specific applications.
- *File system*: Operating system facilitates access to data stored on a hard disk drive or other storage devices. Operating system also creates workspace for user to store a whole document as a computer file.
- *Device drivers*: Operating system manipulates hardware of a peripheral device, such as printer, with the help of respective device driver. A device driver is utility software to facilitate running of a computer device.
- *Networking*: Operating system manipulates operations of networking devices to establish connections between two or more computers. Operating system maintains a layer of networking protocols to communicate with standard devices and applications.
- *Security*: Security of a computer system is paramount importance to ensure authorised access to data and applications in a computer system. Operating system helps in establishing a secure and protected environment for the computer users.
- *Input/Output operations*: Operating system facilitates input/ output operations and use of I/O devices for computer users. I/O devices are specially designed to meet user requirements. Operating system helps in meeting those requirements.

There are different types of operating systems such as multiuser, multiprocessing, multitasking, multithreading, real-time, batch-processing and single-user online operating systems. A multiuser operating system enables multiple users to run programs simultaneously. This type of operating system may be used for just a few people or hundreds of them. In fact, there are some operating systems that are used to allow thousands of people to run programs at the same time. Multitasking, multiprocessing and multiuser *operating systems illustrate different forms* of multiprogramming *operating system*.

You can use operating system to list files and directories, make directories, change to a different directory. You can use it to create files, copy files, move files, remove files and directories, display the contents of a file on the screen and search the contents of a file.

Operating Systems for Personal Computers: There are many operating systems for personal computers. Popular operating systems for personal computers are Linux, Ubuntu and Mac OS, in addition to Microsoft Windows. Nowadays, most of these operating systems provide GUI-based multitasking desktop environment, where computer user is empowered to use his mouse to navigate the desktop, open programs, move files and perform most other tasks.

System Utilities

System utility is a programme that performs a very specific task such as trouble-shooting a system or other program to find errors and missing files. Additional utilities include data backup programs, file compression software and tools used to thoroughly uninstall

other programs. System utilities are usually related to managing system resources. Operating systems contain a number of utilities for managing disk drives, printers and other devices.

Device Drivers

Device driver is a program that controls a device. Device drivers are needed for every device connected to a computer, from the mouse and keyboard to the printer. Many drivers, such as the keyboard driver, come with the operating system, while peripheral manufacturers often provide discs with drivers for users to install with their hardware.

1.5.2 Applications Software

Applications software (also called *end-user programs*) enable you to complete specific tasks, like word processing, making spreadsheets, working with pictures, planning landscaping, playing games, etc. Figuratively speaking, applications software sits on top of systems software because it is unable to run itself without the operating system and system utilities. Application is just another word for *program or software program*, like the packaged programs, Microsoft Word (word processing) or Adobe Photoshop (graphics). When you buy an application for your computer, you're buying software that is typically recorded on a disk.

There are countless desktop applications out there and they fall into many different categories. Some are more **full-featured** (like **Microsoft Word**), while others may only do **one or two things** (like **gadgets**). Below are just a few types of applications that you might use:

- **Library Management systems:** To manage housekeeping operations and library services.
- **Word Processors:** A word processor such as MS Word allows you to create, edit a document, design a flyer and create many other kinds of documents.
- **Web Browsers:** To browse the **World Wide Web using Internet Explorer, Firefox, Google Chrome a**nd **Safari.**
- **Media Players:** To listen to **mp3s** or watch **movies. Windows Media Player** and **iTunes** are popular media players.
- **Gadgets:** (aka **widgets) to calendars**, **calculators**, **maps** and more on the desktop.

Self Check Exercise

Note: i) Write your answers in the space given below.

ii) Check your answers with the answers given at the end of this Unit.

32) What is the difference between operating systems and applications software?

.....

.....

.....

.....

33) The operating system _____.

A. controls how the CPU communicates with other hardware and software components

B. is responsible for waking up the computer

C. makes computers user friendly

D. both A & C

34) Which of the following software is not an operating system?

A. Microsoft Windows B. Microsoft Word C. Linux D. Ubuntu.

35) Which of the following software is not an application software?

A. Microsoft Excel B. Microsoft Excel C. Greenstone D. Ubuntu.

36) Which kind of computer device may require optical character recognition (OCR) software?

A. Scanner B. Barcode Reader C. Printer D. Modem.

1.6 ORGANISING FILES AND FOLDERS ON DRIVES

When a user creates a document using a computer system, this document is stored on a storage device as a computer file. You therefore organise all your data, information and programmes in computer files. You use folders to organise your files on a drive. Folders and files are organised on a drive in a hierarchical system. The drive is the highest level of the hierarchy. You can put all of your files on the drive without creating any folders, but that is like putting all of your papers in a file cabinet without organising them into folders. It works fine if you have only a few files, but as the number of files increases, there comes a point at which things become very difficult to find. So you create folders and put related material together in folders. Figure 1.16 illustrates how in a typical drive files and folders are organised.

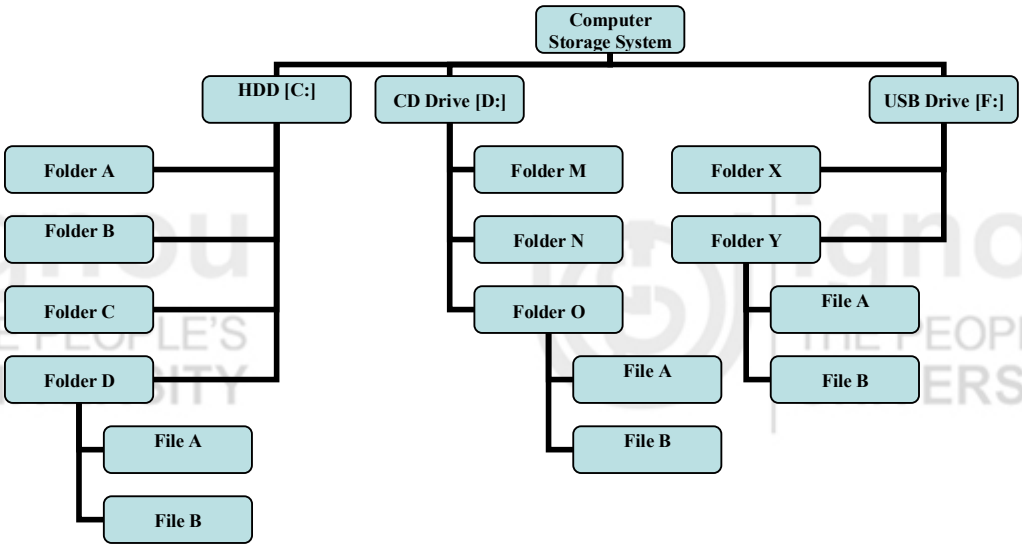

Fig. 1.16: Representation of Data and Information in a Computer System

At the highest level, you have some folders and perhaps some files. You can open any of the folders and put additional files and folders into them. This creates a hierarchy.

Each storage drive is specially named with single digit English alphabet for easy identification. For example, storage space of a hard disk drive is denoted as "**C:**" in Windows operating system, a compact disc or a DVD is usually denoted as "**D:**". There may have some other drives such as "**E:**", "**F:**", "**G:**" and so on. For example, while a file named '**File A**' is located in hard disk drive "**C:**", if a user wants to access this file, he requires to provide whole path, which is ***C:/Folder D/File A***. Similarly, other files and folders can be accessed giving specific path.

1.7 UBUNTU OPERATING SYSTEM

Ubuntu is the world's favourite free and open-source operating system, with over 20 million people preferring it to commercial alternatives. Ubuntu incorporates all the features of a Unix OS with an added customisable GUI. Ubuntu is primarily designed to be used on personal computers, although server editions also exist. Ubuntu is an African word that literally means "humanity to others."

Ubuntu 12.10 is an alternative to the Microsoft Windows operating system for desktop/ laptop personal computers. Ubuntu 12.10 comes with Unity desktop interface. It is installed with a wide range of software that includes LibreOffice, Firefox, Thunderbird, Empathy, Transmission and several lightweight games. Ubuntu can also run many programs designed for Microsoft Windows (such as Microsoft Office).

1.7.1 System Requirements

For the Ubuntu Unity 12.10 desktop product, the official Ubuntu Documentation recommends a 1 GHz Pentium 4 with 512 megabytes of RAM and 5 gigabytes of hard drive space, or better. For less powerful computers, there are other Ubuntu distributions such as Lubuntu and Xubuntu.

1.7.2 Installation

Installation of Ubuntu is generally performed with the Live CD or a Live USB drive, without the need for restarting the computer prior to installation. The Ubuntu OS can run directly from the CD (although this is usually slower than running Ubuntu from an HDD), allowing a user to "test-drive" the OS for hardware compatibility and driver support. The CD also contains the Ubiquity installer, which can then guide the user through the permanent installation process. CD images of all current and past versions are available for download at the Ubuntu web site. Installing from the CD requires a minimum of 256 MB of RAM.

1.7.3 Ubuntu Unity Desktop

The Ubuntu Unity 12.10 desktop operating system has several elements – The Desktop, The Panel, The Launcher, The Dash and The HUD.

Unity's Desktop

The desktop section in Unity is generally not used to store application icons and shortcuts as the corresponding section of other operating systems might. Rather the desktop is really the workspace and backdrop. By default, it is the standard Ubuntu purple wallpaper which can be customised as desired. The desktop is your computer's main working space. You can open and rearrange any number of applications and folders on your desktop.

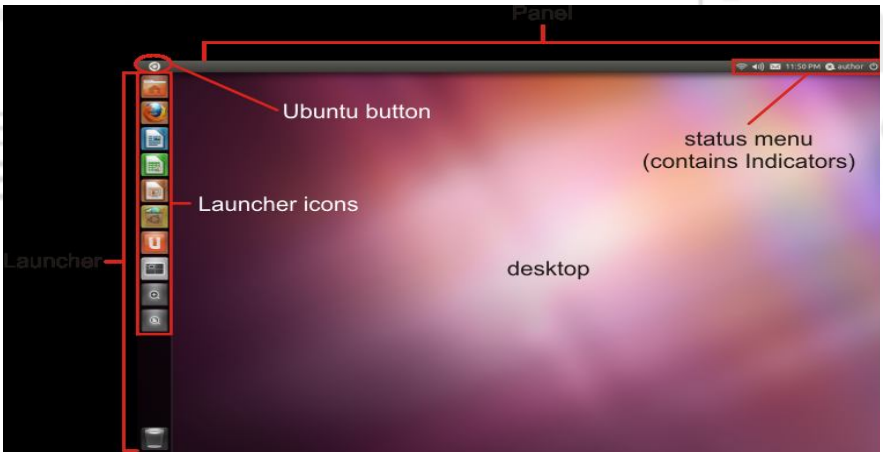

Fig. 1.17: Unity Desktop Components

Source: http://ubuntuone.com//p/1AAB/

The Panel

The Panel is the strip at the top of the interface. The panel displays windows title, menu bar, status menu and indicators. The Window title displays the name of the currently active application. This section appears on the top-left-hand side of the Panel. The menu bar displays application menu. The application menus are (for most applications) invisible until you drag your mouse cursor over the top-left-hand side of the Panel, beside the window title, at which point they appear.

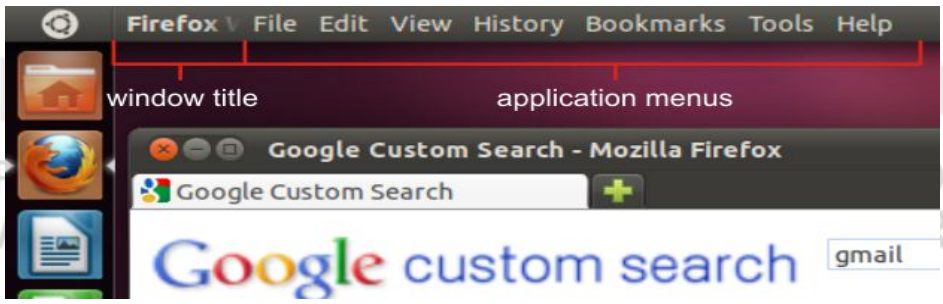

Fig. 1.18: Window Title and Application Menus

Source: http://ubuntuone.com/p/1AAB/

The status menu contains multiple system Indicators, which allow you to monitor and adjust the status of things like internet connectivity, sound controls and messaging/chat from within Unity. The status menu, which contains several system Indicators, is located on the right-hand side of the Panel. This section provides a brief overview of the functions and options accessible from each Indicator.

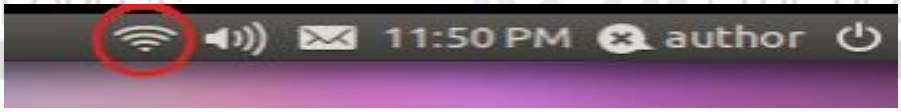

Fig. 1.19: Status Menu, containing Indicators Example – Network Indicator

Source: http://ubuntuone.com/p/1AAB/

The Launcher

The Launcher is a panel of scrollable icons which act as shortcuts to applications, scripts and directories. The buttons (icons) are on the left hand side of the screen. The Launcher icons indicate the specific applications that are located on your Launcher.

This is also known as vertical application switcher. You can add or remove applications from the launcher. In general, only the most common applications should be in the launcher. It serves 3 functions:

1) **Application Launcher:** The Launcher allows you to quickly and easily run and manage your favourite applications and tells you what is running and what is not. Clicking on an icon will launch the application associated with that icon. e.g. Clicking on the FireFox icon launches the FireFox browser.

2) **Visual indicator of running applications:** any running application has its icon placed in the Launcher and an indicator showing its status.

   - **Two solid triangles:** this is the active application (the one on top).
   - **Single solid triangle:** the application is running, but does not have focus (is not on top).
   - **Single open triangle:** the application is running in a different workspace (by default, Ubuntu 12.04 sets up 4 workspaces).

Fig. 1.20: Visual Indicator of Running Applications

Source: http://complete-concrete-concise.com/ubuntu-2/ubuntu-12-04/ubuntu-12-04-basic-unity-interface-desktop-tutorial

3) **Application Switcher:** you can switch to an application (bring it to the front) by clicking on its icon in the Launcher.

The Dash

The Dash (or Dashboard) is the desktop search utility in Unity to quickly search for information both locally (installed applications, recent files, bookmarks, etc) and remotely (Twitter, Google Docs, etc.). You can use it to find out almost anything: programs, music, files and even information from different web sites or find and launch a program that isn't in the launcher. Dash provides a query field in which you type the name of the application or document you want to open. Dash interface is very much like searching with Google. As you type in what you are looking for, Dash begins to display possible answers. Dash is an alternative to navigating a hierarchy of menus to find an application. You can pop up or activate Dash by **Clicking** on the Dash icon (Ubuntu button) in the Launcher or by **Tapping** the Windows key "Super key" on your keyboard. The Dash panel looks something like this:

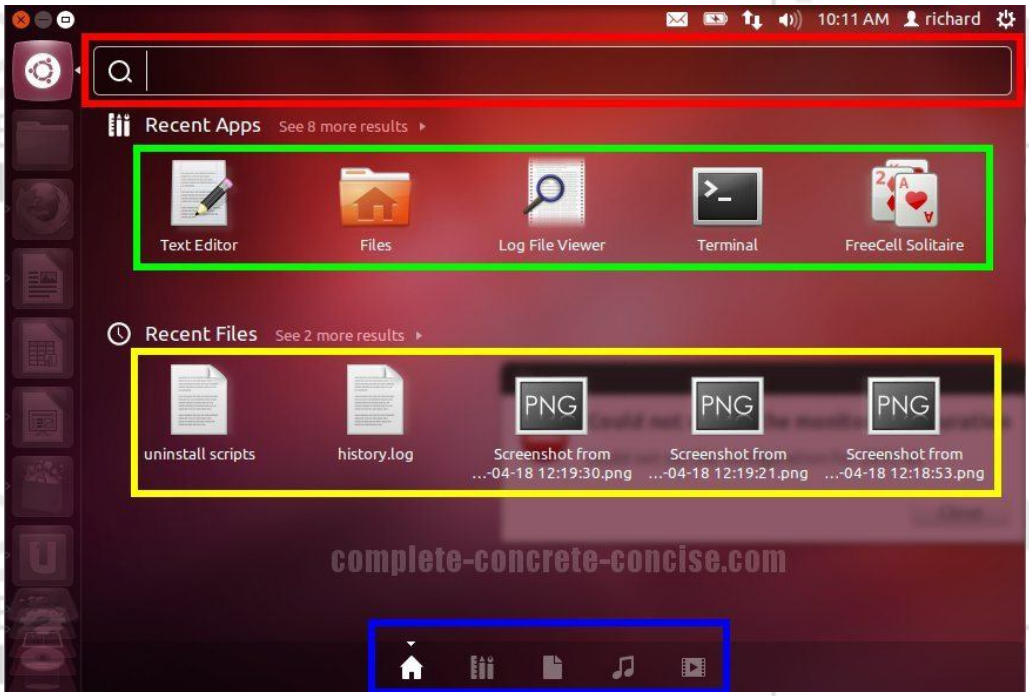

Fig. 1.21: Dash Panel

Source: http://complete-concrete-concise.com/ubuntu-2/ubuntu-12-04/ubuntu-12-04-basic-unity-interface-desktop-tutorial

1) The query field (outlined in red) is where the keyboard focus goes when you activate the Dash. Type the name of the application you want to run, or document you want to open. As you type, Dash will update the list of applications and documents.

2) A list of the most recently used applications (outlined in green) is displayed below the query field. If you type in the query field, the list of applications is modified to match your search. You can use your mouse to select an application, or you can use the arrow keys to navigate to the desired application.

3) A list of the most recent viewed documents (outlined in yellow) is displayed below the recently used applications. If you type in the query field, the list of documents is modified to match your search.

4) At the very bottom of the Dash (outlined in blue) are a number of icons. These are "lenses". A lens is a specifically focussed (or themed) query. You can install custom lenses to extend the dash with additional search features. The five lenses at the bottom are:

   - Dash lens: this is the default lens.
   - Applications lens: this focuses searches only within applications.
   - Folders and Documents lens: this focuses searches only on folders and documents.
   - Music lens: focuses search on music.
   - Video lens: focuses search on videos.

You can navigate to the lenses using either the mouse or keyboard.

The HUD (Head-Up Display)

The HUD is a new menu navigation system, an alternative way to accessing application menus. Instead of navigating a hierarchy of menus, HUD provides a query field in

which you type the name of the action you want to perform with your applications. When an application is open, press the Alt key to bring up HUD search bar and start typing a menu item's name. You can now select from the options and activate it without touching the mouse. Just as Dash replaces navigating a hierarchy of menus to find applications and documents, HUD replaces navigating a hierarchy of menus in an application.

The HUD is activated when you tap on the Alt key. The HUD panel looks something like this:

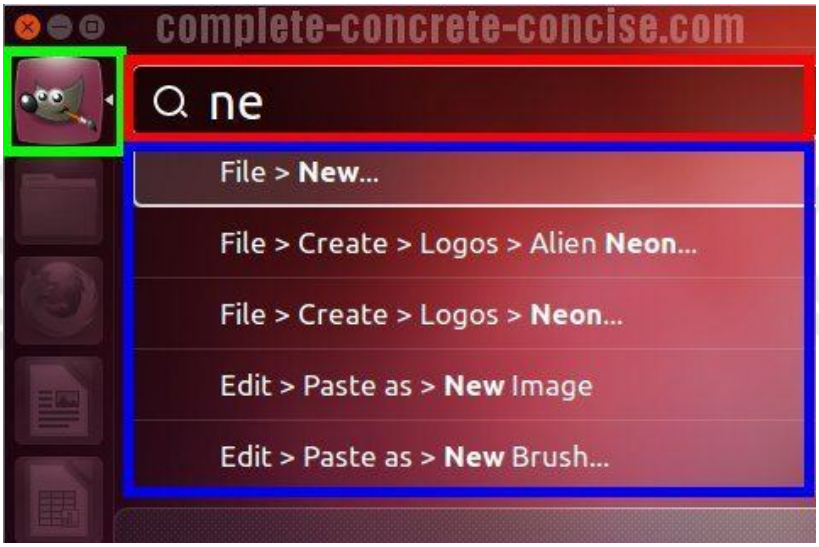

Fig. 1.22: The HUD Panel

Source: http://complete-concrete-concise.com/ubuntu-2/ubuntu-12-04/ubuntu-12-04-basic-unity-interface-desktop-tutorial

1) The query field (outlined in red) is where you type the operation you want to perform in the application, e.g. open, new, auto white balance, etc. This is where the focus goes when you activate the HUD. As you type, a list of possible commands will be displayed below it. You can navigate those commands using the mouse and clicking to select or the keyboard (arrow keys) and pressing Enter to select. By default, the top command is always selected and will be executed if you press Enter. A nice thing is that you do not have to type the whole command.

2) On the left, the icon (outlined in green) shows you for which application the command is for. The HUD may display commands for other programs (like email). This icon shows you which application the command is for. Below the query field is a list of matching commands (outlined in blue)

Opening Ubuntu Unity Desktop

A personal computer is turned on with the help of main switch attached to the computer cabinet. The pre-installed operating system activates computer resources including its peripheral devices. In Ubuntu Unity environment, a login window pops up whereby the system asks to provide user ID and password to get into one's workspace. However, in Windows operating system providing user name and password is optional. After successful authentication through username and password, computer turns ready for authorised user. A GUI-based desktop appears on screen. Here computer user is empowered to use his mouse to navigate the desktop, open programs, move files and perform most other tasks. Things are now visually oriented, where user performs his tasks by single or double clicks of a mouse.

File Management with Nautilus File Browser

In Ubuntu environment, *Nautilus file browser* is used to perform various file management functions (Figure 1.23). It is similar to Windows Explorer. *Nautilus file browser* provides following functionalities, which can be performed by clicking mouse or by selecting from menus:

- Navigating between directories
- Opening files
- Creating new folders
- Copying and moving files and folders
- Dragging and dropping files and folders between locations
- Using multiple tabs and multiple Nautilus windows
- Searching for files on your computer

To illustrate how *Nautilus* creates a new folder, following example is given. A folder can be created by following any of the three methods:

- Open the file manger from the launcher. When the window is active move the mouse pointer to the top left of the panel. Menu bar will appear. to From menubar select *File # Create Folder*, then give name the folder that appears by replacing the default text "untitled folder" with "My Library", or
- Press Ctrl+Shift+N keys simultaneously, then give name the folder that appears by replacing the default text "untitled folder" with "My Library", or
- Right click in the Nautilus file browser window and select *Create Folder* from the popup menu, then give name the folder that appears by replacing the default text "untitled folder" with "My Library".

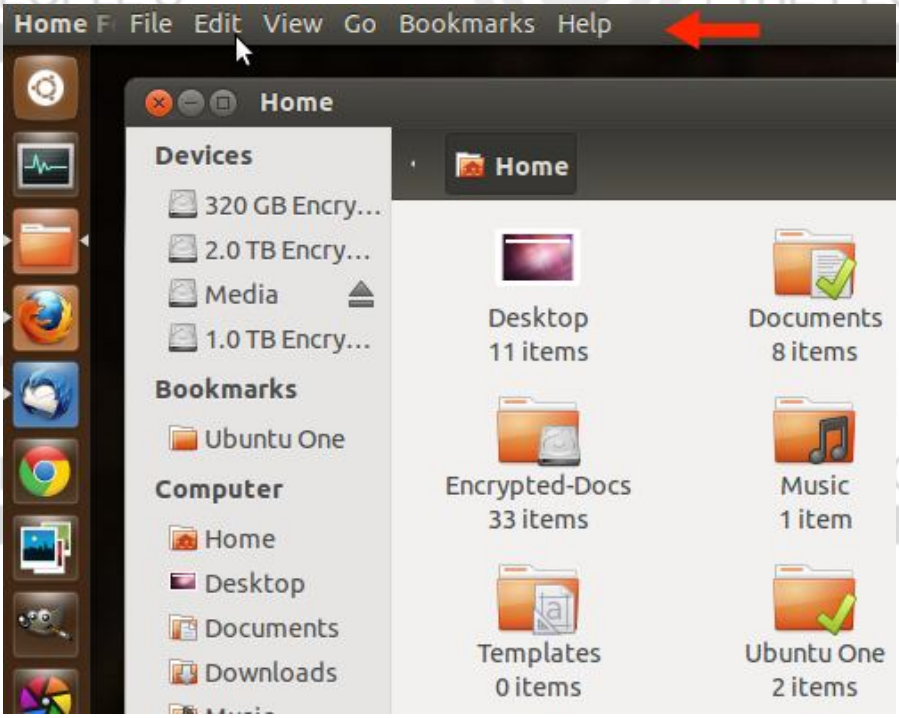

Fig. 1.23: Files and Folders Window

Source: http://askubuntu.com/questions/90260/how-do-i-view-files-and-folders-in-a-list

The Home Folder - Ubuntu makes use of the Home Folder as the default workspace for logged in user. Here user's personal files are located. At the time of creating a user account during Ubuntu installation, user provides a user name. The same name is assigned to the home folder. When user opens his home folder, he will see that there are several folders inside: *Desktop* (which contains files that are visible on the desktop), *Documents, Downloads, Music, Pictures, Public, Templates, Videos* and *Examples*. *Examples* folder contains shortcut for creating new word document, spreadsheet or multimedia file.

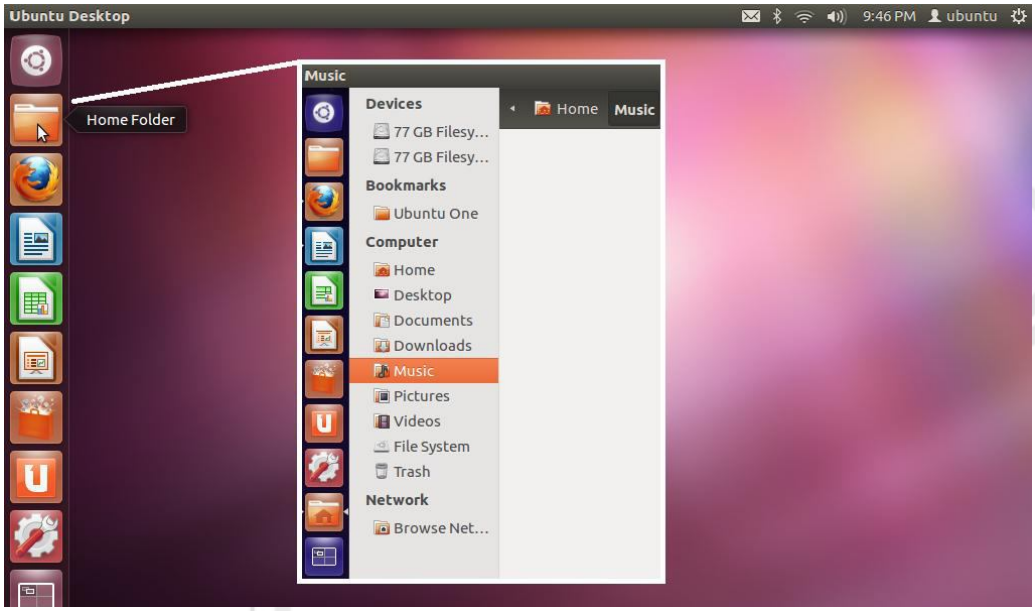

Fig.1.24: Screenshot of the Home Folder

Source: http://ubuntu-za.org/sites/default/files/unity-5-10-0-final-pdf.pdf

1.8 SUMMARY

This Unit provides you basics of computer hardware and software, the major parts of a personal computer including processing unit, motherboard and mass storage devices. The Unit introduces you to the devices used to input data, to process data and to output processed data. The Unit makes it clear that personal hardware, by itself, can't really do much of anything. Your PC needs something that gives that hardware set of instructions that tell it what to do. This is what the software is used for. PC software can be stored as programs on a hard drive or even stored as programs inside of some special hardware chips on the system itself. The Unit goes on to explain software of personal computers, systems software and applications software and how to organise information into files. You have learnt in this Unit that internal hardware provides three main functions. First, it provides processing functionality. The main processing unit in our PC is the Central Processing Unit (CPU). Its job is to process data according to a set of instructions. It takes the input and does something with it. Second functionality is short term data storage. This is done using Random Access Memory or RAM. RAM is the place where the CPU stores the data it's currently working on. In addition, the instructions that the CPU is currently using are also stored in RAM. Remember, RAM is not persistent. That means that if we shut down our PC, data that was stored in RAM will be erased. RAM is used for short-term storage because of speed. For permanent storage of data we use a variety of storage mediums. The most important one is the Hard Disk Drive or HDD. It can store bunch of data and it can retrieve it relatively quickly, but not as nearly as fast as RAM. That's why we don't use a Hard Drive instead of RAM. Remember, data saved on long-term storage is persistent. That means

that if we shut down our PC, the data saved on the Hard Drive will be intact. Your knowledge and understanding of computer hardware and software will help you understand how computers work and how you can use computers for various applications. A good, general understanding of computer hardware can really be helpful in investigating your PC's ability to perform any given task, improve your PC's current performance and decide what configuration you need in your new PC.

1.9 ANSWERS TO SELF CHECK EXERCISES

1) A disk media refers to magnetic media, such as a floppy disk, the disk in your computer's hard drive, an external hard drive. Disks are always rewritable unless intentionally locked or write-protected. On the other hand, a disc media refers to optical media, such as an audio CD, CD-ROM, DVD-ROM, DVD-RAM, or DVD-Video disc. Some discs are read-only (ROM), others allow you to burn content (write files) to the disc once (such as a CD-R or DVD-R, unless you do a multisession burn) and some can be erased and rewritten over many times (such as CD-RW, DVD-RW and DVD-RAM discs).

2) DVD-Video (often simply called DVD) holds video programs and is played in a DVD player hooked up to a TV. DVD aims to encompass home entertainment, computers and business information with a single digital format DVD-ROM holds computer data and is read by a DVD-ROM drive hooked up to a computer. The difference is similar to that between Audio CD and CD-ROM. DVD-ROM also includes future variations that are recordable one time (DVD-R) or many times (DVD-RAM). Most people expect DVD-ROM to be initially much more successful than DVD-Video. Most new computers with DVD-ROM drives will also be able to play DVD-Videos.

3) E. 4) A. 5) A. 6) D. 7) A. 8) B. 9) B. 10) A. 11) B. 12) A. 13) D. 14) D. 15) D. 16) C. 17) D. 18) E. 19) A. 20) A. 21) B. 22) A. 23) B. 24) A. 25) B. 26) A.27) B. 28) A. 29) A. 30) A. 31) B.

32) Operating system is the **system software** that makes the computer work. It is an **interface between you and the hardware**. It not only contains drivers used to speak the hardware's language, but also offers you a very specific graphical user interface (GUI) to control the computer. Application software is the software that you install onto your operating system. It consists of the programs that actually let you do things with your computer. For example MS Word, MS Excel, MS Power Point. These applications are written to run under the various operating systems.

33) D. 34) B. 35) D. A.

1.10 KEYWORDS

Cache : Cache memory is random access memory that a computer microprocessor uses to reduce the average time to access memory. It can access cache more quickly than it can access regular RAM.

CD-R Drive : An acronym for Compact Disc Recordable drive, a type of disc drive that can create CD-ROMs and audio CDs. Also called a CD burner, this allows users to "master" a CD-ROM or

audio CD for publishing. Until recently, CD-R drives were quite expensive, but prices have dropped dramatically.

CD-ROM : An acronym for Compact Disk Read-Only Memory, a CD-ROM is an optical storage medium for digital data that can hold up to 1GB, although the most common size is 650MB. A single CD-ROM has the storage capacity of 700 floppy disks—enough memory to store about 300,000 text pages.

CD-RW : An acronym for Compact Disk Rewritable, a CD-RW is an optical storage medium for digital data that can create CD-ROMs and audio CDs and then record over them.

Central Processing Unit : The CPU is the hardware device in a computer that executes all of the instructions from the software.

Computer Hardware : Hardware, in the computer world, refers to the physical components that make up a computer system.

Computer Software : Software is a general term for the various kinds of programs used to operate computers and related devices.

CS-ROM Drive : Also called a CD-ROM player, a device that can read information from a CD-ROM. CD-ROM drive can be either internal, in which case they fit in a bay, or external, in which case they generally connect to the computer's SCSI interface or parallel port.

Desktop Computer : A *desktop computer* is a personal *computer* (or desktop PC) in a form intended for regular use at a single location, as opposed to a mobile laptop or portable *computer.*

1.11 REFERENCES AND FURTHER READING

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