Unit 1 Computer - An Introduction

Learning Outcome

After reading this unit, you will be able to:

- Explain the basic concept of computer and its structure
- Understand basic computer organisation and its advantages
- Know different types of computer software application
- Give overview of the components of computer system
- Explicate various computer generations
- Elucidate on different business software packages

Time Required to Complete the unit

1. 1st Reading: It will need 3 Hrs for reading a unit
2. 2nd Reading with understanding: It will need 4 Hrs for reading and understanding a unit
3. Self Assessment: It will need 3 Hrs for reading and understanding a unit
4. Assignment: It will need 2 Hrs for completing an assignment
5. Revision and Further Reading: It is a continuous process

Content Map

1.1 Introduction

Our lifestyles have undergone a sea change with the advancement in technology especially in the field of computers. Computers are an integral part of our lifestyles today and are found at offices, homes, schools, colleges, hotels, shops etc. This advance in technology has made our lives easy and comfortable. For instance, we can execute a number of activities using computer based systems- we can write a draft on word processor and email it, make calculations using an electronic spreadsheet and incorporate graphics, create a database of friends with their phone numbers, addresses and e-mail ids etc. It is an arduous process to perform these activities using existing traditional methods.

Computers can also simplify other tasks such as word processing, designing, web site development, database management etc. Therefore, a computer should be referred to as a 'data processor'.

1.2 Introduction to Computer

The computer comprises of technologically advanced hardware put together to work at great speed. To accomplish its various tasks, the computer is made of different parts, each serving a particular purpose in conjunction with other parts. In other words, a 'computer' is an ensemble of different machines that you will be using to accomplish your job. A computer is primarily made of the Central Processing Unit (usually referred to as the computer), the monitor, the keyboard and the mouse. Other pieces of hardware, commonly referred to as peripherals, can enhance or improve your experience with the computer.

1.2.1 EVOLUTION OF COMPUTER TECHNOLOGY

The origin of computer technology took place in the 19th century. People desired to have a machine that would carry out mathematical calculations for them. The ABACUS is considered to have been the first computer in the world. It was used to perform simple measurements and calculations. ABACUS is available even today for school going children.

In the 17th century, a scientist named Pascal developed a machine that could perform mathematical calculations. This machine comprised of a number of gears. The movement of gear mechanism was used to perform some calculations. He named the machine PASCALINE.

However, the concept of the modern computer was propounded by the scientist and mathematician Charles Babbage. He first wrote on the use of logic and loops in process execution. Based on the concept of logic and loops, Babbage envisaged two models for

performing computations- Analytical Engine and Difference Engine. In those days, electronics was not developed. Therefore, these models proposed by Babbage existed only on paper. However, the ideas given by Babbage were implemented after the invention of electronics.

George Boolean developed the famous Boolean Algebra based on binary numbers. De Morgan put forward theorems on logic gates. These theorems are known as De Morgan's Theorems.

Lady Ada was the first computer programmer.

The real application of computers began in the late fifties. The computers were used in the United States for various applications such as census, defence, R&D, universities etc.

1.2.2 ADVANTAGES OF COMPUTERS

Compared to traditional systems, computers offer many noteworthy advantages. This is one reason that traditional systems are being replaced rapidly by computer-based systems. The main advantages offered by computers are as follows:

- High Accuracy
- Superior Speed of Operation
- Large Storage Capacity
- User-friendly Features
- Portability
- Platform independence
- Economical in the long term

1.2.3 TYPES OF COMPUTERS

Computers are classified in a variety of ways depending upon the principles of working, construction, size and applications. Various types of computers are discussed in this section.

DIGITAL AND ANALOG COMPUTERS

ANALOG COMPUTERS

The computers that process analog signals are known as Analog Computers. The analog signal is a continuous signal. For example, sine wave is an analog signal. The analog

quantities are based on decimal number systems. Examples of Analog computers are the slide rule, ABACUS etc.

The operational amplifiers are widely used in the construction of analog computers when the analog electrical signal is to be processed. For example, a differentiator is the op amp circuit that differentiates input signal. If the input signal V sin θ is given to analog computer, the output would be V cos θ. Accordingly, the analog computer that generates the second order differential equation can be drawn as given in Fig 1.1

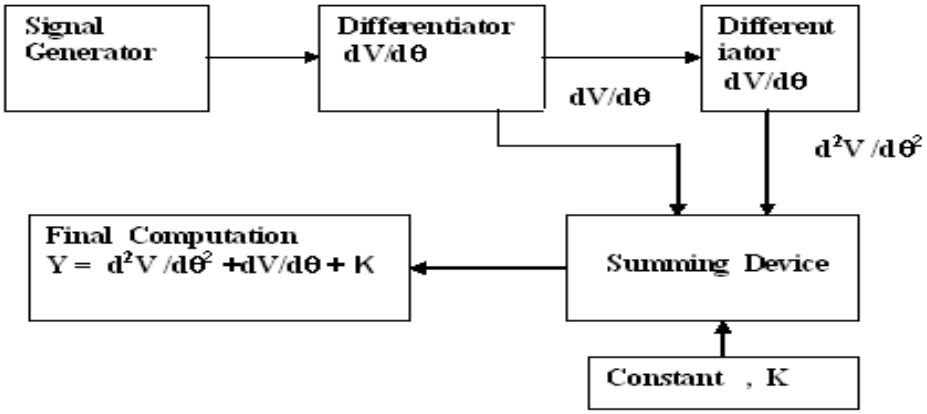


Fig. 1.1: Analog Computers

DIGITAL COMPUTERS

Computers that process digital signals are known as Digital Computers. The Digital signal is a discrete signal with two states 0 and 1. In practice, the digital computers are used and not analog.

Examples of digital computers are personal computers, supercomputers, mainframe computers etc.

Supercomputers Are the most powerful computers in terms of speed of execution and large storage capacity. NASA uses supercomputers to track and control space explorations.

Mainframe Computers Are next to supercomputers in terms of capacity. The mainframe computers are multi terminal computers, which can be shared simultaneously by multiple users. Unlike personal computers, mainframe computers offer time-sharing.

For example, insurance companies use mainframe computers to process information about millions of its policyholders.

Minicomputers These computers are also known as midrange computers. These are desk-sized machines and are used in medium scale applications. For example, production departments use mini-computers to monitor various manufacturing processes and assembly-line operations.

Microcomputers As compared to supercomputers, mainframes and minicomputers, microcomputers are the least powerful, but these are very widely used and rapidly gaining in popularity.

Personal Computer PC is the term referred to the computer that is designed for use by a single person. PCs are also called microcontrollers because these are smaller when compared to mainframes and minicomputers. The term 'PC' is frequently used to refer to desktop computers. Although PCs are used by individuals, they can also be used in computer networks.

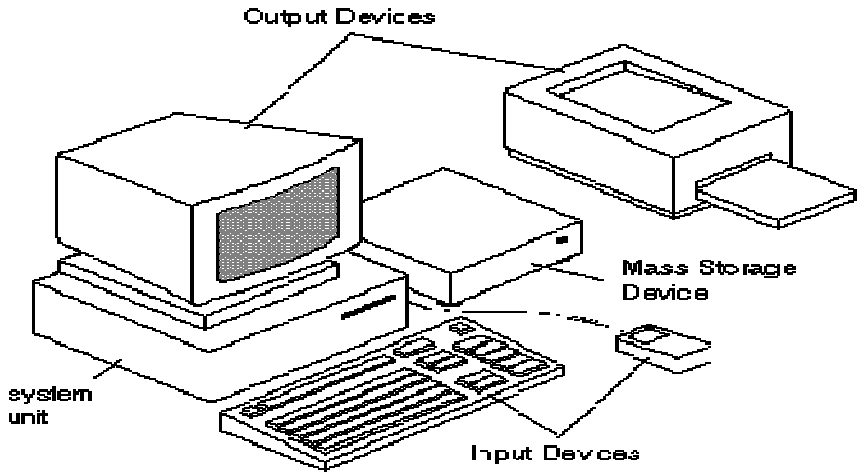


Fig. 1.2: Personal Computer

Desktop Computer This is the most commonly used personal computer. It comprises of a keyboard, mouse, monitor and system unit. The system unit is also known as cabinet or chassis. It is the container that houses most of the components such as motherboard, disk drives, ports, switch mode power supply and add-on cards etc. The desktop

computers are available in two models- horizontal model and tower model.

Laptops Are also called notebook computers. These are the portable computers. They have a size of 8.5 x 11 inch and weigh about three-to-four kilos.

Palmtops Palmtops are also called handheld computers. These are computing devices, which are small enough to fit into your palm. The size of a palmtop is like an appointment book. The palmtops are generally kept for personal use such as taking notes, developing a list of friends, keeping track of dates, agendas etc. The Palmtop can also be connected to a PC for downloading data. It also provides value-added features such as voice input, Internet, cell phone, camera, movie player and GPS.

Personal Digital Assistant (PDA) – is the palm type computer. It combines pen input, writing recognition, personal organisational tools and communication capabilities in a small package.

Study Notes

Assessment

Write notes on the following:

1. Evolution of Computer Technology
2. Advantages of Computers

3.	Types of Computers
4.	Digital and Analog computers

	**Discussion**
What do you know about ABACUS? Discuss.	

1.3 Basic Elements of Computer System

Basic elements of a computer system are Mouse, Keyboard, monitor, memory, CPU, motherboard, Hard Disk, Speakers, Modem, power supply and processor.

Mouse: Mouse is used for operating the system. Nowadays, optical mouse is more popular as compared to simple mouse.

Keyboard: Keyboard is used to input data in to the system so that the system gives output to the user. Therefore, the keyboard is an integral part of the input system. A computer is essentially incomplete without a keyboard.

Monitor: Monitor, which again is a very essential part of the computer system, displays the actions that the computer performs on our command.

Motherboard: Motherboard again a necessary element of the computer system contains different elements as memory, processor, modem, slots for graphic card and LAN card.

Hard Disk: Hard disk is used to store data permanently on computer.

Modem: Modem is used to connecting to the Internet. Two types of modems are widely used. One is known as software modems and the other is known as hardware modems.

Speakers: Speakers are also included in basic elements of a computer. It is not indispensible, because a computer can perform its

function without speakers. However, we use them to for multiple purposes.

1.3.1 Basic Computer Functioning

A computer can be defined as an electronic device that accepts data from an input device, processes it, stores it in a disk and finally displays it on an output device such as a monitor.

To understand the basic rudiments of the functioning of the computer refer to the basic block diagram of a computer as shown in Fig. 1.3 This flow of information holds true for all types of computers such as Personal Computers, Laptops, Palmtops etc. In other words, the fundamental principle of working is the same.

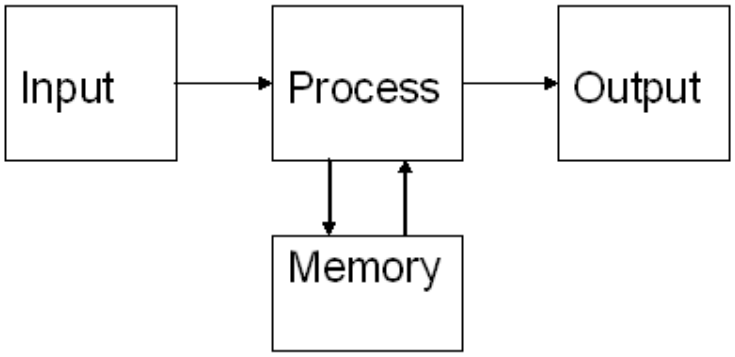


Fig 1.3: Block diagram of computer

As shown in Fig 1.3, there are four main building blocks in a computer's functioning- input, processor, output and memory. The data is entered through input devices like the keyboard, disks or mouse. These input devices help convert data and programs into the language that the computer can process.

The data received from the keyboard is processed by the CPU, i.e. the Central Processing Unit. The CPU controls and manipulates the data that produce information. The CPU is usually housed within the protective cartridge. The processed data is either stored in the memory or sent to the output device, as per the command given by the user. The memory unit holds data and program instructions for processing data.

Output devices translate the processed information from the computer into a form that we can understand.

1.3.2 Components of Computer System

MOTHERBOARD

The motherboard is the main component inside the case. It is a large rectangular board with integrated circuitry that connects the various parts of the computer as the CPU, RAM, Disk drives (CD, DVD, Hard disk or any others) as well as any other peripherals connected via the ports or the expansion slots.

Components directly attached to the motherboard include:

- The central processing unit (CPU) performs most of the calculations that enable a computer to function and is sometimes referred to as the "brain" of the computer. It is usually cooled by a heat sink and fan.
- The chip set aids communication between the CPU and the other components of the system, including main memory.
- RAM (Random Access Memory) stores all running processes (applications) and the current running OS.
- The BIOS includes boot firmware and power management. The Basic Input Output System tasks are handled by operating system drivers.
- Internal Buses connect the CPU to various internal components and to expansion cards for graphics and sound.

Current Technology

- The north bridge memory controller, for RAM and PCI Express
- PCI Express, for expansion cards such as graphics and physics processors, and high-end network interfaces
- PCI, for other expansion cards
- SATA, for disk drives

Obsolete Technology

- ATA (superseded by SATA)
- AGP (superseded by PCI Express)
- VLB VESA Local Bus (superseded by AGP)
- ISA (expansion card slot format obsolete in PCs but still used in industrial computers)

- External Bus Controllers support ports for external peripherals. These ports may be controlled directly by the south bridge I/O controller or based on expansion cards attached to the motherboard through the PCI bus.

  USB

  FireWire

  SATA

  SCSI

POWER SUPPLY

A power supply unit (PSU) converts alternating current (AC) electric power to low-voltage DC power for the internal components of the computer. Some power supplies have a switch to change between 230 V and 115 V. Other models have automatic sensors that switch input voltage automatically or are able to accept any voltage within these limits. Power supply units used in computers are generally switch mode power supplies (SMPS). The SMPS provides regulated direct current power at several voltages as required by the motherboard and accessories such as disk drives and cooling fans.

REMOVABLE MEDIA DEVICES

- CD (compact disc): The most common type of removable media, suitable for music and data
- CD-ROM Drive: A device used for reading data from a CD
- CD Writer: A device used for both reading and writing data to and from a CD
- DVD (digital versatile disc): A popular type of removable media that is the same size as a CD but stores up to 12 times as much information- the most common way of transferring digital video and is popular for data storage
- DVD-ROM Drive: A device used for reading data from a DVD
- DVD Writer: A device used for both reading and writing data to and from a DVD
- DVD-RAM Drive: A device used for rapid writing and reading of data from a special type of DVD
- Blu-ray Disc: A high density optical disc format for data and high-definition video that can store 70 times as much information as a CD
- BD-ROM Drive: A device used for reading data from a Blu-ray disc

- BD Writer: A device used for both reading and writing data to and from a Blu-ray disc
- HD DVD: A discontinued competitor to the Blu-ray format
- Floppy disk: An outdated storage device consisting of a thin disk of a flexible magnetic storage medium used today mainly for loading RAID drivers
- Iomega Zip drive: An outdated medium-capacity removable disk storage system, first introduced by Iomega in 1994
- USB flash drive: A flash memory data storage device integrated with a USB interface, typically small, lightweight, removable and rewritable with varying capacities from hundreds of megabytes (in the same ballpark as CDs) to tens of gigabytes (surpassing, at great expense, Blu-ray discs)
- Tape drive: A device that reads and writes data on a magnetic tape, used for long term storage and backups

SECONDARY STORAGE

This hardware keeps data inside the computer for later use and retains it even when the computer has no power.

- Hard disk: A device for medium-term storage of data
- Solid-state drive: A device quite similar to the hard disk, but containing no moving parts and which stores data in a digital format
- RAID array controller: A device to manage several internal or external hard disks and optionally some peripherals in order to achieve performance or reliability improvement in what is called a RAID array

SOUND CARD

This device enables the computer to output sound to audio devices, as well as accept input from a microphone. Most modern computers have sound cards built-in to the motherboard, though it is common for a user to install a separate sound card as an upgrade. Most sound cards, either built-in or added, have surround sound capabilities.

OTHER PERIPHERALS

In addition, hardware devices can include external components of a computer system. The following are either standard or very common.

WHEEL MOUSE

Includes various input and output devices, usually external to the computer system

INPUT

- Text input devices
  - Keyboard: A device to input text and characters by pressing buttons (referred to as keys)
- Pointing devices
  - Mouse: A pointing device that detects two-dimensional motion relative to its supporting surface
  - Optical Mouse: Uses light to determine motion
  - Trackball: A pointing device consisting of an exposed protruding ball housed in a socket that detects rotation about the two axes
  - Touch screen: Senses the user pressing directly on the display
- Gaming devices
  - Joystick: A control device that consists of a handheld stick that pivots around one end, to detect angles in two or three dimensions
  - Gamepad: A handheld game controller that relies on the digits/ fingers (especially thumbs) to provide input
  - Game controller: A specific type of controller specialized for certain gaming purposes
- Image, video input devices
  - Image scanner: A device that provides input by analysing images, printed text, handwriting or an object
  - Webcam: A low resolution video camera used to provide visual input that can be easily transferred over the Internet
- Audio input devices
  - Microphone: An acoustic sensor that provides input by converting sound into electrical signals

	Study Notes

	Assessment

Write notes on the following:

1. Keyboard
2. Motherboard
3. Wheel Mouse
4. Sound card

Discussion

Discuss and Match Column 'A' with Column 'B'.

S. No.	Column 'A'	Column 'B'
1.	**Mouse**	It used to connecting to the Internet.
2.	**Keyboard**	It is used for operating the system. Nowadays, optical is more popular as compared to simple one.
3.	**Motherboard**	It displays the actions that the computer performs on our command.
4.	**Hard Disk**	It is used to input data in to the system so that the system gives output to the user.
5.	**Monitor**	It contains different elements as memory, processor, modem, slots for graphic card and LAN card.
6.	**Modem**	It is used to store data permanently on computer.

1.4 Generations of Computers and Computer Languages

1.4.1 Generations of Computers

Using size and features as the bases, computers are classified into various generations. These generations of computers are discussed below:

First Generation

The first generation computers were bulky in size. They were able to execute hundreds of instructions per second and were expensive as well. They used vacuum tubes as their main components. Machine language is a first generation language, for example EDVAC, UNIVAC etc.

SECOND GENERATION

The second-generation computers were smaller in size as compared to the first generation computers. These were capable of executing thousands of instructions per second, with a transistor as its main component. Assembly language is the second-generation language in which programs were written using mnemonic codes, for example, PDP (Programmed data processor), PDP1 etc.

THIRD GENERATION

The third generation computers were more advanced and used integrated circuits. These computers contained thousands of components per circuit. They were cheaper than second-generation computers. The languages used in this generation were BASIC, COBOL etc. for example, IBM 307 Series, PDP II etc.

FOURTH GENERATION

The fourth generation computers used complex circuits like the large-scale integrated circuits called microprocessors or chips, which surprisingly cost less than the third generation computers. These computers were able to execute millions of instructions per second. The languages used in this generation are C++, SQL etc. for example, CRAY 2, IBM 3090/600 Series.

FIFTH GENERATION

These computers work on artificial languages (AI) like LISP, PROLOG etc. They use super/ultra large-scale integrated circuits, which is also called parallel processing method. They execute billions of instructions per second, for example, Laptops, Palmtops, PDA (Personal Digital Assistant) etc.

Different kinds of languages emphasise different parts about the problem, and so are better at describing different aspects of the solution or even different kinds of problems and solutions. Computer Science is ever evolving, so there is continual evolution of the concepts we need to use and the notations for describing these concepts.

Operational languages, for example, express how something is achieved, and makes the reader figure out what is being achieved. Declarative languages express what must be achieved and make the system work out how to achieve it.

The earliest languages had few restrictions, so they were very powerful, but turned out to be very dangerous to use. After a while, people developed languages that were much

safer to use, but there were complaints about their lack of power. Nowadays, we see languages that are both safe and powerful.

Sometimes we have to use assembly language (Low-Level Language, LLL) because there is just no other reasonable way of telling the computer what it must do. However, most programming is done in High-Level Languages (HLLs) because of productivity. It is usually easier, or more cost-effective, to use a HLL. Some of the reasons for this are:

- Easy to write: Useful concepts and facilities, relevant to application
- Easy to read: For reuse, maintenance, enhancement etc.
- Portability: Other compiler/toolset suppliers, users, computers - standards
- Error detection and reporting

1.4.2 COMPUTER LANGUAGES

The computer performs its functions based on the instructions given by the user. The set of such instructions written for a particular task is known as a computer program.

Program is the set of instructions that tells the computer how to process the data, into the form desired by the user.

The language in which a computer program is written is known as programming language. The programming languages are classified as Low-level language and High-level language. See figure 1.4.

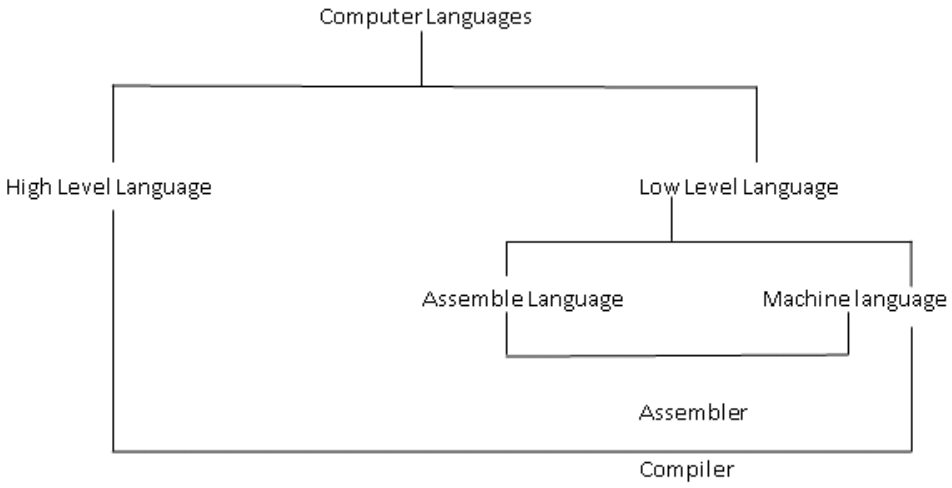


Fig 1.4: Programming Languages

Low-level language is further classified as Machine language and Assembly language.

Machine language is expressed in terms of binary numbers i.e. 0 and 1 as the processor understands binary numbers only. However, it is difficult to read and write the program in terms of 0s and 1s.

The machine language code is further simplified by converting it to the code called op code. The op code depends upon the type of processor. The program written in the op code is known as Assembly language code. During the run time, it is necessary to convert the op code into machine language so that the processor will understand and process the code. The internal program that translates op code to machine code is known as Assembler. Some examples of Assembler are Microsoft Assembler (MASM), Z-80, 8085, 8086 etc. The Assembler for each processor is different.

Usage of the Assembly language requires knowledge of the Assembly language and computer hardware. It is more convenient to write a program in a High level language, which comprises of instructions in simple English. Examples of High level language are BASIC, FORTRAN, COBOL etc. A compiler is the internal program that translates High level language to Machine language.

'Software' is another name for program. In most cases, the terms ‘software’ and ‘program’ are interchangeable.

There are two types of software - system software and application/ utility software.

Application software is the end user software. The programs written under application software are designed for general purpose and special purpose applications. An example of application software is Microsoft Internet Explorer.

System Software enables an application software to interact with the computer hardware. System software is the ‘background’ software that helps the computer to manage its internal resources. The most important system software is the operating system. The system software performs important tasks such as running the program, storing data, processing data etc. Windows XP is an example of system software.

We will be studying in detail about system software and application software later in this book.

The computer works on either batch processing or time-sharing basis.

- **Batch Processing:** In batch processing, the computer acts as a 'stand-alone' unit. As such, it is available for a single user. Therefore, a number of programs can be executed simultaneously. They have to stand in queue.

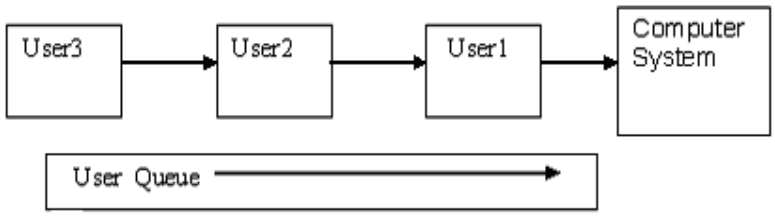


Fig. 1.5: Batch Processing

- **Time-sharing**: Unlike batch processing, time sharing offers simultaneous usage of computer. The computer is provided with multiple terminals from which the system can be accessed simultaneously by a number of users.

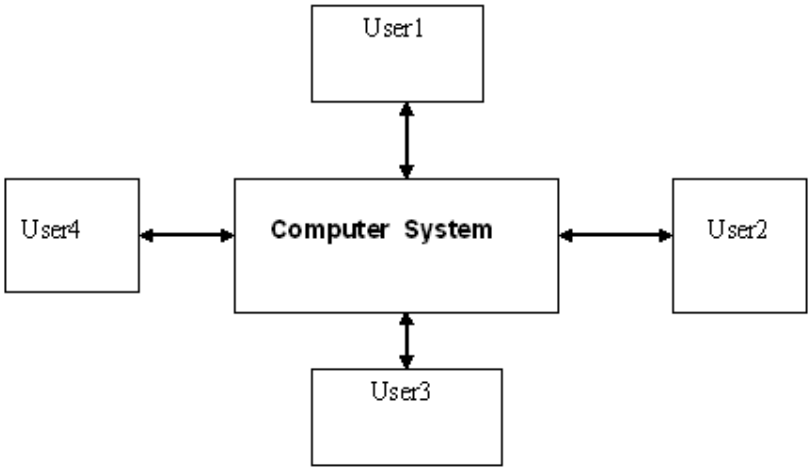


Fig. 1.6: Time Sharing

	**Study Notes**

	**Assessment**
Differentiate between: 1. Application software and System Software 2. Machine language and Assembly language 3. Batch processing and Time-sharing	

	**Discussion**
Discuss Generations of Computers.	

1.5 PC Software Packages

WORD PROCESSING SOFTWARE

Word processing software is used for creating documents. Drafts, letters, reports, essays, write-ups etc can be created using word processing software. Earlier, Word Star was being used widely for this purpose. Sidekick and Word Perfect are also used for drafting

letters. However, the most commonly used word processing package in the world is Microsoft Word, which will be discussed later in this book.

SPREADSHEETS

Spreadsheet is a computer application that simulates a paper worksheet. It displays multiple cells that together, make up a grid consisting of rows and columns, each cell containing either alphanumeric text or numeric values. Spreadsheets are frequently used for financial information because of their ability to re-calculate the entire sheet automatically after a change to a single cell is made.

MICROSOFT EXCEL

Microsoft had been developing Excel on the Macintosh platform for several years to the point, where it has developed into a powerful system. A port of Excel to Windows 2.0 resulted in a fully functional Windows spreadsheet. Starting in the mid 1990s and continuing through the present, Microsoft Excel has dominated the commercial electronic spreadsheet market.

PRESENTATION PROGRAMS

Microsoft PowerPoint is a presentation program developed by Microsoft. It is part of the Microsoft Office suite and runs on Microsoft Windows and Apple's Mac OS X computer operating systems.

PowerPoint is widely used by business people, educators, students and trainers and is among the most prevalent forms of persuasive technology. Beginning with Microsoft Office 2003, Microsoft revised the branding to emphasize PowerPoint's place within the office suite, calling it Microsoft Office PowerPoint instead of just Microsoft PowerPoint. The current versions are Microsoft Office PowerPoint 2007 for Windows and 2008 for Mac.

GRAPHICS PROGRAMS

Computer graphics are graphics, which are created with the aid of computers and the representation and manipulation of pictorial data by a computer.

The development of computer graphics has made the application more user-friendly. It is also easier to understand and interpret many types of data. Developments in computer graphics had a profound impact on many types of media and revolutionized the animation and video game industry.

The term computer graphics includes everything on computers that is not text or sound. Today nearly all computers use some graphics and users expect to control their

computer through icons and pictures rather than just by typing. Computer graphics has the following features:

- Representation and manipulation of pictorial data by a computer
- Development of technologies used to create and manipulate such pictorial data
- Digitally synthesizing and manipulating visual content

Today computer-generated images touch many aspects of our daily life. Computer imagery is found on television, in newspapers, in weather reports and during surgical procedures. A well-constructed graph can present complex statistics in a way that is easier to understand and interpret. Such graphs are used to illustrate papers, reports, thesis and other presentation material. A range of tools and facilities are available to enable users to visualize their data.

Study Notes

Assessment

Explain the followings:

1. Word Processing Software
2. Spreadsheets
3. Microsoft Excel
4. Presentation Programs
5. Graphics Programs

	**Discussion**
What is Ms Office. Discuss all the components of Ms Office.	

1.6 Summary

INTRODUCTION

Computers are an integral part of our lifestyles today and are found at offices, homes, schools, colleges, hotels, shops etc. This advance in technology has made our lives easy and comfortable. For instance, we can execute a number of activities using computer based systems.

INTRODUCTION TO COMPUTER

A 'computer' is an ensemble of different machines that you will be using to accomplish your job. A computer is primarily made of the Central Processing Unit (usually referred to as the computer), the monitor, the keyboard and the mouse. Other pieces of hardware, commonly referred to as peripherals, can enhance or improve your experience with the computer.

EVOLUTION OF COMPUTER TECHNOLOGY

The origin of computer technology took place in the 19th century. People desired to have a machine that would carry out mathematical calculations for them. The ABACUS is considered to have been the first computer in the world. It was used to perform simple measurements and calculations. In the 17th century, a scientist named Pascal developed a machine that could perform mathematical calculations. The real application of computers began in the late fifties. The computers were used in the United States for various applications such as census, defence, R&D, universities etc.

Advantages of Computers

- High accuracy
- Superior speed of operation
- Large storage capacity
- User-friendly features

- Portability
- Platform independence
- Economical in the long term

TYPES OF COMPUTERS

ANALOG COMPUTERS

The computers that process analog signals are known as analog computers. The analog signal is a continuous signal. For example, sine wave is an analog signal. The analog quantities are based on decimal number systems. Examples of Analog computers are the slide rule, ABACUS etc.

DIGITAL COMPUTERS

Computers that process digital signals are known as Digital Computers. The Digital signal is a discrete signal with two states 0 and 1. In practice, the digital computers are used and not analog.

BASIC ELEMENTS OF COMPUTER SYSTEM

Basic elements of a computer system are Mouse, Keyboard, monitor, memory, CPU, motherboard, Hard Disk, Speakers, Modem, power Supply and processor.

BASIC COMPUTER FUNCTIONING

Computer is defined as an electronic device that accepts data from an input device, processes it and stores it in a disk and finally displays it on an output device such as a monitor. There are four main building blocks of a computer organisation – input, processor, output and memory.

COMPONENTS OF COMPUTER SYSTEM

MOTHERBOARD

The motherboard is the main component inside the case. It is a large rectangular board with integrated circuitry that connects the various parts of the computer as the CPU, RAM, Disk drives (CD, DVD, Hard disk or any others) as well as any other peripherals connected via the ports or the expansion slots.

POWER SUPPLY

A power supply unit (PSU) converts alternating current (AC) electric power to low-voltage DC power for the internal components of the computer.

REMOVABLE MEDIA DEVICES

- CD (compact disc): The most common type of removable media, suitable for music and data
- CD-ROM Drive: A device used for reading data from a CD
- CD Writer: A device used for both reading and writing data to and from a CD
- HD DVD: A discontinued competitor to the Blu-ray format
- Floppy disk: An outdated storage device consisting of a thin disk of a flexible magnetic storage medium used today mainly for loading RAID drivers

SECONDARY STORAGE

This hardware keeps data inside the computer for later use and retains it even when the computer has no power.

SOUND CARD

This device enables the computer to output sound to audio devices, as well as accept input from a microphone.

OTHER PERIPHERALS

Hardware devices can include external components of a computer system. The following are either standard or very common.

WHEEL MOUSE

Includes various input and output devices, usually external to the computer system.

INPUT

- Text input devices
- Pointing devices
- Optical mouse uses light to determine mouse motion
- Gaming devices
- Image, video input devices
- Audio input devices

GENERATIONS OF COMPUTERS AND COMPUTER LANGUAGES

FIRST GENERATION

The first generation computers were bulky in size. They were able to execute hundreds of instructions per second and were expensive

SECOND GENERATION

The second-generation computers were smaller in size as compared to the first generation computers. These were capable of executing thousands of instructions per second, with a transistor as its main component.

THIRD GENERATION

The third generation computers were more advanced and used integrated circuits. These computers contained thousands of components per circuit.

FOURTH GENERATION

The fourth generation computers used complex circuits like the large scale integrated circuits called microprocessors or chips, which surprisingly cost less than the third generation computers. These computers were able to execute millions of instructions per second.

FIFTH GENERATION

These computers work on artificial languages (AI) like LISP, PROLOG etc. They use super/ultra large-scale integrated circuits which is also called parallel processing method.

PROGRAMMING LANGUAGES

Program is the set of instructions that tells the computer how to process the data, into the form desired by the user. The language in which a computer program is written is known as programming language. The programming languages are classified as Low-level language and High-level language. The programming languages are classified as Low-level language and High-level language. Low-level language is further classified as Machine language and Assembly language.

PC SOFTWARE PACKAGES

WORD PROCESSING SOFTWARE

Word processing software is used for creating documents. Drafts, letters, reports, essays, write-ups etc can be created using word processing software.

SPREADSHEETS

Spreadsheet is a computer application that simulates a paper worksheet. It displays multiple cells that together, make up a grid consisting of rows and columns, each cell containing either alphanumeric text or numeric values. Spreadsheets are frequently used for financial information because of their ability to re-calculate the entire sheet automatically after a change to a single cell is made.

MICROSOFT EXCEL

Microsoft had been developing Excel on the Macintosh platform for several years to the point, where it has developed into a powerful system.

PRESENTATION PROGRAMS

Microsoft PowerPoint is a presentation program developed by Microsoft. It is part of the Microsoft Office suite and runs on Microsoft Windows and Apple's Mac OS X computer operating systems.

GRAPHICS PROGRAMS

Computer graphics are graphics, which are created with the aid of computers and the representation and manipulation of pictorial data by a computer.

1.7 Self-Assessment Test

Broad Questions

1. Explain in detail the different types of digital computers.
2. What do you mean by programming languages? Elaborate.

Short Notes

a. Computer generations

b. Types of software packages

c. Different types of computers

d. Basic computer organisation

e. Batch processing and time sharing

1.8 Further Reading

1. Automating Managers: The Implications of Information Technology for Managers, John, Moss Jones, London, Printer, 1990

2. Computers, Concepts and Uses 2nd ed., Summer M., Englewood Cliffs, New Jersey, Prentice Hall Inc, 1988
3. Foundations of Business Systems, David Van Over, Fort Worth, Dryden 1992
4. Information Systems: Theory and practice 5th ed., Burch, John And Grudniski Gary, New York., John Wiley, 1989
5. Online Business Computer Applications 2nd Ed, Eliason Alan L., Chicago Science Research Associates, 1987

Assignment

Write in detail about any two or three software packages / programs that are new to the market.

Unit 2 Disk Operating Systems and Windows

Learning Outcome

After reading this unit, you will be able to:

- Identify the features of Windows and its versions
- Explain the concept and application of spreadsheets
- Elucidate on the overview of MS Excel and how to work with it
- Enter and copy formulas
- Retrieve spreadsheets

Time Required to Complete the unit

1. 1st Reading: It will need 3 Hrs for reading a unit
2. 2nd Reading with understanding: It will need 4 Hrs for reading and understanding a unit
3. Self Assessment: It will need 3 Hrs for reading and understanding a unit
4. Assignment: It will need 2 Hrs for completing an assignment
5. Revision and Further Reading: It is a continuous process

Content Map

2.1 Introduction

Windows predecessor MS-DOS (Microsoft Disk Operating System) was the most popular operating system earlier. However, its numerous drawbacks led to the emergence of a new class of system software. Windows, which was a product of this class, was based on a radically different approach called Graphical User Interface (GUI).

The user is not expected to memorise or type any command; all that he needs to do is click on the appropriate picture (icon) with the help of a small hand-held device called a mouse.

Using a mouse is easier than using a keyboard. In a Graphical User Interface, the various commands and options are represented on the screen in the form of small images called 'Icons'. Clicking on an icon is easier than typing commands through a keyboard. GUI based interfaces work on WYSIWYG (What You See Is What You Get) technology, making the work of the user easier. Therefore, GUI-based interfaces are much more user friendly.

With Windows, Microsoft has successfully addressed all the limitations of MS-DOS, in addition to the new user-friendly features. Windows has been aptly named as it rightly facilitates the users to work on several Windows simultaneously..

2.2 Disk Operating Systems and Windows

As the name implies, the Operating System is used for operating the System or the Computer. It is a set of computer programs, which is used to execute a specific task. The single user operating is DOS (Disk Operating System). The main functions of DOS are to manage disk files and allocate system resources according to the requirement. DOS provides vital features to control hardware devices such as Keyboard, Screen, Disk Devices, Printers, Modems and Programs.

2.2.1 INTRODUCTION TO DOS

Disk Operating System (specifically) and disk operating system (generically), most often abbreviated as DOS, refers to an operating system software, used in most computers, which provides the abstraction and management of secondary storage devices and the information on them (e.g., file systems for organizing files of all sorts). Such software is referred to as a *disk* operating system since the storage devices it manages are made of rotating platters (such as hard disks or floppy disks).

DOS is the medium through which the user and external devices attached to the system communicate. DOS translates the command issued by the user in the format that is

comprehensible by the computer and instructs the computer to function accordingly. It also translates the result and any error message in the format for the user to understand.

2.2.2 FEATURES OF WINDOWS

Microsoft Windows is a series of software operating systems and graphical user interfaces developed by Microsoft. Some of its important features are listed below:

1. **Faster Operating System:** Windows include tools that increase the speed of the computer. Windows includes a set of programs designed to optimize the efficiency of computer, especially when used together.
2. **Improved Reliability:** Windows improves computer reliability by introducing new wizards, utilities and resources that lend a hand in helping your system operate effortlessly.
3. **Innovative, Easy to use features:** Windows makes your computer easier to use with new and enhanced features.

2.2.3 OVERVIEW OF DIFFERENT VERSIONS OF WINDOWS

The different versions of Windows are discussed below:

WINDOWS 1.0

Microsoft released the first version of Windows way back in 1985. It marked a major breakthrough as it allowed users to switch from character based (CUI)/non-graphical MS-DOS to the GUI based operating system. The product incorporated a set of desktop applications, including the MS-DOS file management program and value additions such as a calendar, card file, notepad, calculator, clock and telecommunications programs. It allowed users to work with multiple applications at the same time (multitasking).

WINDOWS 3.0

Microsoft released this version of Windows in 1990. Some of its main features were:

- 32 bit operating system with support for advanced graphics
- Inclusion of Program Manager, File Manager and Print Manager
- A completely rewritten application development with new capabilities and native support for applications running in extended memory and fully pre-emptive MS-DOS multitasking

- Inclusion of Windows software development kit (SDK), which facilitated software developers focus more on writing applications and less on writing device drivers
- Improved Windows icons

WINDOWS NT 3.1/3.11

Microsoft released this version of Windows on July 27, 1993. This OS marked an important milestone for Microsoft. Some of its main features were:

- It was the first Windows operating system to merge support for high-end client/server business applications.
- It contains new built-in features for security, operating system power, performance, desktop scalability and reliability.
- It included support for multiprocessor (more than one CPU) architecture.
- Windows NT was geared towards business users and had a rich Application Programming Interface (API), which made it easier to run high-end engineering and scientific applications.

WINDOWS 95

Microsoft released this version of Windows in 1995. Some of its main features were:

- Provided 32 bit operating system with built-in Internet-support
- Facilitated easy installation of hardware peripherals and software applications through plug- and- play capabilities
- Enhanced multimedia capabilities, more powerful features for mobile computing and integrated networking

WINDOWS 98

Microsoft released this version of Windows in 1998. It is often described as an operating system that 'Works Better, Plays Better'. Some of its main features were:

- New features were added to enable easy access to Internet-related information.
- Multiple display support allowed using several Visual Display Units (VDU) simultaneously to augment the capacity of the desktop and to allow running of different programs on separate monitors.

- USB Support – the Universal Serial Bus made a computer easier to use with advanced plug-and-play capabilities. It allowed supplementing devices to your computer without having to restart each time a device is added to the computer.
- Accessibility wizard made it easier for physically challenged people to operate a computer without installing any special software.
- An extensive and easy-to-use self-help system was provided.

WINDOWS 2000 PROFESSIONAL

Microsoft released this version of Windows in 2000. It was an upgrade to Windows NT4.0. It was designed with the aim to replace Windows 95, Windows 98 and Windows NT 4.0 on desktops and laptops. It added major improvement in reliability, easy usage, internet compatibility and support for mobile computing. It made hardware installation much easier by adding support to a wide variety of new Plug and Play hardware, including advanced networking and wireless products, USB devices and infrared devices.

WINDOWS XP

Windows XP features user-friendly screens, simplified menus among other features. It was a major breakthrough for desktop operating systems. Two main versions of Windows XP were released, viz. Windows XP Home Edition and Windows XP Professional Edition. Features of Windows XP are:

Safe and easy personal computing: Windows XP makes personal computing easy and enjoyable. Along with unmatched dependability and security, Windows XP displays power, performance, a bright original appearance and abundant assistance tailored to one's requirement. World of Digital Media: Work at length using digital media while at home, at work and on the Internet. Enjoy photography, music, videos, computer games and more.

- Connected Home and Office: Share files, photos, music, even a printer and Internet connection; all on a network that is private and secure.
- Best for Business: With Windows XP, you get the established reliability of Microsoft Windows 2000, enhanced for high-speed performance and even superior consistency.

	Study Notes

	Assessment
1. What is Disk Operating systems? 2. What is Windows?	

	Discussion
Discuss different versions of windows.	

2.3 Text Processing Software

The text processing Software or Word Processing is one of the most significant Application packages of Windows. The Word processing software is used for creating documents. Drafts, letters, reports, essays, write-ups etc. can be created by means of word processing software. Earlier, Word Star was being used extensively for this purpose. However, the most commonplace word processing package used today is Microsoft Word.

Microsoft Word is Microsoft's word processing software. It was first released in 1983 bearing the name Multi-Tool Word for Xenix systems. Later, Versions for several other platforms including IBM PCs running DOS (1983), the Apple Macintosh (1984), SCO UNIX, OS/2 and Microsoft Windows (1989) were written. It is a component of the Microsoft Office system; however, it is also sold as a standalone product and included in Microsoft Works Suite.

Beginning with the 2003 version, the branding was revised to emphasize Word's identity as a component within the Office suite. Microsoft began calling it Microsoft Office Word instead of merely Microsoft Word. The latest releases are Word 2007 for Windows and Word 2008 for Mac OS X.

Once again, the 2010 version appears to be branded as Microsoft Word, once again. The contemporary versions are Microsoft Word 2010 for Windows and 2008 for Mac.

The significant features of MS Word are as follows:

1. It is an easy and simple package for a general user.
2. The features such as paragraph, font, symbols, spell check, table, drawing, bullets and numbering, page numbering provided by this package enable a user to develop a document in an error free format.
3. The text file generated by MS Word is .doc. This file can be used in other applications such as MS Excel, MS Visual Studio 6.0, MS Visual Studio.net, Web browser, pdf format etc.

	**Study Notes**

	**Assessment**
What do you understand by Text Processing Software?	

	**Discussion**
Discuss significant features of MS Word	

2.4 Introduction to Spreadsheets

Spreadsheet is a computer application that simulates a paper worksheet. It displays multiple cells that together formulate a grid consisting of rows and columns, each cell containing either alphanumeric text or numeric values. A spreadsheet cell may alternatively contain a formula that defines how the contents of that cell are to be calculated from the contents of any other cell (or combination of cells) each time any cell is updated. Spreadsheets are frequently used for financial information as they robotically enable the re-calculation of the total sheet, after a modification to a single cell is made.

VisiCalc was typically considered the original electronic spreadsheet (although this has been challenged) and it helped turn the Apple II computer into a success and greatly assisted in their widespread application. Lotus 1-2-3 was the most popular spreadsheet in use when DOS was the dominant operating system. Excel is now considered to have the largest market share on the Windows and Macintosh platforms

MICROSOFT EXCEL

Microsoft had been developing Excel on the Macintosh platform for several years, eventually converting it into a powerful system. A port of Excel to Windows 2.0 resulted in a fully functional Windows spreadsheet. The highly robust Windows 3.x platforms of the early 1990s made it possible for Excel to take a significant amount of market share from Lotus. By the time Lotus responded with serviceable Windows products, Microsoft had started compiling their Office suite. Starting in the mid 1990s and continuing through to the present, Microsoft Excel has dominated the commercial electronic spreadsheet market.

	**Study Notes**

	**Assessment**
What are Spread Sheets?	

	**Discussion**
Discuss Microsoft Excel in detail.	

2.5 Creation of Spreadsheet Application

TO START MICROSOFT EXCEL

1. Move the mouse pointer over the Start button present on the extreme left of the task bar and then click the left mouse button. A push-up menu appears.
2. Place the mouse pointer over the Program option inside the push up menu. A submenu is displayed.
3. Move the mouse pointer over the Microsoft Excel option and click the left mouse button. A blank workbook is instantly displayed on the screen. Data can be entered in the file Book1 and calculations can be made on entered data.

When MS-Excel is loaded, the Excel window will appear on the screen. The Excel window is shown below:

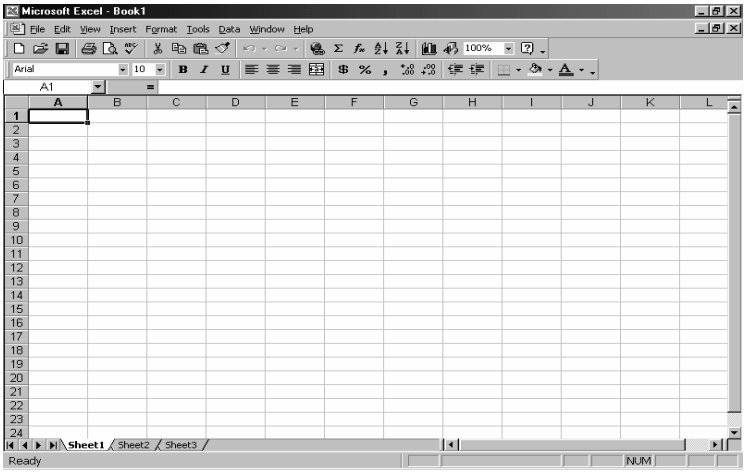


Fig. 2.1: PART OF MS-EXCEL WINDOW

1. **Title Bar:** Displays the application name, file name and various window controls, such as minimize button, maximize button and close button.

   a. **Minimize button:** This is used for altering a window/sheet into a button. The screen is minimized and appears in the form of a button on the taskbar.

   b. **Maximize button:** This is used for magnifying a window/sheet subsequent to its minimization and restoration.

   c. **Close button:** This is used to close a window/sheet.

2. **Menu Bar**: Different options for selection

File: Use this option to create a new file, open an existing file and save a file. Other options are printing, print preview, setting up of print area, closing the worksheet, exiting Excel etc.

Edit: This helps in copying, cutting and deleting a range of text, pasting text that is copied or cut from another location, clearing the contents of cells, finding the particular text in the worksheet, etc.

View: This helps in enabling and disabling certain tools in the Excel worksheet

Insert: This can be used to insert cells, rows and columns in the work sheet.

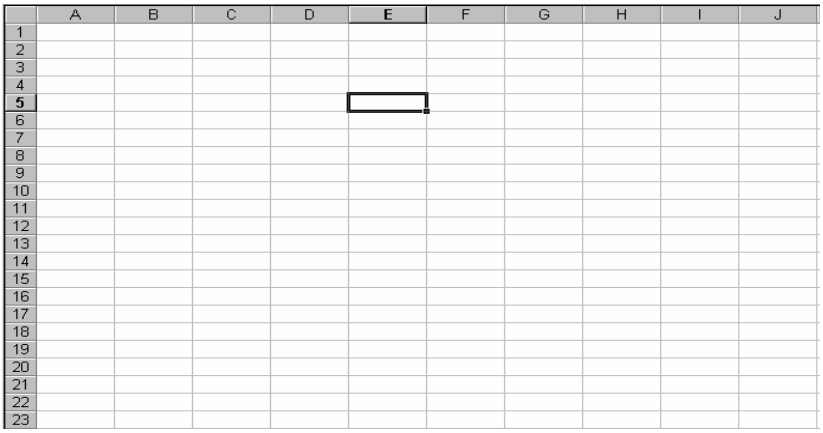
Format: This helps in formatting the row/ column to increase/decrease height, width etc.

Tools: This helps the spell check and protection of worksheets/ workbooks by setting a password for accessing it and customising it according to one's specification etc.

Data: This is used to sort (ascending/descending), filter the list, to obtain the subtotal etc.

Window: This is used to hide/unhide the workbook, to create a new window, to split the pane etc.

Help: This can be used to get any help about Excel.



3. **Standard tool bar:** Displayed by default, allows giving common commands like saving the file, opening a file, printing etc.

New: This is used to create a new workbook.

Open: This is used to open an existing file.

Save: This is used to save the file.

Print: This is used to take a printout of the file.

Preview: This is used to preview the document before the actual printing.

Spell check: This is used to check the spelling and grammatical errors in the file.

Cut: This is used to move a selected block from one location to another.

Copy: This is used to copy a selected block from one location to another.

Paste: This is used to place the selected block during the copy or cut operation at a certain location.

Undo: This is used to retain any modifications made to a file.

Redo: This is used to reverse the last undo action performed on the file.

Auto Sum Button: This is used to add the numbers on a particular range.

Paste function Button: This is used to perform different operations on a selected set of numbers, such as calculating the average or finding the minimum or maximum of set of numbers etc.

Sort Ascending: This is used to arrange a set of numbers in ascending (increasing) order.

Sort Descending: This is used to arrange a set of numbers in descending (decreasing) order.

Chart Wizard Button: This is used in creating chart graphs for a set of numbers.

Drawing: This is used to add the drawing tool bar just above the status bar of the window.

Zoom: This is used to change the size of the work sheet or to display the selected block in greater size.

4. **Formatting toolbar:** Allows the user to give commands related to formatting cells and cell contents such as Bold, Underline, Font Style, Font Size, Colour etc.

Font: This helps in changing the style of the text typed in the work sheets.

One can select a required font from the available font list and change the style of the text inside the selected block.

Font Size: This helps in changing the size of the text. One can select a required size for the font from the available list and change the size of the text inside the selected block.

Bold: This helps in making the selected look bolder/ darker than the other text

Italic: This helps to make the text in the selected block look tilted or slanted.

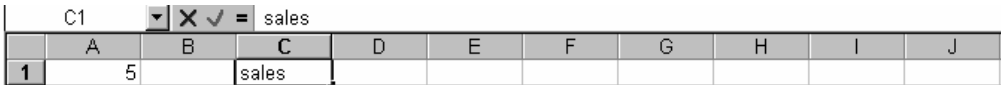
Underline: This helps in underlining the selected text.

Align Left: This helps in left justifying the contents of cell in the selected block.

Centre: This helps in centre justifying the contents of the cell inside the selected block.

Align Right: This helps in right justifying the contents of the cell inside the selected block.

5. **Name box** – Displays the address of the current cell.
6. **Formula Bar** – Displays the cell content.



The above figure shows the address of the active cell and the contents of active cell. In the above example C1 is the address of the cell and 'sales' is content of that cell.

7. **Current Cell**: Current cell is the active cell
8. **Row Headers**: There are 65636 rows (lines) numbered as 1, 2, 3 … 65536. The number of the first row is 1 and that of the last row is 65636. To go to a cell in last row, press End and Down arrow keys and to return to a cell in the first row, press End and up arrow key.
9. **Column Headers**: There are 256 columns numbered as A, B, C, Z, AA, and AB… AZ, BA, BB, IV. The first column is designated as 'A' and the last column as'IV'. To go to a cell in last column header, press End and Right arrow keys. To return to the cell in the first column, press End and Left Arrow keys.
10. **Scroll Bars**: Used to scroll through different parts of the current sheet.
11. **Sheet Tabs**: Display the sheet names. Each worksheet is named as Sheet1, Sheet2 and Sheet3.
12. **Status Bar**: Displays various modes such as Ready or Edit mode on the left side. The status of Num lock, Caps lock and Scroll lock keys on the keyboard is on the right side.

The status bar is located at the bottom of the Microsoft Excel Window. It displays Ready or Edit on the left hand side and NUM on the right hand side.

Ready: This indicates that the workbook is ready to accept data from the user.

Edit: This indicates the workbook is in edit mode i.e. the contents of the cell are being modified or a new content is being placed in the cell.

NUM: This is located on the right hand side of the status bar and represents the status of Num Lock indicator on the keyboard. If Num Lock is enabled on the keyboard, NUM appears and if Num Lock is disabled, NUM disappears from the Status Bar.

CELL AND CELL ADDRESS

The intersection of a column and a row is known as a cell. Each cell has a name or a cell address. The cell address consists of the column letter and row number. For example, the first cell is in the first column and first row. First column name is A and first row number is 1. Therefore, the first cell address is A1. Similarly, the address of last cell is IV65536 i.e. column IV and row number is 65536.

The total cells in a worksheet are 256*65536.

ALIGNING CELLS

Now we will type some more. Go to cell

C3 SEPT (Type-in SEPT and press the Enter key)

Notice again, how SEPT is automatically aligned to the left. Logically, since you are using Excel in the English version, the text is left-aligned. We would also like to centre SEPT in cell C3. Click on cell C3 to "mark" the cell. One way to do centre SEPT is to simply click on the Centre button in the button bar at the top of the screen. Make sure that you are on cell C3 when you click (see image above right).

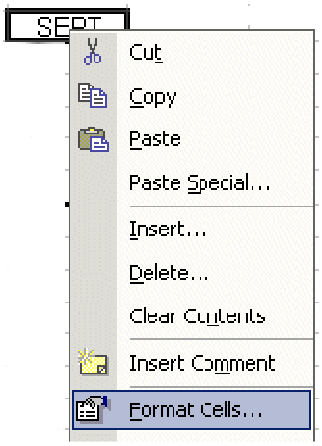


Fig. 2.2: Right click options

Here is another way to centre the word. Right Click on cell C3. Then click on Format Cells.

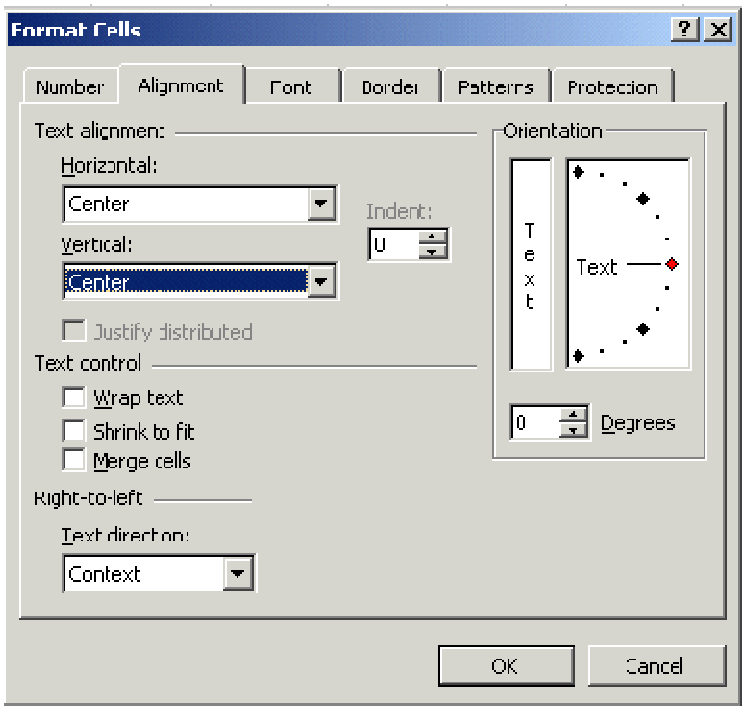


Fig. 2.3: Cell format window

When the Format Cells Menu appears, first click on the Alignment Tab, then on Horizontal/Centre/Vertical/Centre and finally click OK. Try it.

Now type the text below in the cells indicated.

D3 OCT

E3 NOV

F3 DEC

G3 MONTHLY TOTALS (press the Enter key and then correct the width of this column)

B	C	D	E	F	G	H
	Janie's & Greg's Budget					
	SEPT	OCT	NOV	DEC	MONTHLY TOTALS	

Next, we will highlight cells D3 through G3. To do this, point to D3 and click the left button on the mouse. Then, holding this button, drag the mouse to the right through G3. When the cells are highlighted, take your finger off the left mouse button. Now point to the group of cells and click the right mouse button to bring up the Format Cells menu. Click on

Alignment and select Centre (vertical & horizontal). Finally, point to OK and click the left mouse button. All of the cells will then be centered.

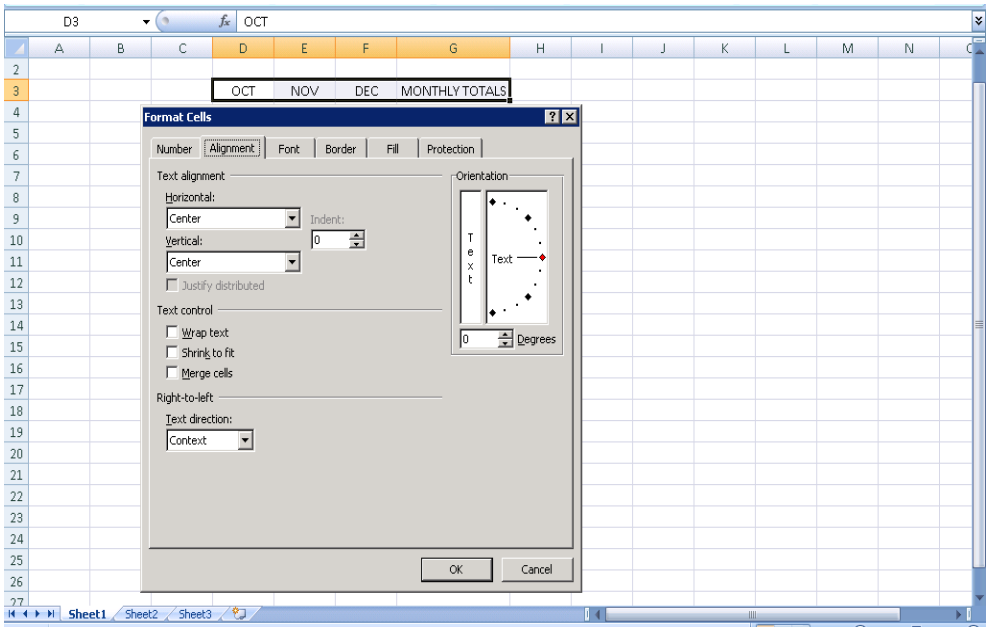


Fig. 2.4: Format cell window

You could also click the Centre button as done previously

MONTHLY TOTALS will not fit into its space when you do this. Thus, move the cursor over the line between cells G and H and drag the line to the right to widen the G cell just as you did a few minutes ago.

2.5.1 COMPONENTS OF AN EXCEL WORKBOOK

Row Number: The horizontal group of cells is termed as a row. Each row is assigned a number. The row numbers appear on the left side of the workbook

Column Number: The vertical group of cells is termed as a column. Each column is assigned a number. The column number appears below the Formula Bar in the workbook.

Column Headings: The name given to each column is termed as column heading. These appear just below the Formula Bar.

Vertical Scroll Bar: The vertical scroll bar consists of two buttons Up Arrow Scroll button and the Down Arrow Scroll button. Clicking on any of these buttons allows you to see those rows of a sheet, which are not visible on the screen.

Horizontal Scroll Bar: The horizontal scroll bar consists of two buttons: Right Arrow Scroll button and the Left Arrow Scroll button. Clicking on any of these buttons allows you to see those columns of a sheet, which are not visible on the screen.

Select 'All' button: This is the first place where the row numbers and column headings meet.

Sheet tab: Using this, one can move from one sheet to another of the workbook. By default, an Excel workbook has three sheets with its name displayed. The default names of these sheets are Sheet1, Sheet2 and Sheet3. These names can be changed and new names can be assigned to them. This tab appears just above the Status Bar.

2.5.2 CLOSING THE EXCEL WORKBOOK

A. To close the Excel workbook:

- Select the File option on the Menu bar and click the left button of the mouse. A pull-down menu is displayed immediately.
- Select the Close option and click the left mouse button. A message box is displayed immediately, asking you whether you want to save this sheet with three options 'Yes', 'No' and 'Cancel'. Select 'Yes' to save the workbook. You will be asked for a file name. Give a name to the file and click 'Save'. If you do not wish to save the workbook, select 'No' and click the left mouse button. This will close the sheet without saving it. Click 'Cancel' to cancel the operation.

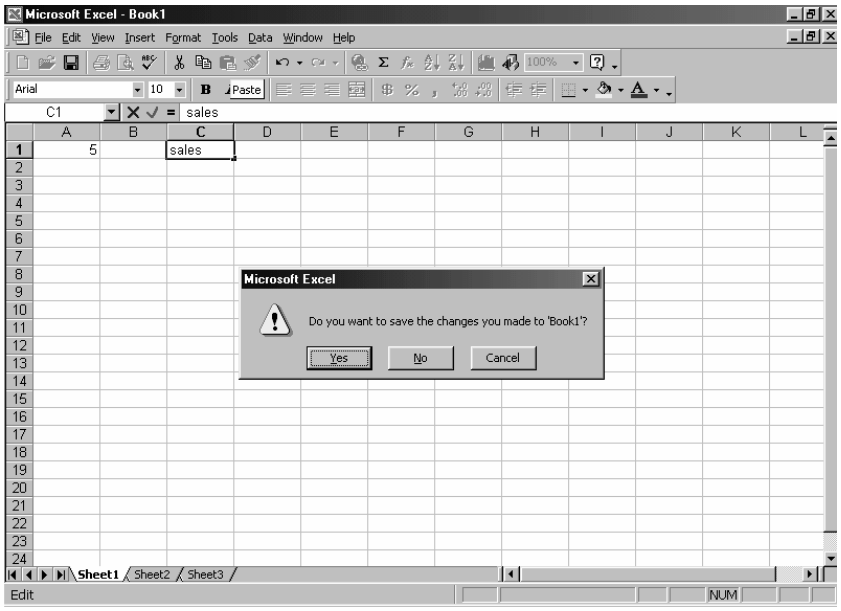


Fig. 2.5: Saving option

B. To close the Excel program:

- Move the mouse pointer to the 'Close' button at the right hand corner of the Title bar.
- Click the left mouse button.

SAVING THE WORKBOOK

The various ways in which you can save the workbook are given below:

1. Select the 'Save' option from the standard tool bar. Then select the drive and folder and give the file a name. Finally click on the ‘Save’ button.
2. Use of File option button on Menu Bar:
   a. Click on the 'File' option in the Menu Bar
   b. Select 'Save' from the dropdown menu
   c. A window will open. Here, select the drive and the folder, give the file a name and then click on 'Save' button.
3. Press 'Ctrl' and 'S' keys simultaneously. The 'Save' window will appear. Follow the same procedure as given above.

Study Notes

	**Assessment**

1. Explain the following:
   a. Title Bar
   b. Menu Bar
   c. Standard tool bar
   d. Formatting toolbar
   e. Name box
   f. Scroll Bars
   g. Status Bar
2. What are the components of an Excel Workbook.

	**Discussion**

Discuss the process "To start Microsoft Excel" and process "To close the Workbook".

2.6 Formulae Function

From the example given below, you will learn how to enter and copy formulas. In this example, you have to calculate the total price of each quantity and then the final total value of all quantities. To calculate the total price of the pens, you enter the quantity in cell address B2 and price in cell address C2. Multiply these values and place the result in cell address D2. Repeat the procedure for the items Pencil and Pen Box. The total of all the three items will be placed in cell address D5.

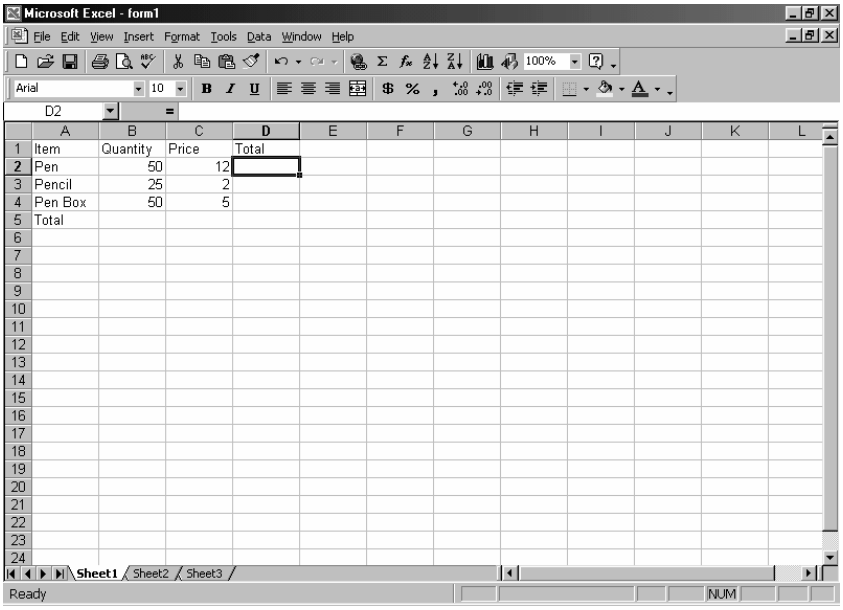
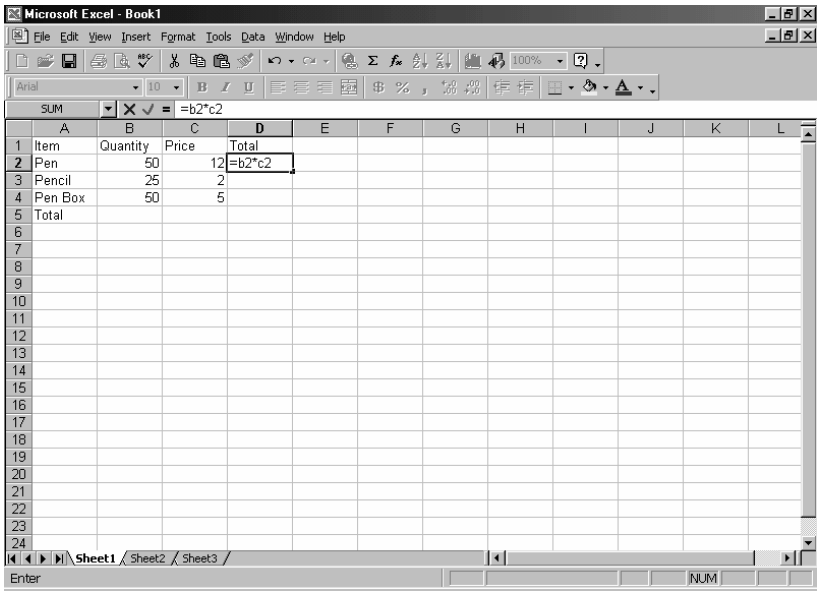
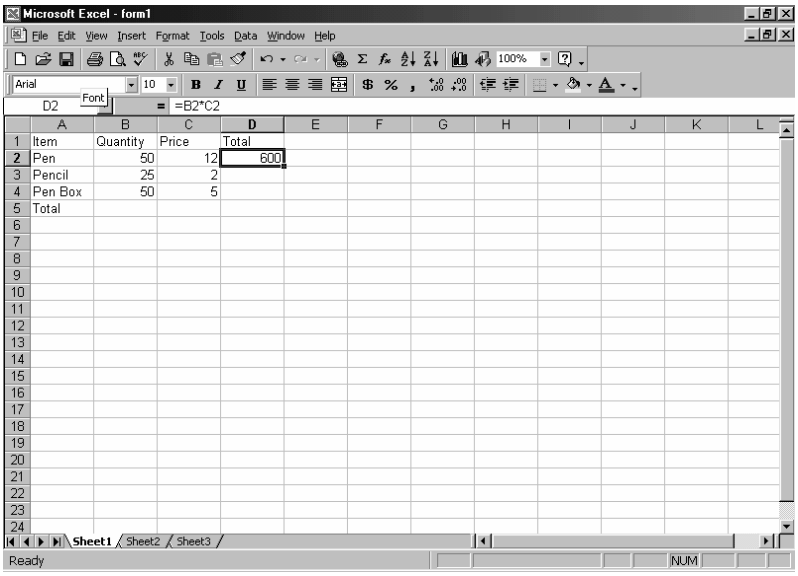


Fig. 2.6: Excel sheet

Formula can also be entered by using the cell address. In the above example, the value is to be calculated by using the formula Quantity * Rate. To calculate the value of first item, pen, in the cell D2, type = B2 * C2 or +B2*C2. (Cell names can be indicated by small letters or capital letters). When typed, it will appear in cell D2 as shown below:



Press Enter. The value will be calculated and displayed as shown below:



Use the same procedure to calculate the cost for Pencil and Pencil Box and then add the values to get the final total.

2.6.1 ADDING NUMBERS

There are several ways for learning how to add numbers. Each method has its advantages and disadvantages.

To commence,, move the cursor to cell C9 and click on it.

Always move the cursor to the cell where you want the answer to be located.

TYPE-IN METHOD

We want to add the three numbers in cells C6, C7 and C8. To use this method, type (using the keys on the keyboard) the following in cell C9:

= C6 + C7 + C8

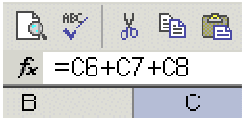
4			
5	INCOME		
6		Parents	300
7		Job	50
8		Investments	150
9		Total	=C6+C7+C8
10			

Fig. 2.7: Spread sheet

The spreadsheet should look like the image above as you are typing in this equation.

4			
5	INCOME		
6		Parents	300
7		Job	50
8		Investments	150
9		Total	500
10			

Now press the Enter key. Then, click on cell C9 again. The total of these cells will now appear in C9.



When you have completed typing your equation, you will see this formula in the area below the menu bar.

Change the number in cell C6 to 500 (and press Enter). You can see how the total is automatically recalculated. Whenever a number is entered in a cell, the entire spreadsheet will mechanically recalculate.

SUBTRACTION, MULTIPLICATION AND DIVISION

You can put in a MINUS (-) for subtraction, ASTERISK (*) for multiplication, and SLASH (/) for division.

Two important points to remember about Excel formulas:

- Formulas in Excel always begin with the equal sign (**=**).
- The =EQUAL sign always goes in the cell where you want the answer to appear.

Use Cell References in Formulas

Even though you can use numbers directly in a formula, it is much better to use the cell references of the numbers you want to subtract.

If previously you have used the cell references rather than the actual data, then later, if you need to change the data in either cell, the results of the formula will update automatically without you having to rewrite the formula.

Setting Up the Subtraction Formula

As an example, lets create a formula in cell E3 that will subtract the contents of cell E1 from cell E2.

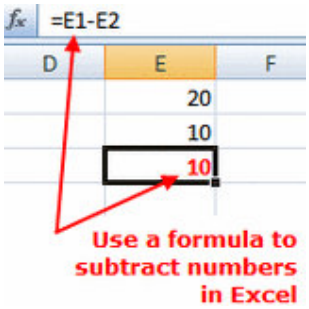


Fig. 2.8: Use of formula

Our formula:

=E1 - E2

- Insert the number 20 in cell E1
- Insert the number 10 in cell E2

Formula Steps

To subtract 10 from 20 and have the answer appear in cell E3:

- Type an EQUAL sign in cell E3.
- Click on cell E1 with the mouse pointer.
- Type a MINUS sign (**-**) in cell E3.
- Click on cell E2 with the mouse pointer.
- Press the ENTER key on the keyboard.
- The answer 10 should be present in cell E3.

To expand your formula to include additional operations such as addition, multiplication or more subtractions, simply continue to add the correct mathematical operator followed by the cell reference containing your data.

POINT METHOD

With reference to the examples mentioned under Type in method, we will use the same for explaining the Point method. Move to cell C9 and click on it. We will now add the numbers in a second way. Press the Delete key on the keyboard to delete the current formula.

First, press the '=' and point the cursor to cell C6 using the mouse, press the left mouse button pointing to cell C6 (you will see a marquee box go around the cell). Now press

a '+' and move cursor to C7. Press the left mouse button, and press another '+' before moving the cursor to C8. Again press the left mouse button (notice that as you click " + and point ", the addition formula is built in cell C9). Now press Enter. The same formula can be built using the arrow movement keys on the keyboard (except that you do not have to click on each cell as the cell is marked when you move the arrows). Notice, as you are entering the cell addresses, when you place another '+' in the formula, the cursor "returns" to cell C9. Also notice that as you point to each cell, it is highlighted by a "marquee box." This "tells" which cell you have pointed.

FUNCTION METHOD

Once again, move the cursor to cell C9. Delete the formula by pressing the Delete key.

Now type the following: =SUM(

[This tells Excel that we are going to sum some numbers in a range, which will follow the =SUM(.]

There are two ways to enter this range:

ARROW KEY AND ANCHOR METHOD

With the arrow keys, move the cursor to cell C6. As you do this, you will notice that the cell where the cursor is located appears after the =SUM(. When you get to C6, press the '.' (Period) key. This is called an anchor and it holds one end of the range in place. You will notice that a C6:C6 appears in the formula area under the button bar. This is a one-cell range. Now move with the arrow keys to cell C8. See how cells C6, C7 and C8 get highlighted. This indicates that the range is C6:C8. Excel assumes logically that these are the numbers you want to add. Now press Enter. The numbers still add, but now the formula reads =SUM(C6:C8) instead of =C6+C7+C8 as it did before.

MOUSE METHOD

Again move to cell C9. Delete the formula in cell C9 by pressing the Delete key. Type in =SUM(as done earlier). Now using the mouse, point the cursor to Cell C6.Click and hold down the left mouse button and move/drag the cursor down to cell C8. (Cells C6, C7 and C8 should be highlighted.) Now press Enter.

This =SUM Function is a convenient way to add many numbers, or a block/range of numbers. By simply anchoring and using page downs or using the mouse, you can highlight

many numbers to add quickly. However, since it performs only addition, (sums), you cannot do subtraction, etc.

Once again point to cell C9.. Press the Delete key to eliminate the formula present in cell C9.

Functions

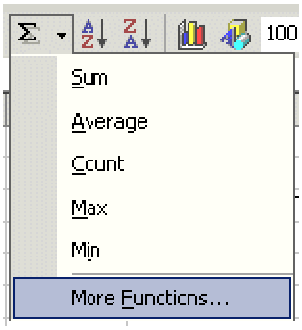


Fig. 2.9: Formulas

There are a number of formulas built into Excel such as SUM. These formulas are called Functions. Below the Menu Bar (see the figure above), you will see a "sigma" ∑ with an inverted triangle to its right. Click on the inverted triangle. The drop-down menu will appear on the right. Move the cursor down to More Functions and click on More Functions.

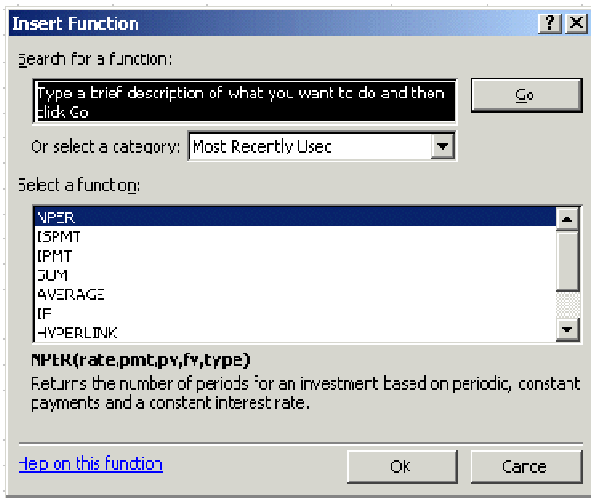


Fig. 2.10: Insert function

Two menu screens will appear simultaneously. An "Office Assistant" will appear (see image) and you can ask questions (the little assistant may be a paper clip or just about anything).

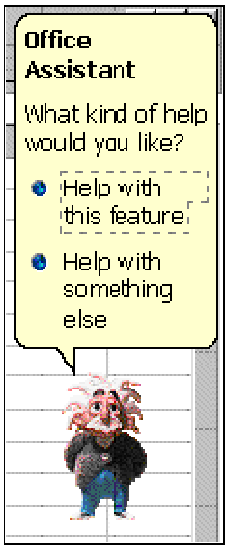


Fig. 2.11: Office assistant

The Insert Function menu screen will also appear (like the one above on the right). The two menu screens work jointly to assist you when you are using functions.

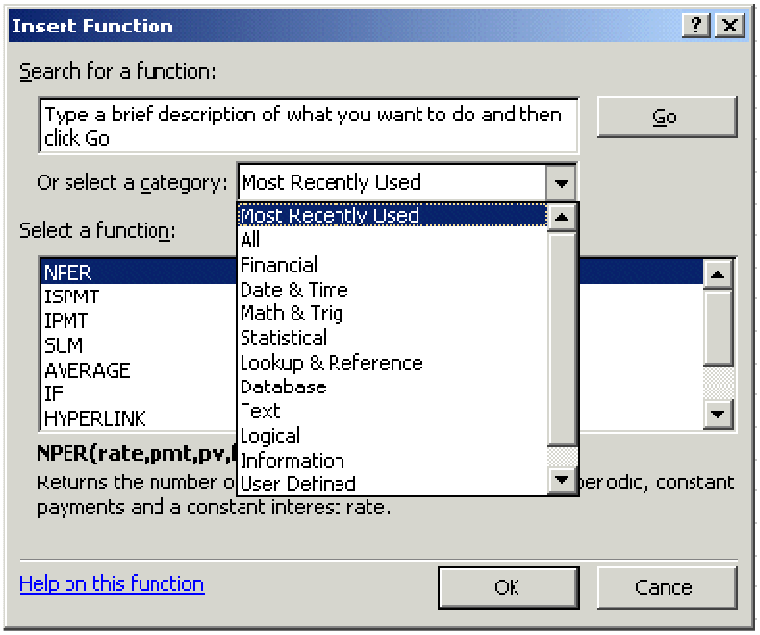


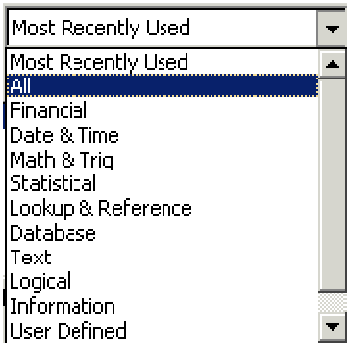
Fig. 2.12: Insert function

Let us work with the Insert Function menu screen. Click on the small inverted triangle to the right of 'Or select a category' (see arrow at left).

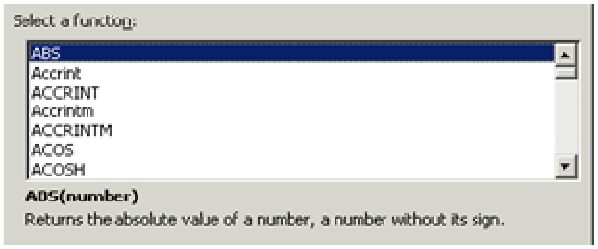
In the drop-down menu that appears, you can see that there are all kinds of formulas (functions) that come with Excel spreadsheet (e.g. statistical, mathematical, financial etc.).

Instead of referring to mathematical, financial, or statistical tables in a book, you can enter data from your spreadsheet into the formulas and obtain answers.

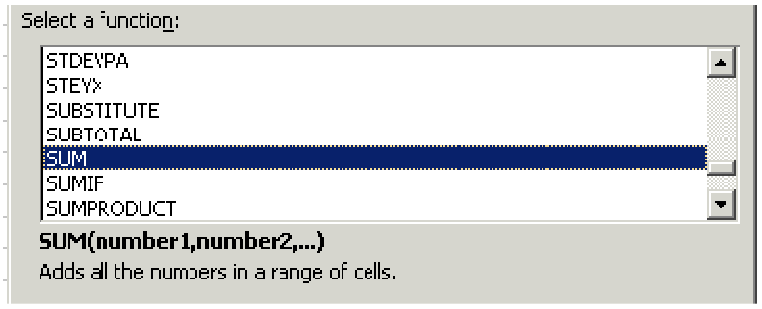
Click on All in the drop-down menu.



Then by selecting a function menu out of those displayed on ALL, the below given figure will appear:.

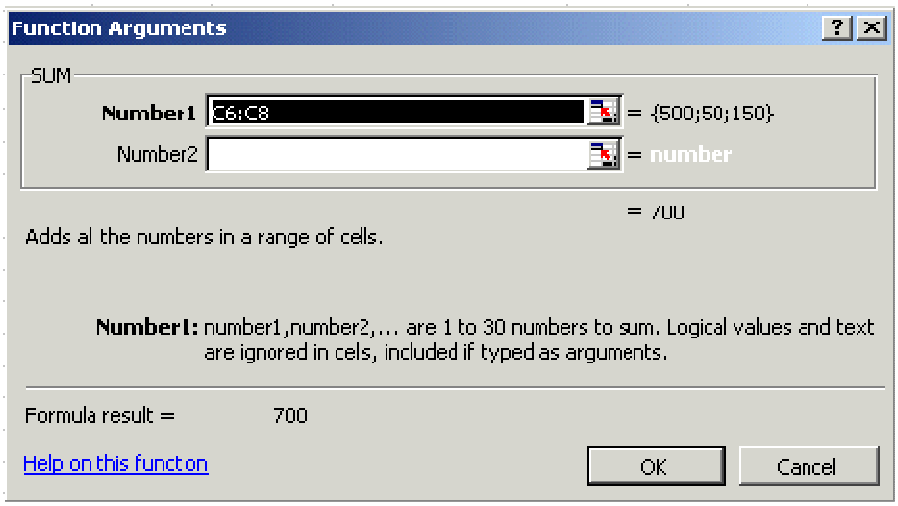


Look at all the functions (formulas) before we commence our study on using the addition formula (SUM).These formulas will be available at this location, in case one needs to revisit them in the future.



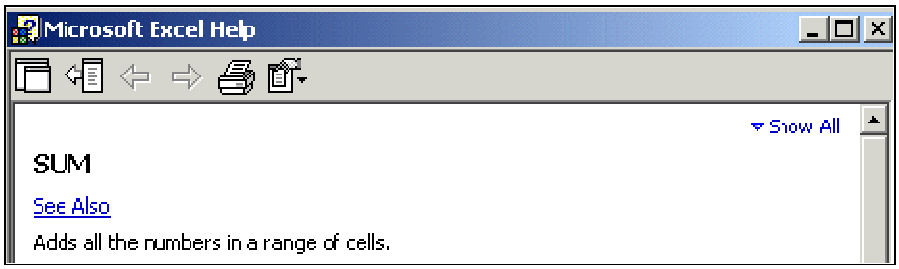
Use the elevator bar located to the right of the 'Select a function menu 'screen and move down the list until you see SUM. Click on SUM.

Then click on OK.



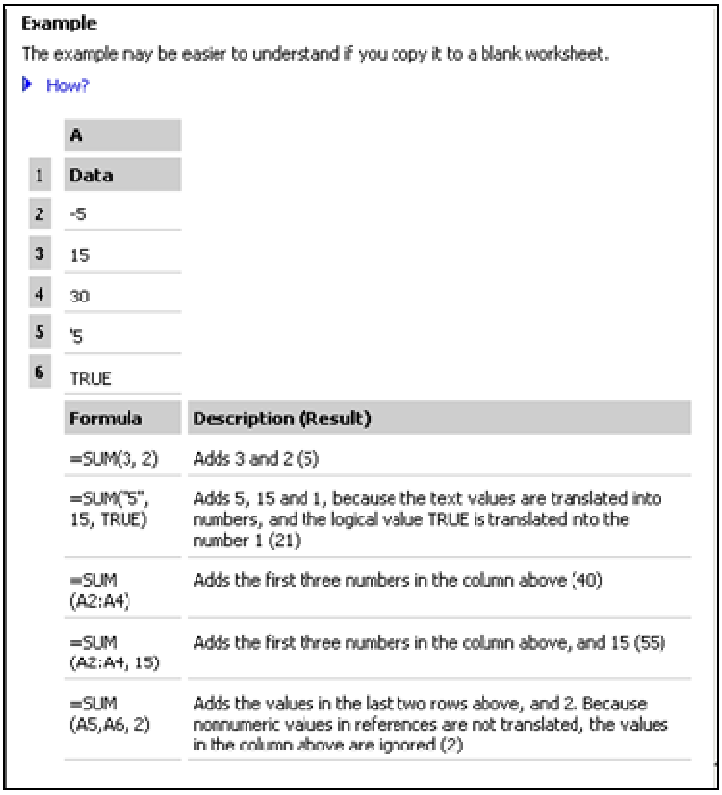
When you click on OK, the Function Arguments menu screen (above) will appear. If you look at the top of the screen in the SUM area, you will see that Excel XP has "guessed" that you desire to add the numbers above cell C9 – where you clicked in your spreadsheet. Notice that it indicates that cells C6:C8 will be added (sum cells C6 through C8 – the colon (:) means "through." It also indicates the numbers in cells C6, C7 and C8 and gives you the sum (= 700).

But it is a little unclear how Excel did this. To see how this SUM equation works, you will go to Help. To do this, click on Help on this function in the lower left corner of the screen (see left arrow above).



You will now see a Microsoft Excel Help window (similar to the one above) that will show you how to use this SUM function (or any function). One advantage of these Help windows is that there are examples for each function.

We move down the SUM help screen using the elevator bar on the right of the help screen. The bottom of the screen looks like the image at the top of the next page. Spend a few minutes looking at the SUM Help window and observe all the features.



Example

The example may be easier to understand if you copy it to a blank worksheet.

How?

	A
1	Data
2	-5
3	15
4	30
5	'5
6	TRUE

Formula	Description (Result)
=SUM(3, 2)	Adds 3 and 2 (5)
=SUM("5", 15, TRUE)	Adds 5, 15 and 1, because the text values are translated into numbers, and the logical value TRUE is translated into the number 1 (21)
=SUM (A2:A4)	Adds the first three numbers in the column above (40)
=SUM (A2:A4, 15)	Adds the first three numbers in the column above, and 15 (55)
=SUM (A5,A6, 2)	Adds the values in the last two rows above, and 2. Because nonnumeric values in references are not translated, the values in the column above are ignored (2)

Fig. 2.13: SUM Help screen

The bottom of the SUM Help screen looks like the image above. Notice that it gives you examples from a small spreadsheet that has data in cells A1 through A6. It uses these numbers too in the examples at the bottom of the help screen.

When you have reviewed all of the help, you care to see, click on the X at the upper right corner of Microsoft Excel Help blue bar to close the Microsoft Excel Help window. If you accidentally close the spreadsheet, simply reply 'yes' to Save and then re-open the spreadsheet.

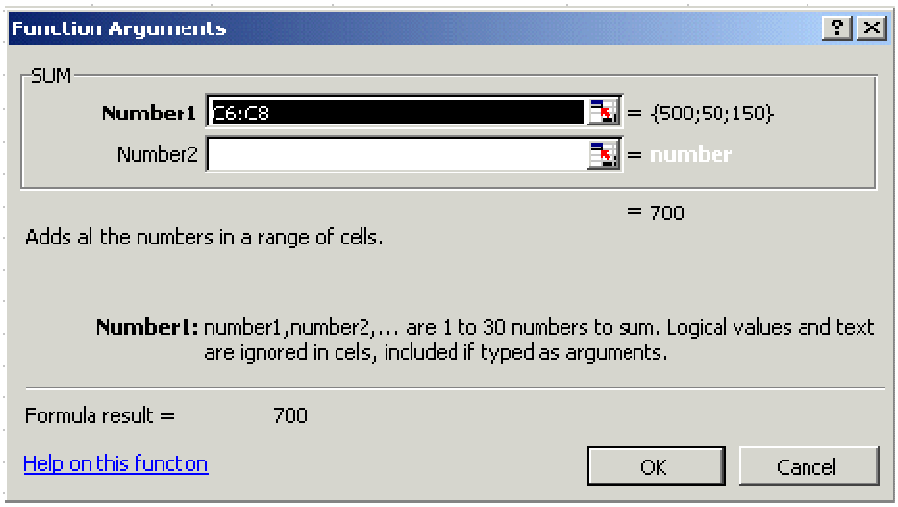
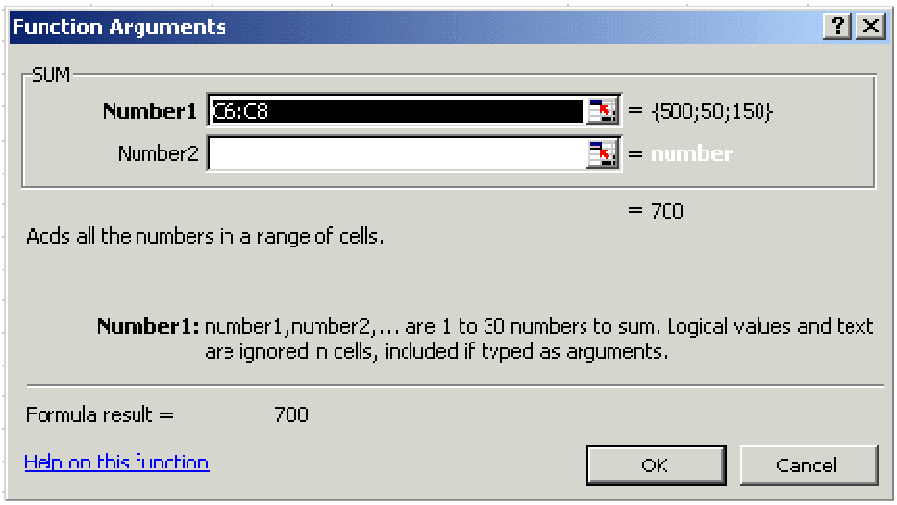


Fig. 2.14: Function Arguments menu screen

The Function Arguments menu screen will still be on the screen.

If the Office Assistant is still on the screen, simply point to it and click the right side button on the mouse. A pop-up menu will appear. Click on Hide. This will put the Assistant away until we need it again

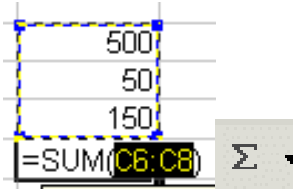


As you can see, in the area to the right of Number 1, the “Wizard” has “guessed” that you want to add numbers in the range C6 to C8. Now, point to some “plain part,” in the gray area above. Click and hold down the left mouse button and drag the above SUM box “away” so that you can see your numbers in C column cells. When you have done this, release the mouse button. Now click on the “small box” at the right edge of the Number 1 area (see arrow above). It has a little red arrow in it.

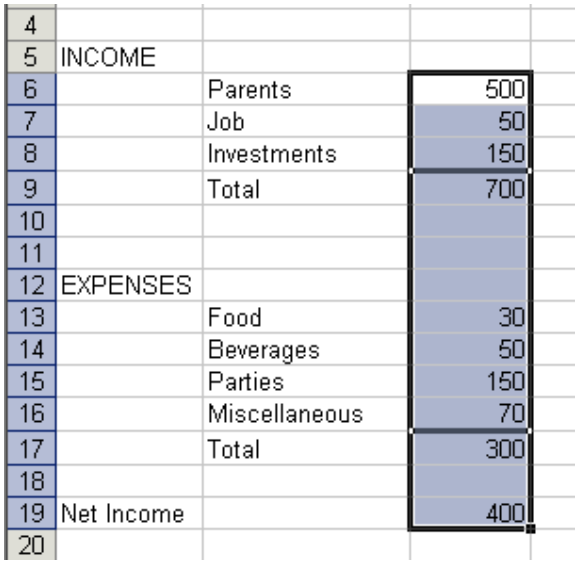
The below window will appear.

Highlight cells C6 to C8 in the spreadsheet (click on C6, hold down the left mouse button and drag until the three cells are highlighted). A “marquee” will begin to flash around the cells, indicating they are highlighted. The Function Arguments area will appear as shown above. Now click on the small button to the right of the cell (see arrow above). The numbers will show in the area to the right of Number 1. Now, click on OK at the bottom of the Function Arguments menu screen. You will see that the SUM formula [=SUM (C6:C8)] shows in the formula area at the top of the screen.

2.6.2 AUTO SUM METHOD



Since, we add numbers more than any other operation in spreadsheets, Excel spreadsheet has an additional feature - Auto Sum. Move to cell C9 again and press the delete key to erase your last formula. Now look at the upper area of the screen, just below the menu bar, for a ∑ (summation) symbol button. Point to it and click with the left mouse button. It is added automatically. Observe that the cells you would logically desire to add, have a marquee around them and that the SUM function is displayed in cell C9. You will need to confirm that this is the correct formula. Press the Enter key and the SUM function will now be set in cell C9.



4			
5	INCOME		
6		Parents	500
7		Job	50
8		Investments	150
9		Total	700
10			
11			
12	EXPENSES		
13		Food	30
14		Beverages	50
15		Parties	150
16		Miscellaneous	70
17		Total	300
18			
19	Net Income		400
20			

Now move to cell C17 and add the total Expenses in cells C13 to C16 - using each of the four methods.

While you are in cell C17, place a line at the top of this cell using the format cells – border method that you learned earlier.

SUBTRACTION

Type Net Income in cell A19.. Next, adjust the width of column A.

From cell C19, we want to subtract the amount for Expenses in cell C17 from the amount for Income in cell C9. This can be accomplished by using either the Type-In Method or Point Method. Go ahead and do this. Do not forget to press the Enter key to confirm your formula.

[The formula should look like this: =C9-C17]

2.6.3 DIVISION AND PERCENT

Now move to cell A21 and type in the word Percent. We are going to calculate a percentage to show you how division works and to give you some more practice with numbers.

Now move to cell C21 and using either the Type-In Method or the Point Method divide (/) the amount for Income in cell C9 by the amount for Expenses in cell C17.

Point to cell C21 and click the right mouse button. First point to Format Cells, then the Number tab followed by a click on Percent. Select zero (O) Decimal Places. Click OK.

[The formula should look like =C9/C17]

2.6.4 ABSOLUTING (AND MULTIPLICATION)

Sometimes, when we are work with a spreadsheet, we do not want a cell to "roll" to the next column when we use the copy feature of the spreadsheet. To stop cells from “rolling” we utilize absoluting. The following is an illustration of absoluting:

Go to cell A23 and type in Number. Go to cell A25 and type in Result.

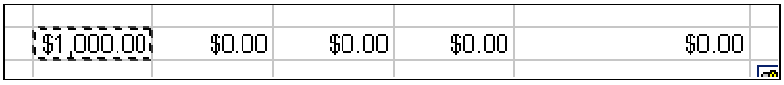
Go to cell C23 and type in a 2 and press the Enter key.

We will now create a formula to multiply our number times Net Income. You may use either the Type-in or Point method. Go to cell C25, and type in a formula to multiply cell C23 times cell C19.

The formula should look like this: =C23*C19

The result in C25 should be two times the net income in cell C19.

Now copy the formula in cell C25 to cells D25, E25, F25 and G25. Your row 25 should look like the one below.



Point to each of the cells D25, E25, F25 and G25. Notice, as you click on each and look at the screen, how C23 (the cell with the 2) "rolled" and became D23, E23, F23 and G23 (which are blank - and caused the "0's"). To do this, we utilize Absoluting or Anchoring.

Go back to cell C25. Now we will enter the formula again, but a little differently (to anchor the 2).

Type in a =C23 (or you could type = and point to C23). Now, press the F4 key. Notice, in the Edit bar at the top of the screen, that the =C23 changes to: $C$23. (This tells you that cell C23 is absoluted or anchored. The "$'s" indicate the absoluting.) Now finish the formula by typing in or pointing *C17 as before. Press Enter.

The formula should look like this: =$C$23*C19

Now copy the formula in cell C25 to cells D25, E25, F25 and G25 again.

The numbers should now be correct. Point to cells D25, E25, F25 and G25 (as you did before). You will notice the "$'s" have copied the =$C$23 to each cell (absoluting) and the Net Income figures have rolled as they should. You may practice by changing some more numbers or the income and expense titles.

	Study Notes

	Assessment

Write a note on:

a. Function method

b. Point method

c. Arrow key and anchor method

d. Mouse method

e. Auto sum method

	Discussion

Find out the sum of first 100 natural numbers in Ms Excel.

2.7 Spreadsheet Operations

The various operations that can be performed on a worksheet are explained below:

2.7.1 Retrieving Spreadsheets

When you need to return to a spreadsheet, you first load Excel, as you did originally. When Excel is on the screen, click on File in the menu bar and then click on Open.

The following Open menu screen will appear:

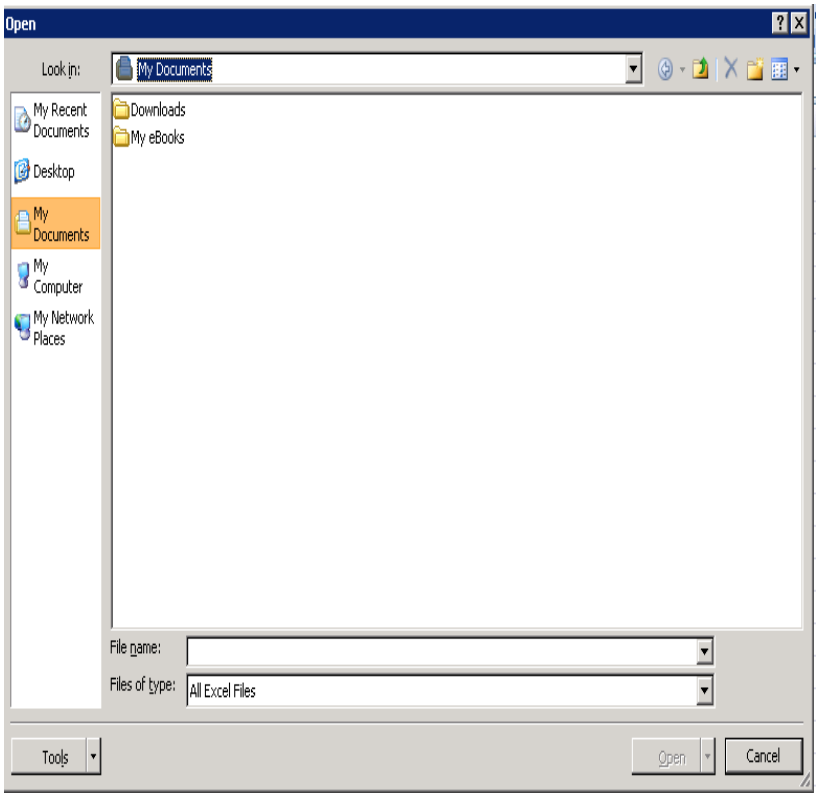


Fig. 2.15: Open menu screen

Click on the down triangle to the right of the Look in box (similar to the triangle in the Save in box). Click on the My Documents. Files saved on the disk will appear in the box below. Click on your file and then click on Open. Your file will be opened. You could also double-click quickly on the file to open it.

Also, if you have not done so already, move your cursor slowly over the "buttons" located below the menu bar. You will notice a little box that tells you what these buttons do. These little boxes are called Text Help boxes. Notice, that under File and Edit in the Menu bar, there is a small folder (Open) and a diskette (Save). Clicking on them will take you directly to Open and Save.

2.7.2 INSERTING CELLS, COLUMNS AND ROWS

To insert cells, columns and rows, follow the steps given below:

1. Click on the Insert button on the Menu bar, then in the drop down menu click on cells. You will get a screen as shown in the following figure:

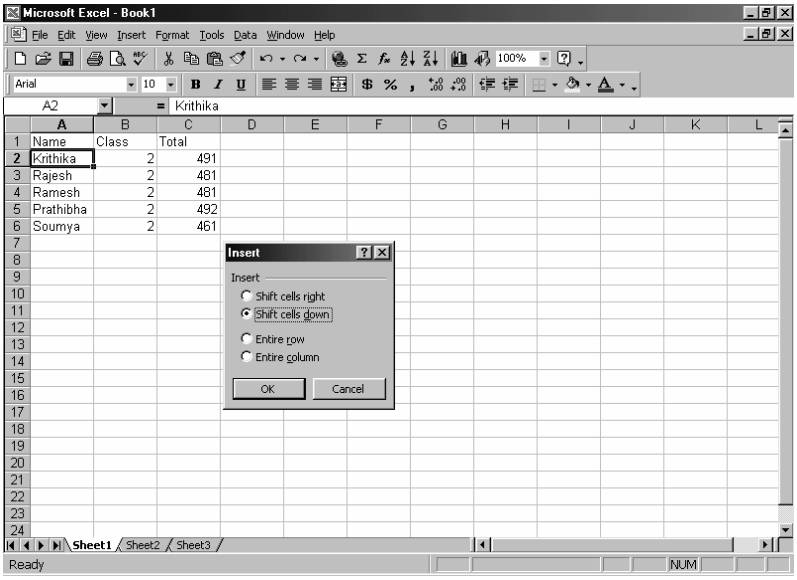
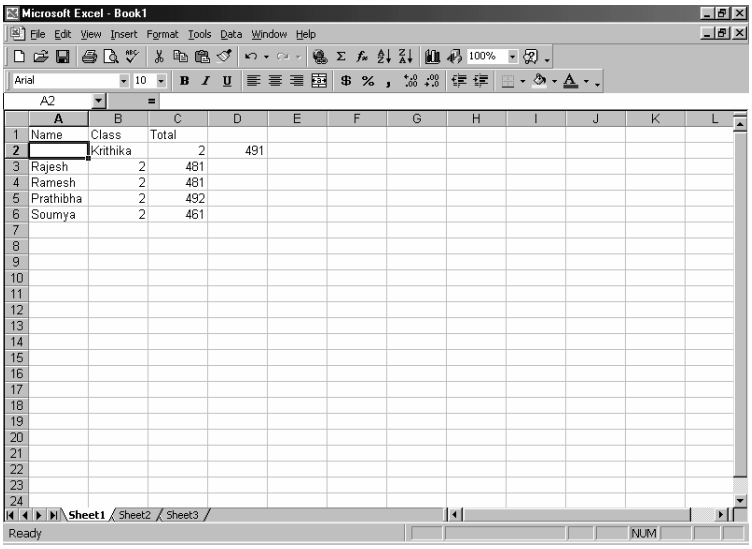


Fig. 2.16: Inserting cells

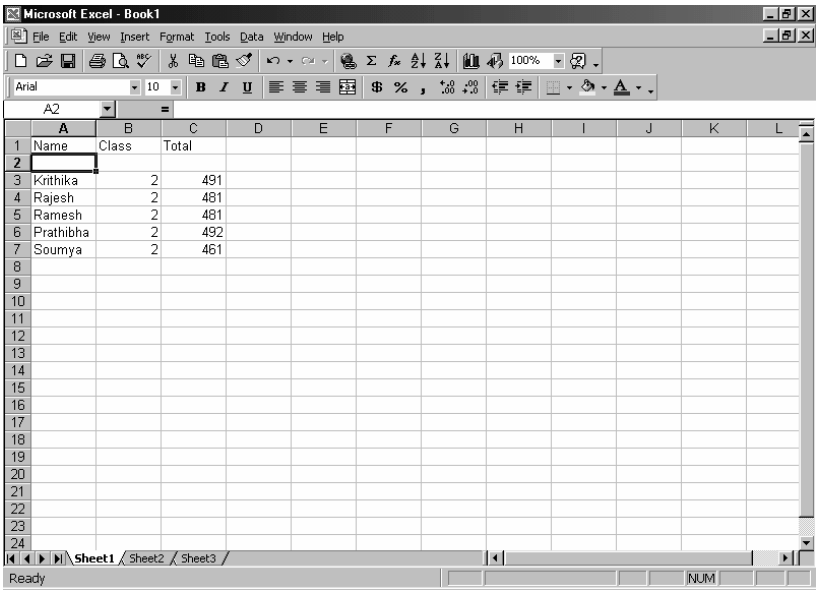
2. You will get four options. Depending on your requirement, select the appropriate option.
   a. Shift cells right
   b. Shift cells down
   c. Entire row
   d. Entire column

   a. Shift cells right: This will add a blank cell to the left of the selected cell. This is shown in Figure below:

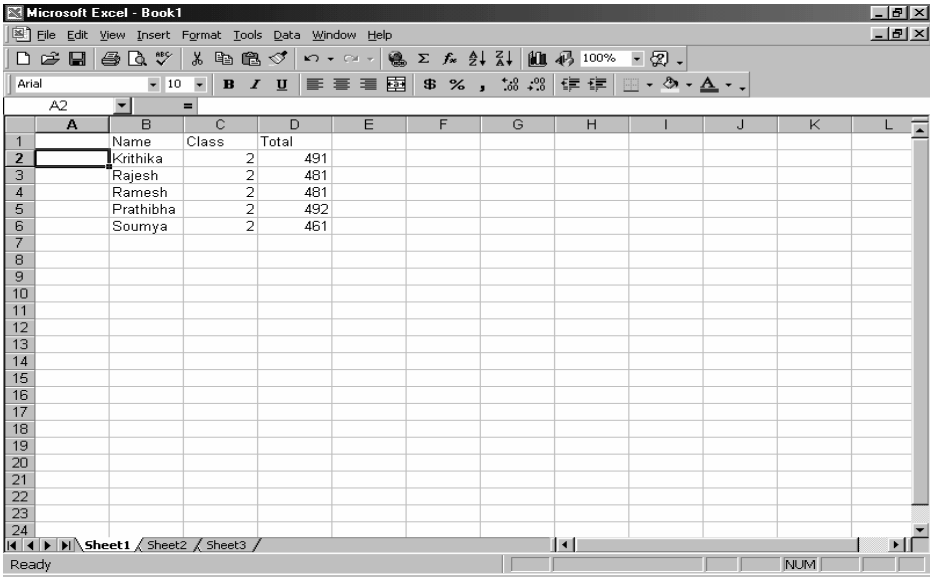


   b. Shift cells down: This will add a blank cell at the top of the selected cell.

c. Entire row: This will add a blank row above the selected row. After executing the command the worksheet will appear as:



d. Entire column: This will add a blank column to the left of the selected column. Considering the figure below, after executing the command the worksheet will appear as:



e. To insert one or more columns

- To insert one column: Follow the steps listed below.
  - Select the cell to the left of which you want to insert the column

- Click on the Insert button in the Menu bar
- Select the Column option from the drop-down menu

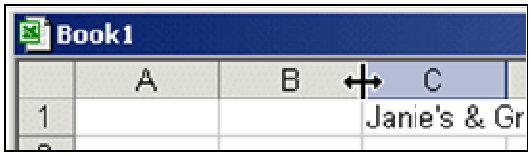
- To insert more than one column: Follow the steps listed below:
  - Select the cell to the left of which you want to insert the columns
  - Select the number of columns to be inserted
  - Click on the Insert button in the Menu bar
  - Select the Column option from the drop down menu.

f. To insert one or more rows

- To insert one row: Follow the steps listed below:
  - Select the cell above which you want to insert the row
  - Click on the Insert button on the Menu bar
  - Select the Row option from the dropdown menu
- To insert more than one row: Follow the steps listed below:
  - Select the cell above which you want to insert the rows
  - Block/ Select the number of Rows to be inserted
  - Click on the Insert button on the Menu bar
  - Select the Row option from the drop down menu

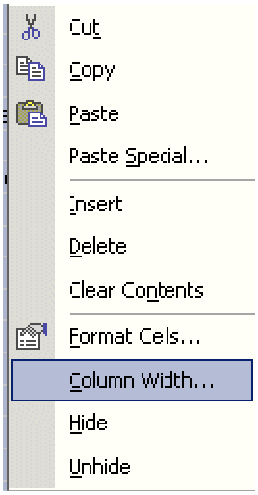
WIDENING COLUMNS

You probably noticed that as you typed in the numbers, some of the words were just too wide for the default cell width (Investments and Miscellaneous). Let us widen column B to take care of this. Move the mouse arrow slowly to the right edge of the B cell (between the B and the C). The cursor will turn into an arrow pointing right and left with a small vertical line in the middle (see arrow below). Hold down the left mouse button and move (drag) the line to the right.



As soon as you start to move (drag), a dotted vertical line will go down the spreadsheet and it will move as you hold down the left button and drag the mouse. Keep dragging to the right until you are past the widest word and a bit more (for some space). Release the button. The column is widened. As you hold down and drag the mouse, you will learn about the current width of the column by observing the upper left corner of the screen, below File in the menu bar, and above the buttons.

This was one way to widen a column. Here is another way. Point to the B at the top of column B (in the Gray area) and click the left mouse button. (The cell should turn black and the column blue).



Now, keeping the cursor somewhere in the “blue” area, click the right mouse button. Notice that a menu with Column Width appears. Click on Column Width. Then type into it 15 and click on OK. This is another way to widen a column. Another way is to put the cursor on

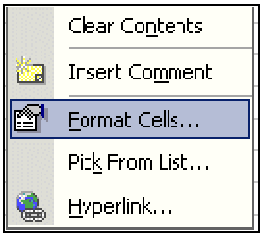
the edge of the cell and double click on the mouse. If there is any text in a cell in that column that is wider than the cell, the column will adjust to that width.

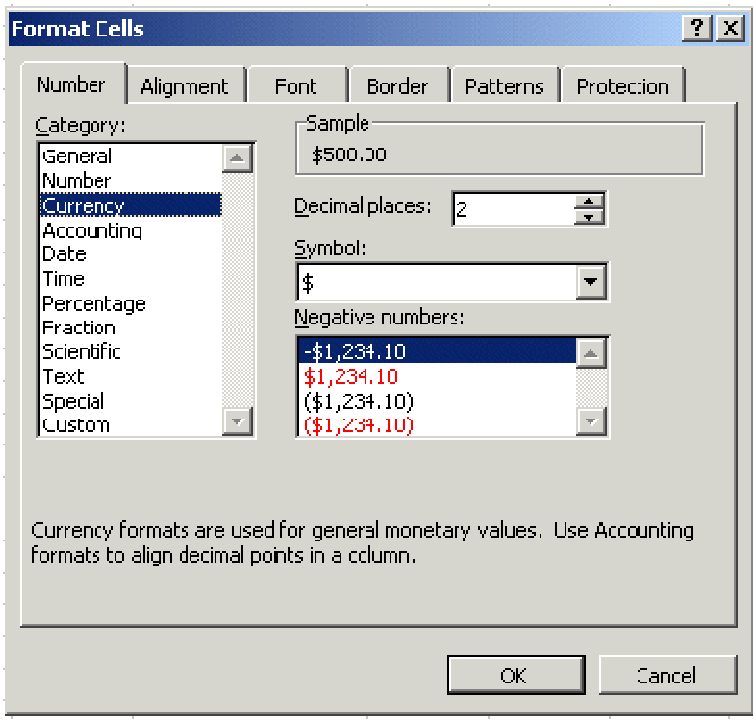
2.7.3 MORE CELL FORMATTING

Since we want our numbers to look better, we can include dollar signs and decimal points in our numbers. This is done by using the mouse. Point to cell C6, hold down the left mouse button and drag it down slowly to highlight cells C6 through C19. Your screen should look like the image shown below:

4			
5	INCOME		
6		Parents	500
7		Job	50
8		Investments	150
9		Total	700
10			
11			
12	EXPENSES		
13		Food	30
14		Beverages	50
15		Parties	150
16		Miscellaneous	70
17		Total	300
18			
19	Net Income		400
20			

Now point anywhere in the highlighted area and click the right mouse button.. A pop-up menu will appear. Click on Format Cells (like you have done before).





Then click on the Number “Tab” at the top of the Format Cells menu screen. Point to Currency and click on Currency.

Notice several things. The right side shows the number of decimal places. The 2 is the default for cents. We will use 2. Notice the box above Decimal Places. It is a sample of what our number will look like. At the lower right, it shows how negative numbers can appear, depending on your choice. When a negative number is calculated, it will appear with your choice. Now click on OK. All the numbers now have $. If you have large numbers that are "too wide" for the current column width, you will see some ######## in the cells where these numbers are located. If this occurs in your spreadsheet, go ahead and widen the columns as you did previously.

4			
5	INCOME		
6		Parents	$500.00
7		Job	$50.00
8		Investments	$150.00
9		Total	$700.00
10			
11			
12	EXPENSES		
13		Food	$30.00
14		Beverages	$50.00
15		Parties	$150.00
16		Miscellaneous	$70.00
17		Total	$300.00
18			
19	Net ncome		$400.00
20			

Your spreadsheet numbers should now look like the image above.

2.7.4 COPYING

	A	B	C	D
1			Janie's & Greg's	
2				
3			SEPT	OC
4				
5	INCOME			
6		Parents	$500.00	
7		Job	$50.00	
8		Investments	$150.00	
9		Total	$700.00	
10				
11				
12	EXPENSES			
13		Food	$30.00	
14		Beverages	$50.00	
15		Parties	$150.00	
16		Miscellaneous	$70.00	
17		Total	$300.00	
18				
19	Net Income		$400.00	
20				
21	Percent		200%	
22				

We could repeat what we did to this point and fill in the Income and Expenses for each of the remaining columns. There is a simpler way to do this. Assuming our income and expense amounts are about the same throughout the months, we want to copy the amounts in Column C to Columns D, E and F. This will require two “steps”.

Move your cursor to cell C6. First, we will highlight what we want to copy; next, we will tell the spreadsheet where we want to place it. So, point to C6, hold down the left mouse button and drag down the column until cells C6 through C21 are highlighted. Your highlighted area should look like the image above.

Now, point to Edit in the Menu bar. Click the left mouse button. Point to Copy in the menu that appears. Click the left button. The menu disappears.

You will notice that once again, when you highlight an area, a marquee of running lights moves around the copy area. Thus, you will know you have highlighted the correct area.

Now we will notify the program where to copy the information. Point to cell D6, click and hold down the left mouse button and drag down and to the right to cell F21. (This will highlight three columns OCT, NOV, DEC to copy.) When you have finished highlighting, your screen should look like the image shown below:

	A	B	C	D	E	F
1			Janie's & Greg's Budget			
2						
3			SEPT	OCT	NOV	DEC
4						
5	INCOME					
6		Parents	$500.00			
7		Job	$50.00			
8		Investments	$150.00			
9		Total	$700.00			
10						
11						
12	EXPENSES					
13		Food	$30.00			
14		Beverages	$50.00			
15		Parties	$150.00			
16		Miscellaneous	$70.00			
17		Total	$300.00			
18						
19	Net Income		$400.00			
20						
21	Percent		23%			

Now point to Edit in the Menu Bar again and click the left mouse button. Point to Paste. Click left button. Click on a cell away from the area where the numbers are located. This will “turn-off” the highlight. Press the Esc key and the marquee will also disappear.

Note: You can also utilize the copy and paste buttons in the button bar to do this if you desire.

Change a few numbers in each of the months in both the income and expense areas to see how the spreadsheet works.

	Study Notes

	Assessment

Write the process for the following:

a. Retrieving Spreadsheets

b. Inserting Cells, Columns and Rows

c. Widening Columns

d. Copy pasting in spread sheet

	Discussion
Try out above-mentioned processing practically on a Computer system.	

2.8 Data Base Functions in Spreadsheet

Microsoft Excel contains number of database functions that are available and will assist you in extracting information from your database.

DAVERAGE

Averages the values in a column of a list or database that match conditions you specify. Syntax DAVERAGE (database, field, criteria) A database is a list of related data in which rows of related information are records, and columns of data are fields. The first row of the list contains labels for each column.

DCOUNT

Counts the cells that contain numbers in a column of a list or database that match conditions that you specify. The field argument is optional. If field is omitted, DCOUNT counts all records in the database that match the criteria.

DCOUNTA

Counts the nonblank cells in a column of a list or database that match conditions that you specify. The field argument is optional. If field is omitted, DCOUNTA counts all records in the database that match the criteria.

DGET

It extracts a single value from a column of a list or database that matches conditions that you specify.

DMAX

It returns the largest number in a column of a list or database that matches conditions that you specify.

DMIN

It returns the smallest number in a column of a list or database that matches conditions that you specify.

DPRODUCT

It multiplies the values in a column of a list or database that match conditions that you specify.

DSTDEV

It estimates the standard deviation of a population based on a sample by using the numbers in a column of a list or database that match conditions that you specify.

DSTDEVP

It calculates the standard deviation of a population based on the entire population by using the numbers in a column of a list or database that match conditions you specify.

DSUM

It adds the numbers in a column of a list or database that match conditions that you specify.

DVAR

It estimates the variance of a population based on a sample by using the numbers in a column of a list or database that match conditions that you specify.

DVARP

It calculates the variance of a population based on the entire population by using the numbers in a column of a list or database that match conditions that you specify.

Study Notes

	**Assessment**
Explain the following: a. DAVERAGE b. DCOUNTA c. DPRODUCT d. DSTDEV e. DSUM	

	**Discussion**
Discuss purpose of DGET, DMAX and DMIN functions	

2.9 Summary

With Windows, Microsoft has successfully addressed all the limitations of MS-DOS, in addition to new user-friendly features. Windows is so-called because it allows users to work on several Windows at the same time. Windows, which was a product of this class, was based on a radically different approach called Graphical User Interface (GUI). In a Graphical User Interface, the various commands and options are represented on the screen in the form of small images called 'Icons'.

A spreadsheet is a "number manipulator". To make the manipulation of numbers easier all spreadsheets are organised into rows and columns.

DISK OPERATING SYSTEMS AND WINDOWS

The operating System is used for operating the system or the computer. It is a set of computer programs and also known as DOS (Disk Operating System). The main functions of DOS are to manage disk files, allocate system resources according to the requirement.

FEATURES OF WINDOWS

1. **Faster Operating System:** Windows include tools that increase the speed of the computer. Windows include a set of programs designed to optimize your computer's efficiency, especially when used together.
2. **Improved Reliability:** Windows improves computer reliability by introducing new wizards, utilities and resources that help keep your system running smoothly.
3. **Innovative, Easy to use features:** Windows makes your computer easier to use with new and enhanced features.

TEXT PROCESSING SOFTWARE

Word processing software is used for creating documents. Drafts, letters, reports, essays, write-ups etc can be created using word processing software. Earlier, Word Star was being used widely for this purpose. Sidekick and Word Prefect are also used for drafting letters. However, the most commonly used word processing package in the world is Microsoft Word.

INTRODUCTION TO SPREADSHEETS

Spreadsheet is a computer application that simulates a paper worksheet. It displays multiple cells that together make up a grid consisting of rows and columns, each cell containing either alphanumeric text or numeric values. Spreadsheets are frequently used for financial information because of their ability to re-calculate the entire sheet automatically after a change to a single cell is made.

MICROSOFT EXCEL

Microsoft had been developing Excel on the Macintosh platform for several years at this point, where it had developed into a powerful system. A port of Excel to Windows 2.0 resulted in a fully functional Windows spreadsheet.

DATA BASE FUNCTIONS IN SPREADSHEET

Microsoft Excel contains number of database functions that are available and will assist you in extracting information from your database.

DAVERAGE

DCOUNT

DCOUNTA

DGET

DMAX

DMIN

DPRODUCT

DSTDEV

DSTDEVP

DSUM

DVAR

DVARP

2.10 Self-Assessment Test

Broad Questions

1. Discuss the components of an Excel Workbook.
2. Explain any five database functions of Excel.
3. Take any 10 numbers and do the following:
    a. Subtraction
    b. Multiplication
    c. Division

Short Notes

a. Objectives of MS-Excel
b. Inserting rows in an Excel Worksheet
c. Methods of closing Excel Workbook
d. Parts of an Excel window
e. Absoluting and Multiplication

2.11 Further Reading

1. Automating Managers: The Implications of Information Technology for Managers, John, Moss Jones, London, Printer, 1990
2. Computers, Concepts and Uses 2nd ed., Summer M., Englewood Cliffs, New Jersey, Prentice Hall Inc, 1988

3. Foundations of Business Systems, David Van Over, Fort Worth, Dryden 1992
4. Information systems: Theory and practice 5th ed., Burch, John And Grudniski Gary, New York., John Wiley, 1989
5. Online Business computer Applications 2nd Ed, Eliason A. L.,. Chicago Science Research Associates, 1987

Assignment

Use and practice MS Excel formulas and note down the commands for your reference.

Unit 3 Modes of Data Processing

Learning Outcome

After reading this unit, you will be able to:

- Explain the modes of data processing
- Take a complete overview of a computer software system
- Define software development process
- Distinguish between data file types
- Describe the relevance of data base management system

Time Required to Complete the unit

1. 1st Reading: It will need 3 Hrs for reading a unit
2. 2nd Reading with understanding: It will need 4 Hrs for reading and understanding a unit
3. Self Assessment: It will need 3 Hrs for reading and understanding a unit
4. Assignment: It will need 2 Hrs for completing an assignment
5. Revision and Further Reading: It is a continuous process

Content Map

3.1 Introduction

This unit explains the basic concepts of how a data is managed and processed, it is meant to give a precise idea of how data processing is done. The unit also emphasizes on the different types of software and their importance and applications. A brief concept on the system development Life cycle has also been explained to give the students a fair idea of how software is developed. Different types of file system are also a part of this unit.

3.2 Data Processing

The term Data Processing can be used to describe any computer procedure that transforms data into information. It is an automatic process. As data is most helpful when presented systematically, data-processing structures are frequently called information systems. Data-processing systems characteristically maneuver raw data into information and similarly information systems characteristically use raw data as input to generate information as output.

In the framework of data processing, data is described as figures or characters that represent dimensions from discernible phenomena. Calculated information is then algorithmically deduced to multiple data. Information is described as either a meaningful response to a question or a meaningful motivation that can give rise to further questions.

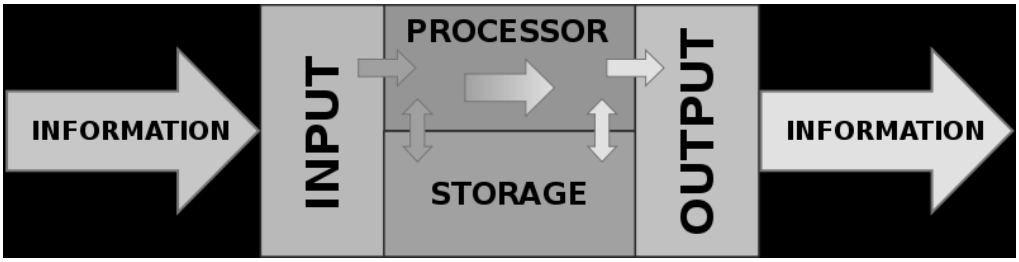


Fig. 3.1: Information Processor

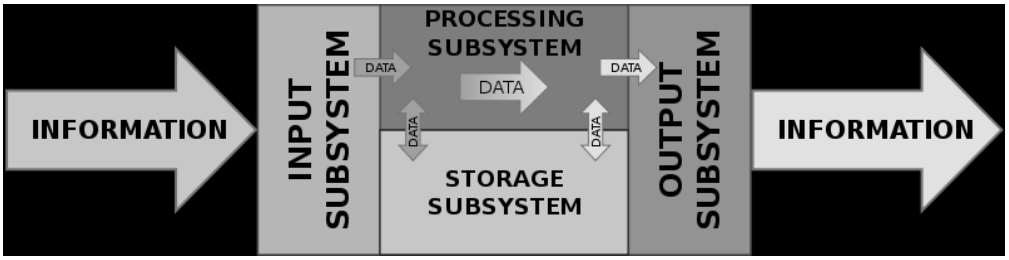


Fig. 3.2: Data Processor

A data entry is a specialized component or form of information processing (sub) system. Its chief difference is that it tends to perform a dedicated function (i.e. its program is

not easy to change). Its dedicated function is normally to perform some (intermediate) step of converting input ('raw' or unprocessed) data, or semi-processed information, from one form into a further or final form of information. This is done through a process called decoding/encoding, formatting, re-formatting, translation or data conversion before the information can be output from the data processor to a further step in the information processing system.

For the hardware data processing system, this information may be used to change the sequential states of a (hardware) machine called a computer. In all essential aspects, the hardware data processing unit is indistinguishable from a computer's central processing unit (CPU), i.e. the hardware data processing unit is just a dedicated computer. However, the hardware data processing unit is normally dedicated to the specific computer application of format translation.

A software code compiler (e.g. for FORTRAN or Algol) is an example of a software data processing system. The software data processing system makes use of a (general-purpose) computer, in order to complete its functions. A software data processing system is normally a stand-alone unit of software, in that its output can be directed to any number of other (not necessarily as yet identified) information processing (sub) systems.

Study Notes

Assessment

What us a Data Processor and Data Processing?

	**Discussion**
Discuss what is software code compiler.	

3.3 Computer Software System

Computer software, or just **software**, is the collection of computer programs and related data that provide the instructions telling a computer what to do. The term was coined to contrast the old term hardware (meaning physical devices). In contrast to hardware, software is intangible, meaning it "cannot be touched". Software is also sometimes used in a more narrow sense, to include application software only. Sometimes the term includes data that has traditionally not been associated with computers, such as film, presses and records.

The various types of Computer Software are discussed below:

SYSTEM SOFTWARE

System software is the program that controls computer hardware. It also maintains computer operation efficiently. The main components of system software are the operating system, network operating system and utility.

System software is computer software designed to operate the computer hardware and to provide and maintain a platform for running application software.

The most basic types of system software are:

- The computer BIOS and device firmware, which provides basic functionality to operate and control the hardware connected to or built into the computer.
- The operating system (prominent examples being Microsoft Windows, Mac OS X and Linux), which allows the parts of a computer to work together by performing tasks like transferring data between memory and disks or rendering output onto a display device. It also provides a platform to run high-level system software and application software.
- Utility software, which helps to analyze, configure, optimize and maintain the computer.

APPLICATION SOFTWARE

Application software, is computer software designed to help the user to perform singular or multiple related specific tasks. Examples include enterprise software, accounting software, office suites, graphics software, and media players.

Application software is contrasted with system software and middleware, which manage and integrate a computer's capabilities, but typically there is no direct application of them in the performance of tasks that benefit the user.

We have seen that the application software tells the computer how to accomplish specific tasks such as word processing or creating drawings for the user. Some of the categories of application software include:

- Word Processing Software
- Spreadsheets
- Database Management Software
- Presentation Programs
- Graphics Programs
- Multimedia Authoring Applications
- Entertainment and Education software
- Web design tools and Web browsers
- Games

PROGRAMMING SOFTWARE

Programming software usually provides tools to assist a programmer in writing computer programs and software using different programming languages in a more convenient way. The tools include:

- Compilers
- Debuggers
- Interpreters
- Linkers
- Text editors

An Integrated Development Environment (IDE) is a single application that attempts to manage all these functions.

Different programming languages support different styles of programming (called programming paradigms). The choice of language used is subject to many considerations such as company policy, suitability to task, availability of third-party packages or individual preference. Ideally, the programming language best suited for the immediate task will be selected. Trade-offs from this ideal involve finding enough programmers, who know the language to build a team, the availability of compilers for that language and the efficiency with which programs written in a given language execute.

Many computer languages provide a mechanism to call functions provided by libraries. Provided the functions in a library follow the appropriate run time conventions (e.g. method of passing arguments), then these functions may be written in any other language.

Study Notes

Assessment

What are Programming Languages. Give few examples.

Discussion

Differentiate between System Software, Application Software and Programming Software.

3.4 Software Development Process

A software development process is a structure imposed on the development of a software product. Similar terms include software life cycle and *software process*. There are several models for such processes; each describing approaches to a variety of tasks or activities in the process.

OVERVIEW

The large and growing body of software development organisations implements process methodologies. The international standard for describing the method of selecting, implementing and monitoring the life cycle for software is ISO 12207.

A decades-long goal has been to find repeatable, predictable processes that improve productivity and quality. Some try to systematize or formalize the seemingly unruly task of writing software. Others apply project management techniques for writing software. Without project management, software projects can easily be delivered late or over budget. With large numbers of software projects not meeting their expectations in terms of functionality, cost or delivery schedule, effective project management appears to be lacking.

Organisations may create a Software Engineering Process Group (SEPG), which is the focal point for process improvement. Composed of line practitioners who have varied skills, the group is at the centre of the collaborative effort of everyone in the organisation involved with the improvement of the software engineering process.

PLANNING

An important task in creating a software product is extracting the requirements or requirements analysis. Customers typically have an abstract idea of what they want as a result, but not of what the software should do. Frequently demonstrating the live code may help reduce the risk of incorrect requirements.

Once the general requirements are gathered from the client, an analysis of the scope of the development should be determined and clearly stated. This is often called a scope document.

IMPLEMENTATION, TESTING AND DOCUMENTING

Implementation is the part of the process where software engineers actually program the code for the project.

Software testing is an important part of the process. It ensures that defects are recognised as early as possible.

Documenting the internal design of software for the purpose of future maintenance and enhancement is done throughout development. This may also include the writing of an API, be it external or internal. It is very important to document everything in the project.

DEPLOYMENT AND MAINTENANCE

Deployment starts after the code is appropriately tested, approved for release and sold or otherwise distributed into a production environment.

Software Training and Support is an important stage for people venturing into an unfamiliar area and may be required to learn the new software.

Maintaining and enhancing software to cope with newly discovered problems or new requirements can take far more time than the initial development of the software. It may be necessary to add a code that does not fit the original design, in order to correct an unforeseen problem. It may also be that a customer is requesting more functionality and a code can be added to accommodate his requests. If the labour cost of the maintenance phase exceeds 25% of the prior-phases' labour cost, then it is likely that the overall quality of at least one prior phase is poor In that case, management should consider the option of rebuilding the system (or portions) before maintenance cost goes out of control.

Bug Tracking System tools are often deployed at this stage of the process to allow development teams to interface with customer/field teams testing the software, to identify any real or perceived issues. These software tools, both open source and commercially licensed, provide a customizable process to acquire, review, acknowledge and respond to reported issues.

3.4.1 SOFTWARE DEVELOPMENT MODELS

Several models exist to streamline the development process. Sometimes a combination of the models may be more suitable.

WATERFALL MODEL

The waterfall model shows a process where developers follow the steps in this order:

- Requirements specification (Requirements analysis)
- Software design
- Implementation (or Coding)
- Integration
- Testing (or Validation)

- Deployment (or Installation)
- Maintenance

In a Waterfall model, after each phase is finished, it proceeds to the next one. Reviews may occur before moving to the next phase, allowing the possibility of changes. Reviews may also be employed to ensure that the phase is indeed complete; the phase completion criteria are often referred to as a "gate" that the project must pass through to move to the next phase. Waterfall discourages revisiting and revising any prior phase once it is complete. This "inflexibility" in a pure Waterfall model has been a source of criticism by other more "flexible" models.

SPIRAL MODEL

The key characteristic of a Spiral model is risk management at regular stages in the development cycle. In 1988, Barry Boehm published a formal software system development "spiral model". It combines some key aspects of the waterfall model and rapid prototyping methodologies, but provides emphasis in a key area: deliberate iterative risk analysis. The Spiral is visualised as a process passing through a number of iterations, with the four quadrant diagrams representative of the following activities:

- Formulate plans to: identify software targets selected to implement the program and clarify project development restrictions
- Risk analysis: an analytical assessment of selected programs to consider how to identify and eliminate risk
- Implementation of the project: the implementation of software development and verification

The spiral model has some restrictive conditions as given below:

- Spiral model emphasizes risk analysis and is often adapted to large-scale internal software development.
- If the implementation of risk analysis greatly affects the profits of the project, then risk analysis is meaningless; therefore, spiral model is suitable for large-scale software projects.
- Good software developers should look for possible risks and accurately analyse the risk, otherwise it may lead to greater risk.

The first stage is to determine the goal of accomplishing these objectives, options and constraints and then from the perspective of risk analysis program, development strategy one must strive to remove all potential risks. If some risk cannot be ruled out, the program must end immediately, or else start the development of the next steps. The next stage is the evaluation results and the design of the next phase.

	**Study Notes**

	**Assessment**

Explain the following Software Development Models in detail:

a. Waterfall Model

b. Spiral Model

	**Discussion**

Discuss Software Development Process.

3.5 Data File Types

Data Files: A data file is used to store data records. These data files are well-defined data structures that contain related data organized in convenient groupings (records) of data items. Each data file has two additional types of records: Header record and trailer record. Header records contain file identification information and keep different groups of records in a file. Trailer records contain codes to mark the end of a set of data records. They also record file usage information.

CATEGORIES OF DATA FILES

Categories of data files: Depending upon the nature of data, data files can be categorized as:

- Master file
- Transaction file
- Work file
- Audit file
- Backup file

Program files: Program files are used to store programs in different languages provided by different software vendors. These files have different extensions depending on the language used to write a program, e.g. a program file in 'C' Language has extension .c while a program file in C++ has extension .cpp.

Object code files: These files store compiled programs written in a language. These files contain the machine code, e.g. after compilation, C compiler creates a file having extension .obj.

Executable Files: These files store ready to execute programs. These files may have the extension .exe, .com or .bat. These programs can be directly executed from the command Prompt.

Unformatted Text Files: These files are simple files containing simple text. Text files can be created using any text editor or line editor, e.g. text files can be created using MS-DOS Edit editor or Notepad editor provided by MS-Windows.

Formatted Text Files: These files contain formatted text. They also contain some commands and symbols to format the text. These files can be created using any word processor, e.g. MS-WORD creates a formatted text file having extension .doc.

	**Study Notes**

	**Assessment**
1. What are Data Files? 2. What are the categories of data files?	

	**Discussion**
Differentiate between: Unformatted Text Files and Formatted Text Files	

3.6 Master and Transaction File

MASTER FILE

This is a collection of records pertaining to one of the main subjects of an information system such as customers, employees, products and vendors. Master files contain descriptive data such as name and address, as well as summary information such as amount due and year-to-date sales.

Following are the kinds of fields that make up a typical master record in a business information system. There can be many more fields depending on the organisation. The "key" fields below are the ones that are generally indexed for matching against the

transaction records as well as fast retrieval for queries. The account number is usually the primary key, but name may also be primary. There can be secondary indexes; for example, in an inverted file structure, almost all the fields could be indexed.

Employee Master Record

Key: Employee account number

Key: Name (last)

Name (first)

Address, city, state, zip

Hire date

Birth date

Title

Job class

Pay rate

Year-to-date gross pay

Customer Master Record

Key: Customer account number

Key: Name

Bill-to address, city, state, zip

Ship-to address, city, state, zip

Credit limit

Date of first order

Sales-to-date

Balance due

Vendor Master Record

Key: Vendor account number

Key: Name

Address, city, state, zip

Terms

Quality rating

Shipping method

Product Master Record

Key: Product number

Key: Name

Description

Quantity on hand

Location

Primary vendor

Secondary vendor

TRANSACTION FILE

This is a collection of transaction records. The data in transaction files is used to update the master files that contain data about the subjects of the organisation (customers, employees, vendors, etc.). Transaction files also serve as audit trails and history for the organisation. They are often kept online.

Following are the kinds of fields that make up a distinctive transaction record in a business information system. There can be many more fields depending on the organisation. The "key" fields below are the ones that are generally indexed for fast matching against the master record. The account number is usually the primary key; however, name may also be used as a primary key.

Employee Payroll Record

Key: Employee account number

Today's date

Hours worked

Order Record

Key: Customer account number

Today's date

Quantity

Product number

Payment Record

Key: Customer number

Today's date

Invoice number

Amount paid

Check number

Purchase Order

Key: Purchase order number

Today's date

Department

Authorizing agent

Vendor account number

Quantity

Product number

Due date

Total cost

Warehouse Receipt

Key: Purchase order number

Key: Invoice number

Today's date

Quantity

Product number

	**Study Notes**

	**Assessment**
1. What is master file? 2. What is Transaction file?	

	**Discussion**
What is the difference between Master File and Transaction File?	

3.7 Relevance of Database Management System

Database is a software program used to store, delete, update and retrieve data. A database can be limited to a single desktop computer or can be stored in large server machines such as the IBM Mainframe. There are various database management systems available in the market. Some of them are Sybase, Microsoft SQL Server, Oracle RDBMS, PostgreSQL, MySQL, etc.

The advantages of the database management systems can be enumerated as under:

WAREHOUSE OF INFORMATION

The database management systems are warehouses of information, where large amount of data can be stored. The common examples in commercial applications are inventory data, personnel data, etc. Examples for these would be the address book of a cell phone, digital diaries, etc. Both these equipments store data in their internal database.

DEFINING ATTRIBUTES

The unique data field in a table is assigned a primary key. The primary key helps in the identification of data. It also checks for duplicates within the same table, thereby reducing data redundancy. There are tables, which have a secondary key, in addition to the primary key. The secondary key is also called 'foreign key'. The secondary key refers to the primary key of another table, thus establishing a relationship between the two tables.

SYSTEMATIC STORAGE

The data is stored in the form of tables. The tables consist of rows and columns. The primary and secondary keys help to eliminate data redundancy, thus enabling systematic storage of data.

CHANGES TO SCHEMA

The table schema can be changed and it is not platform dependent. Therefore, the tables in the system can be edited to add new columns and rows without hampering the applications that depend on that particular database.

NO LANGUAGE DEPENDENCE

The database management systems are not language dependent. Therefore, they can be used with various languages and on various platforms.

JOINING/ MERGING TABLES

The data in two or more tables can be integrated into a single table. This enables to reduce the size of the database and helps in easy retrieval of data.

MULTIPLE SIMULTANEOUS USAGE

The database can be used simultaneously by a number of users. Various users can retrieve the same data simultaneously. The data in the database can also be modified, based on the privileges assigned to users.

DATA SECURITY

Data is the most important asset. Therefore, there is a need for data security. Database management systems helps to keep the data secured.

PRIVILEGES

Different privileges can be given to different users. Some users, for example, can edit the database, but are not allowed to delete the contents of the database.

ABSTRACT VIEW OF DATA AND EASY RETRIEVAL

DBMS enables easy and convenient retrieval of data. A database user can view only the abstract form of data; the complexities of the internal structure of the database are hidden from him. The data retrieved exists in a user-friendly format.

DATA CONSISTENCY

Data consistency ensures a consistent view of data to every user. It includes the accuracy, validity and integrity of related data. The data in the database must satisfy certain consistency constraints, for example, the age of a candidate appearing for an exam should be of number data type and in the range of 20-25. When the database is updated, these constraints are checked by the database systems.

The commonly used database management system is called relational database management system (RDBMS). The most important advantage of database management systems is the systematic storage of data, by maintaining the relationship between the data members. The data is stored as tuples in a RDBMS.

The advent of object-oriented programming gave rise to the concept of object oriented database management systems. These systems combine properties like inheritance, encapsulation, polymorphism, abstraction with atomicity, consistency, isolation and durability, also called ACID properties of DBMS.

	**Study Notes**

	**Assessment**

What are the advantages of the database management systems?

	**Discussion**
"Database management systems have brought about systematization in data storage, along with data security". Discuss.	

3.8 Summary

DATA PROCESSING

The processing is typically supposed to be automatic and running on a computer. As data are most helpful when presented systematically and in fact educational, data-processing structures are frequently called as information systems to highlight their practicality. Nonetheless, both terms mean the same, executing alike conversions; data-processing systems characteristically maneuver raw data into information and similarly information systems characteristically use raw data as input to generate information as output.

For the hardware data processing system, this information may be used to change the sequential states of a (hardware) machine called a computer. In all essential aspects, the hardware data processing unit is indistinguishable from a computer's central processing unit (CPU), i.e. the hardware data processing unit is just a computer. However, the hardware data processing unit is normally dedicated to the specific computer application of format translation.

COMPUTER SOFTWARE SYSTEM

Computer software, or just software, is the collection of computer programs and related data that provide the instructions telling a computer what to do.

SYSTEM SOFTWARE

System software is the program that controls computer hardware. It also maintains computer operation efficiency. The main components of system software are operating system, network operating system and utility.

APPLICATION SOFTWARE

The application software tells the computer how to accomplish specific tasks such as word processing or creating drawings for the user.

PROGRAMMING SOFTWARE

Programming software provides tools to assist a programmer in writing computer programs, and software using different programming languages in a more convenient way.

PROGRAMMING LANGUAGES

Different programming languages support different styles of programming (called programming paradigms). The choice of language used is subject to many considerations, such as company policy, suitability to task, availability of third-party packages or individual preference.

SOFTWARE DEVELOPMENT PROCESS

A software development process is a structure imposed on the development of a software product. Similar terms include software life cycle and *software process*.

OVERVIEW

The international standard for describing the method of selecting, implementing and monitoring the life cycle for software is ISO 12207.

PLANNING

An important task in creating a software product is extracting the requirements or requirements analysis. Once the general requirements are gathered from the client, an analysis of the scope of the development should be determined and clearly stated. This is often called a scope document.

IMPLEMENTATION, TESTING AND DOCUMENTING

Implementation is the part of the process where software engineers actually program the code for the project.

Software testing is an important part of the process. It ensures that defects are recognised as early as possible.

Documenting the internal design of software for the purpose of future maintenance and enhancement is done throughout development. This may also include the writing of an API, be it external or internal. It is very important to document everything in the project.

DEPLOYMENT AND MAINTENANCE

Deployment starts after the code is appropriately tested, approved for release and sold or otherwise distributed into a production environment. Maintaining and enhancing software to cope with newly discovered problems or new requirements can take far more time than the initial development of the software.

SOFTWARE DEVELOPMENT MODELS

Several models exist to streamline the development process.

WATERFALL MODEL

The waterfall model shows a process where developers follow the steps in this order:

- Requirements specification (Requirements analysis)
- Software design
- Implementation (or Coding)
- Integration
- Testing (or Validation)
- Deployment (or Installation)
- Maintenance

SPIRAL MODEL

- Formulate plans to: identify software targets selected to implement the program and clarify project development restrictions
- Risk analysis: an analytical assessment of selected programs to consider how to identify and eliminate risk
- Implementation of the project: the implementation of software development and verification

DATA FILE TYPES

A data file is used to store the data records. These data files are well-defined data structures that contain related data organized in convenient groupings (records) of data

items. Each data file has two additional types of records: Header record and trailer record. Header records contain file identification information and keep separate groups of records in a file. Trailer records contain codes to mark the end of a set of data records. They also record file usage information

MASTER FILE

This is a collection of records pertaining to one of the main subjects of an information system, such as customers, employees, products and vendors. Master files contain descriptive data, such as name and address, as well as summary information, such as amount due and year-to-date sales.

TRANSACTION FILE

This is a collection of transaction records. The data in transaction files is used to update the master files, which contain the data about the subjects of the organisation (customers, employees, vendors, etc.). Transaction files also serve as audit trails and history for the organisation. Where earlier they were transferred to offline storage after some period, they are increasingly being kept online for routine analyses.

RELEVANCE OF DATABASE MANAGEMENT SYSTEM

Database is a software program used to store, delete, update and retrieve data. There are various database management systems available in the market. Some of them are Sybase, Microsoft SQL Server, Oracle RDBMS, PostgreSQL, MySQL, etc.

The advantages of the database management systems can be enumerated as under:

Warehouse of Information: The database management systems are warehouses of information, where large amount of data can be stored. The common examples in commercial applications are inventory data, personnel data, etc.

- Defining Attributes
- Systematic Storage
- Changes to Schema
- No Language Dependence
- Table Joins
- Multiple Simultaneous Usage
- Data Security

- Privileges: Different privileges can be given to different users. Some users, for example, can edit the database, but are not allowed to delete the contents of the database.
- Abstract View of Data and Easy Retrieval
- Data Consistency

3.9 Self-Assessment Test

Board Questions

1. Explain software development process in detail.
2. Explain how Data base Management system forms the backbone of any software application.

Short Notes

a. Master and transaction File

b. System software

c. Data Files

d. Functions of network operating system

e. Software development models

3.10 Further Reading

1. Automating Managers: The Implications of Information Technology for Managers, John, Moss Jones, London, Printer, 1990
2. Computers, Concepts and Uses 2nd ed., Summer M., Englewood Cliffs, New Jersey, Prentice Hall Inc, 1988
3. Foundations of Business Systems, David Van Over, Fort Worth, Dryden 1992
4. Information systems: Theory and practice 5th ed., Burch, John And Grudniski Gary, New York., John Wiley, 1989
5. Online Business Computer Applications 2nd Ed, Eliason A. L.,. Chicago Science Research Associates, 1987

Assignment

Explain in detail the different types of software system, their relevance and meaning of database.

Unit 4 Basics of Data Processing

Learning Outcome

After reading this unit, you will be able to:

- Explain the basics of data processing
- Enlist the elements of data processing
- Work on an overview of data hierarchy and data file structure
- Apply portfolio development
- Define the concept of micro database manager

Time Required to Complete the unit

1. 1st Reading: It will need 3 Hrs for reading a unit
2. 2nd Reading with understanding: It will need 4 Hrs for reading and understanding a unit
3. Self Assessment: It will need 3 Hrs for reading and understanding a unit
4. Assignment: It will need 2 Hrs for completing an assignment
5. Revision and Further Reading: It is a continuous process

Content Map

4.1 Introduction

Elements of Data processing, the way data is analysed and the details and intricacies of it is explained in this unit. The way the data is managed, the data hierarchy has also been mentioned for the students to understand the concepts in detail. Different types of file format and file structure are also explained in this unit. A brief idea and introduction of application portfolio management is also given. In short, the student would have a fair idea of the hierarchy and structure of data.

4.2 Basics of Data Processing

Data processing means any process that uses a computer program to enter data and summarise, analyse or otherwise convert data into usable information. The process may be automated and run on a computer. It involves recording, analysing, sorting, summarising, calculating, disseminating and storing data. Because data is most useful when well presented and actually informative, data-processing systems are often referred to as information systems.

Nevertheless, data-processing systems typically manipulate raw data into information, and likewise information systems typically take raw data as input to produce information as output.

Data processing may or may not be distinguished from data conversion, when the process is merely to convert data to another format and does not involve any data manipulation.

4.2.1 DATA ANALYSIS

When the domain from which the data is harvested is a science or an engineering field, data processing and information systems are considered terms that are too broad and the more specialized term data analysis is typically used. This is a focus on the highly specialised and highly accurate algorithmic derivations and statistical calculations that are less often observed in the typical general business environment.

In these contexts data analysis packages like DAP, gretl or PSPP are often used. This divergence of culture is exhibited in the typical numerical representations used in data processing versus numerical; data processing's measurements are naturally represented by integers or by fixed-point or binary-coded decimal representations of numbers, whereas the majority of data analysis measurements are often represented by floating-point representation of rational numbers.

4.2.2 PROCESSING

Practically all naturally occurring processes can be viewed as examples of data processing systems where "observable" information in the form of pressure, light, etc. are converted by human observers into electrical signals in the nervous system. We recognise these senses as touch, sound, and vision. Even the interaction of non-living systems may be viewed in this way as rudimentary information processing systems.

4.2.3 ELEMENTS OF DATA PROCESSING

In order to be processed by a computer, data needs to first be converted into a machine-readable format. Once data is in digital format, various procedures can be applied on the data to get useful information. Data processing may involve various processes, including:

- Data acquisition
- Data entry
- Data cleaning
- Data coding
- Data transformation
- Data translation
- Data summarization
- Data aggregation
- Data validation
- Data tabulation
- Statistical analysis
- Computer graphics
- Data warehousing
- Data mining
- Data fusion

	**Study Notes**

	**Assessment**
What do you understand by Data Processing and Data Analysing?	

	**Discussion**
Discuss various elements of Data Processing.	

4.3 Data Hierarchy and Data File Structures

This refers to the systematic organisation of data, often in a hierarchical form. Data organisation involves fields, records, files and so on.

- A data field holds a single fact. Consider a date field, e.g. "September 19, 2004". This can be treated as a single date field (e.g. birthdate) or as three fields, namely, month, day of month and year.
- A record is a collection of related fields. An Employee record may contain a name field(s), address fields, birth date field and so on.

- A file is a collection of related records. If there are 100 employees, then each employee would have a record (e.g. called Employee Personal Details record) and the collection of 100 such records would constitute a file (in this case, called Employee Personal Details file).
- Files are integrated into a database. This is done using a Database Management System. If there are other facets of employee data that we wish to capture, then other files such as Employee Training History file and Employee Work History file could be created as well.
- In terms of data storage, data fields are made of bytes and these in turn are made up of bits.

DATA FILE STRUCTURES

This is a particular way that information is encoded for storage in a computer file.

Since a disk drive, or indeed any computer storage, can store only bits, the computer must have some way of converting information to 0s and 1s and vice-versa. There are different kinds of formats for different kinds of information. Within any format type, e.g. word processor documents, there will characteristically be several different formats.

File formats are divided into proprietary and open formats.

GENERALITY

Some file formats are designed to store only a particular type of data: the JPEG format, for example, is designed only to store static photographic images. Other file formats, however, are designed for storage of several different types of data: the GIF format supports storage of both still images and simple animations, and the QuickTime format can act as a container for many different types of multimedia. A text file is simply one that stores any text, in a format such as ASCII or UTF-8. Some file formats, such as HTML are also text files.

SPECIFICATIONS

Many file formats, including some of the most well-known file formats, often have a published specification document (often with a reference implementation) that describes exactly how the data is to be encoded, and which can be used to determine whether or not a particular program treats a particular file format correctly.

Using file formats without a publicly available specification can be costly. Learning how the format works will require either reverse engineering from a reference implementation or acquiring the specification document for a fee from the format

developers. This second approach is possible only when there *is* a specification document and typically requires the signing of a non-disclosure agreement. Both strategies require significant time, money or both. Therefore, generally, file formats with publicly available specifications are supported by a large number of programs, while non-public formats are supported by only a few programs.

IDENTIFYING THE TYPE OF A FILE

A method is required to determine the format of a particular file within the file system- an example of metadata. Different operating systems have traditionally taken different approaches to this problem, with each approach having its own advantages and disadvantages.

Of course, most modern operating systems and individual applications, need to use all of these approaches to process various files, at least to be able to read 'foreign' file formats, if not work with them completely.

FILENAME EXTENSION

One popular method in use by several operating systems, including Mac OS X, CP/M, DOS, VMS, VM/CMS and Windows, is to determine the format of a file based on the section of its name following the final period. This portion of the filename is known as the filename extension.

For example, HTML documents are identified by names that end with .html (or .htm) and GIF images by .gif. In the original FAT file system, filenames were limited to an eight-character identifier and a three-character extension, which is known as 8.3 filename. Many formats, thus, still use three-character extensions, even though modern operating systems and application programs no longer have this limitation.

One artifact of this approach is that the system can easily be tricked into treating a file as a different format simply by renaming it. An HTML file can, for instance, be easily treated as plain text by renaming it from filename.html to filename.txt. Although this strategy was useful to expert users, who could easily understand and manipulate this information, it was frequently confusing to less technical users, who might accidentally make a file unusable (or 'lose' it) by renaming it incorrectly.

This led more recent operating system shells such as Windows 95 and Mac OS X, to hide the extension when displaying lists of recognised files. This separates the user from the complete filename, preventing the accidental changing of a file type, while allowing expert users to retain the original functionality through enabling the displaying of file extensions.

A downside of hiding the extension is that it then becomes possible to have what appear to be two or more identical filenames in the same folder. This is especially true when image files are needed in more than one format for different applications.

For example, a company logo may be needed in both .tif format (for publishing) and .gif format (for web sites). With the extensions visible, these would appear as the unique filenames "CompanyLogo.tif" and "CompanyLogo.gif". With the extensions hidden, these would both appear to have the identical filename "Company Logo", making it more difficult to determine which one to select for a particular application.

A further downside is that hiding such information can become a security risk. This is because on a filename extensions-reliant system all usable files will have such an extension (for example all JPEG images will have ".jpg" or ".jpeg" at the end of their name), so seeing file extensions would be a common occurrence and users may depend on them when looking for a file's format. By having file extensions hidden, a malicious user can create an executable program with an innocent name such as "Holiday photo.jpg.exe". In this case, the ".exe" will be hidden and a user will see this file as "Holiday photo.jpg", which appears to be a JPEG image, unable to harm the machine save for bugs in the application used to view it.

However, the operating system will still see the ".exe" extension and thus will run the program, which is then able to cause harm and presents a security risk. This issue requires users with hidden extensions to be vigilant and never open files, which seem to have a known extension displayed despite the hidden option being enabled (since it must therefore have 2 extensions, the real one being unknown until hiding is disabled). This presents a practical problem for Windows systems where extension hiding is turned on by default.

INTERNAL METADATA

A second way to identify a file format is to store information regarding the format inside the file itself. Usually, such information is written in one (or more) binary string(s), tagged or raw texts placed in fixed, specific locations within the file. Since the easiest place to locate them is at the beginning of it, this area is usually called a file header when it is greater than a few bytes or a magic number if it is just a few bytes long.

FILE HEADER

First, the meta-data contained in a file header are not necessarily stored only at the beginning of it, but might be present in other areas too, often including the end of the file; that depends on the file format or the type of data it contains. Character-based (text) files have character-based human-readable headers, whereas, binary formats usually feature

binary headers, although that is not a rule: a human-readable file header may require more bytes, but is easily discernable with simple text or hexadecimal editors. File headers may not only contain the information required by algorithms to identify the file format alone, but also real metadata about the file and its contents.

For example, most image file formats store information about image size, resolution, colour space/format and optionally other authoring information like who, when and where it was made, what camera model and shooting parameters it was taken with and so on. Such metadata may be used by a program reading or interpreting the file both during the loading process and after that, but can also be used by the operating system to quickly capture information about the file itself without loading it all into memory.

The downsides of file header as a file-format identification method are at least two. First, at least a few (initial) blocks of the file need to be read, in order to gain such information; those could be fragmented in different locations of the same storage medium, thus requiring more time to find. Second, if the header is binary hard-coded (i.e. the header itself is subject to a non-trivial interpretation in order to be recognised), especially for metadata content protection's sake, there is a risk that the file format may be misinterpreted, or even badly written at the source, often resulting in corrupt metadata, which might even render the file unreadable.

A more logically sophisticated example of file header is the one used in wrapper (or container) file formats.

EXTERNAL METADATA

A final way of storing the format of a file is to explicitly store information about the format in the file system, rather than within the file itself.

This approach keeps the metadata separate from both the main data and the name, but it is also less portable than either file extensions or "magic numbers", since the format has to be converted from filesystem to filesystem.

Zip files or archive files solve the problem of handling metadata. A utility program collects multiple files together along with metadata about each file and the folders/directories they came from all within one new file (e.g. a zip file with extension .zip). The new file is also compressed and possibly encrypted, but now is transmissible as a single file across operating systems by FTP systems or attached to email. At the destination, it must be unzipped by a compatible utility to be useful, but the problems of transmission are solved this way.

MAC OS TYPE-CODES

The Mac OS' Hierarchical File System stores codes for *creator* and *type* as part of the directory entry for each file. These codes are referred to as OS Types, and for instance a HyperCard "stack" file has a *creator* of WILD (from HyperCard's previous name, "Wildcard") and a *type* of STAK. The type code specifies the format of the file, while the creator code specifies the default program to open it with when double-clicked by the user. For example, the user could have several text files all with the type code of TEXT, but each one may open in a different program, due to having differing creator codes. RISC OS uses a similar system, consisting of a 12-bit number, which can be looked up in a table of descriptions- e.g. the hexadecimal number FF5 is "aliased" to PoScript, representing a PostScript file.

MAC OS X UNIFORM TYPE IDENTIFIERS (UTIS)

A Uniform Type Identifier (UTI) is a method used in Mac OS X for uniquely identifying "typed" classes of entity such as file formats. It was developed by Apple as a replacement for OSType (type & creator codes).

The UTI is a Core Foundation string, which uses a reverse-DNS string. Common or standard types use the public domain (e.g. www.public.png for a Portable Network Graphics image), while other domains can be used for third-party types (e.g. www.adobe.pdf for Portable Document Format). UTIs can be defined within a hierarchical structure, known as a conformance hierarchy. Thus, public.png conforms to a super type of public image, which itself conforms to a super type of public data. A UTI can exist in multiple hierarchies, which provides great flexibility.

In addition to file formats, UTIs can also be used for other entities, which can exist in OS X, including:

- Pasteboard data
- Folders (directories)
- Translatable types (as handled by the Translation Manager)
- Bundles
- Frameworks
- Streaming data
- Aliases and symlinks

OS/2 Extended Attributes

The HPFS, FAT12 and FAT16 (but not FAT32) file systems allow the storage of "extended attributes" with files. These comprise an arbitrary set of triplets with a name, a coded type for the value and a value, where the names are unique and values can be up to 64 KB long. There are standardized meanings for certain types and names (under OS/2). One such type is that the ".TYPE" extended attribute is used to determine the file type. Its value comprises a list of one or more file types associated with the file, each of which is a string, such as "Plain Text" or "HTML document". Thus a file may have several types.

The NTFS file system also allows the storage of OS/2 extended attributes, as one of file *forks*, but this feature is merely present to support the OS/2 subsystem (not present in XP), so the Win32 subsystem treats this information as an opaque block of data and does not use it. Instead, it relies on other file forks to store meta-information in Win32-specific formats. OS/2 extended attributes can still be read and written by Win32 programs, but the data must be entirely parsed by applications.

POSIX extended attributes

On Unix and Unix-like systems, the ext2, ext3, ReiserFS version 3, XFS, JFS, FFS, and HFS+ file systems allow the storage of extended attributes with files. These include an arbitrary list of "name=value" strings, where the names are unique, which can be accessed by their "name" parts.

PRONOM Unique Identifiers (PUIDs)

The PRONOM Persistent Unique Identifier (PUID) is an extensible scheme of persistent, unique and unambiguous identifiers for file formats, which has been developed by The National Archives of the UK as part of its PRONOM technical registry service. PUIDs can be expressed as Uniform Resource Identifiers using the info:pronom/namespace.

MIME types

MIME types are widely used in many Internet-related applications. These consist of a standardised system of identifiers (managed by IANA) consisting of a *type* and a *sub-type*, separated by a slash — for instance, text/html or image/gif. MIME types identify files on BeOS, AmigaOS 4.0 and MorphOS, as well as store unique application signatures for application launching. In AmigaOS and MorphOS the Mime type system works in parallel with Amiga specific Data type system.

There are problems with the MIME types as several organisations and people have created their own MIME types without registering them properly with IANA, which makes the use of this standard awkward in some cases.

FILE FORMAT IDENTIFIERS (FFIDS)

File format identifiers is another, not widely used way to identify file formats according to their origin and their file category. It was created for the Description Explorer suite of software. It is composed of several digits of the form NNNNNNNNN-XX-YYYYYYY. The first part indicates the organisation origin/maintainer; this number represents a value in a company/standards organisation database. The next two digits categorize the type of file in hexadecimal. The final part is composed of the usual file extension of the file or the international standard number of the file, padded left with zeros. For example, the PNG file specification has the FFID of 000000001-31-0015948 where 31 indicates an image file, 0015948 is the standard number and 000000001 indicates the ISO Organisation.

FILE CONTENT BASED FORMAT IDENTIFICATION

Another but least popular way to identify the file format is to look at the file contents for distinguishable patterns among file types. As we know, the file contents are a sequence of bytes and a byte has 256 unique patterns (0~255). Thus, counting the occurrence of byte patterns it is often referred to as byte frequency distribution. There are many content-based file-type-identification schemes that use byte frequency distribution to build the representative models for file type and use any statistical and data mining techniques to identify file types

4.3.1 FILE STRUCTURE

There are several types of ways to structure data in a file. The most popular ones are described below:

UNSTRUCTURED FORMATS (RAW MEMORY DUMPS)

Earlier file formats used raw data formats that consisted of directly dumping the memory images of one or more structures into the file.

This has several drawbacks. Unless the memory images also have reserved space for future extensions, extending and improving this type of structured file is very difficult. It also creates files that might be specific to one platform or programming language (for example, a structure containing a Pascal string is not recognized as such in C). On the other hand, developing tools for reading and writing these types of files is very simple.

The limitations of the unstructured formats led to the development of other types of file formats that could be easily extended and compatible at the same time.

CHUNK BASED FORMATS

Electronic Arts and Commodore-Amiga pioneered this file format in 1985, with their IFF (Interchange File Format) file format. In this kind of file structure, each piece of data is embedded in a container that contains a signature identifying the data, as well as the length of the data (for binary encoded files). This type of container is called a "chunk". The signature is usually called a chunk id, chunk identifier or tag identifier.

With this type of file structure, tools that do not know certain chunk identifiers simply skip those that they do not understand.

This concept has been taken again and again by RIFF (Microsoft-IBM equivalent of IFF), PNG, JPEG storage, DER (Distinguished Encoding Rules) encoded streams and files (which were originally described in CCITT X.409:1984 and therefore predate IFF) and Structured Data Exchange Format (SDXF). Even XML can be considered a kind of chunk-based format, since each data element is surrounded by tags, which are similar to chunk identifiers.

DIRECTORY BASED FORMATS

This is another extensible format, that closely resembles a file system (OLE Documents are actual file systems), where the file is composed of 'directory entries' that contain the location of the data within the file itself as well as its signatures (and in certain cases its type). Good examples of these types of file structures are disk images, OLE documents and TIFF images.

Study Notes

	**Assessment**

1. Differentiate between:
   a. Generality And Specifications of file.
   b. Internal metadata and External metadata
2. What is file structure?
3. What is Data Hierarchy?

	**Discussion**

Discuss how can you identifying the type of a file. What are Filename extensions.

4.4 Application Portfolio Management

IT **Application Portfolio Management** (**APM**) is a practice that has emerged in medium to large size Information Technology (IT) organisations since the mid 1990s. Application Portfolio Management attempts to use the lessons of financial portfolio management to justify and measure the financial benefits of each application in comparison to the costs of the application's maintenance and operations.

PORTFOLIO

Taking ideas from investment portfolio management, practitioners of APM gather information about each of the applications used in a business or organisation, including the cost to build and maintain the application, the business value produced, the quality of the application, and the expected lifespan. Using this information, the portfolio manager is able to provide detailed reports on the performance of the IT infrastructure in relation to the cost to own and the business value delivered.

DEFINITION OF AN APPLICATION

In the field of application portfolio management, the definition of an application is a critical component. Many service providers offer services specifically tailored to helping an organisation create their own definition of an application due to the often contentious results that come from these definitions.

- **Application software-** An executable software component or tightly coupled set of executable software components (one or more), deployed together, that deliver some or all of a series of steps needed to create, update, manage, calculate or display information for a specific business purpose. In order to be counted, each component must not be a member of another application.
- **Software component**- An executable set of computer instructions contained in a single deployment container in such a way that it cannot be broken apart further. Examples include a Dynamic Link Library, an ASP web page and a command line "EXE" application. A zip file may contain zero or more software components because it is easy to break them down further (by unpacking the ZIP archive).

Software application and software component are technical terms used to describe a specific instance of the class of application software for the purposes of IT portfolio management.

THE REQUIREMENTS OF A DEFINITION

The definition of an application has the following needs in the context of Application Portfolio Management:

- It must be simple for business team members to explain, understand and apply.
- It must make sense to development, operations and project management in the IT groups.
- It must be useful as an input to a complex function whose output is the overall cost of the portfolio. In other words, there are many factors that lead to the overall cost of an IT portfolio. The sheer number of applications is one of those factors.
- It must be useful for the members of the Enterprise Architecture team who are attempting to judge a project with respect to their objectives for portfolio optimization and simplification.
- It must clearly define the boundaries of an application so that a person working on a measurable 'portfolio simplification' activity cannot simply redefine the boundaries of two existing applications in such a way as to call them a single application.

Examples

Often the definition of an application can be a difficult thing to convey clearly. The section below offers some examples of how to interpret this definition. There are examples

of things that are applications, things that are not applications and things that are a composite of two or more applications.

INCLUSIONS

By this definition, the following are applications:

- A web service endpoint that presents three web services: Invoice Create, Invoice Search and InvoiceDetailGet
- A service-oriented business application (SOBA) that presents a user interface for creating invoices, and that turns around and calls the Invoice Create service. (The service itself is a different application).
- A legacy system composed of a rich client, a server-based middle tier and a database, all of which are tightly coupled (e.g. changes in one are very likely to trigger changes in another)
- A website publishing system that pulls data from a database and publishes it to an HTML format as a sub-site on a public URL
- A database that presents data to a Microsoft Excel workbook that queries the information for layout and calculations. An Excel spreadsheet that contains a coherent set of reusable macros that deliver business value. The spreadsheet itself constitutes a deployment container for the application (like a TAR or CAB file).
- A set of ASP or PHP web pages that work in conjunction with one another to deliver the experience and logic of a web application. It is entirely possible that a sub-site would qualify as a separate application under this definition if the coupling is loose.
- A web service end point that no one uses, but that can be rationally understood to represent one or more useful steps in a business process.

EXCLUSIONS

The following are not applications:

- An HTML website
- A database that contains data but is not part of any series of steps to deliver business value using that data
- A web service that is structurally incapable of being part of a set of steps that provide value. For example, a web service, which will only accept data that breaks the schema.

- A stand-alone batch script that compares the contents of two databases by making calls to each and then sends an e-mail to a monitoring alias if data anomalies are noticed

COMPOSITES

The following are many applications:

- A composite SOA application composed of a set of reusable services and a user interface that leverages those services. There are at least two applications here (the user interface and one or more service components). Note that each service is not counted as an application.
- A legacy client-server app that writes to a database to store data, and an excel spreadsheet that uses macros to read data from the database to present a report. There are two apps in this example. The database clearly belongs to the legacy app in that was developed with it, delivered with it and is tightly coupled to it. This is true even if the legacy system uses the same stored procedures as the Excel spreadsheet.

Study Notes

Assessment

1. Define application.
2. What are the exclusions of an application?

	**Discussion**
Discuss what are composites?	

4.5 Introduction to Micro DataBase Manager

Micro DB Manager is a database abstraction class written in PHP using object-oriented technologies.

The class realizes the following functionalities:

- Connecting to the database
- Executing queries
- Converting results to associative array
- Getting selected rows
- Getting affected rows
- Getting last insert id
- Getting the number of executed queries
- Getting the execution time of the queries
- Getting error messages and codes

	**Study Notes**

	**Assessment**
What is Micro Data Base Manager?	

	**Discussion**
Discuss functions of Micro Data Base Manager.	

4.6 Summary

BASICS OF DATA PROCESSING

Data processing means any process that uses a computer program to enter data and summarise, analyse or otherwise convert data into usable information. The process may be automated and run on a computer. It involves recording, analysing, sorting, summarising, calculating, disseminating and storing data.

DATA ANALYSIS

This is a focus on the highly specialized and highly accurate algorithmic derivations and statistical calculations that are less often observed in the typical general business environment. In these contexts data analysis packages like DAP, gretl or PSPP are often used.

PROCESSING

Practically all naturally occurring processes can be viewed as examples of data processing systems where "observable" information in the form of pressure, light, etc. are converted by human observers into electrical signals in the nervous system as the senses we recognize as touch, sound, and vision.

ELEMENTS OF DATA PROCESSING

Once data is in digital format, various procedures can be applied on the data to get useful information. Data processing may involve various processes, including:

- Data acquisition
- Data entry

- Data cleaning
- Data coding
- Data transformation
- Data translation
- Data summarization
- Data aggregation
- Data validation
- Data tabulation
- Statistical analysis
- Computer graphics
- Data warehousing
- Data mining
- Data fusion

DATA HIERARCHY AND DATA FILE STRUCTURES

This refers to the systematic organisation of data, often in a hierarchical form. Data organisation involves fields, records, files and so on.

DATA FILE STRUCTURES

This is a particular way that information is encoded for storage in a computer file. File formats are divided into proprietary and open formats.

GENERALITY

Some file formats are designed to store only a particular type of data: the JPEG format, for example, is designed only to store static photographic images.

SPECIFICATIONS

Many file formats, including some of the most well-known file formats, often have a published specification document (often with a reference implementation) that describes exactly how the data is to be encoded, and which can be used to determine whether or not a particular program treats a particular file format correctly.

IDENTIFYING THE TYPE OF A FILE

A method is required to determine the format of a particular file within the file system- an example of metadata.

FILENAME EXTENSION

Many formats still use three-character extensions, even though modern operating systems and application programs no longer have this limitation. For example, HTML documents are identified by names that end with .html (or htm) and GIF images by .gif. In the original FAT file system, filenames were limited to an eight-character identifier and a three-character extension, which is known as 8.3 filename.

INTERNAL METADATA

A second way to identify a file format is to store information regarding the format inside the file itself.

FILE HEADER

First, the meta-data contained in a file header are not necessarily stored only at the beginning of it, but might be present in other areas too, often including the end of the file; that depends on the file format or the type of data it contains.

MAGIC NUMBER

The magic number approach offers better guarantees that the format will be identified correctly. It can often determine more precise information about the file.

FILE FORMAT IDENTIFIERS (FFIDS)

It was created for the Description Explorer suite of software. It is composed of several digits of the form NNNNNNNNN-XX-YYYYYYY. The first part indicates the organisation origin/maintainer (this number represents a value in a company/standards organisation database), the next two digits categorize the type of file in hexadecimal. The final part is composed of the usual file extension of the file or the international standard number of the file, padded left with zeros.

FILE CONTENT BASED FORMAT IDENTIFICATION

Counting the occurrence of byte patterns is often referred to as byte frequency distribution. There are many content-based file type identification schemes that use byte frequency distribution to build the representative models for file type and use any statistical and data mining techniques to identify file types.

FILE STRUCTURE

There are several types of ways to structure data in a file. The most popular ones are described below:

UNSTRUCTURED FORMATS (RAW MEMORY DUMPS)

Earlier file formats used raw data formats that consisted of directly dumping the memory images of one or more structures into the file. The limitations of the unstructured formats led to the development of other types of file formats that could be easily extended and compatible at the same time.

CHUNK BASED FORMATS

With this type of file structure, tools that do not know certain chunk identifiers simply skip those that they do not understand.

This concept has been taken again and again by RIFF (Microsoft-IBM equivalent of IFF), PNG, JPEG storage, DER (Distinguished Encoding Rules) encoded streams and files (which were originally described in CCITT X.409:1984 and therefore predate IFF) and Structured Data Exchange Format (SDXF).

DIRECTORY BASED FORMATS

This is another extensible format, that closely resembles a file system (OLE Documents are actual file systems), where the file is composed of 'directory entries' that contain the location of the data within the file itself as well as its signatures (and in certain cases its type).

APPLICATION PORTFOLIO MANAGEMENT

Application Portfolio Management attempts to use the lessons of financial portfolio management to justify and measure the financial benefits of each application in comparison to the costs of the application's maintenance and operations.

PORTFOLIO

Taking ideas from investment portfolio management, practitioners of APM gather information about each of the applications used in a business or organisation, including the cost to build and maintain the application, the business value produced, the quality of the application, and the expected lifespan.

THE REQUIREMENTS OF A DEFINITION

The definition of an application has the following needs in the context of Application Portfolio Management:

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INTRODUCTION TO MICRO DATA BASE MANAGER

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The class realizes the following functionalities:

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- Getting last insert id
- Getting the number of executed queries
- Getting the execution time of the queries
- Getting error messages and codes

4.7 Self-Assessment Test

Broad Questions

1. Elaborate the data hierarchy structure in detail.
2. Explain several types of ways to structure data in a file

Short Notes

a. Data Processing and its elements

b. Application Portfolio Development

c. Data analysis

d. Different kinds of file formats

e. Micro data base manager

4.8 Further Reading

1. Automating Managers: The Implications of Information Technology for Managers, John, Moss Jones, London, Printer, 1990
2. Computers, Concepts and Uses 2nd ed., Summer M., Englewood Cliffs, New Jersey, Prentice Hall Inc, 1988
3. Foundations of Business Systems, David Van Over, Fort Worth, Dryden 1992
4. Information Systems: Theory and practice 5th ed., Burch, John And Grudniski Gary, New York., John Wiley, 1989
5. Online Business Computer Applications 2nd Ed, Eliason A. L.,. Chicago Science Research Associates, 1987

Assignment

Discuss the concept of application portfolio management

Unit 5 Programming Concepts

Learning Outcome

After reading this unit, you will be able to:

- Work with PowerPoint XP
- Make a basic presentation
- Explain slide views and auto shapes
- List the characteristics of LAN and WAN
- Define data communication networking

Time Required to Complete the unit

1. 1st Reading: It will need 3 Hrs for reading a unit
2. 2nd Reading with understanding: It will need 4 Hrs for reading and understanding a unit
3. Self Assessment: It will need 3 Hrs for reading and understanding a unit
4. Assignment: It will need 2 Hrs for completing an assignment
5. Revision and Further Reading: It is a continuous process

Content Map

5.1 Introduction

The main aim of this unit is the basic understanding of Microsoft PowerPoint presentation and how a presentation is made. It explains all the detailed steps of making a PowerPoint presentation. With PowerPoint, you can easily create slide shows for illustrating your presentations. This unit teaches about the usage of layouts to organize the content on each slide. PowerPoint has several slide layouts to select from. You can learn the method of creating slides, making changes to slides, applying a theme and running a slide show.

The following unit explains about the computer networking and LAN & WAN.

5.2 Use of Tiles in Programming

A program is a sequence of commands that a computer executes, in order to perform some actions; be it the calculation of the number of calories in your lunch or the path, the space shuttle will follow on its re-entry to Earth from space. The sequence of commands can be as short as just 1 command or as complex as you can imagine (millions of commands or more). It is the job of the programmer to create and test the commands that will perform some predefined task.

A programming language is a language in which you can specify the commands in a program. Just as there are innumerable ways to say "Hello" in the spoken languages of the world, there are innumerable ways to make a computer say "Hello", depending on what programming language you use. Different computer programming languages have different pros and cons to their use. Some are only available on certain operating systems (i.e. Visual Basic only works on Microsoft Windows), some are very complex (like C++ or Java), some are simple (Basic) and some are designed for specific tasks like mathematics (Fortran). It is partially up to the programmer to choose the appropriate language for his or her program.

5.2.1 Basic Programming Concepts

Statements: A statement is the simplest concept in a programming language. A statement is merely a single command to perform a single well-defined task. For example, "Stop the car", and "leave the house" are single statements describing single well-defined tasks. Note that even seemingly simple statements can often be broken down into many simpler statements. "Stop the car" could be broken down in to steps such as "Apply the brakes"", Downshift"", pull over to the curb" and "Apply the parking brake".

The number of steps you should supply and the level of detail you should use for describing their performance will be determined in part by the programming language you

use. In some languages "Stop the car" may be a single statement, on others, hundreds or thousands of statements.

Variables: Statements only get you so far without additional concepts. Variables are perhaps the most ubiquitous entity in any programming language. You can think of a variable as a box in which you can store something - a number, a date, someone's name, the price of a sweater, the number of people in your immediate family, the current speed at which your car is travelling, etc. The beauty of a variable is that you can store information in it and retrieve information from it any time you want.

Each variable "box" has a name. You refer to the different variables that you are using by their names. With variables, you can start having more interesting statements and have the computer perform mathematics.

Logic: One thing that computers do really well is obey the rules of logic. In particular, they are good at doing calculations and comparisons. For example, "5 is less than 3" is a false statement and "2 + 2 = 4" is a true statement; these are all straight-forward logical conclusions. "Yellow is a nice happy colour" is not something that can be determined logically unless you have already specified what makes a colour "nice and happy".

Performing logical operations, especially when a variable is involved, allows you to determine the truth or falsity of all kinds of things. This is known as "Boolean logic" as the result is the 2-valued truth or falsity of the statement.

Conditionals: Since we can determine if comparison is true or false, it would be nice if we could act on this information. This is where a conditional comes in. Consider the example of driving. We know that if the stoplight is red then stop the car. This uses a little logic (is the stoplight red?) for us to determine whether we should stop the car. As you can imagine, we use these types of rules all the time in everyday life without ever realizing it. They are used all the time in computer programs too.

Study Notes

	**Assessment**
Explain: a. Statements b. Variables c. Logic d. Conditionals	

	**Discussion**
Discuss the use of Tiles in Programming.	

5.3 Presentation Graphics

A type of business software that enables users to create highly stylized images for slide shows and reports. The software includes functions for creating various types of charts and graphs and for inserting text in a variety of fonts. Most systems enable you to import data from a spreadsheet application to create the charts and graphs. Presentation graphics is often called *business graphics.*

STARTING MICROSOFT POWERPOINT

The PowerPoint screen has many elements.

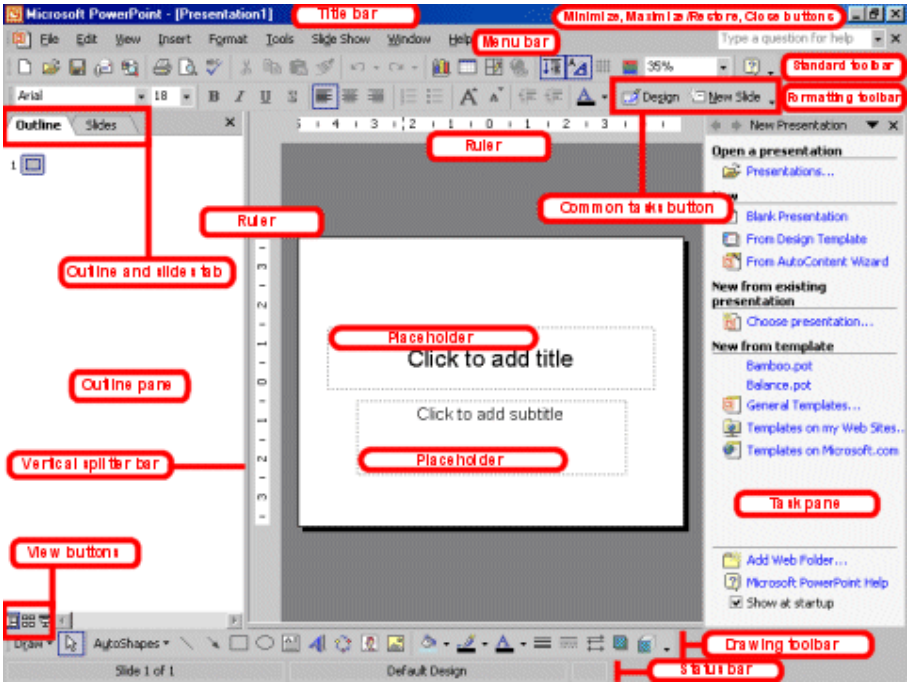


Fig. 5.1: PowerPoint screen

TITLE BAR

The Title bar generally appears at the top of the screen. The Title bar displays the title of the current presentation.

MENU BAR

The Menu bar displays the menu. You use the menu to give instructions to PowerPoint.

STANDARD AND FORMATTING TOOLBARS

PowerPoint has several toolbars. Toolbars provide shortcuts to menu commands. The most commonly used toolbars are the Standard and Formatting toolbars. You use the Standard toolbar to do such things as open a file; save a file; print a file; check spelling; cut, copy, and paste; undo and redo; or insert a chart or table. You use the Formatting toolbar to change the font, font size or font color; bold, underline, or italicize text; left align, right align, center, or justify; bullet or number lists; highlight; or decrease or increase the indent.

RULERS

Rulers are vertical and horizontal guides. You use them to determine where you want to place an object. They are marked in inches.

PLACEHOLDERS

Placeholders hold the objects in your slide. You use placeholders to hold text, clip art and charts.

STATUS BAR

The Status bar generally appears at the bottom of the screen. The Status bar displays the number of the slide that is currently displayed, the total number of slides and the name of the design template in use or the name of the background.

OUTLINE TAB

The Outline displays the text contained in your presentation.

SLIDES TAB

The Slides tab displays a thumbnail of all your slides. You click the thumbnail to view the slide in the Slide pane.

VIEW BUTTONS

The view buttons at the left bottom corner of the screen allow three slide views: Normal View**,** Slide Sorter View and Slide Show**.**

The view buttons can be useful as you prepare your presentation. They control the way slides are displayed on the screen. Click a view button to see a different view.

NORMAL VIEW

Normal view splits your screen into three major sections: Outline and Slides tabs, Slide pane and Task pane. The Outline and Slides tabs are on the left side of your screen. They enable you to shift between two different ways of viewing your slides. The Slides tab shows thumbnails of your slides. The Outline tab shows the text on your slides. The Slide pane is located in the centre of your screen. The Slide pane shows a large view of the slide on which you are currently working. The Task pane is located on the right side of your screen. The Tasks pane enables you to select the task you want to perform.

SLIDE SORTER VIEW

Slide Sorter view enables you to view thumbnails of all your slides. In Slide Sorter view you can easily add, delete or change the order of your slides. When you are in Slide

Sorter view, a special Formatting toolbar appears. It has options that allow you to make changes to your slides

SLIDE SHOW

Use the Slide Show view when you want to view your slides, as they will look in your final presentation. When in Slide Show view:

Esc	Returns you to the view you were using previously.
Left-clicking	Moves you to the next slide or animation effect When you reach the last slide, you automatically return to your last view.
Right-clicking	Opens a pop-up menu You can use this menu to navigate the slides, add speaker notes, select a pointer and mark your presentation.

DRAWING TOOLBAR

The Drawing toolbar generally appears near the bottom of the screen. It contains tools for creating and editing graphics.

COMMON TASKS BUTTONS

Using the common tasks buttons, you can select the type of tasks you want to perform.

TASK PANE

The Task pane enables you to select the specific task you want to perform. The PowerPoint XP Task Pane replaces the dialog boxes used in PowerPoint 2000. The down-pointing arrow in the top, right corner of the pane allows you to select different menus and tools. By default, the Task Pane appears when PowerPoint XP is launched.

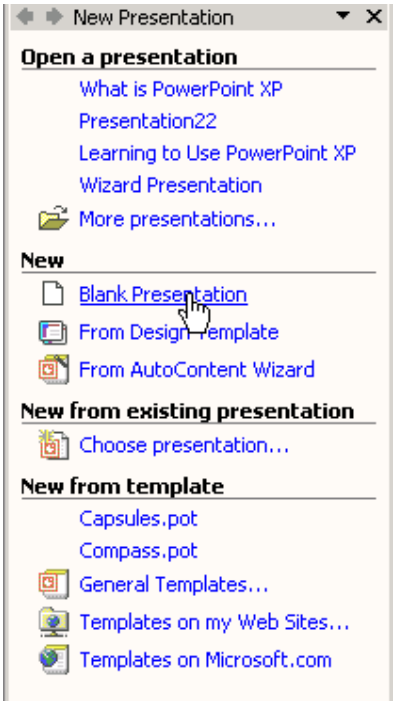


Fig. 5.2: Task Pane

The Slide Layout and Slide Design panes within the Task Pane help organize layouts, design templates, and color schemes. When you select a design option, your slides are quickly updated with the new look.

You can view the Slide Layout and Slide Design panes by clicking on the down-pointing arrow next to New Presentation in the Task Pane.

Select Slide Layout or Slide Design (Design Templates, Color Schemes, Animation Schemes).

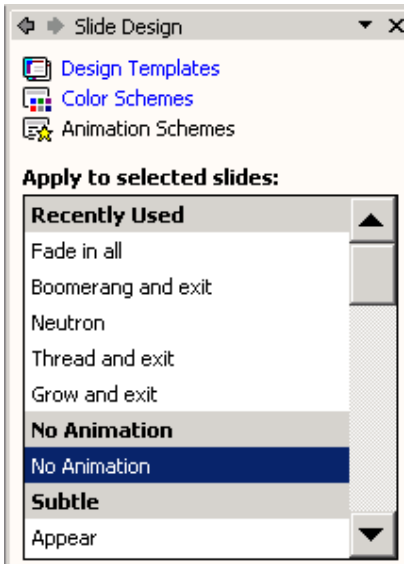


Fig. 5.3: Slide Layout or Slide Design

VERTICAL SPLITTER BAR

You can click and drag the vertical splitter bar to change the size of your panes.

MINIMIZE BUTTON

You use the Minimize button to remove a window from view. While a window is minimized, its title appears on the taskbar.

MAXIMIZE/RESTORE BUTTON

You use the Maximize button to cause a window to fill the screen. After you maximize a window, if you click the Restore button, the window returns to its former size.

CLOSE BUTTON

You use the Close button to exit the window and close the program.

	Study Notes

	**Assessment**
Explain the following: a. Task Pane b. View Buttons c. Placeholders d. Standard and Formatting Toolbars	

	**Discussion**
What is the difference between "Slide Show" and "Slide Sorter View".	

5.4 Creating a Presentation on PC

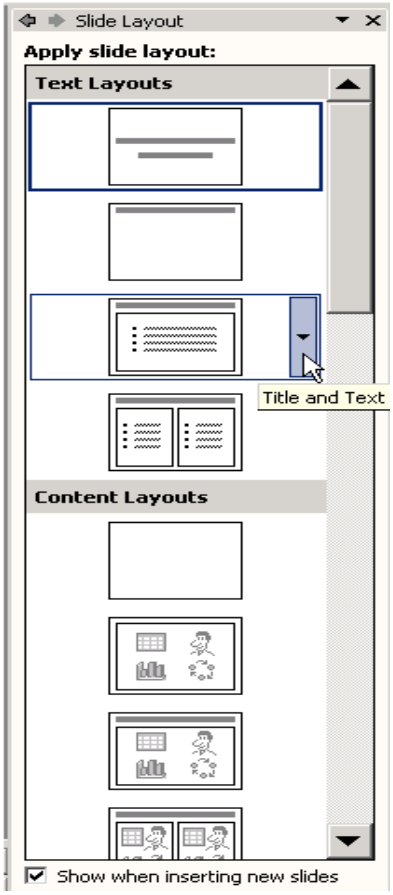
PowerPoint offers three ways to create a presentation: Blank presentation**,** From Design Template and From AutoContent Wizard**.**

5.4.1 BLANK PRESENTATION

The Blank presentation option is one of the most commonly used methods. It offers several blank slides with layouts for text and graphics.

- Open PowerPoint
- A slide featuring a place for a title and subtitle appears by default. You may begin your presentation with this slide or choose a different slide layout.

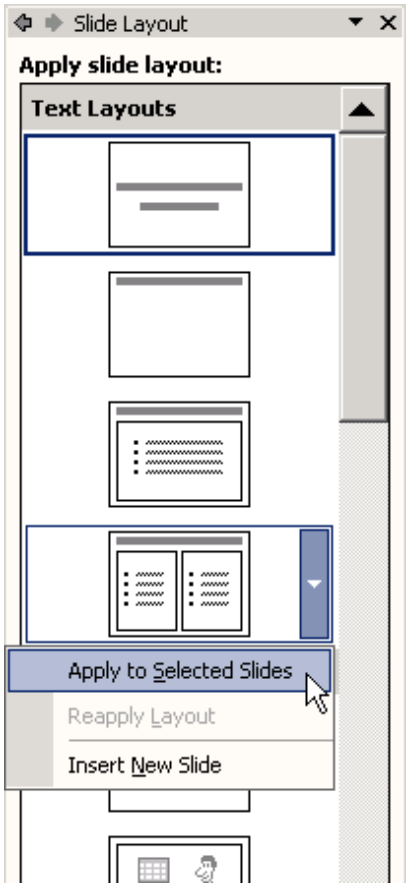
- The New Presentation Pane appears on the right side of the screen.
- Under New, click Blank Presentation.
- A list appears.



Choosing a Slide Layout

As you work on your presentation, think about the type of layout you want. Do you want a slide with text and lots of clip art or one with text and a chart? PowerPoint offers many layout options.

- Move your arrow pointer over the layouts or use the scroll bar in the Slide Layout Pane**.**
- A gray bar appears on the right of each layout.
- When you find a layout that you like, click the down-pointing arrow and choose Apply to Selected Slide.



Placeholders

Once you choose a layout for your slides, you can begin adding text, graphics or other items. You do this with placeholders- specials places within a slide where you can add content.

To Add Text to a Placeholder

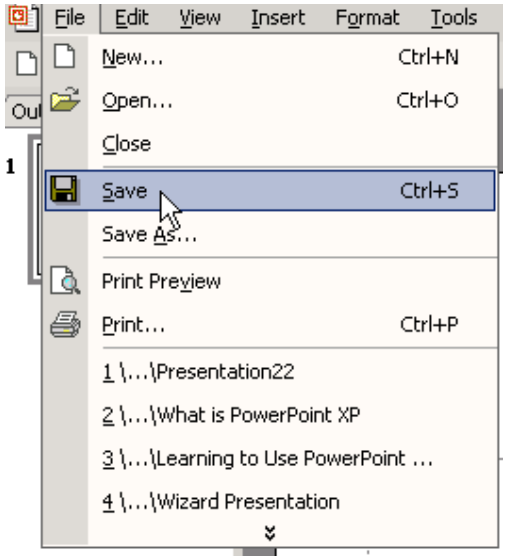
- Click on the placeholder.
- Start typing.

Fig. 5.4: Placeholders

Saving a Presentation

You can save, close and exit presentations in PowerPoint, just as you would while using other Microsoft applications.

- Click on **File** → **Save**. (Ctrl + S)



- Select the location where you want to save your presentation.

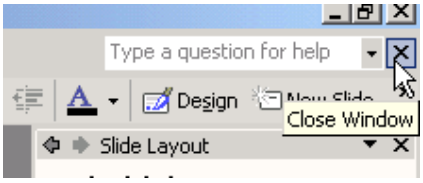
- Type a name in the File Name box or keep the one that PowerPoint has provided.

Closing a Presentation and Exiting PowerPoint

Once you have finishing working on your presentation, you can close it.

To Close a Presentation

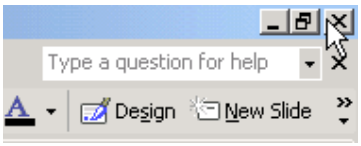
- Click the **X** in the PowerPoint presentation window (Ctrl + W).



- The PowerPoint application remains open and you can start a new presentation.

To Exit PowerPoint

- Click the **X** in the far right top corner.



OR

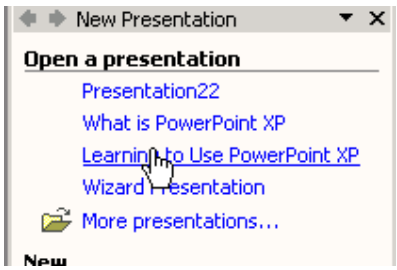
- Choose **File** → **Exit**. (Alt + F4)

5.4.2 Inserting, Copying and Deleting Slides

Opening a Presentation

You can quickly open a presentation that you have previously saved by using the Task Pane.

- Start PowerPoint.
- In the **Task Pane** under **Open a Presentation**, click on the presentation that you want to open.



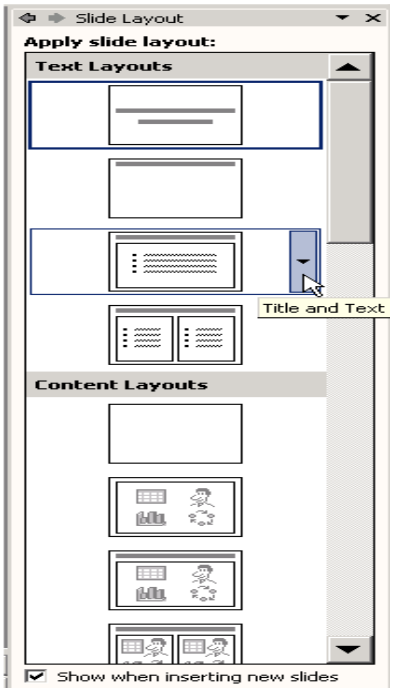
OR

- Select **File** → **Open**.
- Navigate to the file you want to open

Inserting a New Slide

Once you have created your opening slide, you will want to add more slides to your presentation.

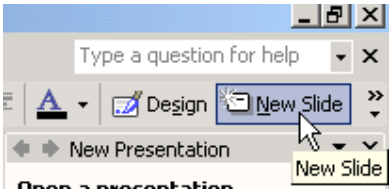
- Click on **Insert** → **New Slide** (Ctrl + M).
- Move your arrow pointer over layouts or use the scroll bar and select a slide layout.



- A grey bar appears on the right
- Click the down-pointing arrow and select Insert New Slide.

OR

- Click the New Slide button at the top of the screen



- Move your arrow pointer over layouts or use the scroll bar and select a design layout.
- A grey bar appears on the right.
- Click the down-pointing arrow and select Insert New Slide**.**

COPYING A SLIDE

Copying is another technique that you may use as you work on your slide presentation. For example, you may want to repeat a slide later in the presentation or copy a slide and make slight changes to it to make a different point.

- Click the slide you want to copy in the pane on the left.
- Click on the Copy Button on the Standard Toolbar (Ctrl + C).
- Move the arrow pointer to where you want the copied slide to appear.

OR

- Right click the slide you want to copy in the pane on the left.
- Move the arrow pointer to where you want the copied slide to appear.
- A horizontal cursor appears.
- Click the Paste Button on the Standard Toolbar or right click → Paste (Ctrl + V).

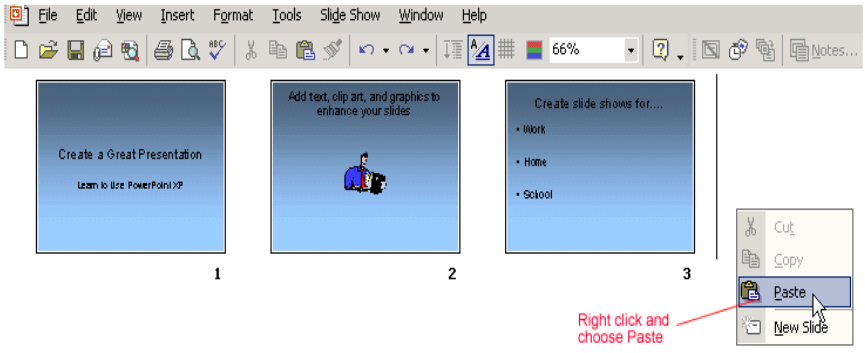


Fig. 5.5: COPYING A SLIDE

Deleting a Slide

Sometimes you may want to take one or more slides out of your presentation.

- Click the slide.
- Press Delete on your keyboard.

OR

- Right click the slide you want to delete in the pane to the left → Delete Slide.

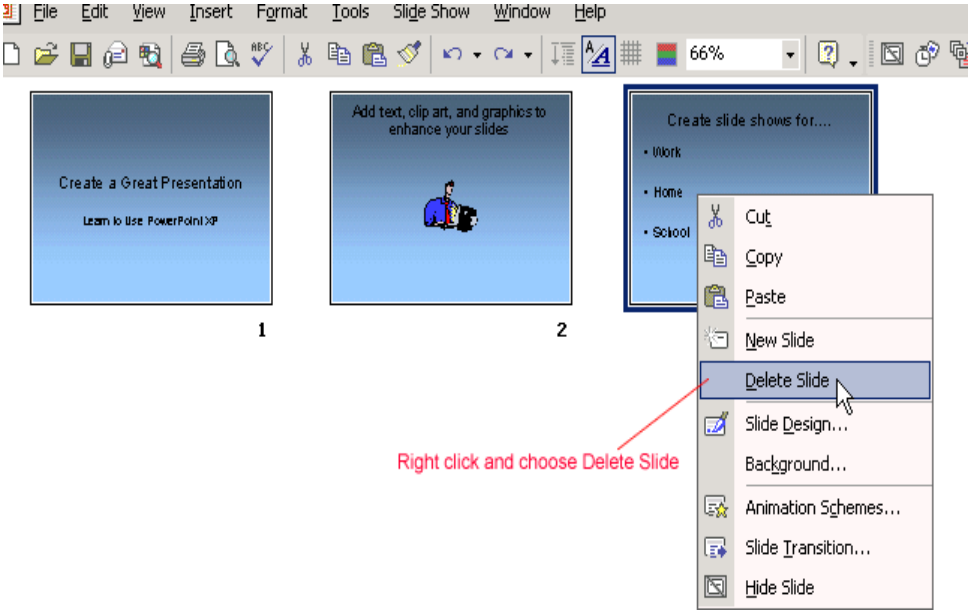


Fig. 5.6: Deleting a Slide

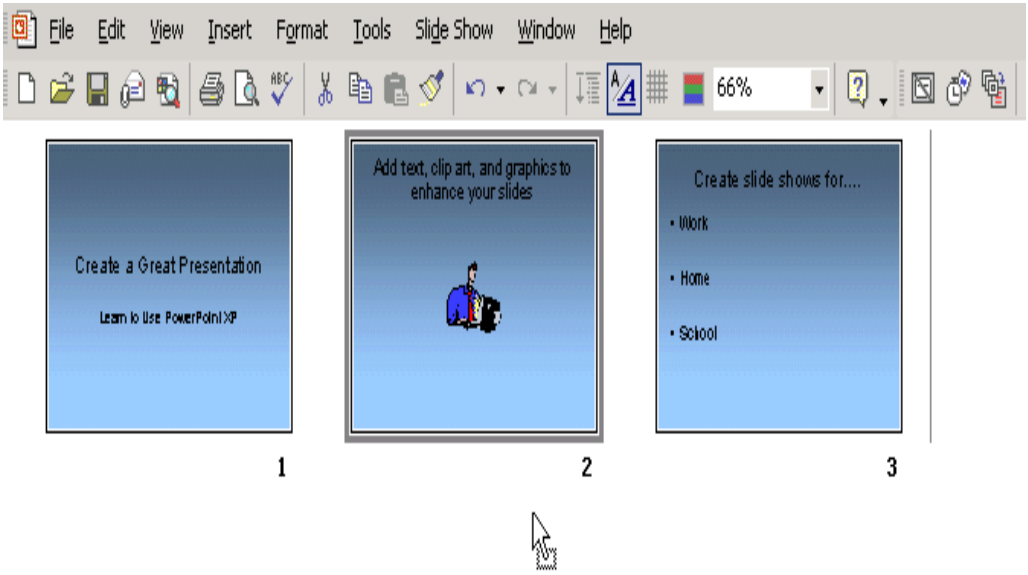
5.4.3 WORKING WITH SLIDE VIEWS

SLIDE SORTER VIEW

As you are working on your presentation, you may want to change the order of your slides. You can rearrange slides in Slide Sorter View. It enables you to view miniature slides that you can drag and drop.

To Manipulate Slides in Slide Sorter View

- Click on the Slide Sorter View button in the left bottom corner of the page.
- Click the slide you want to move.
- Hold down the left mouse button and drag the slide to its new location. A pointer with a box appears as you drag the slide.



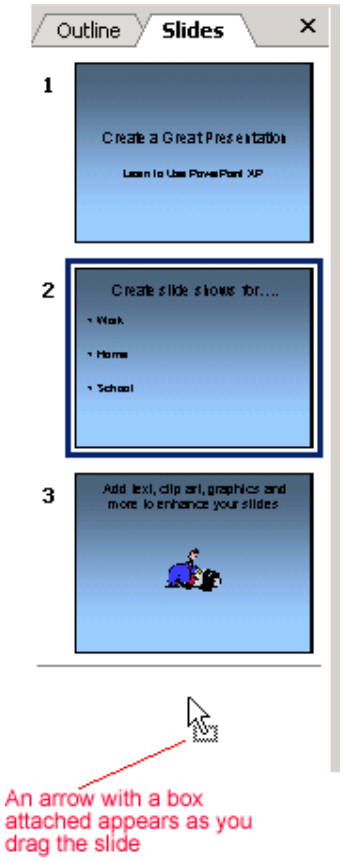
- Click on the Normal View button  to return to Normal View**.**

Working with Slides in Normal View

You can also easily move slides in Normal View. Remember, this is the Tri-Pane View that shows small slides on the left, a slide in the centre and the Task Pane on the right.

To Move Slides in Normal View

- Click on the Normal View button  .
- Click a slide in the left pane, drag, and drop it to its new location.
- Hold down the left mouse button and drag the slide to its new location. A pointer with a box appears as you drag the slide.



To toggle between the different views in PowerPoint XP, click on the View buttons or click on View ➔ Slide Sorter**,** Normal or Slide Show**.**

CHANGING AND VIEWING SLIDES IN OUTLINE VIEW

Outline View also allows you to make changes to slides. While you can drag and drop slides in this view, it's also useful for making changes to the text of your slides or for viewing multiple slides.

To View or Make Changes to Text in Outline View:

- Click the Outline View tab in the left pane.

- An outline view of your slides appears with text.
- Click on the small grey slide you want to make changes to.
- Scroll through the slides in outline view.
- Select the slide in the outline and then type changes directly onto the center slide.

- You can view the text of all of your slides in this view.
- Return to Normal View by clicking the Slides tab in the left pane.

VIEWING SLIDES IN SLIDE SHOW VIEW

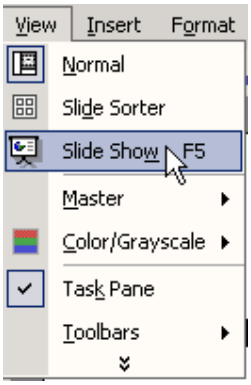
After you have made some changes to your PowerPoint presentation, you can get an idea of how it will look as a slide show.

To View Slides in Slide Show View:

- Click on the Slide Show button at the bottom left corner of the screen.

OR

- Click on View → Slide Show.



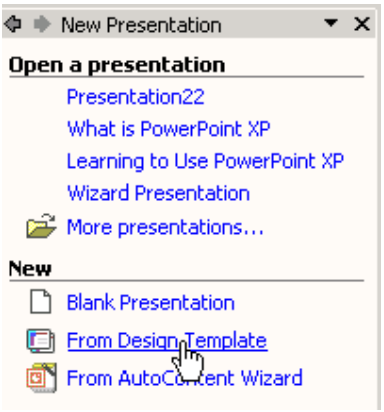
- Click on each slide until you reach the end of the slide show. (black screen)
- Click to exit and return to Normal View.

5.4.4 APPLYING A DESIGN TEMPLATE

PowerPoint offers Design Templates to make it easy to create an attractive presentation. These templates come in a variety of colors and styles. You can apply a design to existing slides or begin a new presentation with a template.

To Begin a New Presentation with a Design Template

- Open PowerPoint.
- In the Task Pane under New, click on From Design Template.



- A list of templates appears.
- Move your mouse pointer through the different designs or use the scroll bar.
- Click on the down-pointing arrow in the grey box next to the template that you like.
- Select Apply to All Slides.

ADDING A DESIGN TO AN EXISTING PRESENTATION

PowerPoint makes it easy to enhance existing slides with a design template.

- Open PowerPoint.
- In the Task Pane, under Open a presentation, click on the presentation you want.
- Click on the down-pointing arrow in the New Presentation pane and select Slide Design - Design Templates**.**
- A list of templates appears.

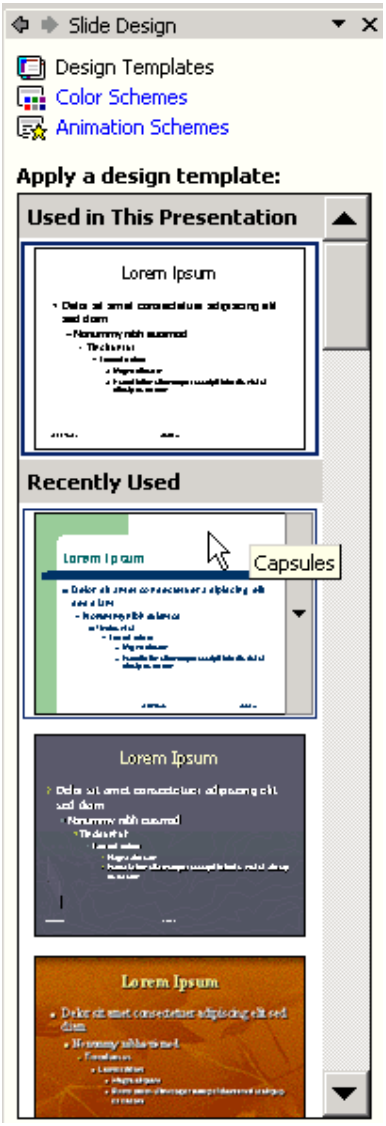


Fig. 5.7: Design Templates

- Move your mouse pointer through the different designs or use the scroll bar.
- Click on the down-pointing arrow in the grey box next to the template that you like.
- Select Apply to All Slides.

Applying a Design Template to Selected Slides

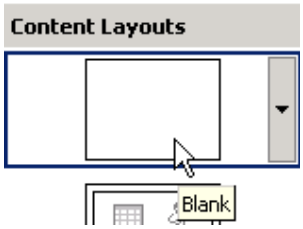
As you are working on your presentation, you can select Apply to Selected Slides if you want one or more slides to have a different look.

5.4.5 FORMATTING TEXT

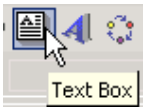
ADDING TEXT TO AN ORIGINAL SLIDE

Many of PowerPoint's slides have text boxes already included and ready for you to add information. However, if you create an original slide you will need to add a text box or two.

- Insert a blank New Slide.



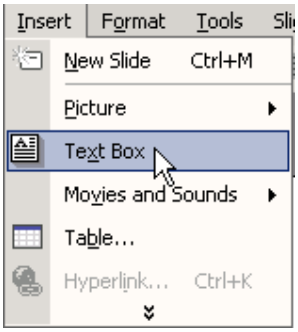
- Click on the Text Box button in the Drawing Toolbar.



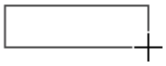
- Click and drag your mouse pointer to create a text box on the slide.

OR

- Click on Insert → Text Box.



- Click and drag your mouse pointer to create a text box.



THE FORMATTING TOOLBAR

PowerPoint's default font or text type is Arial. However, you may want to change the font type, font size and more. Use the Formatting Toolbar to set the colour, size, and overall look of your text. It does not matter whether the text is an original slide or is in a preset layout.

Here are some of the formatting options:

- Font type
- Font size
- Bold, Italics and Underline
- Center, Align Left and Align Right
- Bullets and Numbering
- Font color
- Increase Font Size
- Decrease Indent

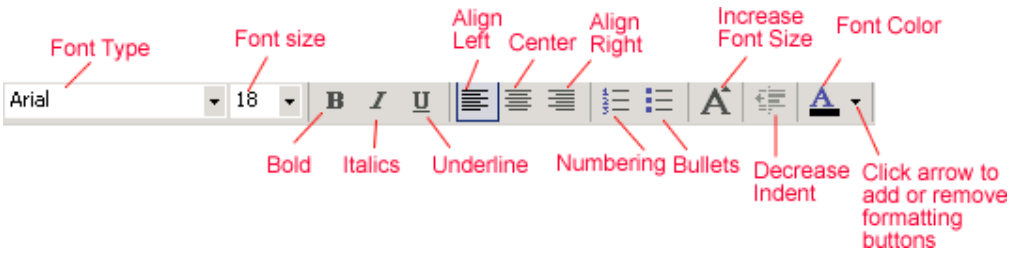
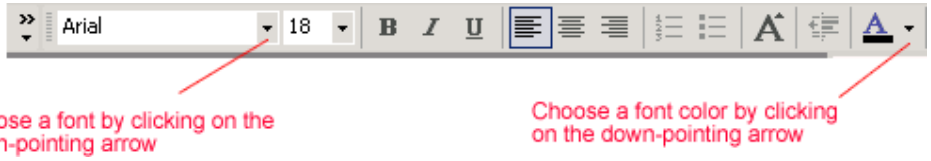


Fig. 5.8: FORMATTING TOOLBAR

The Formatting Toolbar allows you to make many changes to your text to give it the look you want for your presentation.

- In the Formatting Toolbar, click on the down-pointing arrow OR button for the item you want to format.
- For example, to set the font size for text you have not typed yet, click on the down-pointing arrow next to the number and choose the font size. To change the font color, click on the down-pointing arrow next to the "underlined" A.



- To make formatting changes to existing text, highlight the text and click on the down-pointing arrow OR button for formatting change.

5.4.6 ADDING CLIP ART AND PICTURES

INSERTING CLIP ART INTO A SLIDE

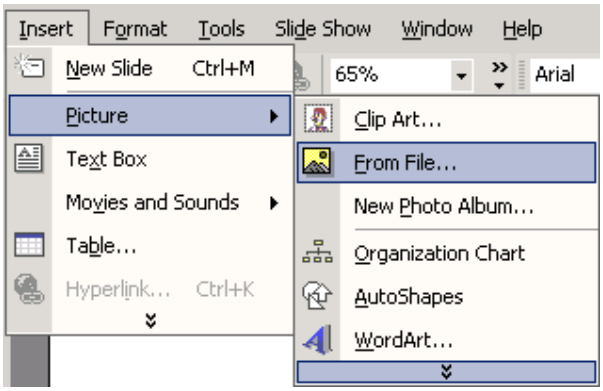
Clip art is a collection of graphical images. You can easily enhance your presentation with clip art in a few easy steps.

- In the Outline view in the left pane, select the slide in which you want the clip art to appear.
- Click the Clip Art button on the Drawing Toolbar.

OR

- Select the slide you want to work on.
- Click on the down-pointing arrow in the Task Pane → Insert Clip Art.

Complementing your presentation with a few pictures may also help engage the audience's attention. Click on Insert → Picture → From File.



- Navigate to the folder where you've saved your picture.
- Click on the picture you want to insert into the slide.

OR

- Click the Insert Picture button on the Drawing Toolbar.

- Navigate to the picture that you want to use.
- Select the picture and click Insert.

Inserting Pictures or Clip Art Using a Slide Design Layout

Some slide layouts already have icons for clip art and pictures. PowerPoint allows you to insert pictures though these slide design layouts.

To Insert Pictures Using a Slide Design Layout:

- Browse the slide design layouts to find one with an icon for a picture.
- Click on the picture icon.

- Navigate to the picture you want to insert.
- Select the picture and click Insert.

RESIZING PICTURES AND CLIP ART

Once you insert clip art or a picture, you may need to resize it to fit your slide better.

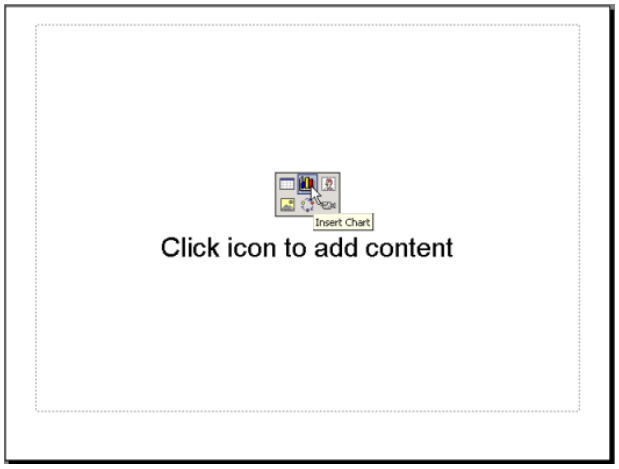
- Click the cursor the edge of the graphic and a resizing handle appears. A resizing handle is a black, double-headed arrow that changes to a "plus sign", + ,once you start resizing the image:
- Drag the graphic to the size that you want.

5.4.7 ADDING CHARTS, DIAGRAMS, TABLES AND AUTO SHAPES

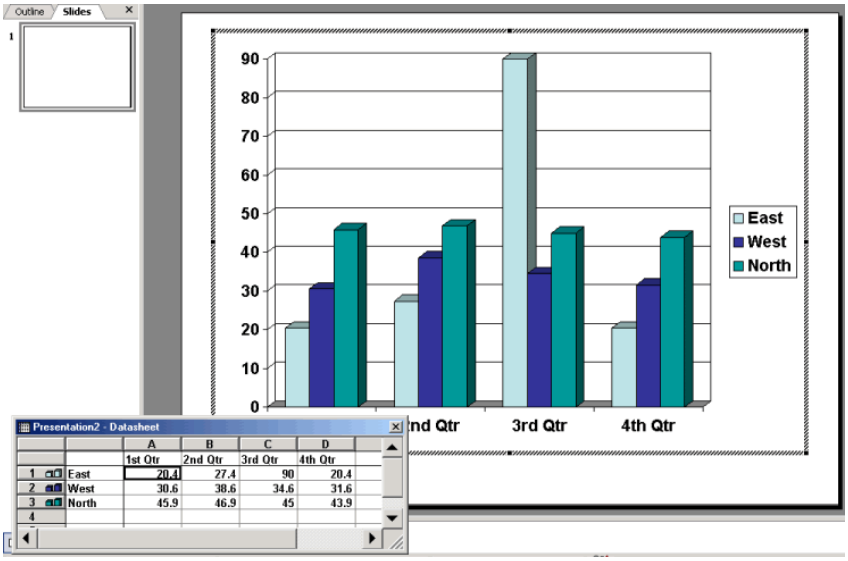
INSERTING A CHART

PowerPoint allows you to insert charts into your slide presentation to display different types of information to your audience.

- Insert a new slide with a title and a chart icon.
- When the slide appears, click the Insert Chart icon.



- A chart appears with a data sheet and sample data.



- Replace the sample data in the data sheet with actual data that you want to present. The Y-axis is for values or numbers. For example, number of hours worked or amount of money earned. The X-axis is the label for the information. It now reads East, West and North.
- You can delete some information in columns or rows of the sheet. Right click on the row or column and choose Cut**,** Delete or Clear Contents.

  NOTE: You can expand the chart columns to fit your data or titles. Place your mouse pointer over the end of the column in the grey heading. A black cross with double arrows appears. Right click and drag the columns to the size you want.
- To format column width, click on Format ➞ Column width.

- Notice that as you enter the new data and titles etc., the chart on the slide changes to show this new information.

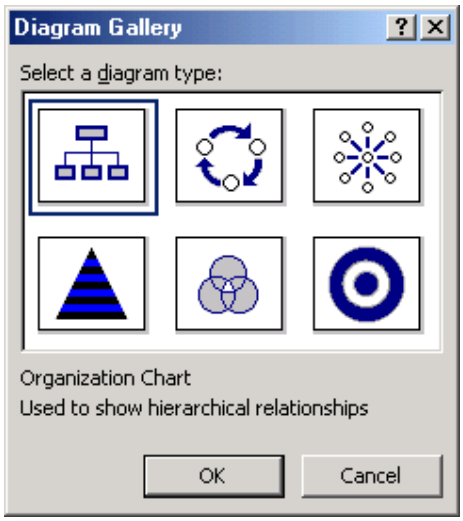
If the datasheet disappears, double click on the chart and select View → Datasheet.

INSERTING A DIAGRAM OR ORGANIZATION CHART

An organisation chart shows hierarchal relationships in a company or organization such as president, vice president etc. Diagrams are used to show relationships between various elements.

- Insert a new slide with a Diagram or Organization Chart icon.
- Click on the Insert Diagram or Organization Chart icon.

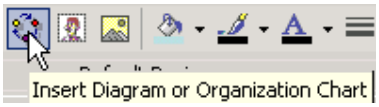
- When the Diagram Gallery dialog box appears, select a diagram or chart type.



- Click OK.

OR

- If working in a blank slide, click the Insert Diagram or Organisation Chart button on the Drawing Toolbar.

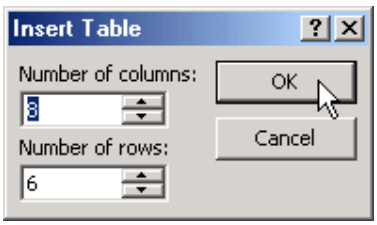


INSERTING A TABLE

PowerPoint also gives you the option of displaying information within your presentation in a table.

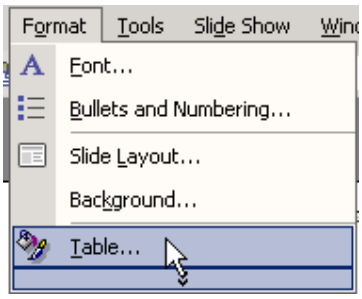
- Insert a new slide with a table icon.
- Click on the Insert Table icon.

- When the dialog box appears, set the number of columns and rows for your table.



- Click OK.
- Enter the data for your table.

- To format the table, choose Format → Table.

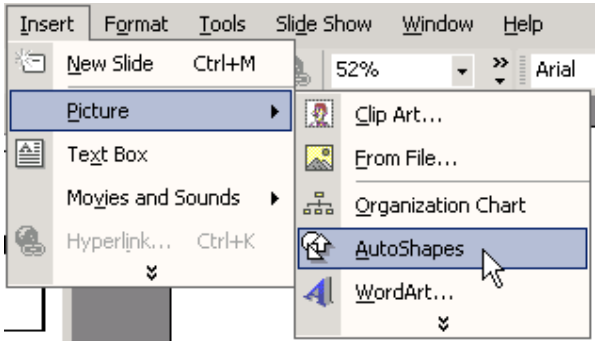


- Click on the tabs and make any necessary changes.
- Click OK.

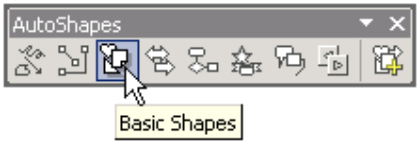
INSERTING AN AUTOSHAPE

PowerPoint provides many different items that you can use to enhance your slides. For example, an AutoShape can be a useful graphical element. AutoShapes include lines, arrows, banners, stars and other shapes that you can add to your presentation.

- Click Insert → Pictures → AutoShapes.



- A small AutoShapes toolbar appears.

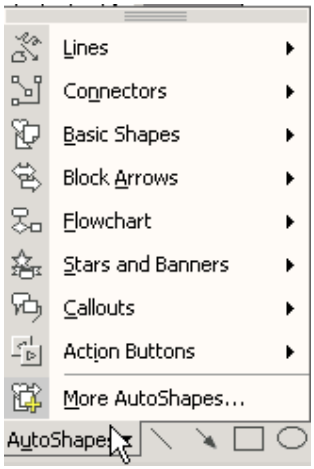


- Click on the various options and a list of AutoShapes appears.
- Select the one for your presentation.
- To format an AutoShape, right click on it and select Format AutoShape.

- A dialog box appears with various formatting options.

OR

- Insert AutoShapes by clicking on the Drawing Toolbar at the bottom of the PowerPoint screen. A list of options appears.



You can click and drag an AutoShape to increase its size and you can add text by selecting Insert ➔ Text Box.

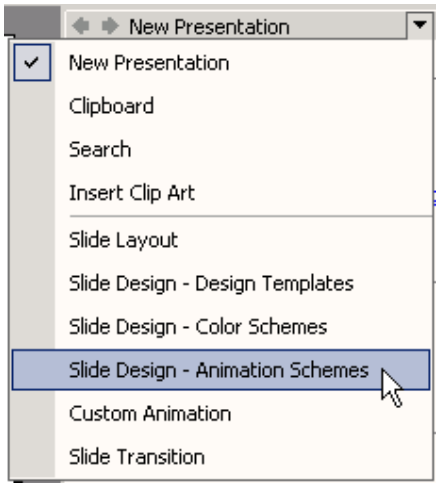
5.4.8 ANIMATING SLIDES

ANIMATING SLIDES

Animating slides involves adding movement and sometimes sound to text or to the slides in a presentation. Animation can help create a livelier and more interesting slide show. PowerPoint provides some preset animation or allows you to customize the animation to fit your needs.

To Animate Slides using Animation Schemes:

- Open the PowerPoint presentation that you want to work on.
- Select the slide that you want to animate.
- In the Task Pane, click the down-pointing arrow next to New Presentation ➔ Slide Design ➔ Animation Schemes.



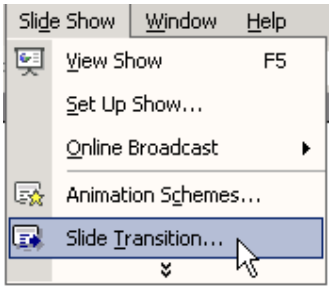
5.4.9 ADDING TRANSITION

Adding Transition

Once you have completed all of your slides, create a cohesive presentation by adding transition. You can move from slide to slide with interesting transitions that affect the timing, entrance and exit of your slides. A transition is an effect that is applied to some or all of the slides in a presentation.

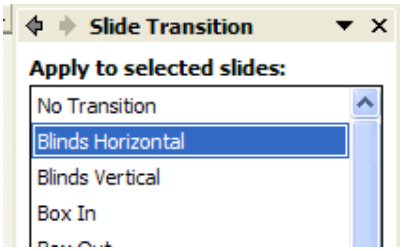
To Make Transitions from Slide to Slide:

- Click on Slide Show → Slide Transition.



OR

- In the Task Pane, click on the down-pointing arrow next to New Presentation, → Slide Transition.

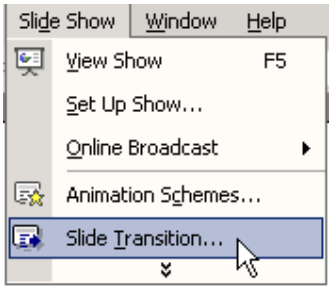


- In the Slide Transition pane, select the effect you want from the drop-down menu. Ex. Blinds Horizontal, Blinds Vertical, Box In and Box Out.
- Automatically preview each transition by clicking on it. (Auto Preview has to be selected).
- Click Apply to All when you have chosen an effect.
- Select to proceed from slide to slide on mouse click or automatically after the number of seconds that you select.
- To see how your transition works, preview the slide show.

PREVIEWING A SLIDE SHOW

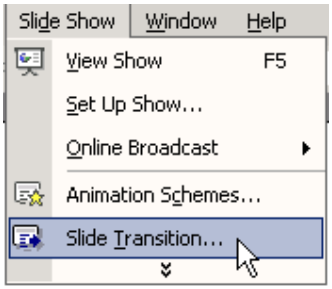
If you want to get an idea of what your completed task would look like to an audience, preview it. PowerPoint allows you to view your show in slide show format.

- Click on View → Slide Show. (F5)



OR

- Click on Slide Show → View Show.



OR

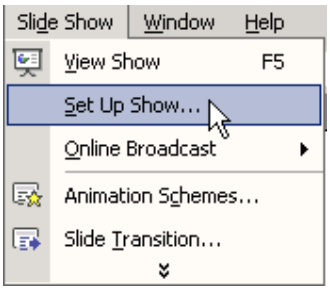
- Click on the Slide Show button to start the presentation.
- To move to the next slide, click the mouse. (Space bar or Enter).
- When the screen goes dark, click the screen to return to the PowerPoint screen.
- You can exit the slide show by pressing ESC on the keyboard at any time.

If you have set the slides to advance mechanically, you don't need to click through the slides. Just sit back and enjoy the show. At the end of the show, click the left mouse button to return to the PowerPoint Screen.

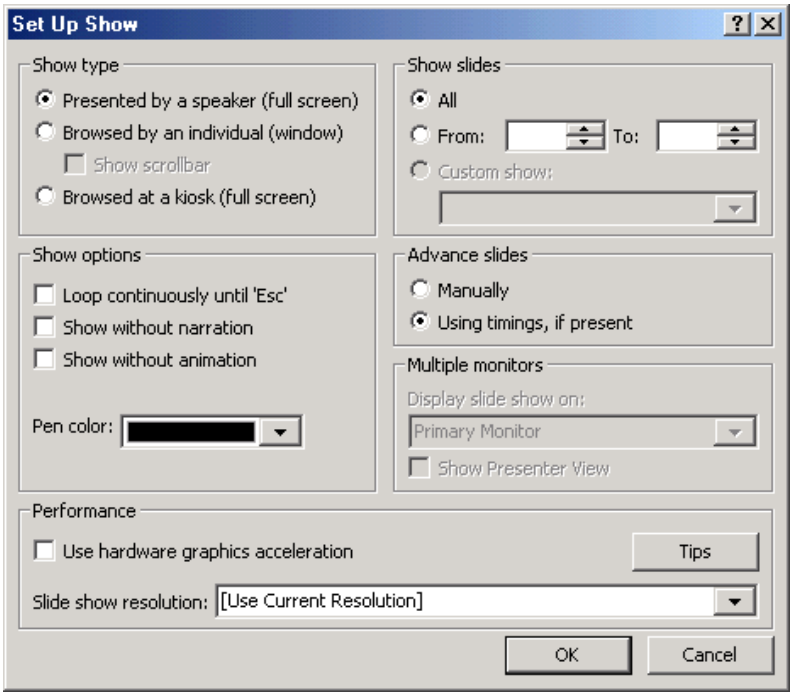
SETTING UP A SLIDE SHOW

Once you have added, created a presentation and previewed it, set up a show. Take the necessary steps to make sure your slides are ready for a real audience.

- Click on Slide Show → Set Up Show.



- The **Set Up Show** dialog box appears.



- Select your show type. Usually, it's presented by a speaker.
- Select the slides you wish to demonstrate. For example, all or slides 3 - 12.
- Select show options. You can leave these blank unless you're planning to run a show continuously on a kiosk or want to show it without animation etc.
- Next, decide how you plan to advance your slides.
- Click OK.

Print Your Outline

1. Select **File > Print Preview** from the menu.
2. Click the down arrow next to the Print What icon.

	Study Notes

	**Assessment**

Write the process for the following:

a. Inserting a New Slide

b. Applying a Design Template

c. Viewing Slides in Slide Show View

d. Closing a Presentation and Exiting PowerPoint

e. To Add Text to a Placeholder

f. Deleting a Slide

g. Adding Text to an Original Slide

h. Inserting a Chart

i. Adding Transition

j. Inserting Clip Art into a Slide

	**Discussion**

Prepare a presentation on the topic "Basics of Computers".

5.5 Data Communication Networking

A computer network, often simply referred to as a network, is a collection of computers and devices connected by communications channels that facilitate communication and sharing of resources among users. Networks may be classified according to a wide variety of characteristics.

5.5.1 Local Area Network (LAN)

A Local Area Network (LAN) is a combination of programs and equipment that connect a number of personal computers. It is by far the most common type of data network. As the name suggests, a LAN serves a local area and supplies networking capability

to a group of computers in close proximity to each other such as in an office building, a school or a home.

Typical installations are in industrial plants, office buildings, college or university campuses or similar locations. In these locations, it is feasible for the owning organisation to install high quality, high-speed communication links interconnecting nodes. Typical data transmission speeds are one to 100 megabits per second.

A LAN is useful for sharing resources like files, printers, games or other applications. A LAN, in turn, often connects to other LANs and to the Internet or other WAN.

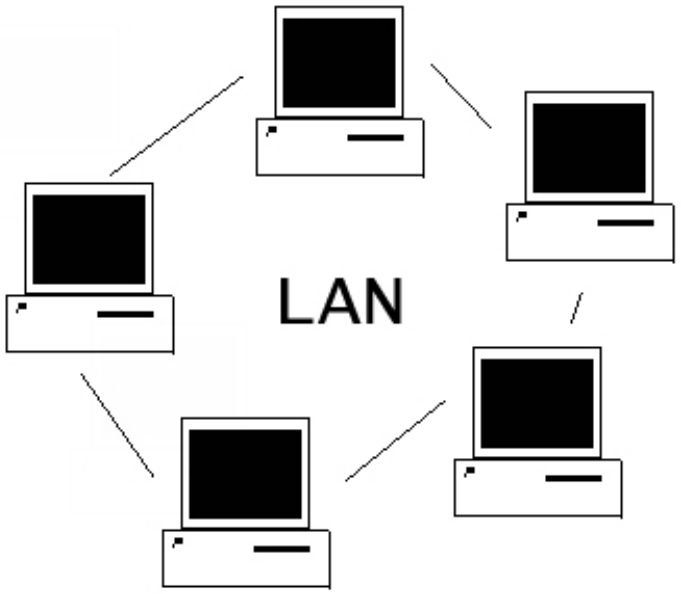


Fig. 5.9: Local area network

Specialised operating system software may be used to configure a local area network.

Examples:

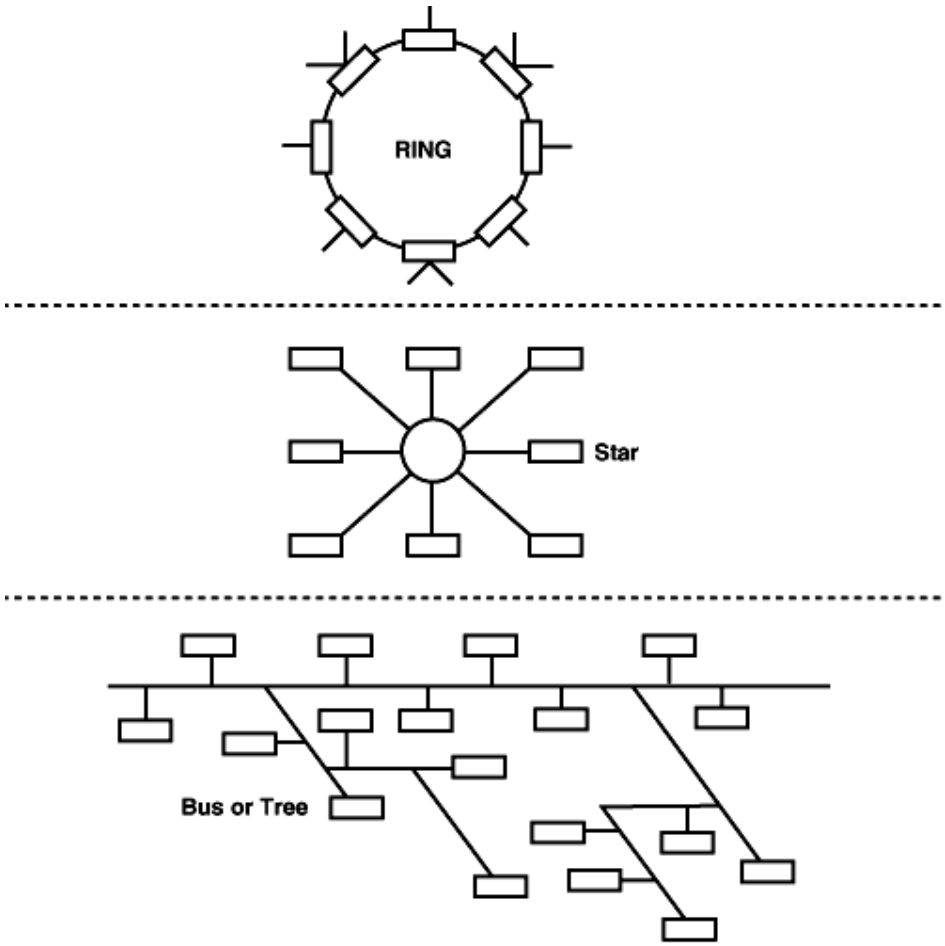
The most common type of local area network is an Ethernet LAN. The smallest home LAN can have precisely two computers; a large LAN can accommodate many thousands of computers. Many LANs are divided into logical groups called subnets. An Internet Protocol (IP) "Class A" LAN can, in theory, accommodate more than 16 million devices organised into subnets.

Unfortunately, the networking software and operating systems used with the PC, LANs were quite different from the networking software used on midrange and mainframe computers and office automation equipment (for example, dedicated word processing machines and intelligent copiers). This, of course, set up the predictable and inevitable conflict between PCs, office automation equipment and the larger midrange and mainframe computers.

LAN TOPOLOGIES

Whether the purpose of the LAN is to interconnect PCs, minicomputers, or both is almost extraneous; the first issue is often selecting the topology of the LAN. This choice dictates the cable, cabling methodology and the networking software that can operate on the LAN. The three basic topologies are the ring, the star and the bus.

- **Ring:** As its name suggests, a ring LAN joins a set of attachment units together via a series of point-to-point connections between each unit. Each attachment unit, in turn, interfaces to one or more computers or computing devices. Information flows from attachment unit to attachment unit in a single direction, thus forming a ring network. Because each PC in a ring network acts as a repeater, performance degrades with each additional PC. Consequently, this is on average appropriate only in small networks.
- **Star:** In a star LAN, each computer or computer-related device is connected on a point-to-point link to a central device called a Hub. The hub acts as the LAN traffic manager, setting up communication paths between two devices seeking to exchange information. This configuration makes it very easy to isolate problem nodes, and is one of the most common LAN models.
- **Bus:** The simplest form of bus LAN is a set of computers or devices connected to a common, linear connection. Under the bus topology, information is transmitted over the distance of the network. As a result, each computer can pick up its intended information. Links from the main bus line might break off into additional linear links with multiple attachments; this type of bus structure is also referred to as a tree because multiple branches reach out from the main trunk. This model is used in high-speed PBXs.



Star and ring network topologies are sometimes combined into one network to provide a higher degree of fault tolerance. Because a star network is susceptible to a failure in the hub and a ring network is sensitive to a break in the ring, combining both forms offer an alternate route in case one topology fails.

5.5.2 WIDE AREA NETWORK (WAN)

A Wide Area Network (WAN) is a collection of LANs

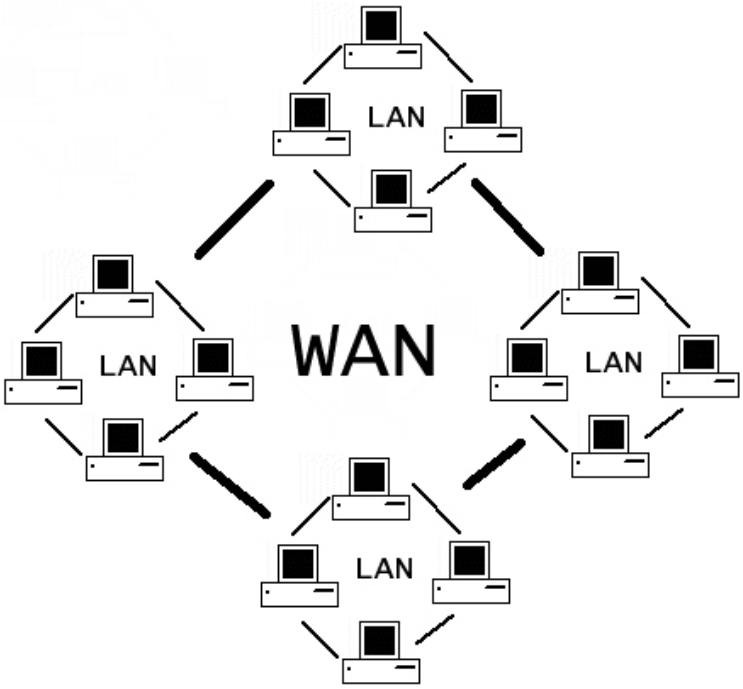


Fig. 5.10: Wide Area Network

A **WAN** spans a large geographic area, such as a state, a province or a country. WANs often connect multiple smaller networks, such as local area networks (LANs) or metro area networks (MANs). World's most popular WAN is the Internet. Some segments of the Internet, like VPN-based extranets, are also WANs in themselves. Finally, many WANs are corporate or research networks that utilize leased lines. WANs generally utilize different and a good deal of expensive networking equipment than do LANs. Key technologies often found in WANs include SONET, Frame Relay and ATM.

- **Wide Area Network** (**WAN**) is a computer network that covers a broad area (i.e. any network, whose communications links cross metropolitan, regional, or national boundaries). This is in contrast with personal area networks (PANs), local area networks (LANs), campus area networks (CANs) or metropolitan area networks (MANs), which are usually limited to a room, building, campus or specific metropolitan area (e.g. a city) respectively.

WAN CONNECTION TECHNOLOGY OPTIONS

There are several ways to connect Nonstop S-series servers to WANs, including via the Server Net Wide Area Network (SWAN) or SWAN 2 concentrator, which provides WAN client connectivity to servers that have Ethernet ports and appropriate communications software. You can also use the Asynchronous Wide Area Network (AWAN) access server, which offers economical asynchronous-only WAN access. Several options are available for WAN connectivity:

Table 5.1: WAN connectivity options

Option:	**Description**	**Advantages**	**Disadvantages**	**Bandwidth range**	**Sample protocols used**
Leased line	Point-to-Point connection between two computers or Local Area Networks (LANs)	Most secure	Expensive		PPP, HDLC, SDLC, HNAS
Circuit switching	A dedicated circuit path is created between end points. Best example is dialup connections	Less Expensive	Call Setup	28 - 144 kbps	PPP, ISDN
Packet switching	Devices transport packets via a shared single point-to-point or point-to-multipoint link across a carrier internetwork. Variable length packets are transmitted over Permanent Virtual Circuits (PVC) or Switched Virtual Circuits (SVC)		Shared media across link		X.25 Frame-Relay
Cell relay	Similar to packet switching, but uses fixed	Best for simultaneo	Overhead can be		ATM

	length cells instead of variable length packets. Data is divided into fixed-length cells and then transported across virtual circuits	us use of voice and data	considera ble		

Transmission rates usually range from 1200 bps to 24 Mbps, although some connections such as ATM and Leased lines can reach speeds greater than 156 Mbps. Typical communication links used in WANs are telephone lines, microwave links and satellite channels.

Recently with the proliferation of low cost of Internet connectivity, many companies and organisations have turned to VPN to interconnect their networks, creating a WAN in that way. Companies such as Cisco, New Edge Networks and Check Point offer solutions to create VPN networks.

Study Notes

Assessment

1. What is LAN?
2. What is WAN?

	**Discussion**
Discuss LAN Topologies.	

5.6 Summary

INTRODUCTION

Microsoft PowerPoint is a widely used utility to create presentations relating to products, organisation, research papers etc. This is effective software, which provides techniques for designing dynamic presentations.

Microsoft PowerPoint is a powerful tool to create professional presentations and slide shows. PowerPoint allows you to construct presentations from scratch or by using the easy to use wizard.

USE OF TILES IN PROGRAMMING

A program is a sequence of commands that a computer executes in order to perform some actions. A programming language is a language in which you can specify the commands in a program.

BASIC PROGRAMMING CONCEPTS

Statements: A statement is the simplest concept in a programming language. A statement is merely a single command to perform a single well-defined task.

Variables: The beauty of a variable is that you can store information in it and retrieve information from it any time you want.

Logic: One thing that computers do really well is obey the rules of logic. In particular, they are good at doing calculations and comparisons.

Conditionals: Well, since we can determine if comparison is true or false, it would be nice if we could act on this information. This is where a conditional comes in.

PRESENTATION GRAPHICS

A type of business software that enables users to create highly stylized images for slide shows and reports. The software includes functions for creating various types of charts and graphs and for inserting text in a variety of fonts. Most systems enable you to import

data from a spreadsheet application to create the charts and graphs. Presentation graphics is often called *business graphics.*

CREATING A PRESENTATION ON A PC

PowerPoint offers three ways to create a presentation: **Blank presentation**, **From Design Template** or **From AutoContent Wizard**.

DATA COMMUNICATION NETWORKING

A **computer network**, often simply referred to as a **network**, is a collection of computers and devices connected by communications channels that facilitate communication and sharing of resources among users.

LOCAL AREA NETWORK (LAN)

A Local Area Network (LAN) is a combination of programs and equipment that connect a number of personal computers. It is by far the most common type of data network. A LAN is useful for sharing resources like files, printers, games or other applications. A LAN, in turn, often connects to other LANs and to the Internet or other WAN.

LAN TOPOLOGIES

Whether the purpose of the LAN is to interconnect PCs, minicomputers, or both is almost irrelevant; the first issue is often about selecting the topology of the LAN. This choice dictates the cable, cabling methodology and the networking software that can operate on the LAN. The three basic topologies are ring, star and bus.

WIDE AREA NETWORK (WAN)

A Wide Area Network (WAN) is a collection of LANs. A **WAN** spans a large geographic area, such as a state, a province or a country. WANs often connect multiple smaller networks, such as local area networks (LANs) or metro area networks (MANs). The world's most popular WAN is the Internet.

5.7 Self-Assessment Test

Broad Questions

1. Explain the difference between LAN and WAN
2. Discuss about Presentation Graphics

Short Notes

a. Uses of PowerPoint

b. Slide Layouts

c. Adding slides

d. Creating a presentation

e. Programming Concepts

5.8 Further Reading

1. Automating Managers: The Implications of Information Technology for Managers, John, Moss Jones, London, Printer, 1990
2. Computers, Concepts and Uses 2nd ed., Summer M., Englewood Cliffs, New Jersey, Prentice Hall Inc, 1988
3. Foundations of Business Systems, David Van Over, Fort Worth, Dryden 1992
4. Information systems: Theory and practice 5th ed., Burch, John and Grudniski Gary, New York., John Wiley, 1989
5. Online Business Computer Applications 2nd Ed, Eliason A. L.,. Chicago Science Research Associates, 1987

Assignment

Create a Power Point presentation of at least 18-20 slides to show the use of Computers in various fields of Management.

Glossary

BIOS: Basic Input/output system: The BIOS of a PC software is built into the PC and is the first code run by a PC when powered on.

Bus: In computer architecture, a bus is a subsystem that transfers data between computer components inside a computer or between computers.

Encapsulation: This term is often used interchangeably with information hiding. A common use of information hiding is to hide the physical storage layout for data so that if it is changed, the change is restricted to a small subset of the total program.

GUI: Graphical User Interface: It is a type of user interface that allows users to interact with programs by offering graphical icons.

Inheritance: It is a way to compartmentalise and reuse code by creating collections of attributes and behaviours called objects, which can be based on previously created objects.

Macintosh: A series of several lines of personal computers designed, developed and marketed by Apple Inc.

Peripherals: A device attached to host computer, but not a part of it and is more or less dependent on the host.

Polymorphism: It is the ability of one type A to appear as and be used like another type B. The ability of referring a particular data type in more than one form is Polymorphism.

RAID: Redundant array of inexpensive disks.

SCSI: Small Computer System Interface. It is a set of standards for physically connecting and transferring data between computers and peripheral devices.