



DEPARTMENT OF EDUCATION

GRADE 9

DESIGN AND TECHNOLOGY COMPUTING

UNIT 1



COMPUTER BASICS

Published by:



FLEXIBLE OPEN AND DISTANCE EDUCATION
PRIVATE MAIL BAG, P.O. WAIGANI, NCD
FOR DEPARTMENT OF EDUCATION
PAPUA NEW GUINEA

GRADE 9 DESIGN AND TECHNOLOGY-COMPUTING

UNIT 1

COMPUTER BASICS

- **WHAT IS A COMPUTER?**
- **HARDWARE**
- **DATA HANDLING**
- **SOFTWARE**

Acknowledgments

We acknowledge the contributions of all Secondary Teachers who in one way or another helped to develop this Course.

Our profound gratitude goes to the former Principal of FODE, Mr. Demas Tongogo for leading FODE team towards this great achievement. Special thanks to the FODE IT Edit Team and SRC Members who played an active role in critiquing and editing to ensure quality control for this Course.

We also acknowledge the professional guidance provided by the Curriculum Assessment Division throughout the process of writing especially to the late Mr. Tobias Gena.

The development of this book was co-funded by GoPNG and World Bank.

DIANA TEIT AKIS

PRINCIPAL

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First Published in 2017 by Flexible Open and Distance Education, Papua New Guinea.

Printed by Flexible Open and Distance Education

ISBN: 978-9980-89-646-9

National Library Services of Papua New Guinea

SECRETARY'S MESSAGE

Achieving a better future by individual students and their families, communities or the nation as a whole, depends on the kind of curriculum and the way it is delivered.

This course is a part of the new Flexible, Open and Distance Education curriculum. The learning outcomes are student-centred and allows for them to be demonstrated and assessed.

It maintains the rationale, goals, aims and principles of the national curriculum and identifies the knowledge, skills, attitudes and values that students should achieve.

This is a provision by Flexible, Open and Distance Education as an alternative pathway of formal education.

The course promotes Papua New Guinea values and beliefs which are found in our Constitution, Government Policies and Reports. It is developed in line with the National Education Plan (2005 -2014) and addresses an increase in the number of school leavers affected by the lack of access into secondary and higher educational institutions.

Flexible, Open and Distance Education curriculum is guided by the Department of Education's Mission which is fivefold:

To facilitate and promote the integral development of every individual

To develop and encourage an education system satisfies the requirements of Papua New Guinea and its people

To establish, preserve and improve standards of education throughout Papua New Guinea

To make the benefits of such education available as widely as possible to all of the people

To make the education accessible to the poor and physically, mentally and socially handicapped as well as to those who are educationally disadvantaged.

The college is enhanced to provide alternative and comparable pathways for students and adults to complete their education through a one system, many pathways and same outcomes.

It is our vision that Papua New Guineans' harness all appropriate and affordable technologies to pursue this program.

I commend all those teachers, curriculum writers, university lecturers and many others who have contributed in developing this course.



UKE KOMBRA, PhD
Secretary for Education

TABLE OF CONTENTS**Page**

TITLE	1
ACKNOWLEDGMENTS	2
CONTENTS	3
COURSE INTRODUCTION.....	5
UNIT INTRODUCTION.....	6
STUDY GUIDE	7
TOPIC 1: WHAT IS A COMPUTER.....	9
☐ Lesson 1 Definition of Computer	10
☐ Lesson 2 Characteristics of Computer	13
☐ Lesson 3 History of Computers	18
☐ Lesson 4 Parts of a Computer	30
☐ Lesson 5 Computer Terminology	39
☐ Lesson 6 Care and Appropriate Use of Computers.....	52
Answers to Practice Exercises 1 – 6	59
TOPIC 2: HARDWARE AND PERIPHERALS.....	62
☐ Lesson 7 Functions of the Hardware	64
☐ Lesson 8 Computer Processing	77
☐ Lesson 9 Input Devices	83
☐ Lesson 10 Output Devices	96
☐ Lesson 11 Classification of Hardware Systems	103
☐ Lesson 12 Trouble shooting and Maintenance	109
Answers to Practice Exercises 7 – 12.....	116
TOPIC 3: DATA HANDLING	120
☐ Lesson 13 Data and Information	122
☐ Lesson 14 Data Coding, Sources and Types	127
☐ Lesson 15 Primary Storage	134
☐ Lesson 16 Secondary Storage.....	139
☐ Lesson 17 Data Transmission and Compression	145
☐ Lesson 18 Data Security	150
Answers to Practice Exercises 13 – 18.....	157
TOPIC 4: SOFTWARE.....	161
☐ Lesson 19 Operating System	163
☐ Lesson 20 Utility Software.....	170
☐ Lesson 21 Software Packages.....	174
☐ Lesson 22 Custom Software.....	179
☐ Lesson 23 Hardware Requirement.....	184
☐ Lesson 24 Graphical User Interface	189
Answers to Practice Exercises 19 – 24.....	199
GLOSSARY.....	203

COURSE INTRODUCTION



Dear Student,

Welcome to the FODE Grade 9 Design and Technology-Computing Course. The Course consists of four units:

UNIT 1: WHAT IS A COMPUTER?
UNIT 2: HARDWARE AND PERIPHERALS
UNIT 3: DATA HANDLING
UNIT 4: SOFTWARE

Each unit is divided into 4 Units which include all of the information you will need for this Course. In addition, you must have a functional computer with Microsoft Windows Application programs to fully apply all knowledge, skills and attributes necessary to gain full understanding and efficient transfer of learning for this course.

Basic Computer Guide Manual will be provided to help you understand the lessons. You must study the Basic Computer Guide Manual first before you start with the Course Book as it will provide you with the initial knowledge and skills necessary to comprehend Information Technology. Another tool to help you with your study is the Glossary of Computer Terms which is found at the end of this book. It will guide you with all terms used in each lesson. Refer to these manuals whenever you need them to fully grasp all lessons.

Assessments

- **Practice Exercises**

Each lesson in each Unit Book has a Practice Exercise for you to do after the Summary. Answers to the Practice Exercises are found at the end of each Topic in the unit.

- **Assignments**

Each Unit has a corresponding Assignment booklet which you will send to FODE Provincial Center for marking. The marked Assignment will be returned to you with comments and advice from your tutor. A mark will be given. This mark is counted towards your final mark in the exam.

- **Examinations**

The exams are held each year in November.

For more information refer to the **Study Guide**.

UNIT INTRODUCTION

Unit 1 is Computer Basics where you will learn about the basic concepts of a computer. The Unit consists of the following four Topics which will help you understand what a computer is.

Topic 1:	What is a Computer?
Topic 2:	Hardware
Topic 3:	Data Handling
Topic 4:	Software

By the end of this Unit you will have identified and demonstrated appropriate use of a range of hardware components and peripheral devices and use a range of computer skills and techniques. This understanding of the fundamentals of computer will enable you to move a step higher in gaining the necessary knowledge, skills and attitudes in computing.

STUDY GUIDE

Below are the steps to guide you in your course study.

Step 1: Read each lesson in the Unit Book carefully. In most cases, reading through a lesson once is not enough. It helps to read something over several times until you understand it. You are not expected to memorise the information in the Unit Book. You should use it as a reference and to learn from the examples given to illustrate important points.

Step 2: After reading the summary of the lesson, start doing the Practice Exercise. You must do only one practice exercise at a time. Then mark it according to the following instruction.

CHECK YOUR ANSWERS AT THE END OF TOPIC 1.

Step 3: After marking your answers, go back to the lesson and correct any mistakes you may have made. Then move on to the next lesson.

Step 4: After completing all the Practice Exercises, do Assignment 1.

Step 5: Now send the completed Assignment booklet to your FODE Provincial Centre for marking.

Follow all these steps 1 - 5 when completing all Unit Books.

Be honest with yourself when you are doing and marking your Practice Exercises as well as completing your Assignment Booklets.

This Unit has a separate assignment booklet for you to use. The information at the end of the last lesson in every Topic will let you know what to do with the assignment exercises.

Whenever, you need help and advice, contact your tutor or your Provincial Coordinator for assistance. If you are in the NCD or Central Province, we are available on Mondays to Fridays. You can call in anytime between 8 a.m. and 4 p.m. We would be glad to help you.

The following icons are used in each Lesson in this Unit. Icons are the symbols used in this book to indicate the parts of your lessons. The following are the icons and their meanings.



Whenever, you need help and advice, contact your tutor in the Information Technology Department at FODE.

We hope you enjoy learning this course. All the best!

Your Tutor

Information Technology Department
FODE

TOPIC 1

WHAT IS A COMPUTER?

Lesson 1: Definition of Computer

Lesson 2: Characteristics of Computer

Lesson 3: History of Computers

Lesson 4: Parts of a Computer

Lesson 5: Computer Terminology

Lesson 6: Care and Appropriate Use of Computers

TOPIC 1: WHAT IS A COMPUTER?

In this topic you will learn the basic concepts about what a computer is. The Topic is designed to familiarise yourself with computer fundamentals. It aims to provide you with facts and concepts necessary for the basic understanding in the study of computing.

We are all familiar with the use of calculations in our everyday life. We apply mathematical operations like addition, subtraction, multiplication and many other formulae for calculations. Simpler calculations take less time while complex calculations take a much longer time. Another factor is accuracy in calculations. So man explored with the idea to develop a machine which can perform this type of arithmetic calculation faster and with full accuracy. This gave birth to a device or machine called computer.

In this topic, you will study the following:

Lesson 1 is all about the definition of computer. You will be introduced to what a computer is with all its functions and uses. Similar topics were presented in the Basic Computer Guide Manual which you should have finished reading before starting on this unit book.

Lesson 2 discusses the characteristics of computer which also includes its strengths and limitations.

Lesson 3 focuses on the history of computers where early to present computing devices are shown to illustrate how the current computing devices have evolved.

Lesson 4 presents the parts of a computer to establish an understanding on what makes up the computer by identifying the parts, knowing the functions of the parts and locating these parts of the computer.

Lesson 5 explains some of the words used in the field of computing. A more complete list of words are found at the end of this unit book under the Glossary of Computer Terms.

Lesson 6 emphasizes on computer care and appropriate use. Different ways are itemised and discussed for a comprehensive presentation of appropriate machine care and use.

By the end of Topic 1, you should be able to identify the various hardware components, correctly use all hardware devices , use a range of computer applications, demonstrate knowledge and skills about basic features and how to access different application software.

Lesson 1: Definition of a Computer



Welcome to Lesson 1 of Unit 1. Unit 1 starts with the most basic lesson on computer definition.

In this lesson you shall learn about the definition and purpose of computer.

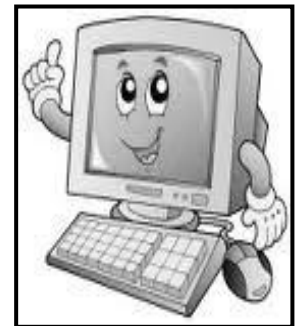


Your Aims:

- define computer
- identify the purpose of computers

What is a Computer?

The computer we see today is quite different from the one made in the beginning. The number of uses of a computer have increased. You must appreciate the impact of computers in our day to day life. For example, reservation of Airline tickets, payment of telephone and electricity bills, deposits and withdrawals of money from banks, business data processing, medical diagnosis and weather forecasting are some of the areas where computer has become extremely useful.



However, there is one limitation of the computer. It is only a machine that has to be given proper instructions to carry out its calculation. The computer needs human beings in order to operate. This is why we should know how a computer works.

Computer is an electronic device. It can be compared to a magic box, which serves different purposes to different people. The computer is composed of both the hardware and the software parts. The CPU (Central Processing Unit), the monitor, the keyboard and the mouse are the common hardware parts of a computer. These topics will be further elaborated in Lessons 4 and 7.

For a common man computer is simply a calculator, which works automatically and quite fast. For a person who knows more about it, computer is a machine capable of solving problems and manipulating data. It accepts data, processes the data by doing some mathematical and logical operations and gives us the desired output.

Therefore, we may define **computer as a device that transforms data**.

Data can be anything like marks obtained by you in various subjects. It can also be your name, age, gender, weight, height and other information about the students in your class or income, savings and investments of a country.

The computer has the following functions:

- a. accepts data
- b. stores data
- c. processes data as desired
- d. retrieves the stored data as and when required
- e. prints the result in desired format
- f. responds to a specific set of instructions in a well define manner

- g. executes a pre-recorded list of instructions (a program)
-



Activity 1: Answer each question.

1. Why do we need to know how a computer works?

2. List three (3) practical situations where a computer is used.

a.

b.

c.

Thank you for completing this activity. Now, you may go to the end of this lesson to check your answer. Make sure you do the necessary corrections before moving on to the next part of this lesson.

Summary



You have come to the end of Lesson 1. In this lesson you learnt that the computer is a device that transforms data which is obtained by you in various subjects. The computer can also be defined in terms of its functions.

NOW DO PRACTICE EXERCISE 1 ON THE NEXT PAGE

Practice Exercise 1

A. Write True if the statement is correct and write False if it is incorrect.

1. Computers can do arithmetic calculations with full accuracy. _____
 2. Computers transform data. _____
 3. Data could be anything. _____
 4. Computers are ~~always~~ "accurate". _____
 5. Computers can solve problems and manipulate data. _____
 6. Computers are limitless and have no boundaries. _____
 7. Computers have a single purpose for different people. _____
 8. Compute means to ~~integrate~~. _____
 9. Humans need not to be aware of how a computer works. _____
 10. Mathematical and logical operations are performed by computers. _____
 11. Computers can retrieve data at any time. _____
 12. Most computers cannot store data. _____
 13. Computers can only print selected of desired outputs. _____
 14. All computers can execute a program. _____
 15. Computers have limitations. _____
-

CHECK YOUR WORK. ANSWERS ARE AT THE END OF TOPIC 1.**Answers to Activity 1**

1. The computer is only a machine and needs to be given proper instructions to carry out its calculation. Computer needs human beings in order to operate. This is why we should know how a computer works.
2.
 - a. Reservation of Air Line tickets
 - b. Payment of telephone and electricity bills
 - c. Deposits and withdrawals of money from the bank

Lesson 2: Characteristics of Computer



Welcome to Lesson 2 of Unit 1. In Lesson 1 you were introduced to the definition and functions of a computer. It would be relevant to understand that all computers have certain common characteristics disregarding their type and size.

In this lesson you shall learn about the characteristics of computer.



Your Aims:

- identify the characteristics of a computer
 - identify the strengths and limitations of a computer
-

Characteristics of Computers

Computers are what they are because of the following characteristics:

1. Word Length

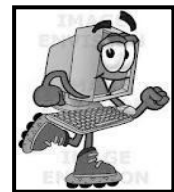
A digital computer operates on binary digits – 0 and 1. It can understand information only in terms of 0s and 1s.

A binary digit is called a bit. A group of 8 bits is called a **byte**.

The number of bits a computer can process at a time in parallel is called its **word length**. The word length is the measure of computing power of a computer. The longer the word length, the more powerful the computer is.

2. Speed

Computers can do calculations at very high speeds. A microcomputer, for example, can carry out millions of instruction per second over and over again without any mistake. As the power of the computer increases, the speed also increases.



3. Storage

A computer can store large amount of data. The thing that makes computer storage unique is not that it can store vast amounts of data, but the way it can retrieve the information that the user wants in a few seconds.



4. Power of Remembering

A computer has the power of storing any amount of information and data. Any information can be stored and recalled as long as you require it, for any numbers of years.



5. Accuracy

The accuracy of a computer system is very high. Errors in hardware can occur, but error detecting and correcting techniques will prevent false results. In most cases the errors are due to human factors rather than the computer itself.



6. Versatility

Computers are very flexible machines. They can perform activities ranging from simple calculations to complex modelling and simulation to navigating missiles and satellites. In other words, they are capable of performing almost any task,

provided the task can be reduced to a series of logical steps.

7. **Automation**

The level of automation achieved in a computer is phenomenal. Once a task is initiated, computers can proceed on its own till its completion. Computers can be programmed to perform a series of complex tasks involving multiple programs.



8. **Diligence**

Diligence means being constant and earnest in effort and application. Computer does not have any of human weaknesses.



Activity 1: Using the given choices below, match the characteristic of a computer to its performed task. Write the letter only.

- | | |
|-------------------------|----------------|
| A. Word length | E. Accuracy |
| B. Speed | F. Versatility |
| C. Storage | G. Automation |
| D. Power of remembering | H. Diligence |

1. Supercomputers can operate in nanoseconds and even picoseconds – one thousand to million times faster than microcomputers. _____
2. The computer accepts whatever that is keyed-in. _____
3. Computers can be programmed to perform a series of complex tasks involving multiple programs. _____
4. Computers can receive and send data in various forms like text, sound, video, graphics and others. _____
5. Computers perform similar task over and over again with the same precision, accuracy and enthusiasm as the first time. _____
6. Computers can communicate with other computers. _____

Thank you for completing this activity. Now, you may go to the end of this lesson to check your answer. Make sure you do the necessary corrections before moving on to the next part of this lesson.

What Computers Cannot Do

After knowing what the computers can do, there is no doubt that computers are fulfilling their promises to perform certain tasks better, faster and cheaper, in terms of the analogy with the automobile industry.

However, computers are machines with limitations. The following are the limitations of a computer:

1. **Productivity**

Computers have not met all our expectations as a productivity improvement tool. Sometimes it takes longer to do something with a computer than it would manually.



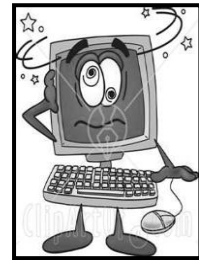
Sometimes it takes too much time to learn how to use an application program that is supposed to increase productivity.

But these problems are sorted out with improved user interface design, easy-to-use and easy-to-learn applications, use of wizards, templates, on-line and context sensitive help facilities and others.

2. **Errors**

Computers do not make errors, people do – either in the way they program computers or in the way they use them.

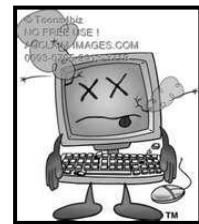
However, computers are extremely too detailed and often frustratingly exact. This is because they use the principle of logic. For example, 1 must always be equal to 1. If you type —oe”, the computer would not understand it.



Many of the problems with the computers occur because the computer cannot tell the difference between doing something sensible or ridiculous.

3. **Reasoning**

Computers cannot think. They cannot discriminate or understand widely different kinds of data and they have absolutely no capacity for moral evaluation. These are still powers possessed only by people and it may be wise to keep things that way.



4. **Feel**

It does not have feelings or emotion, taste, knowledge and experience. Thus, it does not get tired even after long hours of work. It does not distinguish between users.



Activity 2: Answer the given question.

List three ways how computer productivity errors can be corrected.

Thank you for completing this activity. Now, you may go to the end of this lesson to check your answers. Make sure you do the necessary corrections before moving on to the next part of this lesson.



Summary

You have come to the end of Lesson 2. In this lesson, you learnt about the characteristics of a computer. Its strengths are word length, speed, storage, power of remembering, accuracy, versatility, automation and diligence. However, it is limited by productivity, errors, reasoning and feel.

NOW DO PRACTICE EXERCISE 2 ON THE NEXT PAGE

Practice Exercise 2

A. Match Column A to Column B by writing the capital letter of your answer on the space provided for. An answer may be repeated.

Column A	Column B
1. Accuracy _____	A. perform similar tasks over and over again with the same precision, accuracy and enthusiasm as the first time
2. Speed _____	B. programmed to perform a series of complex tasks involving multiple programs
3. Versatility _____	C. capable of performing almost any task
4. Power of Remembering _____	D. accepts whatever that is keyed-in, so if the wrong input is given, the output also will be wrong power of storing any amount of information or data
5. Word Length _____	E. capable of storing huge amounts of data
6. Automation _____	F. can execute millions of instruction per second over and over again without a mistake
7. Storage _____	G. can understand information only in terms of 0s and 1s
8. Diligence _____	H. constant and earnest in effort and application
	I. can perform activities ranging from simple calculations to perform complex modelling and simulation

B. Circle the letter of the best answer.

- Computers do not have the capacity for moral evaluation.
 - Reasoning
 - Feel
 - Errors
 - Productivity
- Computers are extremely detailed machines and often frustratingly exact.
 - Reasoning
 - Feel

- C. Errors
D. Productivity
3. Computers do not get tired even after long hours of work.
A. Reasoning
B. FeelErrors
C. Productivity
4. Computer users takes too much time to learn how to use an application program.
A. Reasoning
B. Feel
C. Errors
D. Productivity
5. Computer cannot tell the differencre between doing something sensible versus something ridiculous.
A. Reasoning
B. Feel
C. Errors
D. Productivity
6. Computer cannot think.
A. Reasoning
B. Feel
C. Errors
D. Productivity
7. Computers do not distinguish between users.
A. Reasoning
B. Feel
C. Errors
D. Productivity
-

CHECK YOUR WORK. ANSWERS ARE AT THE END OF TOPIC 1.

Answers to Activities

Activity 1

1. B
2. E
3. G
4. F
5. H

Activity 2

6. F
1. improved user interface design
2. easy-to-use and easy-to-learn applications
3. use of wizards

Lesson 3: History of Computers



Welcome to Lesson 3 of Unit 1. In Lesson 2 you learnt about the important characteristics of computers. You are now aware that computers have its own strengths and limitations.

In this lesson you shall learn about the history of computers.

Your Aims:

- explain the origin and evolution of computer
- identify the types of computers
- appreciate the evolution of computer through five generations

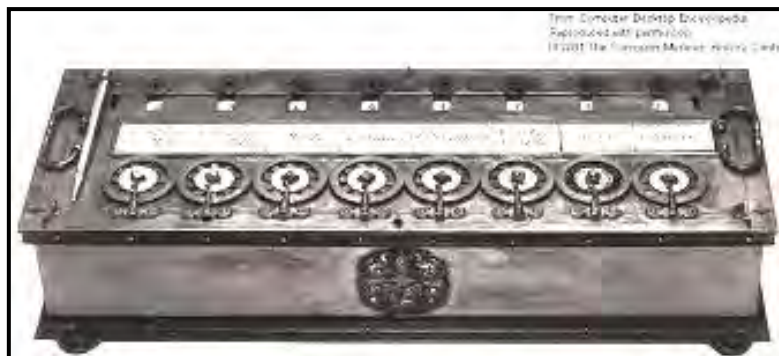
Early Computing Devices

The computer we know today has been around for about sixty years. However, this remarkable machine is built on centuries of intellectual effort. It developed from our need to count and perform calculations.

Here are some of the early computing devices that helped develop the computer that we know today.

1. The Mechanical Calculator

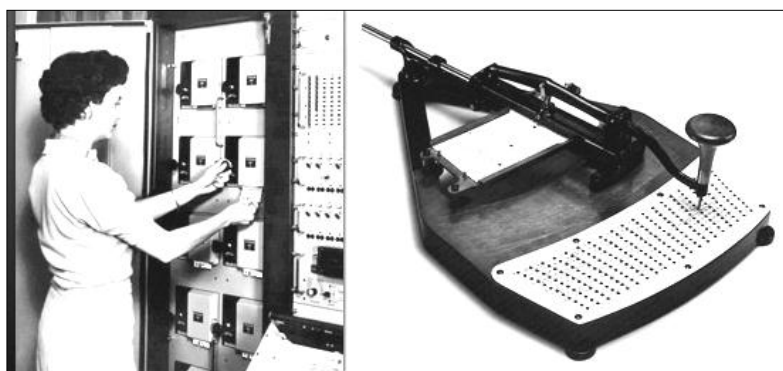
Blaise Pascal is credited as the person who built the first mechanical calculator. In 1642, at only 19, he invented a machine made of gears, wheels and cylinders that could be used to add and subtract. He called it the **Pascaline**.



The Pascaline

2. The Punch Card

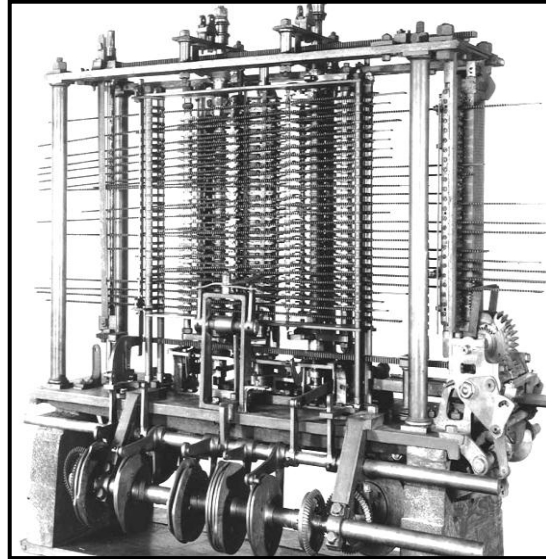
Joseph-Marie Jacquard perfected an automatic looming machine that used a stiff card with a series of holes, called a **punch card**.



The Punch Card

3. The Difference and Analytical Engines

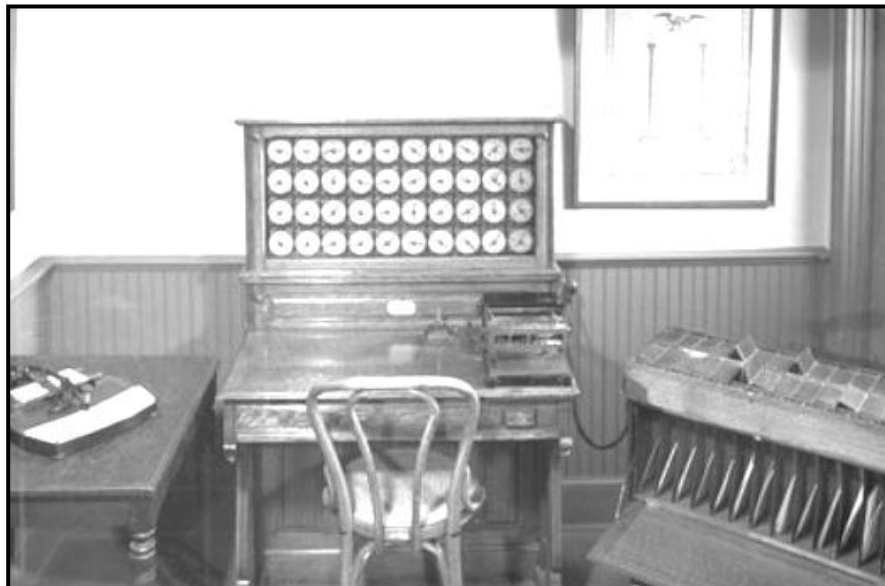
Charles Babbage is considered to be the father of the modern computer. He designed the Difference Engine and the Analytical Engine. Difference Engine calculates mathematical tables to twenty decimal places while the Analytical Engine was the first digital computer.



Charles Babbage's Analytical Engine

4. The Tabulating Device

Herman Hollerith developed a **tabulating device** based on Charles Babbage's punch card system. Hollerith continued to develop tabulating machines and his Tabulating Machine Company became a division of the company later called IBM.



The Tabulating Device

5. The Automatic Calculator

Howard Aiken worked with IBM. In 1939, he constructed a fully automatic calculator called the **Mark I**. It was 17 metres by 2.5 metres and contained three million electrical connections and 805 kilometres of wire. The Mark I was an electromechanical machine and could perform four basic operations.



The Mark I



Activity 1: Write T if the statement is True and write F if the statement is incorrect.

1. Pascaline is the first digital computer. _____
2. IBM was Tabulating Machine Company. _____
3. Howard Aiken designed the first mechanical calculator. _____
4. Charles Babbage developed the tabulating device. _____
5. Mark I calculates the four mathematical operations. _____

Thank you for completing this activity. Now, you may go to the end of this lesson to check your answer. Make sure you do the necessary corrections before moving on to the next part of this lesson.

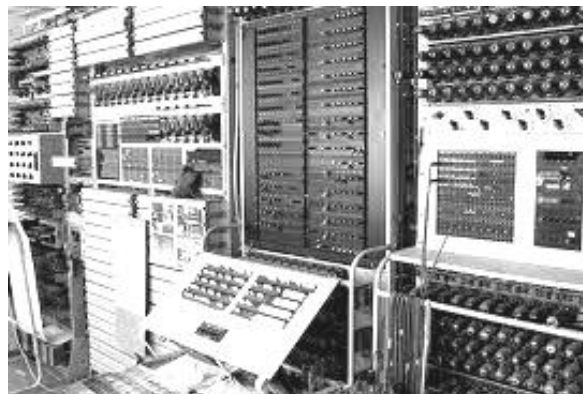
Early Electronic Computers



These early electronic computers have gone a long way. Their features and capabilities have increased through time.

1. The Colossus

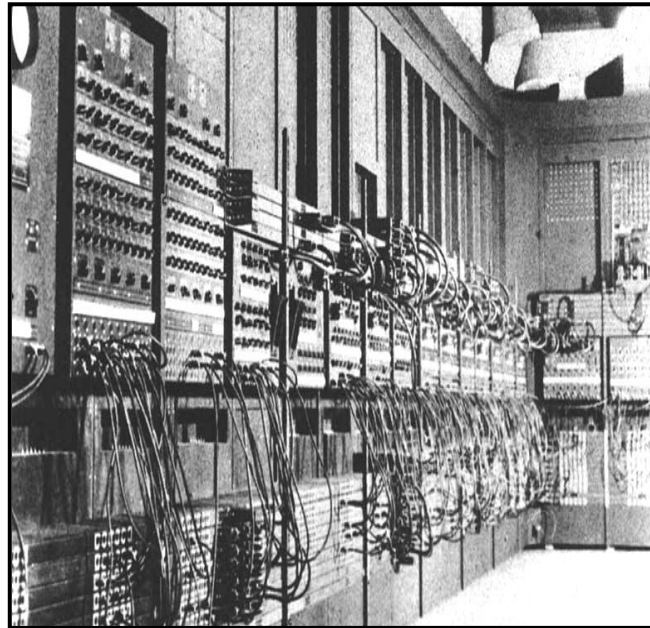
The first electronic digital computer was the **Colossus**. It was built in England by a team of mathematicians headed by Alan Turing.



The Colossus

2. The ENIAC

ENIAC (Electronic Numerical Integrator and Calculator) was completed in 1946 by John Presper Eckert and John William Mauchly. ENIAC was a great success for its time and was used by the military for calculations relating to rockets.



ENIAC was completed in 1846

3. The EDVAC

Another great pioneer of computing was John von Neumann who, in 1946, led the development of **EDVAC** (Electronic Discrete Variable Automatic Computer). It could store both instructions and data in its memory.



The EDVAC

4. The UNIVAC

In 1951, **UNIVAC** (Universal Automatic Computer) was designed by Eckert and Mauchly and delivered to the United States of America Bureau of Census. It was the first commercially available electronic computer.



The UNIVAC

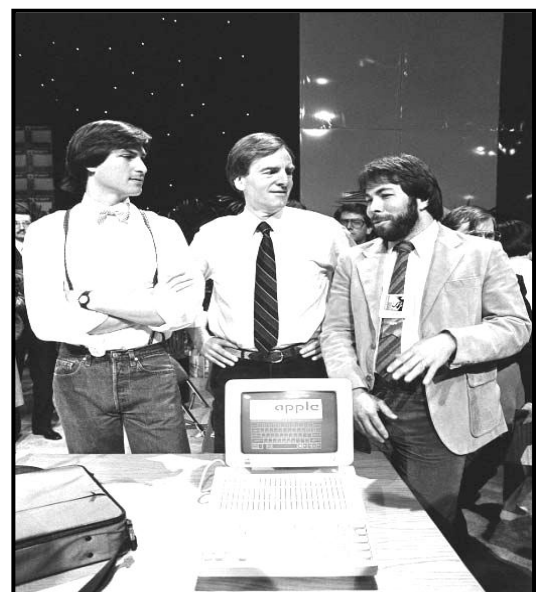
The following significant events and developments paved way for an increasingly high speed and multi functional computer that we have today.

1. William Shockley, John Bardeen and Walter Brattain from Bell Laboratories developed the **first transistor** in 1947. In 1958, the transistor was used in a computer and greatly increased the computer's processing speed to 10 000 operations per second, as well as reducing the size of the computer.
2. BASIC was designed by John Kemeny and Thomas Kurtz in 1964. It is a useful language to teach programming concepts. The **integrated circuit** consists of hundreds of electronic components such as transistors, resistors and capacitors packed on a small piece of silicon wafer.



BASIC (Beginners All-purpose Symbolic Instruction Code) is a high-level programming language

3. The programming language called **C** was created at Bell Laboratories in the United States by Dennis Ritchie in 1972. It was designed for structured programming to use with the UNIX operating system.
4. In 1975, the first popular personal computer called the **Altair** was advertised in Popular Electronics for \$395.
5. The first personal computer to grab the public's imagination was the **Apple**. It was put together by Steve Wozniak and Steve Jobs in a garage to show to members of their computer club.
6. In 1977, the Apple II was produced and it is described as the first personal computer that almost anyone could use.
7. In 1981, IBM released the first high-powered personal computer. It was called the IBM PC and had an open architecture, which meant that others could copy its method of operation.
8. Microsoft was commissioned to design the operating system that became known as MS-DOS. The **Macintosh** computer was



Steve Wozniak and Steve Jobs built the first Apple computer

first released by Apple in 1984. It was one of the first personal computers to feature a graphical user interface (GUI) and use a mouse.

9. Grace Hopper developed the first compiler in 1952. She also conceived the idea of a programming language based on English that led to the development of **COBOL**.



Grace Hopper was actively involved in the development of COBOL.

She believed that the key to opening up new worlds to computing was the development of programming languages that could be understood and used by people who were neither mathematicians nor computer experts.

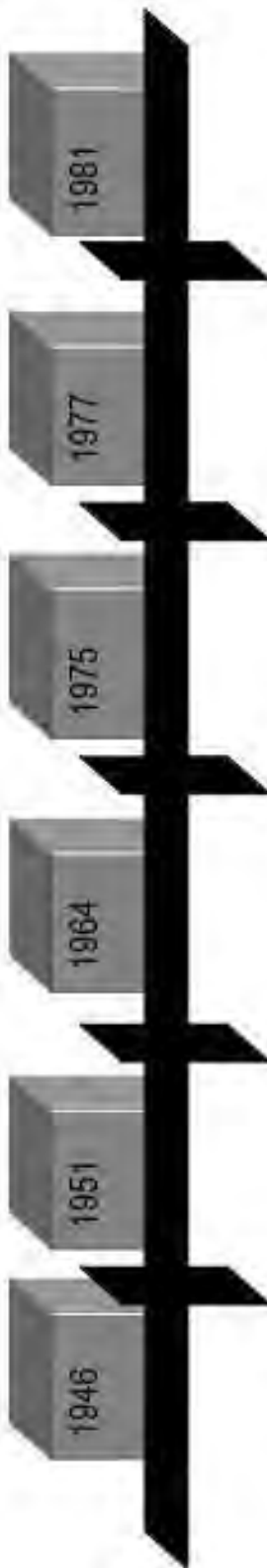
It took several years for her to demonstrate that this idea was feasible.

Grace Hopper and the COBOL

10. Jim Backus of IBM developed a high-level language called **FORTRAN** (**FOR**mula **TRAN**slation) in 1954. It resembles the symbolism used in mathematics and has undergone continued development.



The FORTRAN

**Activity 2: Fill-in the events in the given time line below.**

Thank you for completing this activity. Now, you may go to the end of this lesson to check your answer. Make sure you do the necessary corrections before moving on to the next part of this lesson.

Computer Generations



The evolution of computer started in the 16th century and resulted in the form that we see today. The present day computer, however, has undergone rapid changes during the last fifty years. This period, during which the evolution of computer took place, can be divided into five distinct phases known as **Generations of Computers**. Each phase is distinguished from others on the basis of the type of **circuit switching** used. **Circuit switching** is a switching method in which a dedicated communication path in physical form between two stations within a network is established, maintained and completed for each communication session.

First Generation Computers

First generation computers used **Thermion valves**. These computers were large in size and writing programs on them was difficult. Some of the computers of this generation include:

1. **ENIAC:** It was the first electronic computer built. It was named Electronic Numerical Integrator and Calculator (ENIAC).
2. **EDVAC:** It stands for Electronic Discrete Variable Automatic Computer and was developed in 1950. The concept of storing data and instructions inside the computer was introduced here.



The ENIAC

Other Important Computers of First Generation

1. **EDSAC:** It stands for Electronic Delay Storage Automatic Computer and was developed by M.V. Wilkes at Cambridge University in 1949.
2. **UNIVAC-1:** Eckert and Mauchly produced it in 1951 by Universal Accounting Computer setup.

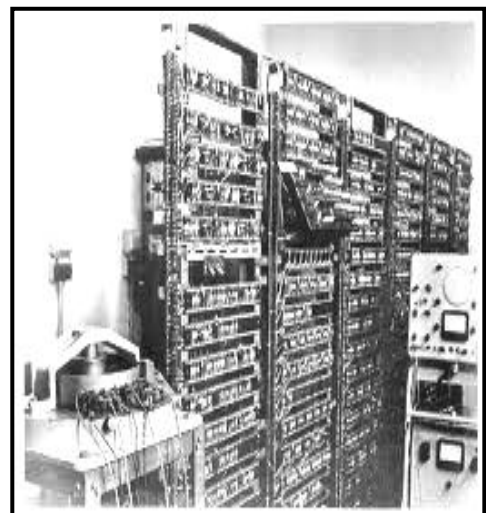
Limitations of First Generation Computer

Following are the major drawbacks of First generation computers.

1. The operating speed was quite slow.
2. Power consumption was very high.
3. It required large space for installation.
4. The programming capability was quite low.

Second Generation Computers

Around 1955 a device called **Transistor** replaced the bulky electric tubes in the first generation computer. Transistors are smaller than electric tubes and have higher operating speed. They have no filament and require no heating. Manufacturing cost was also very low. Thus the size of the computer got reduced considerably. It is in the second generation that the concept of Central Processing Unit (CPU), memory, programming language and input and output units were developed. The programming languages such as COBOL.



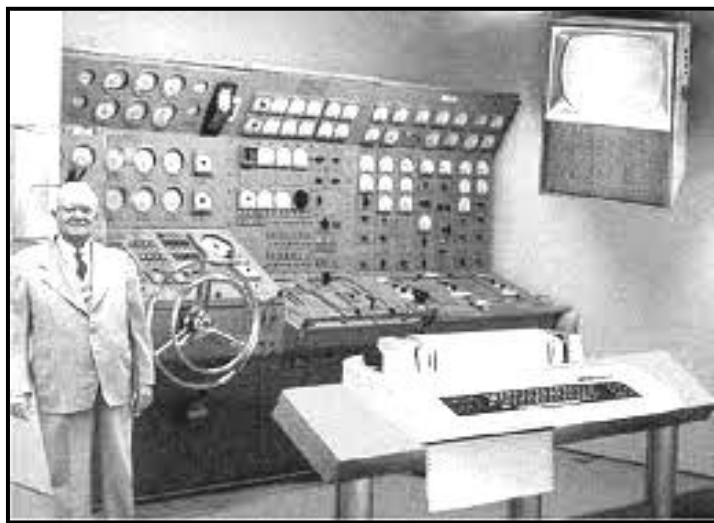
A Second Generation Computer

FORTTRAN were developed during this period. Some of the computers of the Second Generation were:

1. IBM 1620: Its size was smaller as compared to First Generation computers and mostly used for scientific purpose.
2. IBM 1401: Its size was small to medium and used for business applications.
3. CDC 3600: Its size was large and is used for scientific purposes.

Third Generation Computers

The third generation computers were introduced in 1964. They used **Integrated Circuits** (ICs). These ICs are popularly known as **Chips**. A single IC has many transistors, registers and capacitors built on a single thin slice of silicon. So it is quite obvious that the size of the computer got further reduced. Higher level language such as BASIC (Beginners All-purpose Symbolic Instruction Code) was developed during this period. Computers of these generations were small in size, low cost, large memory and processing speed is very high.



A Third Generation Computer

Fourth Generation Computers

Some of the present day computers that you see today are the fourth generation computers that started around 1975. It uses **Large Scale Integrated Circuits** (LSIC) built on a single silicon chip called microprocessors. Due to the development of microprocessor it is possible to place computer's **central processing unit** (CPU) on single chip. These computers are called microcomputers. Later **Very Large Scale Integrated Circuits** (VLSIC) replaced LSICs.

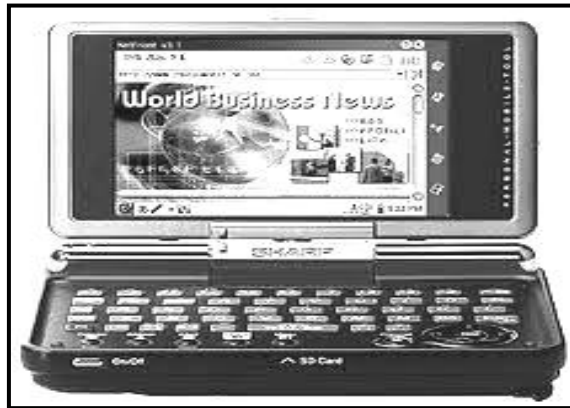
Thus the computer which was occupying a very large room in earlier days are now placed on a table.



A Fourth Generation Computer

Fifth Generation Computers

The computers that came out during the 1990s are said to be Fifth Generation computers. The speed is extremely high. Apart from this, it can perform **parallel processing**. The concept of **Artificial intelligence** has been introduced to allow the computer to take its own decision.



A Fifth Generation Computer



Activity 3: Identify the generation of computer. Use the guide below. Write the letter only.

- A. First Generation Computer
- B. Second Generation Computer
- C. Third Generation Computer
- D. Fourth Generation Computer
- E. Fifth Generation Computer

1. The concept of Artificial intelligence is used. _____
2. Computers used Integrated Circuits (ICs). _____
3. Computers started using COBOL and FORTRAN. _____
4. Computers were large in size and writing programs on them was difficult. _____
5. Computers started using the microprocessors. _____

Thank you for completing this activity. Now, you may go to the end of this lesson to check your answer. Make sure you do the necessary corrections before moving on to the next part of this lesson.

Summary



You have come to the end of Lesson 3. In this lesson, you learnt about the history of computer. It has taken centuries of human effort to see the computer in its present form today. There are five generations of computer. Over these generations the physical size of computer has decreased, but on the other hand the processing speed of computer has improved tremendously. We also discussed about the varieties of computers available today.

NOW DO PRACTICE EXERCISE 3 ON THE NEXT PAGE

Practice Exercise 3

A. Identify what is described in each item below.

1. First mechanical calculator. _____
2. First electronic digital computer. _____
3. First commercially available electronic computer. _____
4. First popular personal computer. _____
5. Complete the following sentences:
 - a. Joseph-Marie Jacquard invented the _____.
 - b. _____ developed a tabulating device that was used in the 1890 census.
 - c. EDVAC could store both _____ and data in its memory.
 - d. Microsoft designed an operating system called _____ for the IBM PC.
6. Who invented these computers?
 - a. Analytical Engine _____
 - b. Mark I _____
 - c. ENIAC _____
 - d. Apple II _____

B. Answer the given questions.

1. What contribution did Ada Augusta Byron make to the development of computers?

 2. Describe the specifications of the IBM PC released in 1981.

 3. What is the importance of studying the history of computers?

-

CHECK YOUR WORK. ANSWERS ARE AT THE END OF TOPIC 1.
--

Answers to Activities**Activity 1**

1. False
2. True
3. False
4. False
5. True

Activity 2

- | | |
|------|---|
| 1946 | - ENIAC was developed
- EDVAC was developed |
| 1951 | - UNIVAC was developed |
| 1964 | - BASIC was designed |
| 1975 | - ALTAIR was advertised as first popular personal computer |
| 1977 | - APPLE 2 was introduced as first personal computer |
| 1981 | - IBM released the IBM PC as the first high powered personal computer |

Activity 3

1. E
2. D
3. B
4. A
5. D

Lesson 4: Parts of Computers



Welcome to Lesson 4 of Unit 1. In Lesson 3 you learnt about the history of computers which provided you with information on how computers have evolved to what they are now.

In this lesson you shall learn about the parts of computers.



Your Aims:

- identify the parts of a computer
- differentiate the functions of each parts of the computer
- locate and name the different parts of a computer

Parts of Computer

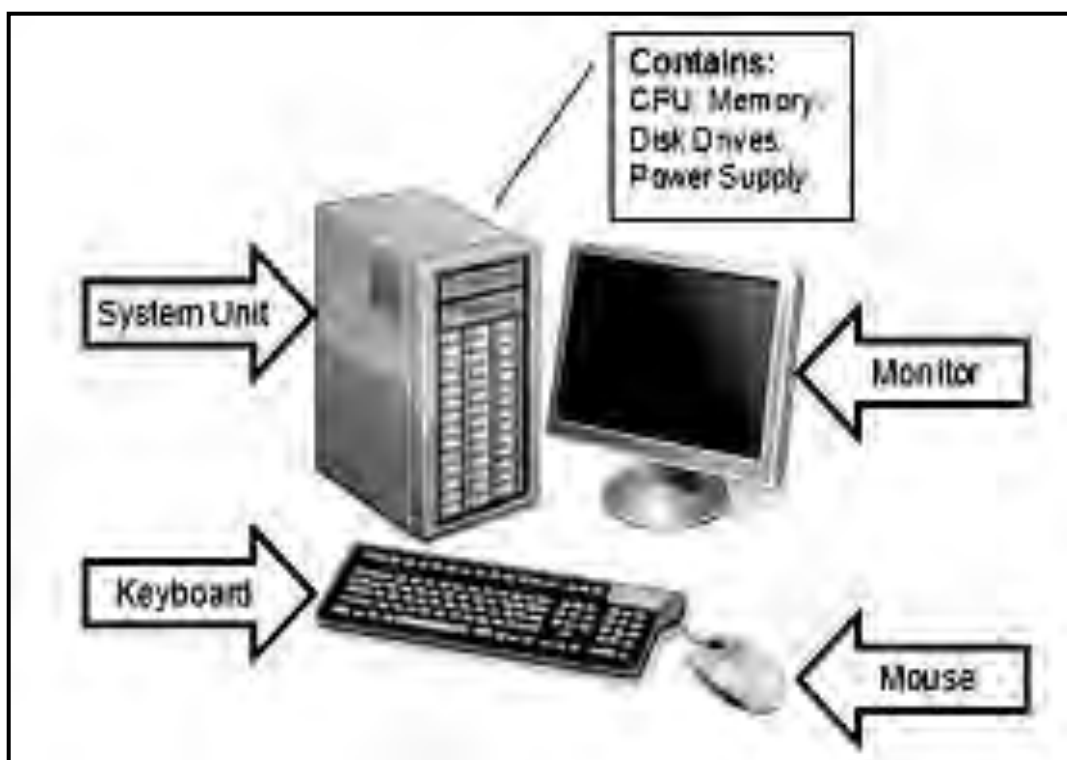
Computer Systems are made up of many different parts, for example hardware, software, processors, memory and others. In Lesson 1, you learnt that computers are made up of hardware and software. In this lesson you will learn that there are specific parts of the computer especially the hardware. It is important that you have a basic understanding of some of the main parts of a computer.

Here are the parts of a computer:

1. Hardware

Hardware is any physical part of the computer that you can touch, see and pick up.

The pictures below makes up the hardware which include the monitor, keyboard, mouse, and the System Unit.



The Hardware

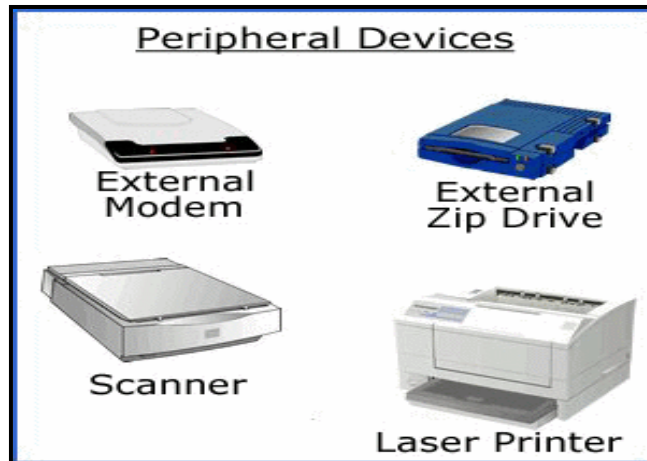
2. **Peripheral**

Peripheral is any device which connects to the computer and exchanges data with the CPU.

Peripherals include all of the computer's input and output devices. Peripherals are also regarded as Hardware. Lessons 9-10 will further discuss on input and output devices.

Some other examples of peripherals are:

- printer
- scanner
- speakers
- external hard drives



3. **Motherboard**

Motherboard is the central circuit board of your computer.

The job of the motherboard is to relay information between the components and peripherals. The motherboard is found inside the System Unit where the CPU is found. The motherboard as part of the System Unit of a computer will be further discussed in Lesson 7.

All of the components and peripherals are plugged into the Motherboard.



The Computer Motherboard

4. **Disk Drives**

Disk drive reads data from a storage device.

Common disk drives that you will come across in your studies are:

- hard disk drive
- removable hard disk drive
- floppy disk drive
- DVD drive
- zip disk drive
- CD drive

Disk Drives just like the motherboard are also found inside the System Unit. The floppy, CD and DVD disk drives are installed inside the front of your computer case so that you can load the disks directly into them.

The hard disk drive is installed inside your computer and it reads data stored on the hard disk. A zip disk drive and a removable hard disk drive are external to the computer and need to be plugged in via a USB port.

The topic on disk drives will be further discussed in Lessons 15-16 on Primary and Secondary Storage Devices.

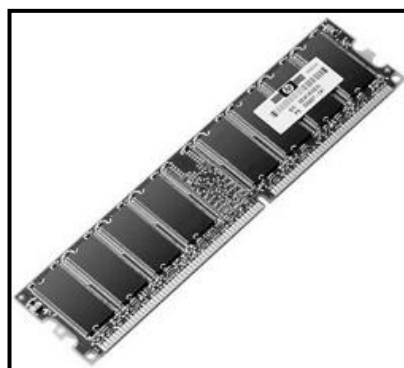


The floppy, Cd and DVD disk drives

5. **The Memory**

Computer memory is any physical device capable of storing information temporarily or permanently. There are two main memory types that you need to clearly understand. These are **Random Access Memory (RAM)** and **Read Only Memory (ROM)**.

Read Only Memory (ROM) is the kind of memory where data stored on ROM is not erased when the power is switched off - it is permanent. This is called 'non-volatile memory'.



The ROM

The ROM chip is used to hold data that cannot be changed by the user. Instructions related to the operating system are stored on ROM chips when the computer is manufactured.

Random Access Memory (RAM) is volatile memory. The data is held on a chip but only temporarily. The data disappears if the power is switched off.



The RAM

Cache Memory

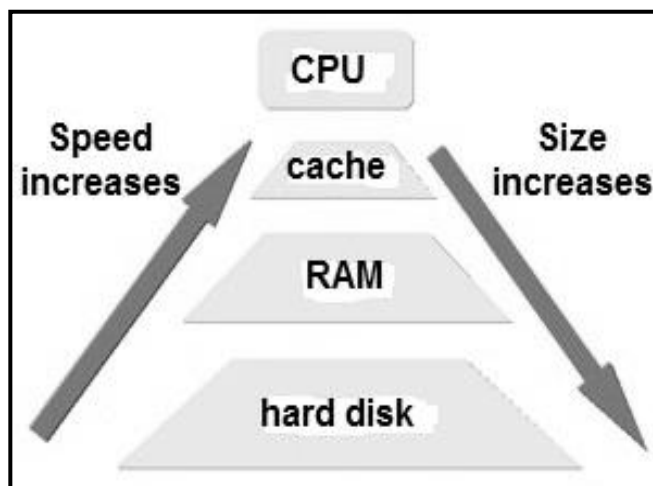
Most data is stored on the hard disk. When we use that data, it is loaded into RAM because it is much faster to access the data from RAM than from the hard disk.

Remember that when we looked at the 'immediate access store earlier, we found out that the CPU needs to access data very quickly. Although RAM is faster than the hard disk, it still isn't fast enough to cope with the speed that the CPU needs to deal with data. This is where Cache is important

By referring to the picture below, we can say that the cache is a special type of computer memory which can be accessed much faster than RAM.

The CPU looks in the cache for the data it needs. If the data is there, it will retrieve it and process it. If the data is not there, then the CPU accesses the system memory and then puts a copy of the new data in the cache before processing it.

Cache memory is volatile so when the computer is shut down; the data stored there is lost.



The Role of the Cache Memory

6. Central Processing Unit

Central Processing Unit (CPU) is the “brain” of the computer.

It is where all the searching, sorting, calculating and decision making takes place.

The CPU contains a tiny clock. Each time this clock 'ticks', one instruction can be dealt with by the CPU. So the more times this clock ticks per second, the more instructions the CPU can carry out and the faster things get done. The speed of the CPU is measured in either Megahertz (MHz) or more commonly now in Gigahertz (GHz).

A typical CPU installed in a computer today would run at around 3 GHz. The CPU of a computer comes in different brand names, one of them is INTEL. The example given below has an INTEL brand name.

Now, look at the pictures below which illustrates where a CPU is located and how it looks like.



The CPU inside the System Unit



CPU located inside the System Unit



The CPU of the computer

7. Software

Software are the applications and programming instructions needed to make the computer hardware do useful work.

These are some examples of systems software which tells the computer what to do:

- Operating System
- Utilities
- User Interface

Now, here are some examples of application software which allow you to do your work:

- Word processors such as Microsoft Word
- Spreadsheets such as Microsoft Excel
- Databases such as Microsoft Access



Example of a Software package : The Windows Vista Software Package



Activity 1: Answer the given questions.

- A. Identify the part of the computer described in each item. Write your answer on the space provided.
1. It is where all the searching, sorting, calculating and decision making takes place. _____
 2. The physical part of the computer. _____
 3. It includes all the computer's input and output devices. _____
 4. Word processing and Databases are examples of this. _____
 5. It is the —brain— of the computer. _____
- B. You were working on your computer and when you logged back on, your work has disappeared. Why did this happen? What must you do the next time?

Thank you for completing this activity. Now, you may go to the end of this lesson to check your answer. Make sure you do the necessary corrections before moving on to the next part of this lesson.



Summary

You have come to the end of Lesson 4. In this lesson, you learnt about the parts of computer. The parts of the computer consist of the Hardware, Software, Central processing, Arithmetic and Logic Unit, Motherboard, Disk drives, Memory and Cache Memory. All of these parts play their own functions to make a computer work.

NOW DO PRACTICE EXERCISE 4 ON THE NEXT PAGE
--

B. Write TRUE if the statement is correct and FALSE if the statement is wrong.

1. The CPU contains a tiny quartz clock which ticks. _____
 2. One of the jobs of the Control Unit is to control the flow of data within the CPU.

 3. The Arithmetic and Logic Unit is where the computer processes data by performing calculations and comparisons. _____
 4. The speed of the CPU is measured in either Megahertz (MHz) or more commonly now in Gigahertz (GHz). _____
-

CHECK YOUR WORK. ANSWERS ARE AT THE END OF TOPIC 1.**Answers to Activity****Activity 1**

A.

1. CPU
2. Hardware
3. Peripheral
4. Software
5. CPU

B.

My work disappeared because I did not save properly. The work I did when the computer was switched on was temporarily saved in the RAM where data disappears once the power is switched off.

Next time, I must save properly my work properly so that it is stored on the hard disk using the ROM.

Lesson 5: Computer Terminology



Welcome to Lesson 5 of Unit 1. In Lesson 4 you learnt about the parts of the computer. This should have made you aware on what makes a computer work.

In this lesson you shall learn about few of the basic terminologies used in the subject of computing.

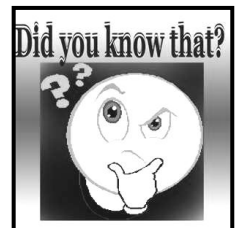


Your Aims:

- identify the terms used in computer technology
- use the terms in computer technology

There are plenty of terms you need to know to increase your understanding of computers. Read through the following terms and identify their meaning and correct use.

A Glossary of Computer Terms can be found at the end of this Unit that will guide you as you journey through the lessons for this course.



A

- **Active Data** - Refers to data that is visible to the system's operating system or the application software with which it was created.
- **Analog**- Also spelled *analogue*, describes a device or system that represents changing values as continuously variable physical quantities.
- **Application (Application Software)** - An application is a program or group of programs designed for end users.
- **Architecture** - A design. The term *architecture* can refer to either hardware or software or to a combination of hardware and software. The architecture of a system always defines its broad outlines and may define precise mechanisms as well.

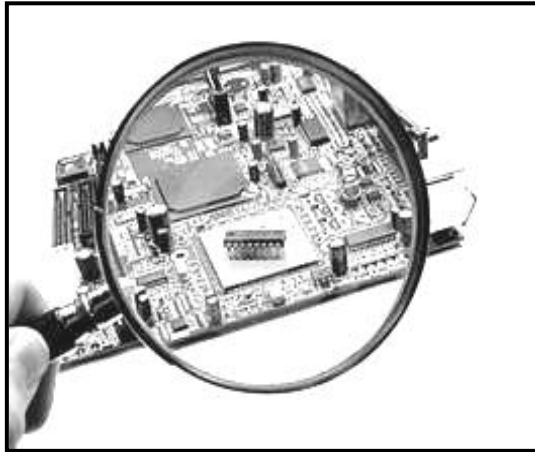
B

- **Bit** - Claude E. Shannon first used the word bit in a 1948 paper. Shannon's bit is a portmanteau word for **binary digit** (or possibly **binary digit**). He attributed its origin to John W. Tukey. See Piece of eight.
- **BASIC** - In computer programming, BASIC (an acronym which stands for Beginner's All-purpose Symbolic InstructionCode) is a family of high-level programming languages designed to be easy to use.
- **Bootling or bootstrapping** — The term bootling or bootstrapping a computer was inspired by the story

Binary	Hex	Decimal
0000	0	0
0001	1	1
0010	2	2
0011	3	3
0100	4	4
0101	5	5
0110	6	6
0111	7	7
1000	8	8
1001	9	9
1010	A	10
1011	B	11
1100	C	12
1101	D	13
1110	E	14
1111	F	15

of the Baron Münchhausen where he pulls himself out of a swamp by the straps on his boots.

- Boolean Logic - Named after the nineteenth-century mathematician George Boole, Boolean's logic is a form of algebra in which all values are reduced to either TRUE or FALSE.
- Bug - a fault in a computer program which prevents it from working correctly.



Where the "bug" can be located

- Byte - the term was coined by Werner Buchholz in 1956 during the early design phase for the IBM Stretch computer. It was coined by mutating the word *bite* so it would not be accidentally misspelled as bit. A byte usually is a grouping of 8 bits, but technically refers to the smallest unit of memory.

C

- C - a programming language named because Dennis Ritchie improved on the B language and called it *New B*. He later called it C. (See also D).
- C++ - an object-oriented programming language and a successor to the C programming language.
- Capacitor - A passive electronic component that holds a charge in the form of an electrostatic field.



Capacitor

- Circuit Switching - A type of communications in which a dedicated channel (or circuit) is established for the duration of a transmission.

- CD Rom Drive - Also called a CD-ROM drive, a device that can read information from a CD-ROM.
- Central Processing Unit (CPU) - the heart of the computer, this is the component that actually executes instructions.
- Cookie - A packet of information that travels between a browser and the web server. The term was coined by web browser programmer Lou Montulli after the term "magic cookies" used by Unix programmers.



Cookie

- COBOL - **CO**mmun **B**usiness-**O**riented **L**anguage
- Computer - A computer is a programmable machine
- CPU - an acronym for **Central Processing Unit** and is often used to refer to a computer system, such as "That beige box sitting next to my 24" flat screen monitor is my new CPU." The "beige box" being referred to in the aforementioned statement is a computer system and not a CPU, the CPU is the chip inside the computer system known specifically as the microprocessor.

D-F

- Data - Distinct pieces of information, usually formatted in a special way.
- Data Compression - Storing data in a format that requires less space than usual.
- Data Processing - (1) Refers to a class of programs that organize and manipulate data, usually large amounts of numeric data. Accounting programs are the prototypical examples of data processing applications. In contrast, **word processors**, which manipulate text rather than numbers, are not usually referred to as data processing applications. (2) Same as Information Technology (IT), refers to all computing functions within an enterprise.
- Database - A collection of information organized in such a way that a computer program can quickly select desired pieces of data.
- Database Management System - A collection of programs that enables you to store, modify and extract information from a database.
- Database Software - Database software is the phrase used to describe any software that is designed for creating databases and managing the information stored in them.

- Desktop - The area on the display screen where icons are grouped is often referred to as the desktop because the icons are intended to represent real objects on a real desktop.
- Desktop Computer - A computer designed to fit comfortably on top of a desk, typically with the monitor sitting on top of the computer.
- Defragging - Defragmentation, also known as defragging, is a process that takes all the file fragments scattered across a computer's hard drive and rejoins the multiple pieces of each file into one area. This can speed up your computer, save you time and extend the life of your hard drive.
- Digital- Describes any system based on discontinuous data or events.
- Digital Mapping - The process of storing and displaying map data in digital form (to store and retrieve on a computer).
- Digitize - To translate into a digital form.
- E-Learning - Education via the Internet, network, or standalone computer. e-learning is essentially the network-enabled transfer of skills and knowledge. e-learning refers to using electronic applications and processes to learn. e-learning applications and processes include Web-based learning, computer-based learning, virtual classrooms and digital collaboration. Content is delivered via the Internet, intranet/extranet, audio or video tape, satellite TV, and CD-ROM
- ENIAC - Acronym for **E**lectronic **N**umerical Integrator **A**nd **C**omputer, the first operational electronic digital computer in the U.S., developed by Army Ordnance to compute World War II ballistic firing tables.
- File - A collection of data or information that has a name, called the filename.
- Firewall - A system designed to prevent unauthorized access to or from a private network.
- Freeze ups - To stop functioning properly, usually temporarily

G

- Graphical User Interface - Abbreviated GUI (pronounced GOO-ee). A program interface that takes advantage of the computer's graphics capabilities to make the program easier to use.
- Google — search engine on the web.



H-L

Google Home Page

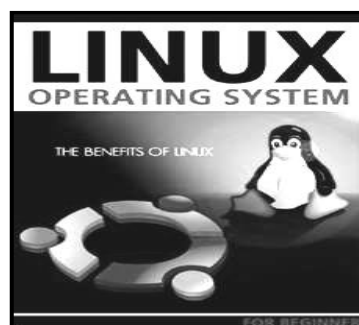
- Hardware - Refers to objects that you can actually touch, like disks, disk drives, display screens, keyboards, printers, boards, and chips

- Icons - Small pictures that represent commands, files, or windows. By moving the pointer to the icon and pressing a mouse button, you can execute a command or convert the icon into a window. You can also move the icons around the display screen as if they were real objects on your desk.
- Import - To use data produced by another application.
- Input - Whatever goes into the computer. Input can take a variety of forms, from commands you enter from the keyboard to data from another computer or device. A device that feeds data into a computer, such as a keyboard or mouse, is called an input device.
 - The act of entering data into a computer.
- Input Device: usually a keyboard and mouse, the input device is the conduit through which data and instructions enter a computer.
- Instruction - A basic command
- ISP - Short for **I**nternet **S**ervice **P**rovider, it refers to a company that provides Internet services, including personal and business access to the Internet.
- Hotmail - free email service, now part of MSN.



Hotmail logo

- Java - a programming language
- Linux - an operating system kernel, and the common name for the operating system which uses it.



Linux logo

M

- Macintosh, Mac - a personal computer from Apple Computer.
- Mac OS - The operating system used in a Macintosh computer. from "Mac", a shortened form of Macintosh.

- Mainframe - a powerful multi-user computer capable of supporting many hundreds or thousands of users simultaneously.
- Mass Storage Device - allows a computer to permanently retain large amounts of data. Common mass storage devices include disk drives and tape drives.
- Memory - enables a computer to store, at least temporarily, data and programs.
- Menu - Most graphical user interfaces let you execute commands by selecting a choice from a menu.



Macintosh dialog box

- Motherboard - The main circuit board of a microcomputer. The motherboard contains the connectors for attaching additional boards.
- Multiprocessing - Supports running a program on more than one CPU.
- Multitasking - Allows more than one program to run concurrently.
- Multi-user - Allows two or more users to run programs at the same time. Some operating systems permit hundreds or even thousands of concurrent users.
- Mozilla - a web browser and successor to Netscape Communicator.



Mozilla page

N-O

- Network - A network is a group of two or more computer systems linked together.
- Network Computer - A computer with minimal memory, disk storage and processor power designed to connect to a network, especially the Internet.

- Network Operating System - Abbreviated as *NOS*, an operating system that includes special functions for connecting computers and devices into a local-area network (LAN).
- Offline - Not connected.
- Online - Turned on and connected.
- Operating System - The operating system is the most important program that runs on a computer.
- Output Device - a display screen, printer, or other device that lets you see what the computer has accomplished.

P

- Pentium - Microprocessor from Intel According to Intel, Pentium conveys a meaning of strength, like titanium.
- Perl — an interpreted scripting language
- Personal Computer - a small, single-user computer based on a microprocessor. In addition to the microprocessor, a personal computer has a keyboard for entering data, a monitor for displaying information, and a storage device for saving data.
- Pointer - A symbol that appears on the display screen and that you move to select objects and commands. Usually, the pointer appears as a small angled arrow.
- Pointing Device - A device, such as a mouse or trackball, that enables you to select objects on the display screen.
- Printer - A device that prints text or illustrations on paper.
- Program - An organized list of instructions that, when executed, causes the computer to behave in a predetermined manner.

R

- Random Access - Refers to the ability to access data at random. The opposite of random access is sequential access.
- Raw Data - Information that has been collected but not formatted or analyzed. Raw data often is collected in a database where it can be analyzed and made useful.
- Read - To copy data to a place where it can be used by a program. The term is commonly used to describe copying data from a storage medium, such as a disk, to main memory.
 - The act of reading. For example, a fast disk drive performs 100 *reads* per second.
- Read/Write - Capable of being displayed (read) and modified (written to). Most objects (disks, files, directories) are read/write, but operating systems also allow you to protect objects with a read-only attribute that prevents other users from modifying the object.
- Read-Only - Capable of being displayed, but not modified or deleted.
- Reboot - To restart a computer. In DOS, you can reboot by pressing the Alt, Control and Delete keys simultaneously. This is called a warm boot. You can also perform a cold boot by turning the computer off and then on again.

- Recycle Bin - An icon on the Windows desktop that represents a directory where deleted files are temporarily stored.
- Router – A device that forwards data packets along networks.

S

- Secondary Memory - Secondary memory (or secondary storage) is the slowest and cheapest form of memory. It cannot be processed directly by the CPU. It must first be copied into primary storage (also known as RAM).
- Server - A computer or device on a network that manages network resources. Shareware - coined by Bob Wallace to describe his word processor PC-Write in early 1983..
- Shut Down - To turn the power off.
- Software - Software means computer instructions or data. Anything that can be stored electronically is software,
- Spam - unwanted repetitious messages, such as unsolicited bulk e-mail
- SPIM - a simulator for a virtual machine closely resembling the instruction set of MIPS (computer manufacturer) processors, is simply MIPS spelled backwards. MIPS stands for Millions of Instructions Per Second, from way back when that was something to boast of. In recent time, SPIM has also come to mean SPam sent over Instant Messaging.



Spam Folder

- Stand-Alone - Refers to a device that is self-contained, one that does not require any other devices to function.
- Storage - (1) The capacity of a device to hold and retain data (2) Short for mass storage.
- Supercomputer - an extremely fast computer that can perform hundreds of millions of instructions per second.
- Surge Protector - A device that shields computer and other electronic devices from surges in electrical power, or transient voltage, that flow from the power supply.
- System Unit - The main part of a personal computer. The system unit includes the chassis, microprocessor, main memory, bus, and ports, but does not include the keyboard or monitor, or any peripheral devices.
- Systems Software - Refers to the operating system and all utility programs that manage computer resources at a low level.

T-V

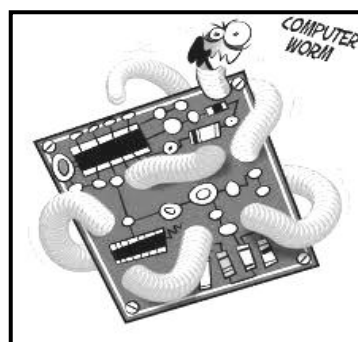
- Trojan horse - a malicious program that is disguised as legitimate software.
- Troubleshoot - To isolate the source of a problem and fix it, typically through a process of elimination whereby possible sources of the problem are investigated and eliminated beginning with the most obvious or easiest problem to fix.
- Upgrade - A new version of a software or hardware product designed to replace an older version of the same product.
- Utility - A program that performs a very specific task, usually related to managing system resources.
- Virus - a piece of program code that spreads by making copies of itself. The term virus was first used as a technical computer science term by Fred Cohen in his 1984 paper "Experiments with Computer Viruses", where he credits Len Adleman with coining it.



-Virus"

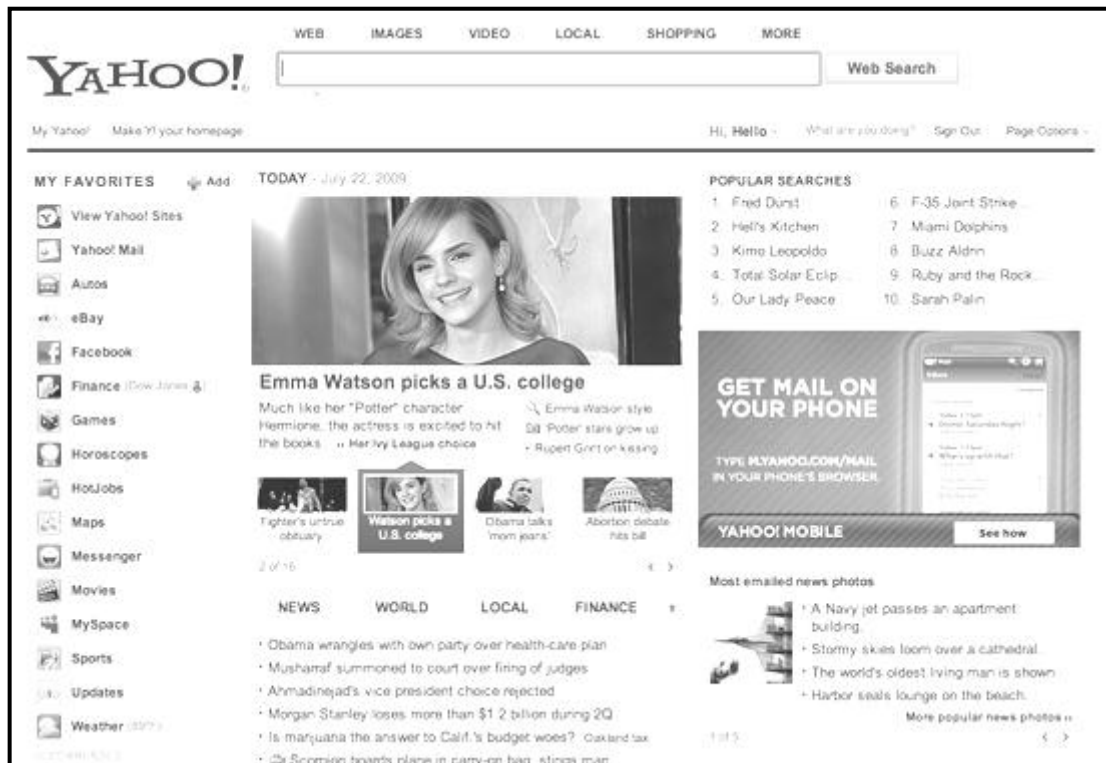
W-Z

- Wiki or WikiWiki - a hypertext document collection or the collaborative software used to create it.
- Windows - You can divide the screen into different areas. In each window, you can run a different program or display a different file. You can move windows around the display screen, and change their shape and size at will.
- Workstation - a powerful, single-user computer. A workstation is like a personal computer but it has a more powerful microprocessor and a higher-quality monitor.
- Worm - a self-replicating program, similar to a virus.



-Worm"

- Yahoo! - internet portal and web directory. Yahoo!'s history site says the name is an acronym for "Yet Another Hierarchical Official Oracle", but some remember that in its early days (mid-1990s), when Yahoo! lived on a server called akebono.stanford.edu, it was glossed as "Yet Another Hierarchical Object Organizer." The word "Yahoo!" was originally invented by Jonathan Swift and used in his book Gulliver's Travels. It represents a person who is repulsive in appearance and action and is barely human. Yahoo! founders Jerry Yang and David Filo selected the name because they considered themselves yahoos.



Yahoo Home Page

- Zip - a file format now also used as a verb to mean compress. Zip means "speed", and they wanted to imply their product would be faster than ARC and other compression formats of the time.



Activity 1: Use the terminologies in the lesson to define each of the following:

1. Virus

2. Data

3. Computer

4. Multi- processing

5. Troubleshoot

6. _____
Operating system

7. _____
Hardware

8. _____
Trojan Horse

9. _____
Utilities

10. _____
CPU

Thank you for completing this activity. Now, you may go to the end of this lesson to check your answer. Make sure you do the necessary corrections before moving on to the next part of this lesson.



Summary

You have come to the end of Lesson 5. In this lesson, you learnt about some of the different terminologies used in computing. You should have gained additional vocabulary which will guide you in further understanding topics in computing.

NOW DO PRACTICE EXERCISE 5 ON THE NEXT PAGE

Practice Exercise 5

A. Fill in the suitable term in every blanks from the pool of computer terms down below. You may use Lesson 5 to identify the suitable term based from its given definition.

- | | |
|---------------------|-----------------|
| A. Computer | I. Storage |
| B. Data | J. Trojan Horse |
| C. Data Compression | K. Troubleshoot |
| D. Desktop computer | L. Utilities |
| E. Digital | M. Virus |
| F. File | N. Worm |
| G. Hardware | O. Zip |
| H. Software | |

As we live in a _____(1)_____ world, the _____(2)_____ plays a very significant role on how we regard information. All important _____(3)_____ are stored as a _____(4)_____ that has a name called the filename.

The _____(5)_____ comes with a monitor sitting on the top of the computer. This machine is composed of both the _____(6)_____ and the _____(7)_____. The first refers to the objects that you can actually touch while the latter are the computer instructions or data.

The _____(8)_____ capacity of these machines differ but it is always better that _____(9)_____ is done to maximize the use of space. Using _____(10)_____ as a file format helps a lot.

Threats to these machines may come in the form of a _____(11)_____, _____(12)_____ or a _____(13)_____. Users must at least know how to _____(14)_____ and use a wide range of _____(15)_____ to keep these machine functioning well.

- | | | |
|----------|-----------|-----------|
| 1. _____ | 6. _____ | 11. _____ |
| 2. _____ | 7. _____ | 12. _____ |
| 3. _____ | 8. _____ | 13. _____ |
| 4. _____ | 9. _____ | 14. _____ |
| 5. _____ | 10. _____ | 15. _____ |

CHECK YOUR WORK. ANSWERS ARE AT THE END OF TOPIC 1.

Answers to Activity**Activity 1**

1. a piece of program code that spreads by making copies of itself
2. distinct pieces of information, usually formatted in a special way.
3. a computer is a programmable machine
4. supports running a program on more than one CPU.
5. to isolate the source of a problem and fix it, typically through a process of elimination whereby possible sources of the problem are investigated and eliminated beginning with the most obvious or easiest problem to fix.
6. the operating system is the most important program that runs on a computer.
7. refers to objects that you can actually touch, like disks, disk drives, display screens, keyboards, printers, boards, and chips
8. a malicious program that is disguised as legitimate software
9. a program that performs a very specific task, usually related to managing system resources.
10. an acronym for Central Processing Unit and is often used to refer to a computer system

Lesson 6: Care and Appropriate Use of Computers



Welcome to Lesson 6 of Unit 1. In Lesson 5 you learnt about the some of the basic terminologies used in computing This should given you additional vocabulary to study your lessons in computing.

In this lesson you shall learn about the care and appropriate use of computer.



Your Aims:

- identify proper care and use of the computer
- appropriately use the computer

Importance of Computer Care and Maintenance

Computer care and maintenance is often overlooked by the average user. Yet, taking a few precautions as you work, and learning to use the computer and its file system properly, can save you trouble in the long run.

Time taken, once or twice a month, to perform a few simple clean up procedures and use a couple of maintenance utilities, can make a big difference in how your computer performs.

When you do preventive maintenance and proper computer care, you can increase the overall speed and efficiency of your computer.

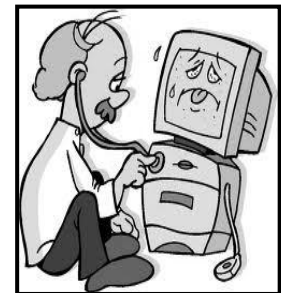
You can reduce the number of freeze-ups where the computer does not respond to any command, the number of fatal errors and the number of reboots your computer can experience.



Protect Your Computer from Damage

Like any kind of equipment, your computer requires care and maintenance to run smoothly. A number of factors can cause damage to your computer's hardware (the physical parts inside the computer) or media (storage devices like CD-ROMs and hard drives):

- Extreme heat, cold or humidity can cause physical damage to a computer's internal components or media (external and internal).
- Electrical or magnetic fields can damage computers and media. Sources of magnetic fields include magnets, motors, speakers and televisions.
- A damaged cable will prevent the computer from communicating with input or output devices.
- Dust can damage hard drives and floppy disk drives and can prevent computers from cooling properly.

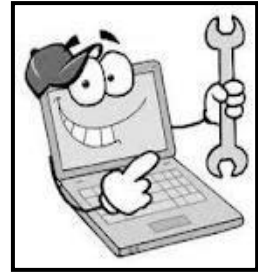


As you know, computers require electricity to operate. As such, problems can arise when there are power outages and power irregularities (called power spikes or power surges). If the power goes out while a file is open, the computer will shut off and all changes to the file since the last time you saved will be lost. Power spikes are

sudden surges of increased electricity that usually occur when the power comes back on after an outage. They can also be caused by atmospheric conditions (such as lightning) in buildings with poor or defective wiring. Power spikes can cause physical damage to many of the components of your computer, especially the hard drive.

Troubleshooting

There are several common problems you are likely to experience with a computer at some point. More serious problems like hard drive failures or malfunctioning monitors (monitors which do not display or display incorrectly) are not as widespread as they once were but difficulties with hardware devices like printers and scanners are still common. Often the device is not plugged in properly or turned on or it is not connected to the computer correctly. Sometimes the device itself is not set up properly. Below are some simple hardware troubleshooting tips:



- Make sure the power is supply to the device is ok. Most computer equipment will have a power light or even a display screen to show the power status of the device.
- Make sure devices that need external power sources are plugged in.
- Check the connections to the device.
- Check the connections to the computer.
- Make sure all cables are in good condition.
- Verify the set up of the device using the computer set up utility software.
- Make sure the computer is set up to work with the device.

Troubleshooting computer problems can be a difficult task. Fortunately, there are some basic steps you can follow to help solve many computer-related issues.

Maintaining Your Computer

There are several steps you can take to help maintain your computer.

- Regularly clean the keyboard and mouse. Poor maintenance is often the cause of many hardware problems. If a mouse becomes dirty, it will not track smoothly. When a keyboard is contaminated with food particles (usually caused when people eat at their desks) the keys become —~~stky~~,” meaning they do not spring back up immediately after you press them.
- Dust particles (including paper dust) cause printers to jam and smear your printouts. Keeping these and other devices well maintained will make them work better and last longer.
- Clean the printer of any dirt or dust to prevent jamming.
- Carefully remove any paper jams. Damaging the printer will make it jam more often and decrease print quality.
- Replacing or upgrading internal components of the computer.



While there is a lot that you can do to your computer to keep your computer running smoothly, there are some maintenance activities that should only be performed by an experienced professional. These include:

- Replacing or upgrading internal components of the computer.
- Repairing physical damage to peripheral equipment.
- Re-routing or adding electrical connections.



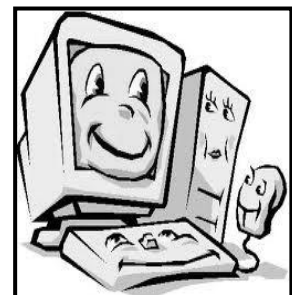
Activity 1: Follow these steps to clean your computer mouse and key board. For this activity, you will need cotton swabs, a lint-free cloth (non-stick to hair or fur) , rubbing alcohol, and compressed air. Check the meaning of the bolded words in the Lesson 5.

1. If you are using an optical mouse , all you need to do is make sure the exterior of the mouse is clean.
2. If you are using a mechanical mouse, make sure your computer is turned off and disconnect it from the computer.
3. Turn the mouse upside down and remove the plastic ring that holds the ball in place. There are usually arrows that tell you in which direction to turn the ring.
4. Remove the ball and check for lint on the ball and inside the mouse.
5. Use a cotton swab and a small amount of rubbing alcohol to clean the rollers inside the mouse. Clean the mouse ball with a swab.
6. Allow the mouse and ball to dry before reassembly.
7. Clean your mouse pad and the area of your desk where the mouse will be used.
8. To clean your keyboard, first turn off your computer.
9. Disconnect the keyboard from the computer.
10. Turn the keyboard over and gently shake out the crumbs and dust.
11. Use a cotton swab and a small amount of rubbing alcohol to clean between the keys.
12. Use a damp lint-free cloth (water is fine) to wipe the keys.
13. Allow the keyboard to dry before connecting it to your computer.
14. Clean the area around your keyboard to keep dust away from your keyboard.

Thank you for completing this activity. Go to the end of the lesson to check whether you have done the steps in cleaning your computer mouse and keyboard. Make sure you do repeat the necessary steps to master the skill before moving on to the next part of this lesson.

Maintaining Your Hard Drive

If you do not regularly take the time to organize your desk, it will become harder and harder to find what you need. Just like your desktop, your hard disk will become cluttered if you do not take the time to organize it. Poorly organised files will lead to a decrease in the performance of your computer. It will take longer to locate the files you need. Keeping a clean and organized hard disk will result in better system performance. The easiest way to do this is to delete unused or temporary files regularly.



A variety of utility programs are available to help keep your computer safe and running without errors. Some are supplied with the Windows operating system, others are available for free, and some are available for purchase.

1. Defragmentation software like Diskeeper or the one supplied with the Windows operating system gather files into one area on the hard disk to make searching faster. Defragmenting your hard disk is an important part of maintaining your computer.
2. Disk Compression programs like Virtual Drive and FarStone are designed to minimize the amount of space used by files on the computer.
3. Disk Scanning programs like ScanDisk (supplied with the Windows operating system) check for and attempt to repair errors on the hard disk.
4. Firewall software like ZoneAlarm and BlackICE keep others from accessing the computer through the Internet.
5. Spyware Detectors like Spybot SP and BPS Spyware Detector check and remove spyware programs that send information from the computer to the Internet.
6. Virus Detection software like Norton AntiVirus and McAfee VirusScan detect and remove potentially damaging viruses from the computer.



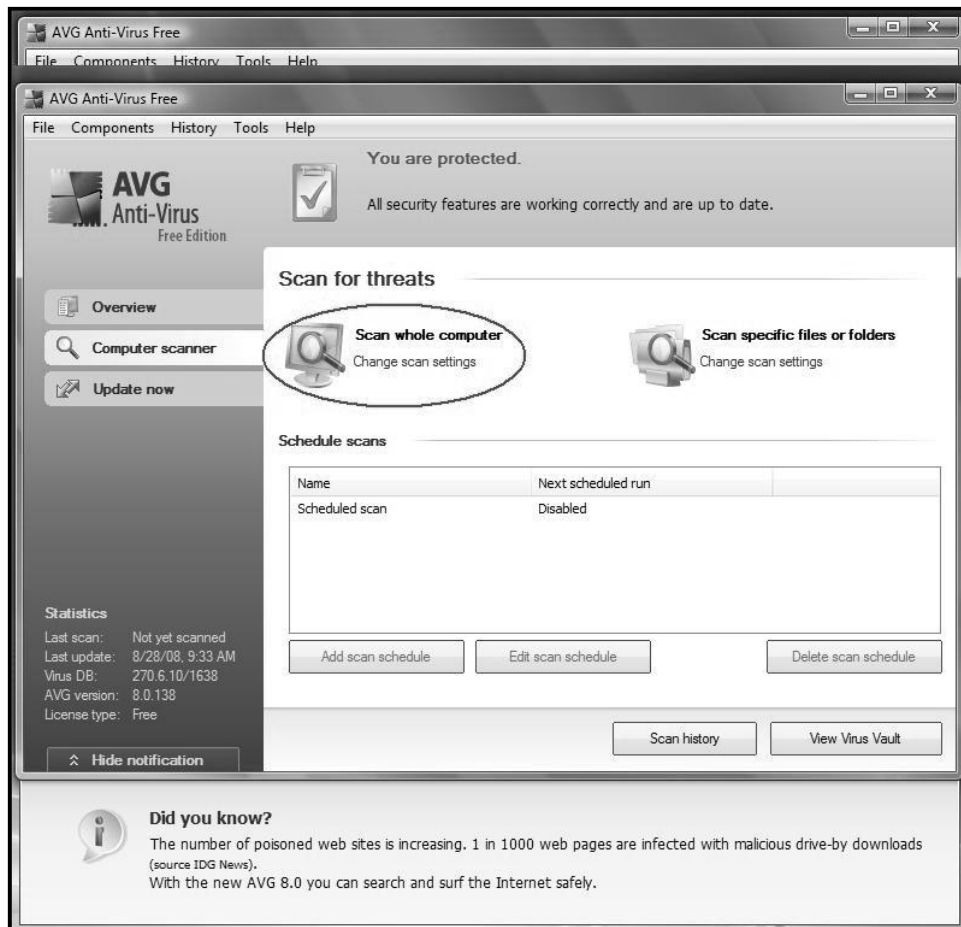
Activity 2: Follow these steps to scan your computer.

You can Scan your PC any time you wish by following a few simple steps:

1. Click on AVG icon to reveal this window.
2. Click on —Computer Scanner. The following windows will open and you can choose to whether to —Scan a whole computer or Scan specific files or folders”.



3. Choose — **Scan whole computer**. A complete scan can take several minutes or hours depending on the number and size of files. When the scan is finished, AVG will display the results.



Thank you for completing this activity. Go to the end of the lesson to check whether you have done the following steps in scanning your computer.

Summary



You have come to the end of Lesson 6. In this lesson, you learnt about the different ways on how to care for your computer. protecting your computer from damage would mean absolute care and maintenance for the computer's smooth run. Troubleshooting tips enables you to remedy few basic computer problems. It is also important to regularly clean your computer mouse and keyboard as you maintain a good hard drive of your computer. A variety of utility programs such as Diskeeper, Norton Anti Virus and Virtual Drive will ensure a safe computer without errors.

You have also gained relevant skills on how to appropriately use and maintain the functionality of your machine.

NOW DO PRACTICE EXERCISE 6 ON THE NEXT PAGE

Practice Exercise 6

A. The following exercise will provide you with an example of how these steps may work in a real-world situation. Imagine that you are trying to print out a report, but there are problems with the printout.

1. Actions to take to solve the problem with the printout
 - a. Carefully explain to the support staff exactly where the staple is lodged.
 - b. Print the report again and verify the printout is clear.
 - c. Follow the instructions the support department gives on how to access the gears and remove the staple without damaging the printer.
 - d. Print a second copy and verify the same smeared appearance.
 - e. Check the printer for paper jams. There are no paper jams, but a staple is lodged in the gears.
 - f. Remove the stapler and other office supplies from the top of the printer.
 - g. Contact the school computer support department.
 - h. See that the printout of the report is smeared.
2. Now, go over the chart below. Read the steps in the Troubleshooting Chart.

Troubleshooting Chart		
Step #	Description	Action #
Step 1	Recognise the problem	
Step 2	Replicate the problem (reproducing the steps that cause the problem consistently)	
Step 3	Attempt a basic solution (such as restarting hardware)	
Step 4	Find available help and advice for the particular problem	
Step 5	Communicate the problem clearly and accurately to others that can help	
Step 6	Follow the instructions given by support services or those that have experience with the problem	
Step 7	Confirm that a problem has been permanently fixed	
Step 8	Take steps to avoid similar problems in the future	

3. In the **Troubleshooting Chart**, write the letter of the **Action** in the right hand column (**Action #**) that best matches the **Description** in the **Troubleshooting Chart**.

CHECK YOUR WORK. ANSWERS ARE AT THE END OF TOPIC 1.

Checklist to Activities**Activity 1**

- ☐ Check if the exterior of the mouse is clean.
- ☐ Disconnect the mechanical mouse from the computer.
- ☐ Turn the mouse upside down and remove the plastic ring that holds the ball in place.
- ☐ Remove the ball and check for lint on the ball and inside the mouse.
- ☐ Use a cotton swab and a small amount of rubbing alcohol to clean the rollers inside the mouse. Clean the mouse ball with a swab.
- ☐ Allow the mouse and ball to dry before reassembly.
- ☐ Clean your mouse pad and the area of your desk where the mouse will be used.
- ☐ Turn off your computer before cleaning the keyboard.
- ☐ Disconnect the keyboard from the computer.
- ☐ Turn the keyboard over and gently shake out the crumbs and dust.
- ☐ Use a cotton swab and a small amount of rubbing alcohol to clean between the keys.
- ☐ Use a damp lint-free cloth (water is fine) to wipe the keys.
- ☐ Allow the keyboard to dry before connecting it to your computer.
- ☐ Clean the area around your keyboard to keep dust away from your keyboard.

Activity 2

- ☐ Click the AVG icon to open the Anti Virus.
 - ☐ Click on —Computer Scanner”.
 - ☐ Click —Scan” then choose —Scan whole computer”.
 - ☐ Closed the AVG Anti Virus program.
-

Answers to Practice Exercises in Topic 1

Practice Exercise 1

- | | |
|----------|-----------|
| 1. TRUE | 9. FALSE |
| 2. TRUE | 10. TRUE |
| 3. TRUE | 11. TRUE |
| 4. TRUE | 12. FALSE |
| 5. TRUE | 13. FALSE |
| 6. FALSE | 14. TRUE |
| 7. FALSE | 15. TRUE |
| 8. FALSE | |
-

Practice Exercise 2

- | | |
|------|------|
| A. | B. |
| 1. D | 1. A |
| 2. G | 2. C |
| 3. C | 3. B |
| 4. E | 4. D |
| 5. H | 5. C |
| 6. B | 6. A |
| 7. F | 7. B |
| 8. A | |
-

Practice Exercise 3

- A.
- a. Pascaline
 - b. Colossus
 - c. UNIVAC
 - d. Altair
- B.
- a. punch card.
 - b. Herman Hollerith
 - c. instructions
 - d. MS-DOS
- C.
- a. Chrales Babbage
 - b. Howard Aiken
 - c. John Presper Eckert and John WilliamMauchly
 - d. Steve Wozniak and Steve Jobs

D.

a.

Ada Augusta Byron (or Countess Lovelace) was one of the great women of computing. She helped Babbage to adjust and correct some of the problems in his work and her notes on Babbage's works were accepted for publication in the book Taylor's Scientific Memoirs. Ada Augusta Byron is dubbed the world's first programmer because she developed the idea to repeat a set of instructions over and over again, in what is now called a loop.

b.

IBM PC had an open architecture, which meant that others could copy its method of operation. It offered 16 kilobytes of RAM expandable to 64 kilobytes and was based on the Intel 8088 microprocessor.

Practice Exercise 4

A.

1. A
2. B
3. C
4. D
5. A
6. A

7. A
8. 2
9. 3
10. 1
11. D

B.

1. True

2. True
 3. True
 4. True
-

Practice Exercise 5

A.

As we live in a (1)digital world, the (2)computer plays a very significant role on how we regard information. All important (3)data are stored as a (4)file that has a name called the filename.

The (5)desktop computer comes with a monitor sitting on the top of the computer. This machine is composed of both the (6)hardware and the (7)software. The first refers to the objects that you can actually touch while the latter are the computer instructions or data.

The (8)storage capacity of these machines differ but it is always better that (9)data compression is done to maximize the use of space. Using (10) zip as a file format helps a lot.

Threats to these machines may come in the form of a (11) virus, (12) worm or a (13) Trojan horse. Users must at least know how to (14) troubleshoot and use a wide range of (15) utilities to keep these machine functioning well.

Practice Exercise 6

A.

Troubleshooting Chart

Step #	Description	Action #
Step 1	Recognize the problem.	h
Step 2	Replicate the problem (reproducing the steps that cause the problem consistently).	d
Step 3	Attempt a basic solution (such as restarting hardware or checking cable connections).	e
Step 4	Find available help and advice for the particular problem.	g
Step 5	Communicate the problem clearly and accurately to others that can help.	a
Step 6	Follow instructions given by support services or those that have experience with the problem.	c
Step 7	Confirm that a problem has been permanently fixed.	b
Step 8	Take steps to avoid similar problems in the future.	f

End of Topic 1.**Now Do Exercise 1 in Assignment Book 1 Then Go to Topic 2.**

TOPIC 2:

HARDWARE AND PERIPHERALS

Lesson 7:	Functions of Computer Hardware
Lesson 8:	Computer Processing
Lesson 9:	Input Devices
Lesson 10:	Output Devices
Lesson 11:	Classification of Hardware Systems
Lesson 12:	Troubleshooting and Maintenance

TOPIC 2: **HARDWARE AND PERIPHERALS**

Computers are very important devices which we all use nowadays. The importance of computers is given by the importance of their components.

In this topic you will learn more about computer hardware. The topic outlines the hardware used in a computer system. Hardware is classified according to its function and specific hardware devices are examined. Hardware systems are also classified according to their capabilities. You will learn troubleshooting procedures when dealing with hardware problems.

Moreover, a computer may perform various tasks considerably, given its default software configuration. However, without a keyboard and a mouse, the computer cannot fully function well. Thus, computer peripherals are increasingly becoming essentials in every personal computer. This topic outlines the commonly used peripherals which helps the computer work well.

Computer hardware components are becoming very important in a way that they allow people to communicate and interact with the computer. Although other computer peripherals may be considered only as an optional component, they can be extremely useful.

In this topic, you will study about the following:

Lesson 7 centers on the functions of the hardware. It presents the definition and the functions of the computer hardware.

Lesson 8 discusses computer processing where its definition and types are highlighted.

Lesson 9 focuses on commonly used computer input devices. It presents what input devices are and their importance for computer data processing.

Lesson 10 presents the commonly used computer output devices. It distinguishes the commonly used output devices and outlines its significance to computer data presentation.

Lesson 11 itemises the classifications of hardware systems where their definitions and uses are outlined.

Lesson 12 emphasizes on computer troubleshooting and maintenance where troubleshooting and maintenance guidelines are identified and illustrated for application.

By the end of Topic 2, you should be able to identify and demonstrate appropriate use of a range of hardware components and peripheral devices and use a range of computer skills and techniques.

Lesson 7: Functions of the Computer Hardware



Welcome to Lesson 7 of Unit 1. In Topic 1 you learnt about the definition, characteristics, history, computer terms and tips on how to care for your computer.

In this lesson you shall learn about the computer hardware and peripherals focusing on the functions of the hardware.



Your Aims:

- define hardware
- identify the function of computer hardware
- identify the hardware components

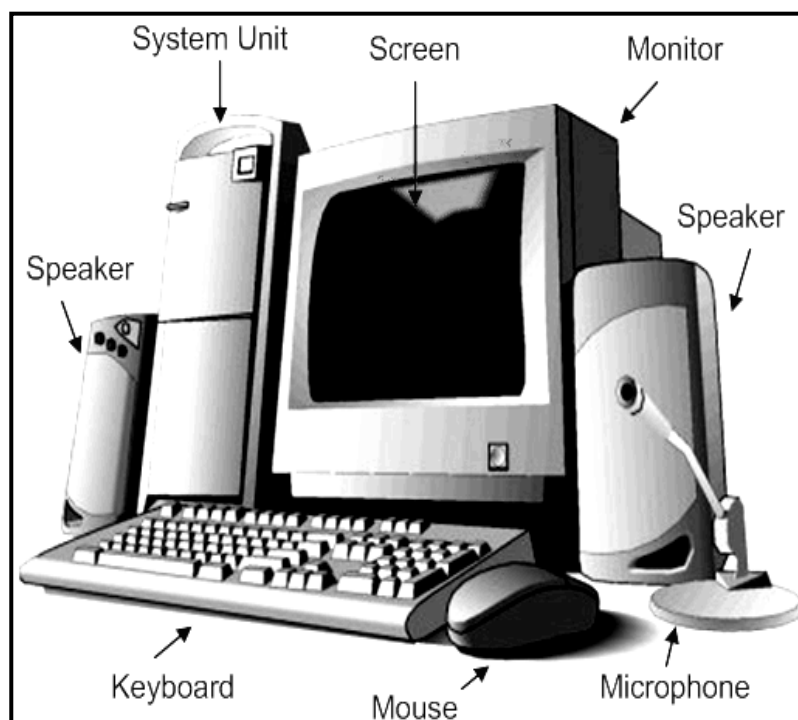
The functions of the **computer hardware** components creates the performance of the computer system. Their functions are important for the computer and its performance.

For example if the computer hardware components within our Personal Computers are very well performing ones then your computer system will function properly. In order to understand the functions of a computer hardware within the computer system you must be able to define what a computer hardware is.

The Hardware

The **hardware is the physical units that make up the computer**, such as the system unit, keyboard and monitor. They are the computer parts that we can see and touch.

The figures below shows the common hardware components that make up the desktop and laptop system.



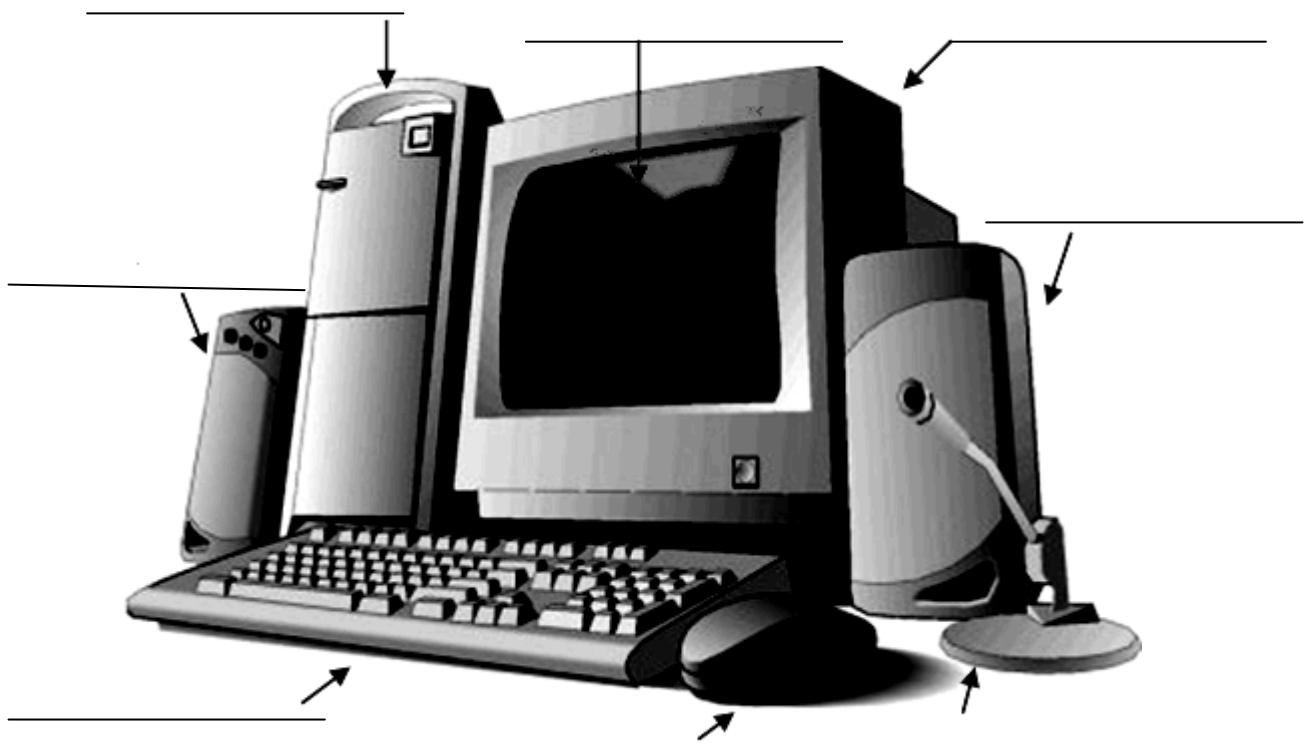
The Desktop Computer Hardware



The Laptop Computer Hardware



Activity 1: The physical parts of the computer hardware are presented in the illustration below. Name the parts and write your answers on the spaces provided.



Thank you for completing this activity. Now, you may go to the end of this lesson to check your answer. Make sure you do the necessary corrections before moving on to the next part of this lesson.

Functions of the Computer Hardware

These are five functions of hardware: input, process, storage, control and output.

Let us discuss them one at a time.

1. The Input

Input involves accepting data into the computer for processing into information.

The **data** are the raw facts used by the computer, such as text and images.

Information is data that has been ordered and given some meaning.

Input devices include keyboards and pointing devices.



Input devices include keyboards and pointing devices.

2. The Process

Process changes data to produce information by following a series of instructions.

Processing is performed by the central processing unit (CPU). The **CPU** is the brain of the computer. It takes the data entered from an input device, changes it to produce information and sends it to an output device to be presented to the user.

3. The Storage

Storage involves receiving and retaining data over a period of time. Storage is classified as primary storage (memory) or secondary storage.

Primary storage stores data and programs that need to be instantly accessible to the CPU.

Secondary storage stores data more permanently and uses media such as hard disks and CDs.

4. The Control

Control coordinates the operations of the input, processing, output and storage.

The control unit is part of the CPU. The control unit is the organiser that directs the flow of data in the computer in the same way as traffic lights control the flow of cars at an intersection.

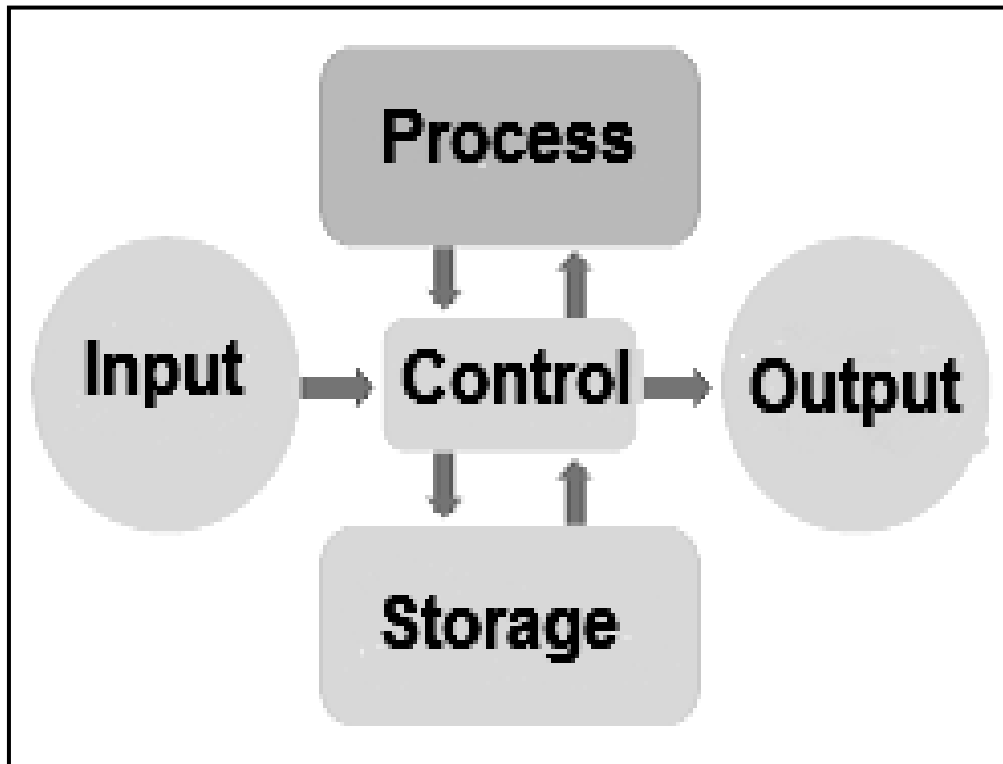
5. The Output

Output involves sending information from the computer.

Output includes the transfer of data from primary storage to an output device such as a screen, printer or speakers.

The information presented is the result of the user's work on the computer.

Now, study the figure below as this represents the five functions of hardware.



Data is entered using an input device and processed in some way before being presented using an output device.

If necessary, the data can be retained on a storage device for later use. Input, output and storage devices are often referred to as *peripheral* devices (pronounced ph-RIHF-er-uhl').

Remember that all the functions of hardware work together.

The activity below will help you remember the different functions of the hardware.



Activity 2: Write the correct function.

1. The hardware can retain data with this function. _____
2. The hardware can coordinate the functions of input, processing, output and storage. _____
3. The hardware can accept data for processing. _____
4. The hardware can produce the needed information. _____
5. The hardware can send information from the computer. _____

Thank you for completing this activity. Now, you may go to the end of this lesson to check your answer. Make sure you do the necessary corrections before moving on to the next part of this lesson.

Hardware components

The hardware components contained inside the System Unit.

The System Unit

System Unit is the box that contains the computer's main hardware components such as the motherboard.



The System Unit in a desktop PC is sometimes referred to as the __pizza box', comparing the rectangular shape of one to the other.

Most personal computers have a system unit based on the following designs:

1. **Tower system** - vertical box that is often kept under the desk. Towers usually have more expansion slots and bays compared to the other designs



2. **Desktop system** - horizontal box designed to sit under the monitor like a platform



3. **All-in-one system** - combine the monitor and system unit into a single casing such as the iMac.



There are many hardware components in the system unit.

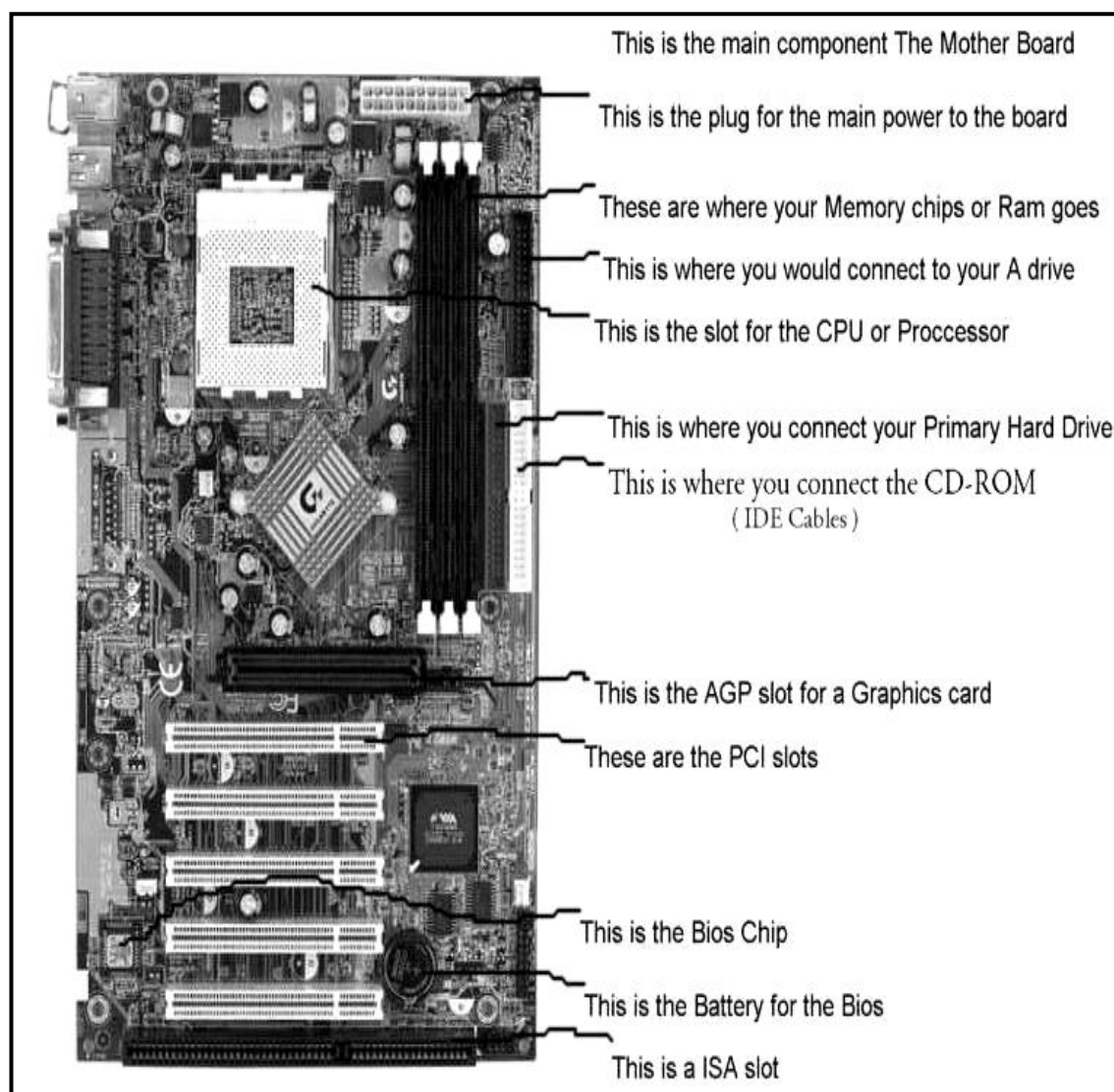
1. The **motherboard** is the main circuit board that contains the computer's vital components. It contains the CPU, memory, expansion slots, buses and other electronic components. The motherboard is also called the **main board** or **system board**.

You learnt in Lesson 4 that the motherboard is the main circuit board of the computer.

Notice that the power supply supplies power to all internal components, the expansion slots extend the capabilities of the computer, the **usb** port is used to connect various components to the computer and other ports are used for connecting peripheral devices to the computer.

An **integrated circuit (IC)** is a single chip of silicon that has replaced millions of transistors and other electrical components. Integrated circuits are referred to as silicon chips or just chips. The motherboard contains a number of chips or chip set which are the integrated circuits. The **CPU** is the largest integrated circuit.

The **power supply** transforms high voltage to a lower voltage that can be used by the computer. It supplies power to all internal components such as the CPU and primary storage.



The Motherboard

Moreover, the Conventional PCI (PCI is an initialism formed from Peripheral Component Interconnect, part of the PCI Local Bus standard and often shortened to just PCI) is a local computer bus for attaching hardware devices in a computer.

2. An **expansion slot** is an opening where a circuit board can be inserted into the motherboard to extend the capabilities of the computer.

Such circuit board is usually called an expansion card or expansion board. There are many different types of expansion cards for different purposes such as to connect a monitor, hard disk or any peripheral device. Expansion cards are also used to extend memory.



Peripheral devices are linked to the CPU using expansion slots and ports.

3. A **bus** is a pathway of wires on the motherboard that connects various components. Data travels through a bus. **USB** (universal serial bus) has become a standard way of connecting peripheral devices.



A USB Flashdrive



A USB

Peripheral devices were covered in Topic 1 Lesson 4 as any device that connects to the computer and exchanges data with the CPU (Central Processing Unit). This includes all the computer's input and output devices which will be further discussed in lessons 9 and 10.

Moreover, peripheral devices allow fast transfer of data and connects a range of devices such as digital cameras, scanners and storage devices. Most computer mouse nowadays are USB type.

4. A **port** is a socket used to connect peripheral devices. It is located at the back of the system unit. Ports have different connectors that are used to attach cables to the peripheral devices. Most connectors are available in two types called male or female. Look at the picture below to differentiate the two types of ports: the male and female ports.



- a. Male connectors have one or more exposed pins like the end of a power cord.
- b. Female connectors have matching holes like a power point.

Some of the devices, such as the mouse and the keyboard, are connected directly to the motherboard.



Activity 3: Look at the illustration below and identify the parts of the motherboard. The choices are found in the pool of words. Write your answer on the space provided.

A Drive

AGP slot

BIOS Chip

CD-ROM

CPU

ISA Slot

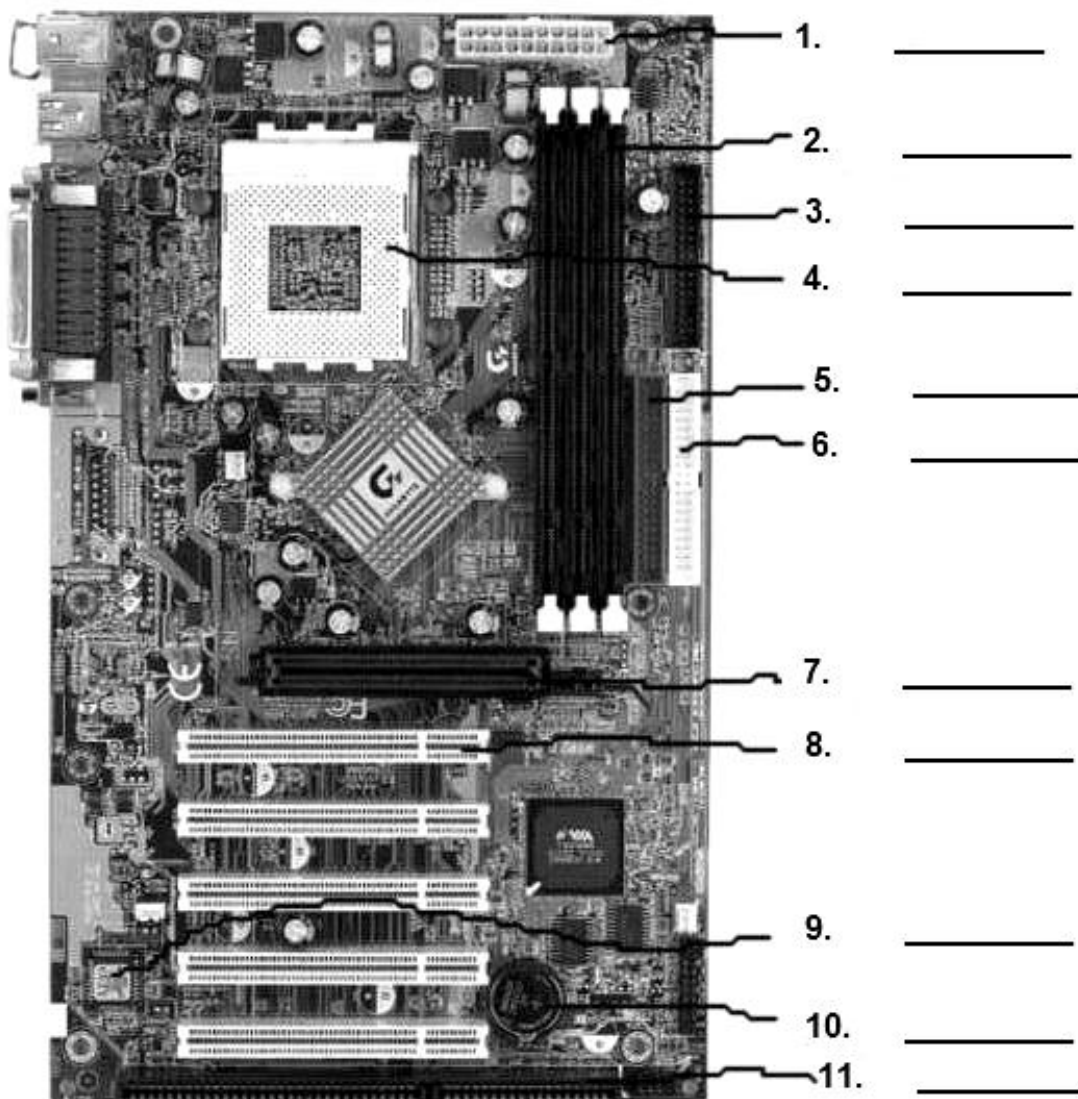
Primary Hard Drive

Plug for the main power

PCI slots

RAM

Battery for BIOS



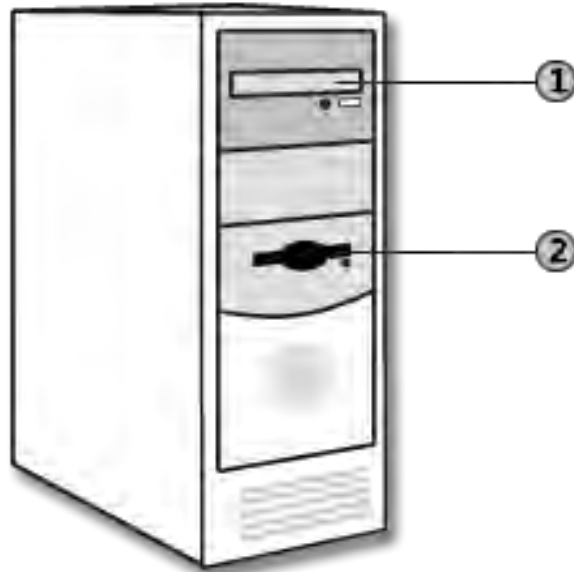


Activity 4: Look at the illustrations below and identify the parts. The choices are found in the pool of words. Write your answer on the space provided.

Modem	Mouse	System Unit	Printer
Speaker	Monitor	Floppy Disk Drive	
Cd/DVD Drive	Keyboard	Drive	

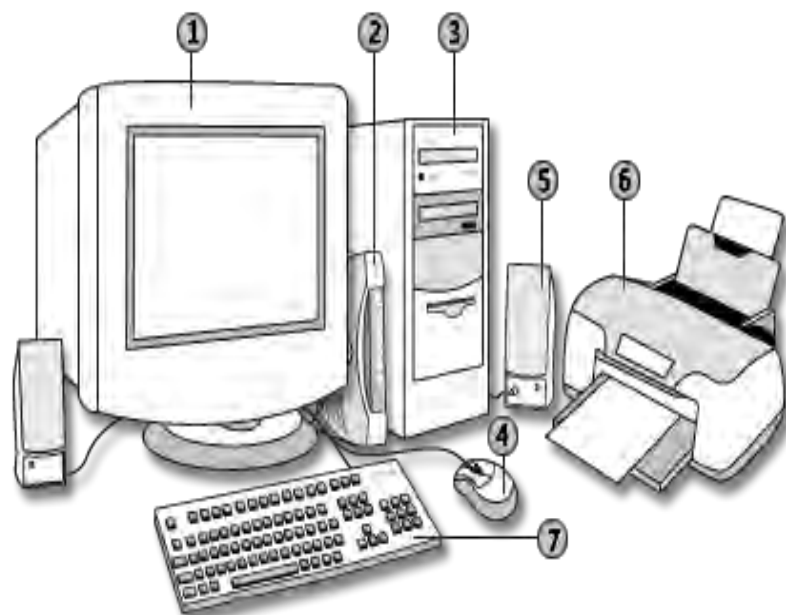
1. The System Unit

- a. _____
- b. _____



2. Common Hardware in a Desktop Computer

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____
- f. _____
- g. _____



Thank you for completing this activity. Now, you may go to the end of this lesson to check your answer. Make sure you do the necessary corrections before moving on to the next part of this lesson.



Summary

You have come to the end of Lesson 7. In this lesson, you learnt about the different functions and components of the hardware of a computer. The hardware is the physical unit that makes up the computer. It has five functions which are storage, processing, input, output and control. You should have gained sufficient understanding on what hardware is.

NOW DO PRACTICE EXERCISE 7 ON THE NEXT PAGE

Practice Exercise 7

A. Identify the word that is described in each item.

1. The brain of the computer. _____
 2. Main circuit board that contains the computer's vital components.

 3. A dedicated chip that works with the main CPU to increase the speed of the computer. _____
 4. A pathway of wires on the motherboard that connects various components.

-

B. Complete the following by writing the answer in brackets with a suitable term:

Data is entered using an _____ device and processed in some way before being _____ using an output device. If necessary the _____ can be retained on a _____ device for later use.

C. Explain the difference between:

1. input and output

 2. a tower and a desktop computer

 3. expansion slot and expansion card

 4. a male and a female connector.

-

D. Answer the following questions.

1. What are the five functions of hardware?
 - a. _____ d. _____
 - b. _____ e. _____
 - c. _____

2. What is an integrated circuit?

3. What is the purpose of an expansion card?

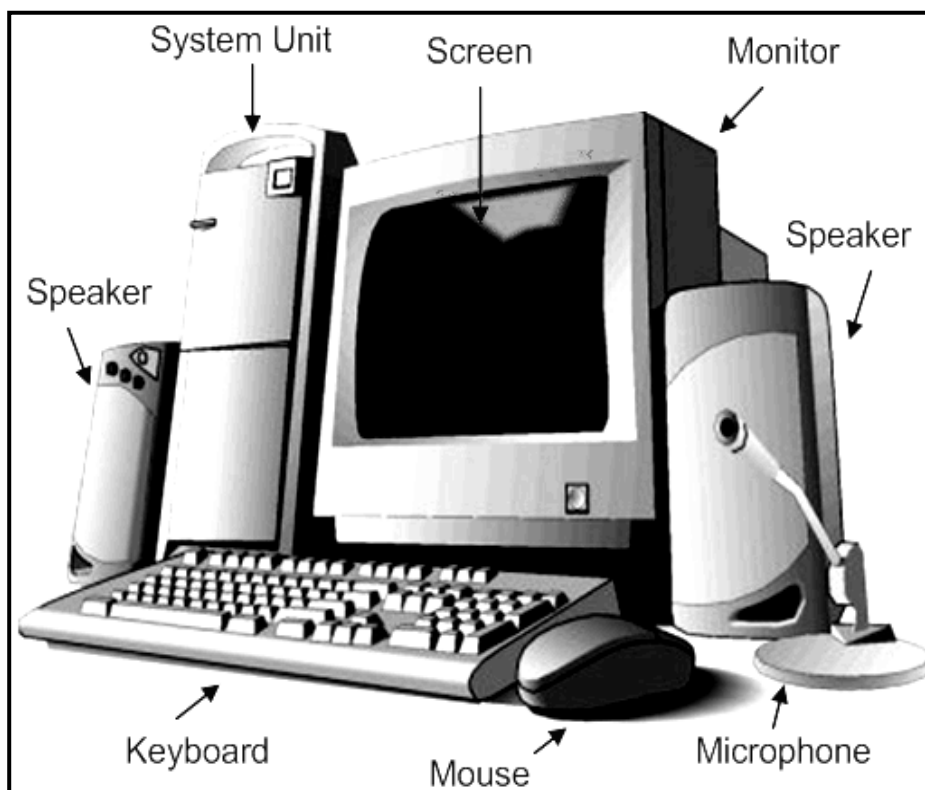
4. Describe a PC card.

5. Why has the USB become the standard method for connecting peripheral devices?

CHECK YOUR WORK. ANSWERS ARE AT THE END OF TOPIC 2.

Answers to Activities

Activity 1



Activity 2

1. Storage
2. Control
3. Input
4. Process
5. Output

Activity 3**A.**

1. Cd/DVD Drive
2. Floppy disk Drive

B.

1. Monitor
2. Modem
3. System Unit
4. Mouse
5. Speaker
6. Printer
7. Keyboard

Lesson 8: Computer Processing



Welcome to Lesson 8 of Topic 2. In Lesson 7 you learnt about the computer hardware and their functions.

In this lesson you shall learn more about the computer's function of processing.



Your Aims:

- define processing and identify its function
- identify the two types of processors and their functions

Computer Data Processing

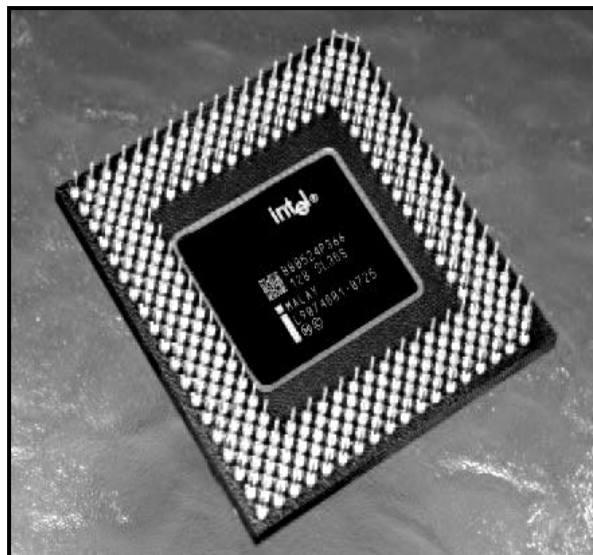
Computer data processing is any process that uses a computer program to enter data and summarise, analyse or otherwise convert data into usable information. It involves recording, analysing, sorting, summarising, calculating, disseminating and storing data. Because data are most useful when well-presented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

Nevertheless, the terms are roughly synonymous, performing similar conversions; data-processing systems typically manipulate raw data into information, and likewise information systems typically take raw data as input to produce information as output.

Processing changes data to produce useful information by following a series of instructions. Processing is performed by the CPU and microprocessors.

The Central Processing Unit

The **central processing unit** (CPU) or processor performs the transformation of data into information.



The CPU

The CPU accepts the data from any input device. It changes this data according to the instructions in a computer program and then sends the results to an output device.

CPU Components

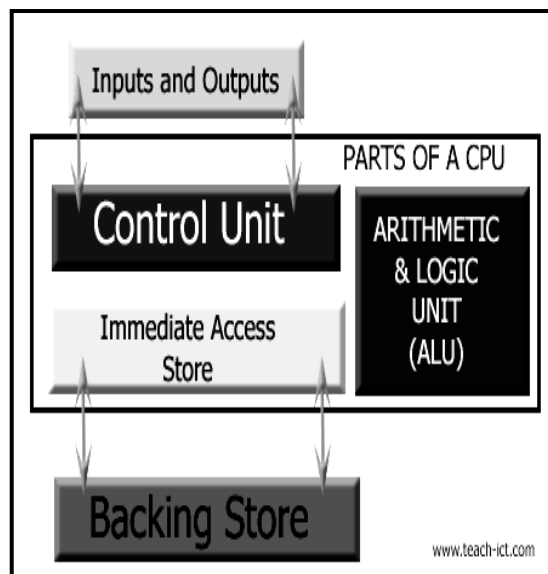
You need to have a basic understanding of the three main parts of a CPU. These are as follows:

1. Control Unit
2. Immediate Access Store
3. Arithmetic and Logic Unit (ALU)

1. The Control Unit

This component has three main functions:

- a. It controls and monitors the hardware attached to the system to make sure that the commands given to it by the application software are used. For example, if you send something to print, the control unit will keep a check that the instructions are sent to the printer correctly.
- b. It controls the input and output of data so that the signals go to the right place at the right time
- c. It controls the flow of data within the CPU



The Three Main Jobs of Control Unit

2. The Immediate Access Store (IAS)

Immediate Access Store holds the data and programs needed at that instant by the Control Unit.

The CPU reads data and programs kept on the backing storage and store them temporarily in the IAS's memory. The CPU needs to do this because Backing Storage (e.g. the hard disk) is much too slow to be able to run the applications from it directly.

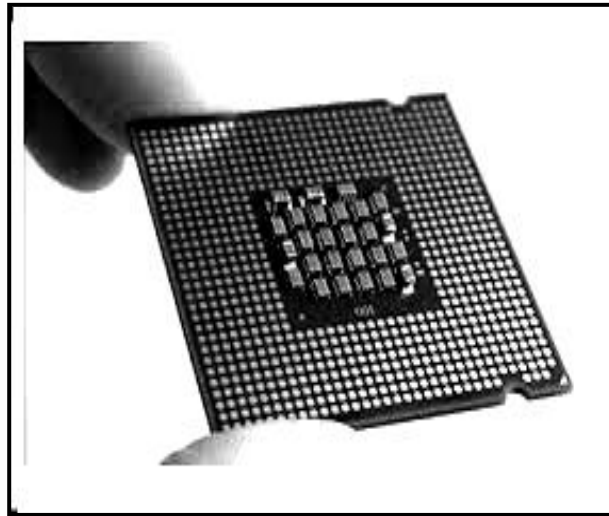
For example, let's pretend that a modern CPU was slowed down to carry out one instruction per second. In this scenario, the hard disk slowed down to an equivalent rate would take three months to supply the data needed by the CPU.

3. Arithmetic and Logic Unit (ALU)

ALU is where the computer processes data either by manipulating it or acting upon it.

It consists of two parts:

- a. **Arithmetic part** - which does exactly what you think it should - it performs the calculations on the data e.g. $3 + 2 = 5$
- b. **Logic part** - this deals with logic and comparisons. For example, it works out if one value is greater, less than or equal to another.



The ALU

The Microprocessors

A **microprocessor** is a CPU contained on one integrated circuit.

Microprocessors are used in personal computers and many consumer devices such as cameras, digital watches, toys, game machines, DVD players, microwaves and motor vehicles.



Activity 1: Explain in one paragraph how “processing” is done by the computer. Use the following terms in your explanation: Data, CPU and Information.

Thank you for completing this activity. Now, you may go to the end of this lesson to check your answers with mine. Make sure you do the necessary corrections before moving on to the next part of this lesson.



Summary

You have come to the end of Lesson 8. In this lesson, you learnt about the processing that occurs in a computer. Processing enables data to be transformed into information.

NOW DO PRACTICE EXERCISE 8 ON THE NEXT PAGE

Practice Exercise 8

A. Complete the following sentences:

1. Processing changes _____ to produce information by following a series of instructions.
 2. The CPU stands for the central _____ unit.
 3. The _____ directs and coordinates the entire hardware system.
 4. The AND operator is an example of a _____ operator.
 5. A _____ is a CPU contained on one integrated circuit.
-

B. Write whether the given statement is TRUE or FALSE.

1. Motorola makes the Pentium processor. _____
 2. ALU is part of the CPU that performs data calculations and comparisons.

 3. Registers provide fast access to data. _____
 4. The address register stores the data to be processed. _____
-

C. Unjumble these words:

1. rgietser _____
 2. ligoc uint _____
 3. mosceicsproror _____
-

D. Answer each in complete sentences.

1. Describe the role of the CPU.

 2. List the three parts of the CPU.

 3. What is the purpose of the control unit?

-

CHECK YOUR WORK. ANSWERS ARE AT THE END OF TOPIC 2.
--

Answer to Activity

The **central processing unit** (CPU) or processor performs the transformation of **data** into **information**. The **CPU** accepts the **data** from any input device. It changes this data according to the instructions given by the user and then sends the results to an output device

Lesson 9: Input Devices



Welcome to Lesson 9 of Topic 2. In Lesson 8 you learnt about the computer hardware processing and its role on how a computer works.

In this lesson you shall learn about the input devices.



Your Aims:

- define input devices
- explain the importance of input devices
- identify and differentiate the different input devices

The Input Devices

To make the computer work it has to be given instructions and in order to do this data has to be entered. **Input** involves sending data into the computer for processing into information. The data entered will be accepted and processed by the computer into information. A device designed to assist the entry of data is called an **input device**.

There are many types of input devices and each of them has special purpose.

1. The Keyboard

A **keyboard** is an input device consisting of a series of keys in a standard layout. Each keyboard has a different arrangement of letters, numbers and symbols, which is called its layout.

It allows the entry of text, numbers, instructions and commands. There are many different types of keyboards, each designed to meet a particular need. For example, the keyboard on an automatic teller machine (ATM) contains special keys that allow the withdrawal of money.

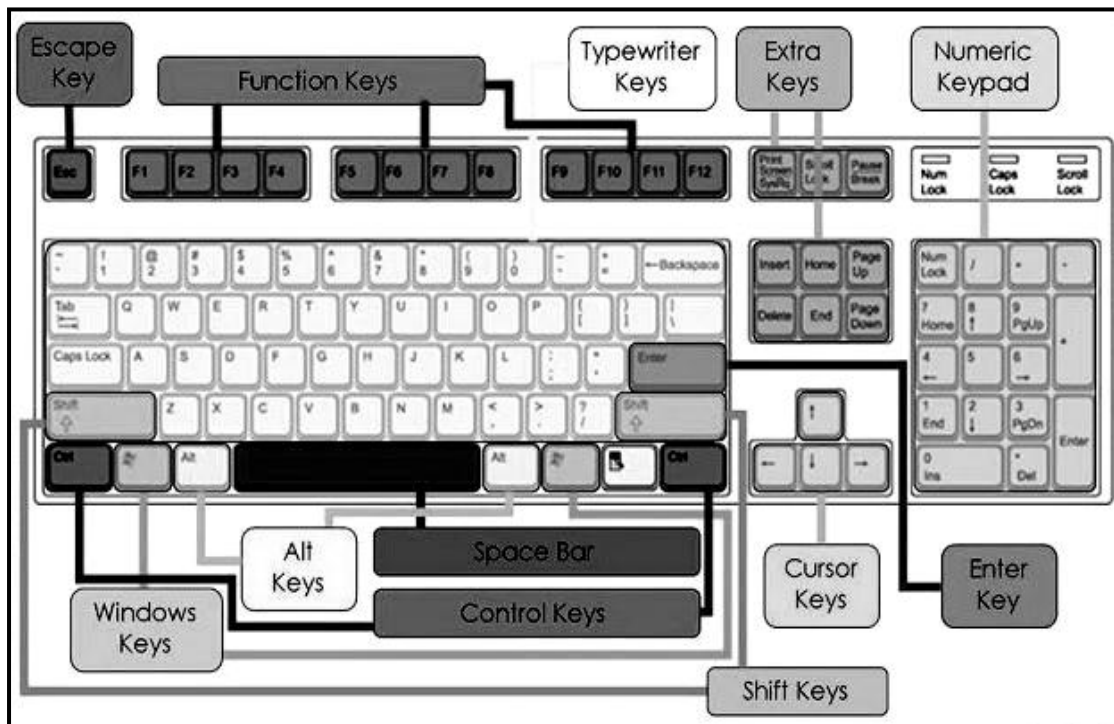
The most common keyboard layout for personal computers is the **QWERTY keyboard**.



The QWERTY keyboard is divided into four main sections:

- **Alphanumeric keys** - letters and numbers on the keyboard. A numeric keypad is located on the right-hand side of the keyboard. It is for quick entry of numbers

- **Cursor control keys** - allows the cursor to be moved and includes the arrow keys, page down, page up, home and end.
- **Special keys** - include enter/return, tab, space, caps lock, backspace, delete and esc (escape). Modifier keys (such as shift, control, alternate, option and command) are used in combination with other keys.
- **Function keys** (F1, F2 to F12) - allow instructions to be given to the computer and depend on the software. There are variations to the standard keyboard, such as the wireless keyboard, a folding keyboard for palm computers, a miniature keyboard built into pocket-sized devices and a one-handed keyboard.



Parts of a Keyboard

2. The Pointing devices

Pointing devices are input devices that control an onscreen symbol called a **pointer**. They are good at giving commands to the computer and for creating certain images. However, pointing devices are not effective for entering large amounts of text.

There are many different types of pointing devices:

- A **mouse** is a small hand-held input device that is moved over a flat surface to control the movement of a pointer. The bottom of the mouse is usually a ball that senses the movement of the mouse. If a button on the mouse is pressed or clicked, it allows a character or command to be selected from the screen.



Mouse

- b. A **trackball** is a pointing device that is similar to a mouse except that the ball is on top of the device instead of the bottom. It allows the cursor to be moved by rotating the ball in the desired direction.



Trackball

- c. A **pointing stick or trackpoint** is a small device shaped like a pencil eraser. It moves the pointer by sensing the direction and amount of pressure applied to the device. A pointing stick is located in the keyboard on many portable computers.



Trackpoint

- d. A **touchpad or trackpad**, is a flat rectangular surface that senses the movement of a finger. When you move your finger on the touchpad it makes a corresponding movement of the pointer.



Touchpad

- e. A **graphics tablet** is an input device that consists of a special electronic pad and a pen called a stylus. The stylus performs the same point-and-click functions as a mouse. Graphics tablets are used by artists and designers.



Graphics Tablet

- f. A **joystick** is a pointing device consisting of a small base unit with a rod that can be tilted in all directions to move the pointer on the screen. Joysticks are frequently used to provide fast and direct input for moving characters and symbols in computer games.



Joystick

- g. A **light pen** is a pointing device consisting of a small rod that looks like a pen. The tip of the pen has a light detector that senses the intensity of light on a screen and emits signals so that the computer can calculate its position.



Light Pen

- h. A **touch screen** enters data by detecting the touch of your finger. The user's finger interrupts a matrix of infrared light beams shining horizontally and vertically across the screen.



Touch Screen

- i. A **pen input** device uses special hardware and software to interpret the movement of a pen. They are used in most personal digital assistants (PDA) and palm computers.



Pen Input



Activity 1: Answer for the following questions:

- A. Give the importance of the keyboard as an input device.

B. Match Column A to Column B. Write the letter of your answer on the space provided.

Column A	Column B
1. Light Pen _____	A. enters data by detecting the touch of your finger
2. Touchpad _____	B. allows the cursor to be moved by rotating the ball in the desired direction
3. Graphics Tablet _____	C. pointing device consisting of a small rod that looks like a pen
4. Touch Screen _____	D. a flat rectangular surface that senses the movement of a finger.
5. Track Ball _____	E. input device that consists of a special electronic pad and a pen called a stylus

Thank you for completing this activity. Now, you may go to the end of this lesson to check your answer. Make sure you do the necessary corrections before moving on to the next part of this lesson.

3. The Digital Input Devices

The world is now digital and it pays to know the different digital input devices that are used with the computer. Data must be digitised before it is used by a computer. There are a range of input devices that capture and digitise data.

The following are some of the commonly used digital devices:

a. The Scanner

Scanners are input devices that make a digital representation of any printed image. Scanners use a software standard called TWAIN. The digital data can be printed, edited or merged into another document.

There are three common types of scanners:

- i. **flatbed scanners** look similar to a small photocopier with the document remaining flat and stationary during the scanning.



Flatbed Scanner

- ii. **pen scanners** are wireless devices that look like a highlighter—when the pen scanner is dragged across a line of printed text it creates a text file.



Pen Scanner

- iii. **drum scanners** are high quality scanners used in publishing applications.



Drum Scanner

b. **The Digital Camera**

Digital cameras are input devices that capture and store images in digital form rather than on film. The main advantage of digital cameras is that making the photos is both inexpensive and fast because there is no film processing.

Digital video cameras are input devices that capture video in a digital format.



Digital Video

c. **The Microphones**

Microphones are input devices that capture sound.

Sound travels through the air in waves and is analog data. Audio is sound that has been digitised.

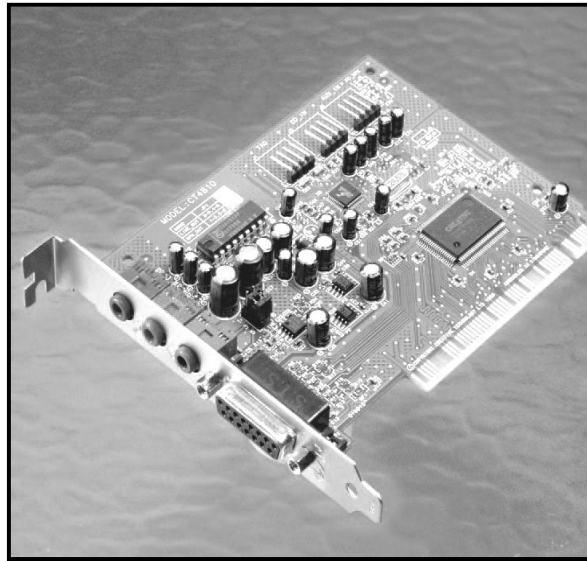
Microphones can be found in the headset or built-in in the laptop computer. Look at the pictures below. Notice that in laptops, you can still connect a USB microphone even though it already has a built-in microphone.



Microphone in a Headset



For a computer to play audio, it needs a **sound card** is an expansion card that allows the PC to accept microphone input, play music and other sounds through speakers or headphones. Voice recognition converts voice signals into digital data.



Sound Card

d. **The OCR**

Optical character recognition (OCR) devices are scanners that read typed text and, in some cases, handwritten text.



OCR

e. **The Barcode**

Barcode readers are used extensively in retail industries to input product identification at point of sale.

Supermarkets use a laser to read barcodes and many firms use handheld barcode readers. Product information (description, price and code) is held on a central computer linked to the point of sale computer. Items passing the barcode reader are entered quickly and accurately.

The description and price of the item is displayed on the cash register and printed on the receipt. Libraries and many industries use barcode readers to keep track of stock movement.



Barcode Reader



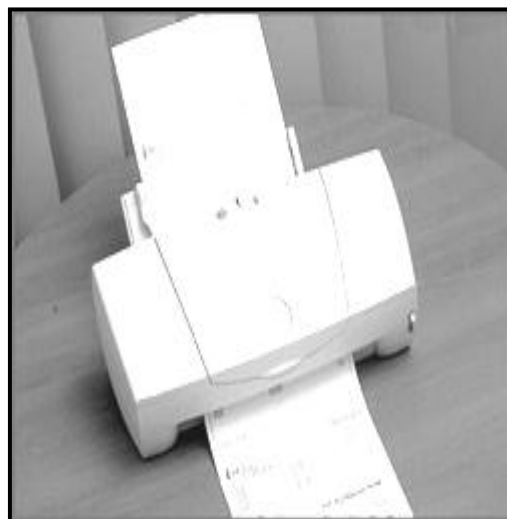
Barcode Reader Scanning an Item

f. **MICR**

Magnetic ink character recognition (MICR, pronounced m'iker') is widely used by banks to print serial numbers on cheques.

After going over the commonly used digital devices, it is worthy to take note that these devices help in a lot of ways to make work easier, faster and more efficient.

It has to be taken note however, that these devices must be used with appropriate care and discretion. The pictures below are examples of MICR.



MICR Machines



Activity 2: Identify the input device. Write your answer in the space provided.

- These are used to keep track of stock movement. _____

2. The document remains flat and stationary during scanning. _____
3. This input device uses sound card. _____
4. Input device that is widely used by banks. _____
5. It has the advantage of having no film processing needed. _____
6. It captures video in digital format. _____

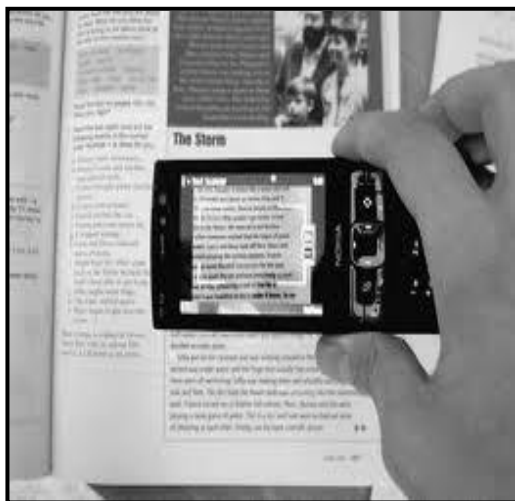
7.



8.



9.



10.



Thank you for completing this activity. Now, you may go to the end of this lesson to check your answer. Make sure you do the necessary corrections before moving on to the next part of this lesson.



Summary

You have come to the end of Lesson 9. In this lesson, you learnt about the common input devices used to accept data into the computer for processing into information. You should have gained relevant idea to understand how computers input to process data.

NOW DO PRACTICE EXERCISE 9 ON THE NEXT PAGE

Practice Exercise 9

A. Answer the following questions.

1. List the four major areas of the QWERTY keyboard.

2. List one advantage and one disadvantage of a pointing device.

3. How does a light pen work?

4. What type of pointing device is popular in most PDAs and palm computers?

5. What is the main advantage of a digital camera?

B. Identify the term that is described in each item.

1. A pointing device that is similar to a mouse except that the ball is on top of the device instead of the bottom. _____

2. A common type of scanner that looks like a highlighter. _____

3. Input device that captures video in a digital format. _____

4. An expansion card that allows the PC to accept microphone input, play music and other sounds through speakers. _____

5. Input device used extensively in retail industries to input product identification at point of sale. _____

C. Write TRUE if the statement is correct and FALSE if it's incorrect.

1. The QWERTY keyboard is the only keyboard layout for personal computers. _____

2. A mouse has one button and a scroll wheel. _____

3. Touch screens enter data by detecting the touch of your finger. _____

4. Most digital cameras compress and save their images in standard JPEG or FlashPix format. _____
 5. A flatbed scanner is a high quality scanner used in publishing applications.

-

CHECK YOUR WORK. ANSWERS ARE AT THE END OF TOPIC 2.**Answers to Activities****Activity 1****A.**

Your computer mouse is a pointing device that is used in a windows operating system environment. Your computer mouse is used primarily for clicking, dragging, copying and executing programs. With a combination of clicks and button pressing on your keyboard, you are able to perform specific tasks such as selecting, dragging and dropping, rollover, page up and down and a whole host of other actions.

B.

1. C
2. D
3. E
4. A
5. B

Activity 2

1. Barcode
2. Flatbed Scanner
3. Microphones
4. Magnetic ink character recognition
5. Digital Camera
6. Digital Video Camera
7. Pen Scanner
8. Drum Scanner
9. Optical character recognition
10. Barcode Reader

Lesson 10: Output Devices



Welcome to Lesson 10 of Unit 2. In Lesson 9 you learnt about the input devices which allows the entry of data in the computer .

In this lesson you shall learn about the output devices.



Your Aims:

- define output devices
 - explain the importance of output devices
 - identify and differentiate the different output devices
-

What is an Output?

Output involves sending information like text, image, video or audio from the computer.

The Output Device

A device designed to assist the output of data is called an **output device**.

There are many types of output devices used for different purposes. These are the screens, the printers, the plotters and the speakers.

Types of Output Devices

1. The Screens

The **screen** is a display surface that provides immediate feedback about what the computer is doing. It can display text, numeric, image and video data. All images on the screen are made up of tiny dots called pixels. A **pixel or picture element** is the smallest part of the screen that can be controlled by the computer. The total number of pixels on the screen is called its resolution.

Types of Screens

- a. A **monitor** is a screen that can display text and graphics. It uses cathode-ray tube (CRT) technology similar to a television.



Monitor Screen

- b. **LCD (liquid Crystal Display) screens** are flat-panel displays that use liquid crystal display. They consist of a backplane and any number of segments or dots.



Monitor Screen

2. The Projectors

An **image projector** is an optical device that projects an image (or moving images) onto a surface, commonly a projection screen.



Projector

These projectors are now commonly used in meetings, conferences and even in the classrooms to display what is in the computer screen for a larger audience to view.



3. The Printers

The **printer** is an output device that produces a paper copy of any required data.

The paper containing the data is called a **hard copy** or **printout**.

Types of Printers

- a. The **dot matrix printer** transfers ink to the page by the impact between a pin, a printer ribbon and the paper.

Dot matrix printers are reliable and cheap, however, they are noisy and do not produce the highest quality output. They are useful when duplicate copies are needed from one print job such as credit card receipts.



Dot Matrix Printer

- b. **Inkjet printers** produce text and images by spraying very fine drops of ink onto the paper. Inkjet printers produce high-quality output in either colour or black and white.

They are quiet, light and relatively cheap, although the ink cartridges are reasonably expensive. High-quality images can be printed on coated paper, photographic glossy paper and overhead transparencies.



Ink Jet Printer

- c. **Laser printers** use a rotating disk to reflect laser beams onto the paper to produce text and images. Laser printers are fast printers that obtain high quality output to rival normal printing processes.

4. **The Plotters**

The **plotter** is an output device used to produce high-quality drawings such as maps, charts and building plans.

The drawings are often larger than the available paper sizes of a standard printer. Plotters operate with commands from the computer and can draw an amazing array of shapes and figures.



Plotter

There are two different types of plotters:

- a. **Pen plotters** produce images using coloured ink pens over the surface of the paper.

Depending on the output, pen plotters are either flatbed or drum.

- i. A **flatbed plotter** looks like a drafting table with pens suspended over it. They are used in engineering and drafting applications.
 - ii. A **drum plotter** works the same way except the paper is rolled around a drum or cylinder.
- b. **Electrostatic plotters** create images by moving paper under a row of wires. When the wires are given an electrostatic charge they touch the paper and create the drawing. Electrostatic plotters produce high quality output and are faster than pen plotters.

5. **The Speakers**

Sounds are produced using **speakers**.

A small speaker is usually located in most personal computers inside the system unit. However, high quality stereo speakers are often connected to the computer using a port and a sound card. The speakers are sometimes built into the sides of the monitor.



Speakers



Activity 1: Name the output devices described in each of the sentences below. Write your answer on the space provided.

1. Output devices that produce sound. _____
2. It displays text, numeric, image and video data. _____
3. It produces a paper copy of any required data. _____
4. An output devices that uses CRT technology. _____
5. Printers which are noisy. _____

Thank you for completing this activity. Now, you may go to the end of this lesson to check your answer. Make sure you do the necessary corrections before moving on to the next part of this lesson.

Summary



You have come to the end of Lesson 10. In this lesson, you learnt about the common output devices used to present data as text, image, audio or video.

NOW DO PRACTICE EXERCISE 10 ON THE NEXT PAGE

Practice Exercise 10

A. True or False. Write TRUE if the statement is correct and FALSE if it is incorrect.

1. A pixel is the smallest part of the screen that can be controlled by the computer. _____
 2. Resolution is the total number of pixels. _____
 3. Dot matrix printers produce the highest quality output. _____
 4. Inkjet printers are quiet, light and relatively cheap. _____
 5. High-speed laser printers can print over one hundred pages per minute. _____
-

B. Answer the following questions.

1. What is **resolution**?

2. When is a plotter used?

3. Compare and contrast a monitor from an LCD.

Output Device	Comparison	Contrast
Monitor		
LCD		

4. Give one advantage of buying a laser printer.

5. List the two different types of plotters.

CHECK YOUR WORK. ANSWERS ARE AT THE END OF TOPIC 2.
--

Answers to Activity

1. Speakers
2. Screen
3. Printer
4. Monitor
5. Dot Matrix Printer

Lesson 11: Classification of Hardware Systems



Welcome to Lesson 11 of Topic 2. In Lesson 10 you learnt about the output devices which are designed to assist the output of data.

In this lesson you shall learn about the classification of hardware systems.



Your Aims:

- identify and define the different classifications of hardware systems
 - identify the uses of each classification
-

Classifications of Computers

A computer is classified according to its power and capabilities. To measure the power of a computer, many different criteria are used, such as its storage capacity and the speed of the CPU. However, with advances in technology the differences have become blurred and the criteria are constantly changing. In fact, personal computers now have the capabilities that were only available in mainframes a few years ago. Classification of hardware systems determines the different types of computers when it comes to its power and capabilities

Let us take a look at the common classifications of computers below.

1. Supercomputers

A **supercomputer** is the fastest, most powerful and most expensive type of computer known. Supercomputers are used for applications that demand maximum power. Aerodynamics design and simulation, and processing geological, genetic and weather data are some examples. Use your dictionary to learn what aerodynamics, design and simulation, geological and genetic.



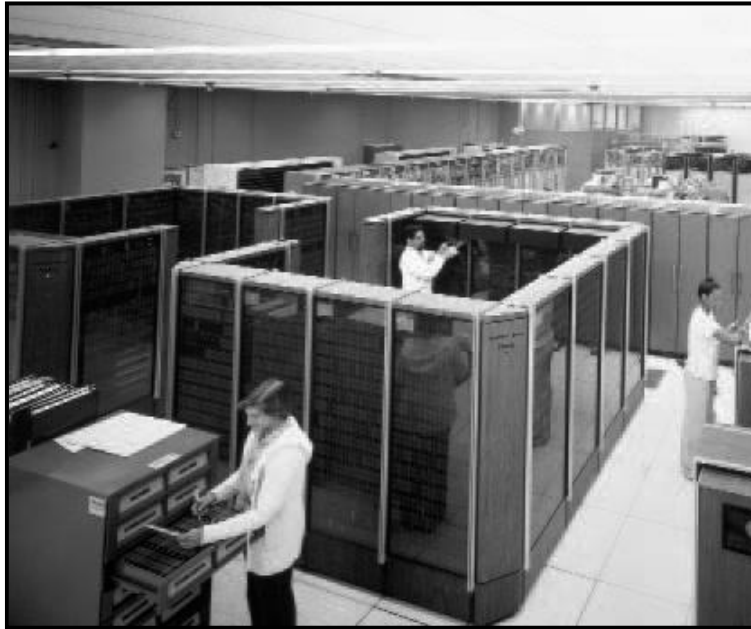
Supercomputer

People access the supercomputer using a terminal. A **terminal** is an input and output device - usually a keyboard and monitor.

2. The Mainframes

A **mainframe** computer is an expensive computer about the size of a refrigerator that is used for large computing jobs.

It is very powerful and capable of processing large amounts of data very quickly but is slower, less powerful and less expensive than a supercomputer. When you withdraw money from a bank account or buy a product using EFTPOS the transaction involves a mainframe computer. Users generally access a mainframe using terminals in a similar way to supercomputers.



Mainframe Computer

3. The Personal Computers

A **personal computer** or **PC** is a relatively low cost computer that is intended for home and light business use.

It is a desktop computer with a CPU contained on one integrated circuit (silicon chip) called a **microprocessor**. A personal computer, as the name suggests, is dedicated to serving a single user. However, with increases in computing power PCs are being used as servers. PCs are the most common type of computer. Millions of personal computers are in use throughout the world because they are useful, inexpensive, easy to use and offer something for almost everyone.

4. The Portable computers

Portable computers are compact self-contained computers that can be carried around and used with a battery pack or electric mains.



Portable Computer

Portable computers generally cost more than PCs with the same capabilities and are also more difficult to upgrade.

Laptops, notebooks and handheld computers are referred to as portable computers. These computers are light (1 or 2 kilograms), compact and easily transported.

Handheld computers are small enough to store in the pocket of a jacket. They are sometimes referred to as personal digital assistants (PDAs) or palmtop computers. Handheld computers are used by people who value mobility over a full-sized keyboard and screen.



Handheld Computer



Activity 1: Differentiate the following:

1. PC and Laptop

2. Supercomputers and Mainframe computers

Thank you for completing this activity. Now, you may go to the end of this lesson to check your answer. Make sure you do the necessary corrections before moving on to the next part of this lesson.



Summary

You have come to the end of Lesson 11. In this lesson, you learnt about the classification of hardware systems. Computers are classified according to its powers and capabilities. There are four common classifications of computers. These are the supercomputers, the mainframe computers, the personal computers and the laptop computers.

NOW DO PRACTICE EXERCISE 11 ON THE NEXT PAGE

Practice Exercise 11

A. Complete the following by writing the suitable term.

The () of the CPU and its () are often used to measure the power of a computer. It is common to divide computers into (), mainframes, (d) and portable computers.

B. Unjumble these words:

- a. pesomurcpeutr _____
 - b. lptoa _____
 - c. estingmarhi _____
 - d. abprotel _____
-

C. Identify the term that is described in each item.

- a. The fastest and most expensive type of computer. _____
 - b. An input and output device, usually a keyboard and a monitor.

 - c. A computer small enough to store in the pocket of a jacket.

 - d. An acronym for the most common type of computer. _____
 - e. A computer designed to provide software and other resources to other computers over a network. _____
-

D. Briefly answer the question.

- a. What are the applications completed by a supercomputer?
-
-

CHECK YOUR WORK. ANSWERS ARE AT THE END OF TOPIC 2.

Answers to Activity

1. PC is a desktop computer with a CPU contained on one integrated circuit (silicon chip) called a microprocessor while a Laptop is a portable computers which is compact self-contained computers that can be carried around and used with a battery pack or electric mains.

2. Supercomputers is the fastest, most powerful and most expensive type of computer while Mainframe computers are expensive computers about the size of a refrigerator that is used for large computing jobs.

Lesson 12: Troubleshooting and Maintenance



Welcome to Lesson 12 of Unit 2. In Lesson 6 you were introduced to computer appropriate care and maintenance.

In this lesson you shall learn more on computer troubleshooting and maintenance.



Your Aims:

- define trouble shooting
- identify the basic trouble shooting and maintenance guidelines
- apply basic troubleshooting and maintenance guidelines

Procedures for Care and Maintenance

Computer users need to perform basic troubleshooting procedures when dealing with hardware problems. It is also important that users adopt procedures for the care and maintenance of their computer.

Troubleshooting

Troubleshooting is to isolate the source of a problem and fix it, typically through a process of elimination whereby possible sources of the problem are investigated and eliminated beginning with the most obvious or easiest problem to fix.

Computers and their peripheral devices will not last forever. It is important to be able to locate the fault so that it can be repaired.

Peer checking is a common method of determining whether a piece of equipment is faulty. It involves swapping the device with another device that is working.

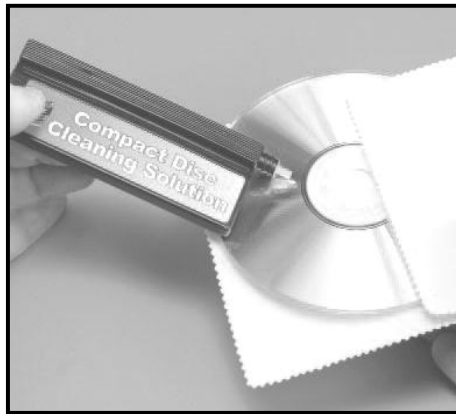
For example, a monitor is checked by replacing it with another monitor and keeping all the same cables.



Peer checking is a useful method of troubleshooting for keyboards, mice, screens, hard disks and most peripheral devices.

Common operating faults are overcome by carefully analysing the situation. Here are the steps:

1. **Starting up** - Turn the power off and check the power chord connections. Press the button to turn on the system unit and the screen.
2. **Blank screen** - Check that the screen is turned on and that the monitor cable is connected to the computer. Check the settings for brightness and contrast.
3. **Not reading data** - Check that the disk drive is connected to the computer. The drive cable needs to be firmly connected. If you cannot read a CD or DVD it is usually the disk that is causing the problem. Clean the disk and check for scratches.



Cleaning CDs is an important troubleshooting task

4. **Not printing** - Check that the printer is turned on and correctly connected to the system unit. Ensure there is paper in the printer and that the operating system recognises the printer.
5. **Mouse not working** - Check that the mouse is being used on a flat surface that is dust free. Remove the mouse ball and gently clean it to remove any dust. Ensure that the operating system recognises the mouse in use.



Activity 1: Read the given situations and provide the steps in troubleshooting.

1. Sofia inserted a disk into her computer and the computer did not reading the data. What possible troubleshooting steps can Sofia do? There are three possible steps

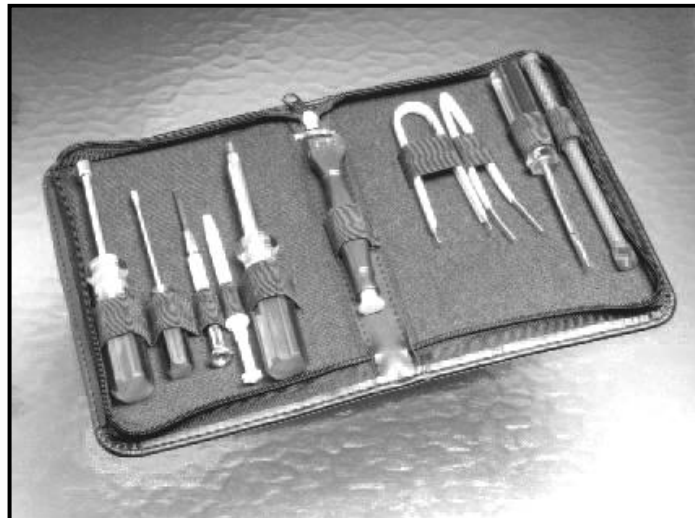
2. Mark transferred his computer to the study room. When he turned on the computer it was not starting up. What possible troubleshooting steps can he do? There are two possible steps.

Thank you for completing this activity. Now, you may go to the end of this lesson to check your answer. Make sure you do the necessary corrections before moving on to the next part of this lesson.

Care and Preventative Maintenance

After learning how to care for the hardware part of your computer through troubleshooting, the following tasks need to be completed on a regular basis to prevent problems with your PC. These are regarded as do's and don't's in maintaining a computer.

1. Turn the computer off when working inside the system unit. A PC toolkit provides the necessary tools to connect any peripheral device. Check that you do not have any static electricity that could damage internal components by wearing an anti-static wrist strap or by touching an unpainted metal surface such as the power supply. Use a surge protector to stop voltage increases affecting your system. Unplug the computer during thunderstorms.



PC Tool Kit

2. Do not eat or drink near the computer. Ensure that your work area is free of dust and small objects such as staples. If dust builds up inside the system unit, remove it carefully with a small vacuum cleaner or a clean and unused paintbrush. Be careful around circuit boards when using a vacuum cleaner as a vacuum cleaner can remove components and jumpers. Small pieces of rubbish in your keyboard can be removed by turning the keyboard up-side down and shaking it gently.
3. Clean the screen with a soft and slightly damp cloth or paper towel. Commercial cleaners can damage the surface of the screen and may enter the electrical system.



A **blackout** occurs when there is a complete loss of power. A **brownout** occurs when there is a power failure with a low voltage level.

An **uninterruptible power supply (UPS)** can give you time to properly close down and avoid data loss when a blackout or brownout occurs.

4. Ensure that the computer is not exposed to direct sunlight or any other heat source for long periods of time. Check that the cables are in perfect working condition. Replace any cables that have deteriorated or are frayed. It is good practice to securely bundle large numbers of cables.
5. Turn off the printer using the power button as this prevents the print head from drying out. Be careful cleaning inside the printer.
6. Use water or rubbing alcohol as a cleaning solution. Check the printer for small pieces of paper that may cause jamming.
7. Delete unnecessary folders and files. Defragging your hard disk will reorganise your files and make disk operations faster. Regularly backup data files to another hard disk, CD or tape. If your main storage device is damaged then you are able to access the backup files to retrieve data. Protect your system from viruses by installing an up-to-date anti-virus program.
8. Complete and send all warranty documents and register each piece of software. Most warranties become void if an unauthorised person tries to repair the product. It is good preventative maintenance to complete an annual service and maintain a file that contains all the information about your system. Each time you make a change to your system, such as adding or removing hardware or software, you should update this file and obtain a hard copy. This file should contain the following information:
 - date and retailer where you purchased your computer equipment
 - serial numbers of all hardware and software purchased
 - telephone numbers and addresses of any businesses that will provide support under warranty
 - chronological history of problems and their solutions-this information is helpful for discussions with support people.

—Prevention is better than cure”, applies so much in maintaining a functioning computer. The tips on how to care for your computer will ensure a prolonged machine life span for your computer.



Activity 2: Write a one paragraph reflection on the importance of troubleshooting and maintenance of your computer.

Thank you for completing this activity. Now, you may go to the end of this lesson to check your answers. Make sure you do the necessary corrections before moving on to the next part of this lesson.



Summary

You have come to the end of Lesson 12. In this lesson, you learnt skills on how to do simple trouble shooting and apply basic practical ways to maintain a functioning and efficient computer. Troubleshooting is normally applied to hardware related problems of the computer.

NOW DO PRACTICE EXERCISE 12 ON THE NEXT PAGE

Practice Exercise 12

A. Complete the following sentences:

1. If the mouse is not working remove the _____ and gently clean it to remove any dust.
 2. A PC toolkit provides the necessary tools to connect any _____ device.
 3. Use a vacuum cleaner carefully near _____ as it can remove components and jumpers.
 4. Protect your system from viruses by installing an up-to-date _____ program.
 5. Most warranties become void if an _____ person tries to repair the product.
-

B. Write TRUE if the statement is correct and FALSE if it's incorrect.

1. If the PC is not reading data it is usually a problem with the CD. _____
 2. Commercial cleaners should be used to clean the surface of the screen. _____
 3. Defragging your hard disk will make disk operations faster. _____
-

C. Complete the following by placing the suitable term in the spaces provided.

Swapping a device with another device that is working is called _____. This is a useful method of troubleshooting for _____, mice, _____, hard disks and most peripheral devices.

D. Describe the steps to overcome these common operating faults:

1. not starting up

2. blank screen

3. not printing

E. What is the purpose of a surge protector?

CHECK YOUR WORK. ANSWERS ARE AT THE END OF TOPIC 2.

Answers to Activities

Activity 1

1. Sofia must check that the disk drive is connected to the computer. The drive cable needs to be firmly connected. If she cannot read a CD or DVD it is usually the disk that is causing the problem. Sofia should clean the disk and check for scratches.
2. Mark should turn the power off and check the power chord connections. He should press the button to turn on the system unit and the screen.

Activity 2

Computers and their peripheral devices will not last forever. It is important to be able to locate the fault so that it can be repaired. Troubleshooting and care for your computer is important to maintain a well functioning computer. It will enable you to maximise the use and life span of your machine. Taking care of your computer will avoid unwanted problems causing inconveniences on work and wasting money and time to have the machine fixed.

—Prevention is better than cure”, applies so much in maintaining a functioning computer. Troubleshooting and maintenance of your computer will ensure a prolonged machine life span for your computer which means more efficient use therefore greater productivity.

Answers to Practice Exercises in Topic 2

Practice Exercise 7

A.

1. CPU
2. Motherboard
3. co-processor
4. bus

B.

Data is entered using an (**input device**) device and processed in some way before being (**presented**) using an output device. If necessary, the (**data**) can be retained on a (**storage**) device for later use.

C.

1. Input involves accepting data into the computer for processing into information while Output involves sending information from the computer.
2. A tower system is a vertical box that is often kept under the desk where towers usually have more expansion slots and bays compared to the desktop system which is a horizontal box designed to sit under the monitor like a platform
3. An expansion slot is an opening where a circuit board can be inserted into the motherboard to extend the capabilities of the computer while the circuit board is called an expansion card or expansion board.
4. Male connectors have one or more exposed pins like the end of a power cord while female connectors have matching holes like a power point.

D.

1. Input, Process, Storage, Control and Output
2. CPU, memory, expansion slots, buses and other electronic components.
3. An integrated circuit (IC) is a single chip of silicon that has replaced millions of transistors and other electrical components.
4. Expansion cards are also used to extend memory.
5. A PC card is the size of a thick credit card that provides an additional function such as extra memory or a modem.

- F.** USB (universal serial bus) has become a standard method of connecting peripheral devices because it allows fast transfer of data and connects a range of devices such as digital cameras, scanners and storage devices.

Practice Exercise 8

A.

1. data
- 2.. processing
3. control unit

4. logical
5. microprocessor

B.

1. FALSE
2. TRUE
3. TRUE
4. FALSE

C.

1. register
2. control unit
3. microprocessor

D.

1. The CPU accepts the data from any input device, changes this data according to the instructions given by the user and then sends the results to an output device.
2. The CPU consists of the control unit, arithmetic logic unit (ALU) and registers.
3. It is the organiser that directs the flow of data in the computer in the same way as traffic lights control the flow of cars at an intersection. The control unit selects and retrieves instructions from storage in sequence, interprets them and starts the required operation.

Practice Exercise 9

A

1. Alphanumeric keys, Cursor control keys, Special keys and Function keys
2. They are good at giving commands to the computer and for creating certain images. However, pointing devices are not effective for entering large amounts of text.
3. The tip of the pen has a light detector that senses the intensity of light on a screen and emits signals so that the computer can calculate its position.
4. Pen input device
5. The main advantage of digital cameras is that making the photos is both inexpensive and fast because there is no film processing.

B.

1. trackball
2. pen scanners
3. digital video camera
4. sound card
5. barcode readers

C.

1. FALSE
2. FALSE
3. TRUE
4. FALSE

Practice Exercise 10**A.**

1. TRUE
2. FALSE
3. FALSE
4. TRUE
5. TRUE

B.

1. The total number of pixels on the screen.
2. A plotter is an output device used to produce high-quality drawings such as maps, charts and building plans.
3. A monitor is a screen that can display text and graphics. It uses cathode-ray tube (CRT) technology similar to a television. While a LCD screens are flat-panel displays that use liquid crystal display.
4. Laser printers are fast printers that obtain high quality output to rival normal printing processes.
5. Pen Plotters and Electrostatic plotters

Practice Exercise 11**A.**

The (**speed**) of the CPU and its (**storage capacity**) are often used to measure the power of a computer. It is common to divide computers into (**super computers**), mainframes, (**personal computers**) and portable computers.

B.

1. supercomputer
2. laptop
3. timesharing
4. portable

C.

1. supercomputer
2. terminal
3. handheld computer
4. PC

5. server

D.

1. Supercomputers are used for applications that demand maximum power, such as aerodynamics design and simulation, and processing geological, genetic and weather data.
-

Practice Exercise 12

A.

1. mouse ball
2. peripheral
3. circuit boards
4. anti-virus
5. unauthorised

B.

1. TRUE
2. FALSE
3. TRUE

C.

Swapping a device with another device that is working is called (peer checking). This is a useful method of troubleshooting for (keyboards), mice, (screen), hard disks and most peripheral devices.

D.

1. Turn the power off and check the power chord connections. Press the button to turn on the system unit and the screen.
2. Check that the screen is turned on and that the monitor cable is connected to the computer. Check the settings for brightness and contrast.
3. Check that the printer is turned on and correctly connected to the system unit. Ensure there is paper in the printer and that the operating system recognises the printer.

E.

1. Use a surge protector to stop voltage increases affecting the system.
-

End of Topic 2.

Now Do Exercise 2 in Assignment Book 2 Then Go to Topic 3.

TOPIC 3:

DATA HANDLING

Lesson 13: Data and Information

Lesson 14: Data Coding, Sources and Types

Lesson 15: Primary Storage

Lesson 16: Secondary Storage

Lesson 17: Data Transmission and Compression

Lesson 18: Data Security

TOPIC 3: DATA HANDLING

We live in an information rich society. Today, many work roles are dependent on the ability to access and retrieve data to answer a query, gain a performance overview or analyse trends over time. In preparing you to become economically active in the society of the future, we need to learn skills to handle data.

Topic 3 will help you develop the understanding, skills and strategies that you need to retrieve relevant, accurate, unbiased information from electronic sources.

In this topic you will learn data handling. You will learn about data and information, data coding, data sources and data types. The storage of data, both primary and secondary, is examined. The chapter concludes by outlining data transmission, data compression and data security.

Lesson 13 is all about the computer data and information . You will be introduced to the different types of data and information.

Lesson 14 discusses on data coding, sources and types. You will learn how the computers manipulate and store data. Moreover, sources and types of data are presented.

Lesson 15 focuses on commonly used primary storage devices.

Lesson 16 Lists and explains the commonly used secondary storage devices.

Lesson 17 presents how data is transmitted and compressed.

Lesson 18 explains on computer data security. Ways on how to protect your computer data are discussed.

By the end of Topic 3, you should be able to identify and demonstrate appropriate use of a range of hardware components and peripheral devices and use a range of computer skills and techniques.

Lesson 13: Data and Information



Welcome to Lesson 13 of Topic 3. In Topic 2 you learnt about hardware and peripherals which provided you with necessary information on how the computer works from the inside.

In this lesson you shall learn about data and information.



Your Aims:

- define data and information
 - identify the importance of data and information
 - compare and contrast the different types of data and information
-

Data and information

To help you understand more about data and information, it is best to learn about their differences.

Data is the raw fact entered into a computer system.

This raw material could be in any of the following types:

1. text – textual or consisting of letters displayed on a screen or printed on paper
2. numbers – refers to any data consisting of numbers
3. graphics – refers to images and pictures
4. audio - refers to sound that includes voice and music
5. animation - refers to a simulation of movement created by displaying a series of pictures, or frames. Cartoons on television is one example of animation.
6. video - refers to recording, manipulating and displaying moving images, especially in a format that can be presented on a television. An example is a recording produced with a video recorder (camcorder) or some other device that captures full motion.

This topic will be further explained in Lesson 14 when we cover the different types of data.

Data can be thought of as unorganised facts that mean little by themselves, such as the letters typed into a word processor.

Information is data that has been ordered and organised into meaning by the computer, such as a word processed document that we can read and understand.



Information is valuable if it is relevant, accurate, current and appropriately presented.

There are many different ways of converting data into information, such as combining data, displaying data in an understandable way or removing irrelevant data. Information depends on the data entered.

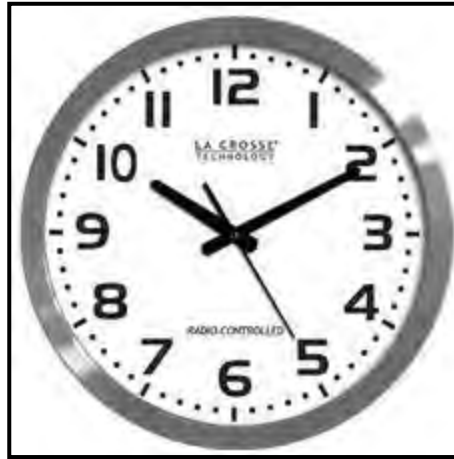
Therefore we can say that **computer data is information processed or stored by a computer.**

Data can be represented in either analog or digital form.

1. Analog

Analog data is represented by using continuous variable physical quantities such as voltages.

For example, an analog clock shows a second hand continually ticking around the clock face, measuring small units of time in seconds.



Analog Clock

At any moment the clock will give you an instant measure of the exact time, since you can estimate parts of a second as the second hand moves.

Sounds, images and video are naturally in analog form. Analog signals are pulses, usually electrical or optical, in the form of continuous waves.

2. Digital

Digital data is represented using discrete measurements in the form of digits or numbers.

For example, a digital clock shows the time as a certain number of hours and minutes. Here the time does not change continuously, but in a series of steps, jumping from second to second and minute to minute. Data is not represented continuously but in discrete quantities using digits.



Digital Clock



Most computers use word sizes of 8, 16, 32 or 64 bits. The bigger the word size, the faster the computer.

Numbers, text and other characters are naturally in digital form. Information technology uses data in digital form using only two digits: 0 and 1. Two digits are easily represented electronically by circuits in the computer being off or

on. The digit 0 is used to represent the electronic state of off ' and the digit 1 is used to represent the electronic state of on'. Each on or off digit is called a **bit** (**B**inary **digiT**).

A **bit** is the smallest unit of data stored in a computer. A group of eight bits is called a **byte**.

Data is processed in words. A **word** (or word size) is the number of bits processed by the computer at one time.

When the computer moves **bits** from one place to another it takes one word at a time.



Activity 1: The passage below was taken from a paper on **Proactive Law Application**. Read it and have a paragraph reflection that focuses on the importance of data and information to present society.

Information resources grow in importance and influence all areas and require multi-disciplinary support. Data and information is power, for those who can find/access, understand and make use of it. The legal community should also be concerned about how these new "resources" are managed and used. The quality of services and decisions are directly related to the quality of information. Source: Proactive Law Application

Thank you for completing this activity. Now, you may go to the end of this lesson to check your answer. Make sure you do the necessary corrections before moving on to the next part of this lesson.



Summary

You have come to the end of Lesson 13. In this lesson, you learnt what data and information are. Computer data is information processed and stored by the computer. Data is represented into two groups : analog and digital data.

NOW DO PRACTICE EXERCISE 13 ON THE NEXT PAGE

Practice Exercise 13

A. Write TRUE if the statement is correct and FALSE if its incorrect.

1. Information must be attractive and easy to use. _____
 2. Sounds, images and video are naturally in digital form. _____
 3. Information technology works with data in analog form. _____
 4. A bit is a binary digit. _____
 5. A group of eight bytes is called a bit. _____
-

B. Complete the following sentences:

- a. Data can be thought of as _____ facts that mean little by themselves.
 - b. Information is _____ using a range of hardware devices.
 - c. _____ data is not represented continuously, but in a series of steps.
 - d. A _____ is the number of bits processed by the computer at one time.
-

C. Explain the differences between:

- a. **data and information**

- b. **analog and digital**

- c. **bit and byte**

CHECK YOUR WORK. ANSWERS ARE AT THE END OF TOPIC 3.
--

Answer to Activity

Computers will be used to manage large volumes of information resources, to control and hide complexity for citizens and to provide easy-to-use computerized tools and to manage automatic services.

But, before we can use these new capabilities, our legacy needs to be migrated to become a trusted and quality-assured legal information resource. So, looking into the legal information of today, we quickly realize that there are some severe problems that must be dealt with.

An important objective for harmonization efforts directs that our laws should be compatible across all government sectors.

Content that can be interpreted by computers (and humans), will be a hard nut to crack. The legal community has a long tradition over millennia, where papers have been the only way to capture, archive and use legal information. Modern computer-based tools (such as data bases) are form-, style- and layout-independent and many times more efficient to manage and maintain complexly structured data and information.

We should use computers to store/archive, compute, find, retrieve, present and transmit data and information. And, we should use humans for what they are good for, to produce, update and make valuable use of data and information. It's —~~over~~kill" to use smart people to manually handle documents, when computers can do it faster and continuously. Most working procedures that are rules-based and repetitive can be candidates for automatic computer services.

If the legal community requires paper to be used, then legal data and information will be assembled, formatted and printed out. If others would like to use a screen or let the text be spoken by a digital voice engine, then that could be done. The paper paradigm shift is about focusing on the information content instead of the presentation.

Source: Proactive Law Application

Lesson 14: Data Coding, Sources and Types



Welcome to Lesson 14 of Topic 3. In Lesson 13 you learnt about what data and information is. It should have made you aware that data when processed by the computer becomes information. In this lesson you shall learn about data coding, sources and types.



Your Aims:

- define data coding and bus
 - identify sources of data
 - differentiate the data types
-

Data Coding

The emphasis in this lesson is on the binary number system used to represent digital data in a computer system. Also, we will examine different sources of data and describe some of the different data types.

Computers use the binary number system to manipulate and store all of their data including numbers, words, videos, graphics, and music.

The **binary system** (or binary code) is an arithmetic system using a base of two.

The binary number system, also called the **base-2** number system, is a method of representing numbers that counts by using combinations of only two numerals: zero (0) and one (1).

In Lesson 13, the term bit was defined as the smallest unit of data stored in computer therefore, it is the smallest unit of digital technology. Bit stands for "**B**inary **d**igi**T**."

A **byte** is a group of eight bits. A kilobyte is 1,024 bytes or 8,192 bits.



The word byte is an abbreviation from the words BinarY digiT Eight

The advantage of the binary system is its simplicity. A computing device can be created out of anything that has a series of switches, each of which can alternate between an "on" position and an "off" position. These switches can be electronic, biological, or mechanical, as long as they can be moved on command from one position to the other. Most computers have electronic switches.

When a switch is "on" it represents the value of one and when the switch is "off" it represents the value of zero. Digital devices perform mathematical operations by turning binary switches on and off. The faster the computer can turn the switches on and off, the faster it can perform its calculations.

Data Sources

A **data source** is any of the following types of sources for digitized data:

1. a database
2. a computer file
3. a data stream

Let us take them one at a time.

1. **The Database**

A **database** is an organized collection of data, usually in digital form.

Data in the database are typically organized to model relevant aspects of reality (for example, the availability of rooms in hotels), in a way that supports processes requiring this information (for example, finding a hotel with vacancies).

The system that organizes, stores and provides access to the data is called a **database system**.

2. **Computer File**

A **computer file** is a block of arbitrary information, or resource for storing information, which is available to a computer program and is usually based on some kind of durable storage.

Computer files can be considered as the modern counterpart of paper documents which traditionally are kept in offices' and libraries' files.



A file is durable in the sense that it remains available for programs to use after the current program has finished.

3. **Data Stream**

A **data stream** is a sequence of digitally encoded coherent signals (packets of data or data packets) used to transmit or receive information that is in the process of being transmitted.

One good example is how we send and receive processed data or information from the Internet.



Activity 1: Write in the space whether the given statement is TRUE or FALSE.

1. Computers use decimal system for data manipulation and storage. _____
2. There are 16 bytes in 2 bits. _____
3. Digitized data sources come from database, computer file and data stream. _____
4. The Intranet and Internet are gateways for data stream. _____
5. A computer file is not durable. _____

Thank you for completing this activity. Now, you may go to the end of this lesson to check your answers. Make sure you do the necessary corrections before moving on to the next part of this lesson.

Data Types

Before we enter data into a computer system, we usually need to tell the computer what type of data it is. This is because the computer stores and processes different types of data in different ways.

Study the different types of data below.

Types of Data

1. Numeric Data

Numeric data simply means **numbers**. There are four types of numeric data. These are integers, real numbers, currency and percentage.

a. Integers

An integer is a **whole number** - it has **no decimal or fractional parts**.
Examples:

- 12 (positive integer)
- -45 (negative integer)



Integers can be either positive or negative.

b. Real Numbers

Any number that you could place on a number line is a **real number**.

Real numbers include **whole numbers** (integers) and **numbers with decimal/fractional parts**.

Real numbers can be **positive** or **negative**.

Examples:

- 1
- -0.0003



Some computer software used strange names for real data. You might see this data type referred to as '**single**', '**double**' or '**float**'.

c. Currency

Currency refers to real numbers that are formatted in a specific way.

Usually currency is shown with a currency symbol and (usually) two decimal places.

Examples:

- £12.45
- -£0.01
- \$5500
- €999.00

d. Percentage

Percentage refers to fractional real numbers that are formatted in a specific way - out of 100, with a percent symbol.

So, the real value **0.5** would be shown as **50%**, the value **0.01** would be shown as **1%** and the number **1.25** would be shown as **125%**

Text data is often input to a computer with speech marks (" . . ") around it: "MONKEY".

These tell the computer that this is text data and not some special command.

2. The Alphanumeric (Text) Data

Alphanumeric (often simply called 'text') data refers to data made up of letters (alphabet) and numbers (numeric). Usually symbols (\$%^+@, etc.) and spaces are also allowed.

Examples:

- DOG
- —A little house”
- ABC123
- enquiries@bbc.co.uk



Note that the **telephone number is alphanumeric**. It often has **spaces, dashes**, etc. which numeric data cannot have.

3. The Date and Time Data

Date (and time) data is usually formatted in a specific way.

The format depends upon the setup of the computer, the software in use and the user's preferences.

Date Examples

- | | |
|---------------|------------|
| • 25/10/2007 | • 10-06-08 |
| • 12 Mar 2008 | |

Time Examples

- | | |
|---------|------------|
| • 11am | • 3:00pm |
| • 15:00 | • 17:05:45 |

4. The Boolean Data

Boolean data is sometimes called 'logical' data (or in some software, 'yes/no' data).

Boolean data can only have two values: **TRUE** or **FALSE**

Examples:

- TRUE
- FALSE



Note that TRUE and FALSE can also be shown as YES / NO, ON / OFF, or even graphically as tick boxes (ticked / unticked)

When we are presented with data to be input into a computer system, we must analyse it and select appropriate data types for each value.

**Activity 2: Differentiate each given set of words.**

1. Numeric Data vs. Alphanumeric Data

2. Integers vs. Real Numbers

3. Boolean Data vs. Date and Time Data

Thank you for completing this activity. Now, you may go to the end of this lesson to check your answers. Make sure you do the necessary corrections before moving on to the next part of this lesson.

Summary

You have come to the end of Lesson 14. In this lesson, you learnt about the binary number system used to represent digital data in a computer system. Also, you were taught of the different sources of data which were discussed as the database, computer file and data stream. Moreover, data types such as the numeric, the alphanumeric, date and time and the Boolean data were distinguished from each other.

NOW DO PRACTICE EXERCISE 14 ON THE NEXT PAGE

Practice Exercise 14

A. Write the term that is described in each item.

1. A method of representing numbers that counts by using combinations of only two numerals. _____
 2. The smallest unit of digital technology. _____
 3. An abbreviation from the words 'Binary Digital Eight'. _____
 4. Telephone number is an example of this type of data. _____
 5. This data type can only have two values: **TRUE** or **FALSE**. _____
-

B. Circle the letter of the correct answer.

1. 31/12/13 is an example of?
a. integer b. percentage c. date and time d. alphanumeric
 2. subagan@me.com is an example of what type of data?
a. Boolean b. Date and Time c. Numeric d. Alphanumeric
 3. It is also called as the ~~logical~~ data.
a. Boolean b. Date and Time c. Numeric d. Alphanumeric
 4. It is considered as the modern counterpart of paper documents.
a. computer file b. data stream c. database
 5. This data type means numbers.
a. Boolean b. Date and Time c. Numeric d. Alphanumeric
-

C. Write TRUE if the statement is correct and FALSE if it is incorrect.

1. TRUE and FALSE can also be shown as YES / NO, ON / OFF in Boolean data. _____
 2. Date and time data format depends on the user's preference.

 3. Digital devices perform mathematical operations by turning binary switches on and off. _____
 4. The system that organizes, stores and provides access to the data is called a database system. _____
 5. The computer stores and processes different types of data in different ways.

-

CHECK YOUR WORK. ANSWERS ARE AT THE END OF TOPIC 3.
--

Answer to Activities**Activity 1**

1. False
2. True
3. True
4. True
5. False

Activity 2

1. Numeric data simply means numbers while Alphanumeric data refers to data made up of letters (alphabet) and numbers (numeric).
2. An integer is a whole number which has no decimal or fractional parts while Real numbers include whole numbers (integers) and numbers with decimal/fractional parts.
3. Boolean data is sometimes called 'logical' data (or in some software, 'yes/no' data) while Date and Time data is composed of date and time which is formatted in a specific way dependeng on user's preferences.

Lesson 15: Primary Storage



Welcome to Lesson 15 of Unit 1. In Lesson 14 you learnt about what data coding, sources and types. By now, you should have gained sufficient knowledge on how the computer identifies and process data.

In this lesson you shall learn about data storage focusing on primary storage.



Your Aims:

- define primary storage
- identify the different primary storage devices
- identify the importance of primary storage

Data Storage

In this lesson we will take a look at the primary storage of a computer system.

Data storage involves receiving and retaining data over a period of time.

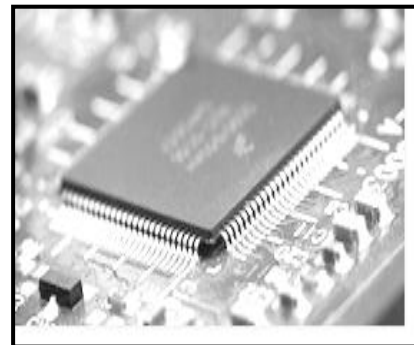
The amount of data storage is very important in determining the capabilities of a computer. Data storage is classified as primary storage or secondary storage.

Primary Storage

Primary storage stores data and programs that need to be instantly accessible to the central processing unit (CPU).

It is internal storage as it uses integrated circuits (silicon chips) located on the motherboard.

Primary storage is also known as main memory, primary memory, main storage or, simply, memory. It consists of RAM, Cache and ROM. Lesson 4 in Topic 1 presented these as parts of the computer system and in Lesson 8 Topic 2 as parts of the CPU necessary for computer processing. Now they are also the primary storage memories. Let us review them one at a time.



Silicon chips

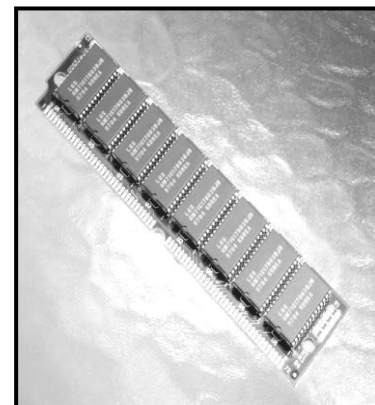
1. RAM

RAM (random access memory) is where data and instructions are held temporarily.

Main Types of RAM

- dynamic RAM (DRAM, pronounced 'de-ram') is memory that must be constantly refreshed
- static RAM (SRAM, pronounced 'essram') is memory that does not have to be updated or refreshed.

RAM is regarded as the working memory of the computer. Programs and files currently in use are stored in RAM.



DRAM chips

RAM is one of the factors that affects the computer's performance. For this reason RAM manufacturers are continually inventing new designs to provide the fastest possible access times at the lowest possible cost.

2. **Cache**

Cache (pronounced 'ash') is a temporary storage area used to store data that the computer can access quickly.

There are two common types of cache:

- a. **Cache memory** is high-speed memory located between the CPU and RAM. It improves performance by using SRAM and reduces the need for the CPU to access the slower DRAM chip.
- b. **Disk cache** works the same way as cache memory. It stores the most recent data from the disk in RAM and when the CPU needs access to data from the disk, it first checks the disk cache.



Disk caching improves the performance because accessing the data from RAM is a thousand times faster than accessing a disk.

3. **ROM**

ROM (read only memory) holds data and instructions that are fixed at the time of production and cannot be changed by the computer.

It is permanent memory that only allows data to be retrieved (read) and not entered into storage (write). Storage of software within the ROM protects it from being damaged or changed.



The software that is stored in ROM is called firmware.

The computer manufacturer sets the actual contents of ROM and it is **non-volatile**. Non-volatile memory does not lose its contents when the power to the computer is turned off.



Activity 1: Identify whether the given statement is TRUE or FALSE.

1. RAM is volatile memory which contents are lost when the computer is turned off. _____
2. Disk cache is a high speed memory. _____
3. Primary storage is located on the motherboard. _____
4. ROM is a permanent memory. _____
5. Firmware protects the ROM from being damaged or changed. _____

Thank you for completing this activity. Now, you may go to the end of this lesson to check your answers. Make sure you do the necessary corrections before moving on to the next part of this lesson.



Summary

You have come to the end of Lesson 15. In this lesson, you learnt about data storage which involves receiving and retaining data over a period of time. The lesson focused on primary storage which speaks of the internal storage as it uses integrated circuits (silicon chips) located on the motherboard. There are three primary storage memories. These are the RAM, RAOM and the Cache.

NOW DO PRACTICE EXERCISE 15 ON THE NEXT PAGE

Practice Exercise 15

A. Identify the term that is described in each item.

1. The receiving and retaining of data over a period of time. _____
2. A temporary storage area used to store frequently requested data and instructions. _____
3. The software that is stored in ROM. _____
4. Data and instructions that are fixed at the time of production and cannot be changed by the computer. _____

B. Complete the following by writing the suitable term in the brackets.

(Data Storage, RAM, Firmware, ROM)

_____ storage is internal storage as it uses
_____ circuits located on the motherboard. It consists of RAM,
_____ and ROM. RAM is an abbreviation for
_____ access memory.

C. Explain the differences between:

1. dynamic RAM and static RAM

2. RAM and ROM

3. cache memory and disk cache

4. volatile and non-volatile memory

D. Answer the given question.

1. List 3 other terms for primary storage.

CHECK YOUR WORK. ANSWERS ARE AT THE END OF TOPIC 3.

Answers to Activity

Activity 1

1. True
2. False
3. True
4. True
5. True

Lesson 16: Secondary Storage



Welcome to Lesson 16 of Unit 1. In Lesson 15 you learnt about what data storage is focusing with primary storage.

In this lesson you shall learn more on data storage with secondary storage.



Your Aims:

- define secondary storage
- identify the different secondary storage devices
- identify the importance of secondary storage device

The Secondary Storage Devices

In this lesson we will take a look at the secondary storage of a computer system.

Secondary storage involves the use of a storage device not located on the computer's motherboard.

A storage device is any device that can store data and then allow it to be retrieved when required. It involves devices such as magnetic tape, magnetic disks, optical disks and flash memory.

Here they are one at a time.

1. Magnetic tape

Magnetic tape is a very long, thin strip of plastic, coated with a thin layer of magnetic material.

Modern tape is wound on two reels inside a cartridge.

A magnetic tape can store large quantities of data in a small space at a relatively low cost. Magnetic tape is often used as a backup or copy of data.

However, the main disadvantage with magnetic tape is that it uses **sequential access** to retrieve data. This form of access starts at the beginning of the tape and reads all of the data until the required item is found. Sequential access to data is slow, making magnetic tapes unsuitable for data that is often updated.



Magnetic Tape

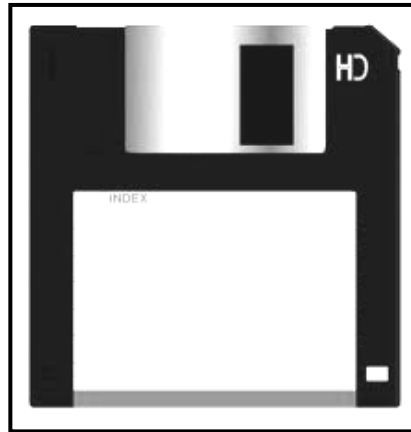
2. Magnetic disks

A **magnetic disk** is a circular piece of metal or plastic, the surface of which has been coated with a thin layer of magnetic material.

Unlike the magnetic tape, the magnetic disks use **random access** (or direct access) to retrieve data. This form of access allows data to be found directly without accessing all the previous data. Random access allows data to be retrieved much faster than sequential access used on magnetic tapes.

There are different kinds of magnetic disks. Let us examine them.

- a. A **disk drive** is a device on which a magnetic disk is mounted. If the disk is permanently attached to the drive it is called a fixed disk (hard disk).
- b. A **floppy disk** (diskette) is a magnetic disk made of flexible plastic and covered with magnetic material. Even though floppies do not have a large storage capacity (1.4 MB) and are slower to access data than a hard drive, they are portable and cheap.



Floppy Disk

- c. A **hard disk** is a magnetic disk made of metal or glass and covered with magnetic material.

Hard disks store more data than floppy disks because the data is stored more densely. A hard disk has a storage capacity measured in GB with larger capacities coming on the market regularly.



Hard Disk

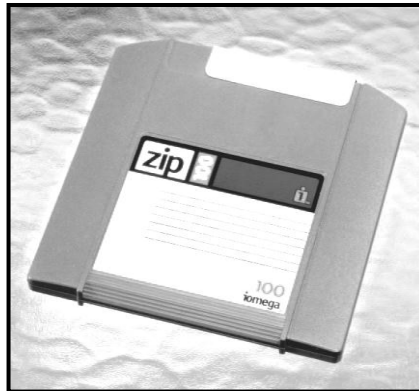
- d. **Removable cartridges** are hard disks found inside a metal or plastic cartridge that can be removed like a floppy disk.

Removable cartridges are fast, though usually not as fast as fixed hard disks. They combine the best parts of hard and floppy disks.

There are two common types of removable cartridges used with personal computers called zip disks and jaz disks:

- i. **Zip disks** (or cartridges) are slightly larger than the 3.5-inch floppy disk and about twice as thick. They can store 100 MB or 250 MB of data. Zip disks are popular for backing up hard disks and transporting files because they are relatively inexpensive.

- ii. **Jaz disks** (or cartridges) are an upgrade of the zip disks. They store up to 2 GB of data. Jaz disks are suited to store large files such as multimedia, graphics and sound.



Zip Disk

3. **Optical media**

An optical disk is a storage medium in which data is read and written using laser technology. Laser technology uses **laser** which is a device that emits light through a process of optical amplification based on the stimulated emission of electromagnetic radiation. The term "**laser**" originated as an acronym for "light amplification by stimulated emission of radiation". Optical disks have the capacity to store large amounts of data and are very reliable.

There are two kinds of optical disks, the CD and the DVD.

a. **The CD**

A **compact disc** (CD) is a polycarbonate disk, the surface of which is coated with a reflective layer of metal. Just like the magnetic disks, CDs use random access to retrieve data.



Compact Disc

There are three kinds of CDs such as CD-ROM, CDR, and CD-RW:

- i. **CD-ROM** (compact disc—read only memory) contains data that cannot be changed. A CD-ROM drive is needed to read data. The larger the drive speed, the faster it can transfer data. CD-ROMs are convenient for storing data that remains constant over time.
- ii. **CD-R** (compact disc—recordable) allows data to be recorded (or burned) but users cannot remove the information. CD-Rs require a CD-R drive to burn the data. They have become a popular storage medium. A CD-R drive allows users to create CD-ROMs and audio CDs.

- iii. **CD-RW** (compact disc—rewritable) allows the user to write, erase and rewrite data. CD-RW is slower than a hard disk and after frequent use areas of the disk may become inaccessible.

b. **The DVD**

DVDs (digital versatile disks) are optical disks that can store large amounts of data. DVDs are the same size as the standard CD but can store in excess of 17 GB. Each of these DVDs works in a similar way to CDs (discussed above) except that they can store more data. DVD-ROM drives can play DVD movies, read DVD data disks, read computer CDs, and play audio CDs.

4. **Flash Memory**

Flash memory is an erasable memory chip used in portable computers, mobile phones, digital cameras and a range of other devices. It retains data when the power is removed. There are two kinds of these: the flash memory card and the memory stick.



Flash Memory card and stick

A **memory stick** is a portable storage device that is connected using the USB port. It is compact, light, reliable and easy to handle. A memory stick allows easy transfer of image, audio and other data between computers and peripheral devices.



Activity 1: Briefly answer the question in a paragraph.

Out of the four kinds of secondary storage devices, which one best suits your need as a FODE student? State one reason and provide an explanation of the benefits of the chosen secondary storage device.

Thank you for completing this activity. Make sure you do the activity before moving on to the next part of this lesson.



Summary

You have come to the end of Lesson 16. In this lesson, you learnt more about data storage which involves receiving and retaining data over a period of time.

This lesson focused on secondary storage devices which involves the use of a storage device not located on the computer's motherboard. There are four secondary storage devices normally used and these are the magnetic tape, magnetic disks, optical disk and the flash memory.

NOW DO PRACTICE EXERCISE 16 ON THE NEXT PAGE

Practice Exercise 16

A. Complete the following sentences:

1. Magnetic tape is often used as a _____ or copy of the data.
 2. A _____ is a circular piece of metal or plastic, the surface of which has been coated with a thin layer of magnetic material.
 3. A floppy disk does not have a large storage capacity and is _____ to access data than a hard drive.
 4. Zip disks are slightly larger than a _____ and about twice as thick.
-

B. Identify what is described in each item below.

1. Magnetic disk made of metal or glass and covered with magnetic material.

 2. A type of removable cartridge that is suited to store large files.

 3. A compact disc that allows the user to write, erase and rewrite data.

 4. A hard disk encased in a metal or plastic cartridge that is removed like a floppy disk. _____
-

C. Unjumble the following words.

1. fplypo idks _____
 2. izp kdsi _____
 3. afhls emyomr _____
 4. scki rdiev _____
-

D. Answer the given question.

1. List three different types of magnetic disks.

CHECK YOUR WORK. ANSWERS ARE AT THE END OF TOPIC 3.
--

Lesson 17: Data Transmission And Compression



Welcome to Lesson 17 of Unit 1. In Lesson 16 you learnt about what data storage using secondary storage devices like the magnetic tape, magnetick disk, optical disk and the flash memory.

In this lesson you shall learn about data transmission and compression. We will examine the two methods for data transmission and explain some of the techniques used to compress data.



Your Aims:

- identify and define the data transmission and compression
 - identify the different ways of data and transmission
 - identify the importance of data transmission and compression
-

Data Transmission

Data can be transferred between computers and devices through a serial transmission or parallel transmission.

1. Serial Transmission

Serial transmission is the transmission of data one bit at a time through a single line. It is used to transmit data to peripheral devices, such as a keyboard and mouse. There are many applications of serial transmission such as its use on networks using either twisted-pair, coaxial or fibre optic cables.



Coaxial Cable

Serial transmission has the advantage of being cheaper than parallel transmission as it uses only a single line. However, it has the disadvantage of being slower than parallel transmission.

2. Parallel Transmission

Parallel transmission involves sending more than one bit at a time (usually 8 bits) simultaneously using separate lines. It is much quicker than serial transmission because it can send more than one bit at a time. Parallel transmission is used only for distances less than a few metres, otherwise errors occur in transmitting the data and the cabling is too expensive. It is used inside the system unit and for connecting peripheral devices such as disk drives.



Ribbon uses parallel transmission to connect a disk drive to the motherboard

Data compression

Data compression reduces the number of bits required to represent the information. It allows the user to store more data and makes data transmission faster. Compressed data must be decompressed to extract the original data. The amount a file is compressed is measured by the **compression ratio**. The compression ratio compares how much larger the uncompressed file is to the compressed file.

There are two ways to compress data. These are **lossy compression** and **lossless compression**.

1. Lossy Compression

Lossy compression permanently removes a number of bits from the file.

The resulting file is smaller in size but not always identical to the original. However, audio and video files can be compressed using high compression ratios, with no noticeable change to the human ear or eye. JPEG and MPEG are common lossy compression formats for graphic and video files.

2. Lossless Compression

Lossless compression allows the original file to be recovered without loss of information.

It works by replacing repeated data with something that takes up less room. For example, in this book the word 'and' appears many times. If you replace each 'and' with a one character symbol or token you save two-thirds of the space.

Lossless compression is used mainly on text files such as word processing, spreadsheets and database files. Each file of a given type can have a different compression ratio depending on the contents of the file. A text file usually has a compression ratio of 3:1. Popular lossless compression systems include ZIP/PKZIP (Windows) and Stuffit (Macintosh).

**Activity 1: Briefly answer the questions.**

1. What makes parallel transmission faster than serial transmission?

2. What is the importance of **data compression**?

Thank you for completing this activity. Now, you may go to the end of this lesson to check your answers. Make sure you do the necessary corrections before moving on to the next part of this lesson.

**Summary**

You have come to the end of Lesson 17. In this lesson, you learnt about the two methods for data transmission and these are serial and parallel transmissions. Moreover, you have learnt about the techniques used to compress data.

NOW DO PRACTICE EXERCISE 17 ON THE NEXT PAGE

Practice Exercise 17

A. Write whether the given statement is TRUE or FALSE.

1. Serial transmission is much quicker than parallel transmission. _____
2. Parallel transmission is used inside the system unit for connecting disk drives.

3. Asynchronous transmission is faster and more efficient than synchronous transmission. _____
4. Lossy compression is used to compress audio and video files.

5. Lossless compression results in a file that is not always identical to the original file. _____

B. Complete the following by replacing with a suitable term in brackets:

Data _____ reduces the number of bits required to represent information. The amount a file is compressed is measured by the _____. A compression ratio of _____ results in a file half the size of the original file. The higher the compression ratio the _____ the compression of data.

C. Unjumble these words:

1. allpreal _____
2. roatmnssisin _____
3. coonresmpsi _____

D. Answer the given question.

1. Explain the difference between serial and parallel transmission.

CHECK YOUR WORK. ANSWERS ARE AT THE END OF TOPIC 3.
--

Answers to Activity

1. It is much quicker than serial transmission because it can send more than one bit at a time. Parallel transmission is used only for distances less than a few metres, otherwise errors occur in transmitting the data and the cabling is too expensive. It is used inside the system unit and for connecting peripheral devices such as disk drives.
 2. Data compression reduces the number of bits required to represent the information. It allows the user to store more data and makes data transmission faster. Compressed data must be decompressed to extract the original data.
-

Lesson 18: Data Security



Welcome to Lesson 18 of Unit 1. In Lesson 17 you learnt about how data transmission and compression. In this lesson you shall learn about data security.



Your Aims:

- define data security
 - identify the need for data security
 - classify the basic security methods
-

Data Security

Data security is a series of steps taken to protect data. It has become a major issue for governments and private organisations. The cost of replacing data that is deliberately or accidentally damaged or lost can be enormous.

The Need for Data Security

Data security is needed to prevent the following threats:

1. information theft—stealing data from one organisation and selling it to another organisation
2. financial theft—illegal transfer of money from one account to another
3. information alteration—changing or deleting existing data
4. unlawful access—unauthorised access to data in a computer system
5. burglary—stealing a computer with its data
6. vandalism—intentional damage to a computer system
7. viruses—creating or introducing computer viruses
8. software piracy—illegal copying of software
9. natural disaster—events such as a fire or flood that could destroy data
10. accidental—unintentional loss or damage to data.

All of these threats, except accidental or natural disaster usually involves a person committing a crime.

A **computer crime** is any illegal activity that involves the use of computer technology by human being. People who gain illegal access to data in computer systems are called **hackers**.

The word hacker was originally used to describe someone who wrote computer programs. It was derived from ‘hack writer’, which described pulp fiction writers in the 1920s.

Hackers are individuals who gain unlawful access to computer systems for the purpose of stealing and corrupting data.

Hackers and computer crime are a growing problem that present our society with many issues.



Activity 1: Read the given situations and briefly answer the questions that follow.

1. Even though hundreds of cases of computer crimes are reported each year, many crimes go unreported. There are several reasons for this: organisations are reluctant to face adverse publicity, publicising the event could give others ideas and in some cases the crime is not discovered.

Are organisations encouraging computer crime by not reporting it? Are organisations that do not report computer crime guilty of a crime themselves?

2. Computer crime is not held in the same light by the community as other criminal activities such as armed robbery. Whereas, the community holds an armed robber in fear or contempt, a hacker is often regarded as clever and the crime is not regarded as dangerous or threatening.

If a burglar and a hacker stole \$300 000 from a business, does it make any difference how the money was taken? Should the penalties for both crimes be the same?

Thank you for completing this activity. Now, you may go to the end of this lesson to check your answers. Make sure you do the necessary corrections before moving on to the next part of this lesson.

Basic Security Methods

Computer criminals have stolen people's personal data and effectively become that person. They have obtained credit card numbers, driver's licence numbers, phone numbers and even birth details. People often provide this data by completing online

forms. However, computer criminals have obtained sensitive information by searching through people's rubbish. Unfortunately, an increase in e-commerce has resulted in an increase in online fraud. People need to be cautious when providing personal details.



One way people online keep track of you is to use your Internet service provider (ISP) address to follow your activities.

Whenever you use your browser, your ISP address is available to others.

Data security is a series of safeguards to protect data. Some of the basic security methods include the following:

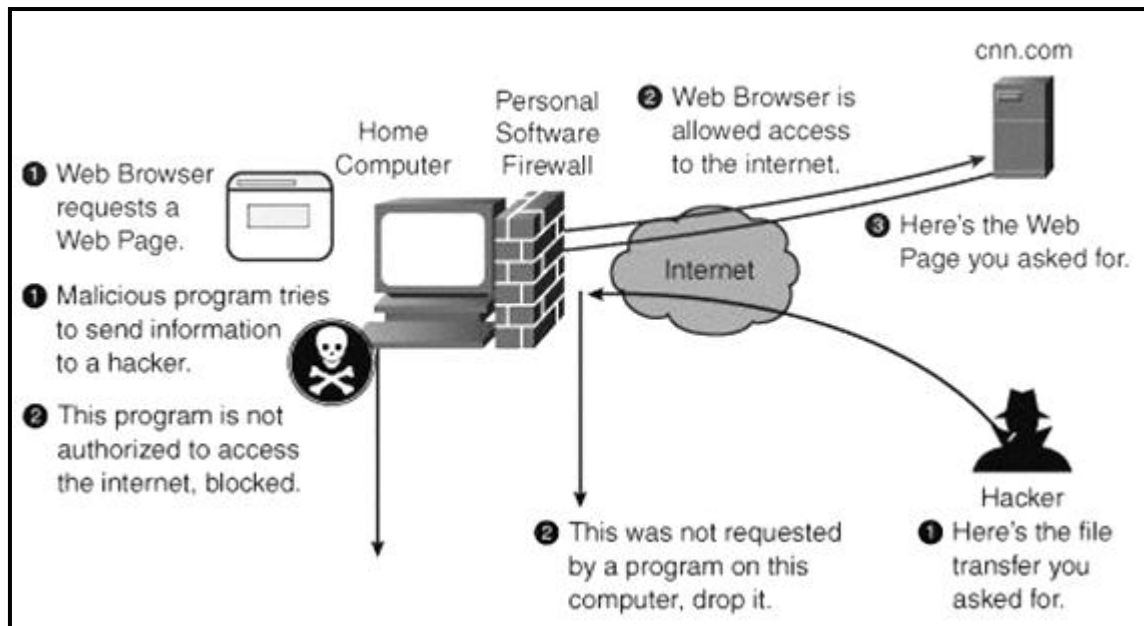
1. **Passwords** are secret words or numbers that are typed on the keyboard to gain access to the system. It is important to choose a password that is not obvious. Good data protection systems change passwords often, so that only authorised persons can have access to certain data.
2. Personal objects carried to gain access to the information system such as a **key, plastic card, or badge**. They are often used together with a personal identification number (PIN).
3. **Biometric devices** are used to verify personal characteristics such as fingerprints, hand size, signature, eye and voice.



Biometric Fingerprint Scanner

4. **Data encryption** is used to prevent data from being intercepted during transmission. Encryption is the process of coding data and decryption the process of changing it back. It is the most effective way to achieve data security during the transmission of data. Data is coded, transmitted and then converted back to its original form.
5. **Firewalls** are used on the Internet or any network to check all incoming data for the purpose of verification and authentication.

A firewall aims to protect a computer system from hackers trying to access sensitive information. On large systems more than one firewall is necessary because barriers need to be placed at all critical points.



How a Firewall works

6. Waste is secured, since discarded printouts are sources of information to unauthorised persons. This kind of waste can be secured by using a shredder.
7. The weakest link in the security of any computer system is the people in it. Employees need to be carefully screened. This is difficult, as well-respected and generally honest employees can commit computer crimes.
8. **Backup procedures** need to be secure and reliable. A regular plan of copying and storing data will guard against data loss. Organisations should keep backup copies in a fireproof safe or offsite.
9. A **certificate** or **digital signature** is an encrypted code that identifies a particular person or website. It aims to ensure that unauthorised persons cannot access data.



Activity 2: Give one paragraph reflection on the statement below.

—Computer crimes can threaten a nation's security and financial health.—

Thank you for completing this activity. Now, you may go to the end of this lesson to check your answers. Make sure you do the necessary corrections before moving on to the next part of this lesson.



Summary

You have come to the end of Lesson 18. In this lesson, you learnt about the reasons why data is secured and some basic security methods. Computer crimes have done damages to many people in as much as most people are now online.

NOW DO PRACTICE EXERCISE 18 ON THE NEXT PAGE

Practice Exercise 18

A. Complete the following sentences:

1. _____ is the stealing of data from one organisation and selling it to another organisation.
 2. People who gain illegal access to data in a computer system are called _____.
 3. _____ are used to verify personal characteristics such as fingerprints.
 4. The opposite process to encryption is called _____.
-

B. Write whether the given statement is TRUE or FALSE.

1. The cost of replacing data that is deliberately or accidentally damaged or lost can be enormous. _____
 2. Information alteration is the illegal transfer of money from one account to another. _____
 3. The weakest link in the security of any computer system is the people in it. _____
-

C. Identify the term that is described in each item.

1. The illegal copying of software. _____
 2. An illegal activity that involves the use of computer technology. _____
 3. Security method that prevents data from being intercepted during transmission. _____
 4. Secret words or numbers that are typed on the keyboard to gain access to the system. _____
-

D. Answer the given questions.

1. What is data security?

2. What is the purpose of a firewall?

CHECK YOUR WORK. ANSWERS ARE AT THE END OF TOPIC 3.

Answers to Activities

Activity 1

1. Organizations who do not report computer crimes are guilty of the crime themselves. Their fear of responsibilities in facing the consequences of a reported crime will pave way for more unreported cases which will likewise add on to the number of computer crimes.
2. The nature of the crime is the same which is stealing. How stealing was done is not the issue but the stealing itself as a crime. These crimes though done in different ways must still have the same weight of punishment as the damages done to the offended is of the same gravity.

Activity 2

—“Computer crimes can threaten a nation’s security and financial health.” The quote speaks of how new age crimes are disregarded. There should be proper laws that should be implemented in countries which are based from an international law.

It must be enforced to secure the nation’s interest in all aspect. Many relevant data can be stolen and damaged which can result to information backdown and further chaotic consequences that would spoil national security which in turn will endanger the citizens of the concerned nation.

Answers to Practice Exercises in Topic 3

Practice Exercise 13

A.

1. TRUE
2. FALSE
3. FALSE
4. TRUE
5. FALSE

B.

1. unorganised
2. displayed
3. Analog
4. word

C.

1. Data is the raw material entered into a computer system while Information is data that has been ordered and given some meaning by people, such as a word processed document that we can read and understand.
2. Analog data is represented by using continuous variable physical quantities such as voltages while Digital data is represented using discrete measurements in the form of digits or numbers.
3. A bit is the smallest unit of data stored in a computer while a group of eight bits is called a byte.

Practice Exercise 14

A.

1. Binary Number system
2. Bit
3. Bit
4. Alphanumeric Data
5. Boolean Data

B.

1. C
2. D
3. A
4. A
5. C

C.

1. TRUE
2. TRUE
3. TRUE.
4. TRUE
5. TRUE

Practice Exercise 15**A.**

1. Data Storage
2. RAM
3. Firmware
4. ROM

B. Primary storage is internal storage as it uses integrated circuits located on the motherboard. It consists of RAM, cache and ROM. RAM is an abbreviation for random access memory.

C.

1. Dynamic RAM is memory that must be constantly refreshed while Static RAM is memory that does not have to be updated or refreshed.
2. RAM (random access memory) is where data and instructions are held temporarily while ROM (read only memory) holds data and instructions that are fixed at the time of production and cannot be changed by the computer. .
3. Cache memory is high-speed memory located between the CPU and RAM while Disk cache stores the most recent data from the disk in RAM and when the CPU needs access to data from the disk, it first checks the disk cache.
- d. Volatile means when the power to the computer is shut off, everything in RAM is lost while non-volatile memory does not lose its contents when the power to the computer is turned off.

D.

1. main memory, primary memory and main storage

Practice Exercise 16**A.**

1. back up
2. magnetic disk
3. slower
4. 3.5 inch floppy disk

B.

1. Hard disk
2. Jaz disk
3. CD RW
4. Removable catridges

C.

1. Floppy disk
2. Zip disk
3. Flash memory
4. Disk drive

D.

1. Disk drive, Floppy disk and Hard disk
-

Practice Exercise 17**A.**

1. False
2. True
3. False
4. True
5. False

B.

Data **compression** reduces the number of bits required to represent information. The amount a file is compressed is measured by the **compression ratio**. A compression ratio of **file** results in a file half the size of the original file. The higher the compression ratio the **greater** the compression of data.

C.

1. Parallel
2. Transmission
3. Compression

D.

1. Serial transmission is the transmission of data one bit at a time through a single line while Parallel transmission involves sending more than one bit at a time (usually 8 bits) simultaneously using separate lines.
-

Practice Exercise 18**A.**

1. Information theft
2. hackers
3. Biometric devices
4. decryption

B.

1. True
2. False
3. True

C.

1. Software piracy
2. Computer crime
3. Data encryption
4. Passwords

D.

1. Data security is a series of safeguards to protect data.
 2. Firewalls are used on the Internet or any network to check all incoming data for the purpose of verification and authentication. A firewall aims to protect a computer system from hackers trying to access sensitive information.
-

End of Topic 3.

Now Do Exercise 3 in Assignment Book 3 Then Go to Topic 4.

TOPIC 4:

SOFTWARE

- | | |
|-------------------|---------------------------------|
| Lesson 19: | Operating System |
| Lesson 20: | Utility Software |
| Lesson 21: | Software Packages |
| Lesson 22: | Custom Software |
| Lesson 23: | Hardware Requirement |
| Lesson 24: | Graphical User Interface |

TOPIC 4: SOFTWARE

Introduction

As you know computer cannot do anything without instructions from the user. In order to do any specific job you have to give a sequence of instructions to the computer. This set of instructions is called a computer **program**. Software refers to the set of computer programs, procedures that describe the programs, how they are to be used.

We can say that it is the collection of programs, which increases the capabilities of the hardware. Software guides the computer at every step where to start and stop during a particular job. The process of software development is called **programming**.

In this topic you will develop more your knowledge of software. From the previous lessons on Topics 1-2, it was discussed that the computers have different parts and it has been mentioned that programs or instructions have to be fed to the computer to do specific task. So it is necessary to provide sequence of instructions so that your work can be done.

We can divide the computer components into two major areas, namely, hardware and software. Hardware is the machine itself and its various individual equipment. It includes all mechanical, electronic and magnetic devices such as monitor, printer, electronic circuit, floppy and hard disk as discussed in Topic 2.

Hence in this topic we will discuss about the other part, namely, the software. Topic 4 will examine the two main types of software: system software and application software. You will also learn about interface design and the graphical user interface (GUI).

Specifically, the following lessons will be discussed:

Lesson 19 covers the operating system as the first composition of the system software which manages all the operations needed to run the computer.

Lesson 20 elaborates on the second component of the system software which is the utility software.

Lesson 21 discusses on the different commonly used software packages.

Lesson 22 outlines the second kind of application software – the custom software.

Lesson 23 explains what are the hardware requirement necessary to effectively run the computer.

Lesson 24 gives basic knowledge on what and how graphical user interface is used.

By the end of Topic 4, you should be able to identify and demonstrate appropriate use of a range of hardware components and peripheral devices and use a range of computer skills and techniques.

Lesson 19: Operating System



Welcome to Lesson 19 of Unit 1. In Topic 3 you learnt about how data is manipulated, transmitted, compressed, used and stored. You should have gained more information to understand why data is relevant.

In this lesson you shall learn about the operating system.



Your Aims:

- define operating system
- identify the functions of the operating system
- identify some commonly used operating systems
- identify the importance of the operating system

The System Software

Before we begin with Lesson 19 on Operating System, it would be proper to identify first what is a System Software.

System software manages all the operations needed to run the computer.

It affects the way the user interacts with a computer. System software carries out a range of functions, such as starting up the computer, loading the application software, storing files and sending data to the printer. It includes the **operating system** and **utility software**.

The Operating system

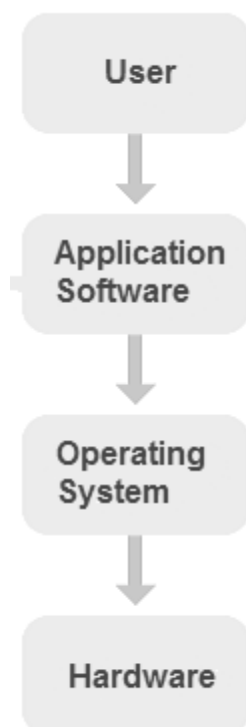
Knowing the basic that the System Software is composed of the Operating System and the Utility Software, then we are ready to discuss the first part which contributes to managing the operations needed to run the computer.

The operating system (OS) is the software that supervises and controls the hardware.

Referring to the figure on the right, the OS supervises and controls the hardware part of the computer which was discussed in Topic 2.

It is usually stored on a hard disk. Most of the time the operating system is working in the background. As you use an application it interacts with the operating system. For example, to print a document you select the print command of the application and a message is passed to the operating system, which performs the task. The most common operating systems are Windows, Linux, UNIX and the Macintosh operating system.

The operating system starts automatically when the computer is turned on. Starting up the computer and the operating system is called **booting** the system. A ROM chip that contains the BIOS (basic input output system) executes a power-on self test (POST) to make sure hardware is connected and operating correctly. After the POST is completed successfully, the BIOS loads the operating system. The operating system runs continuously whenever the computer is on.

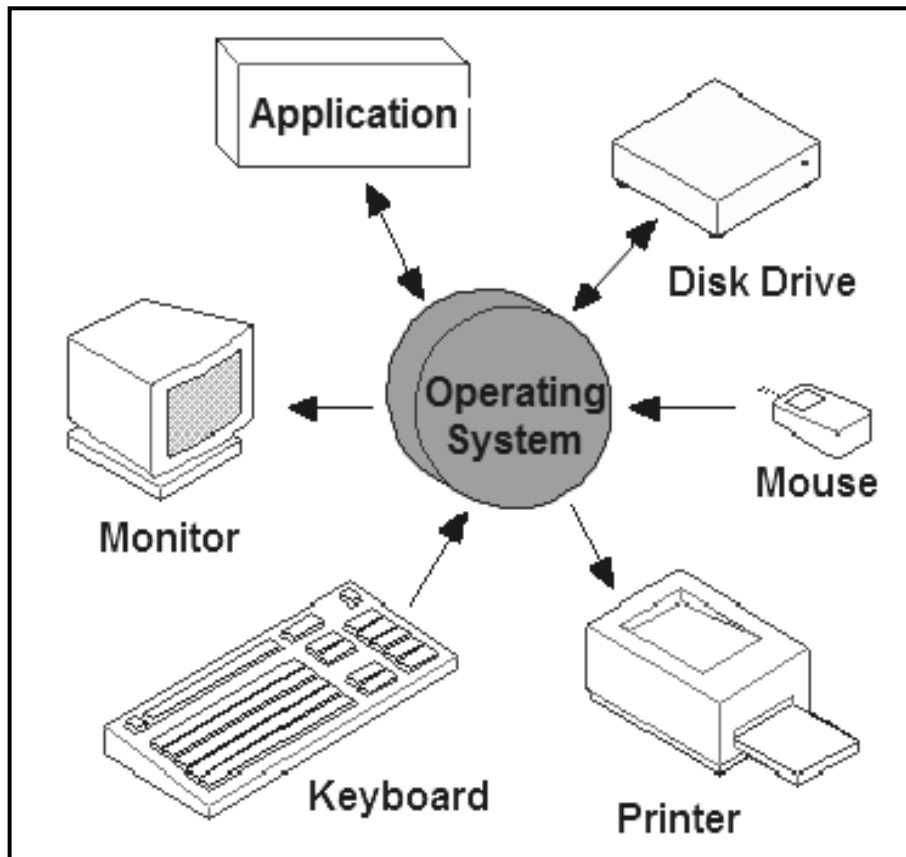


Reviewing now, the **operating system** and **utility programs**

The Function of the OS

are the two major categories of **system software**.

The figure on the next page shows the operating system as the center of all software activities.



The OS as the center of all software activities

The operating system is the most important program that runs on a computer.

Therefore we can say that the OS is the **basic software that controls a computer**. Which further means that every general-purpose computer must have an operating system to run other programs.



The OS being the basic software that controls a computer performs a variety of tasks:

1. **Scheduling hardware operations**

The CPU is required to perform many different tasks. However, it can only work on one task at a time. The operating system determines when the CPU will perform each task.

2. **Memory management**

The operating system controls how the CPU relates to memory. It must ensure data is efficiently accessed and not overwritten. This involves dividing the available memory between different tasks and swapping data between memory and secondary storage.



Data that has been read into memory from an input device or is waiting to be sent to an output device is stored in an area of memory called a **buffer**.

To increase printer efficiency the operating system uses a technique called spooling. **Spooling** transfers the data to a printer buffer and queues it until it can be printed.

3. Controlling peripheral device

The operating system provides the communication with all input, output and storage devices.

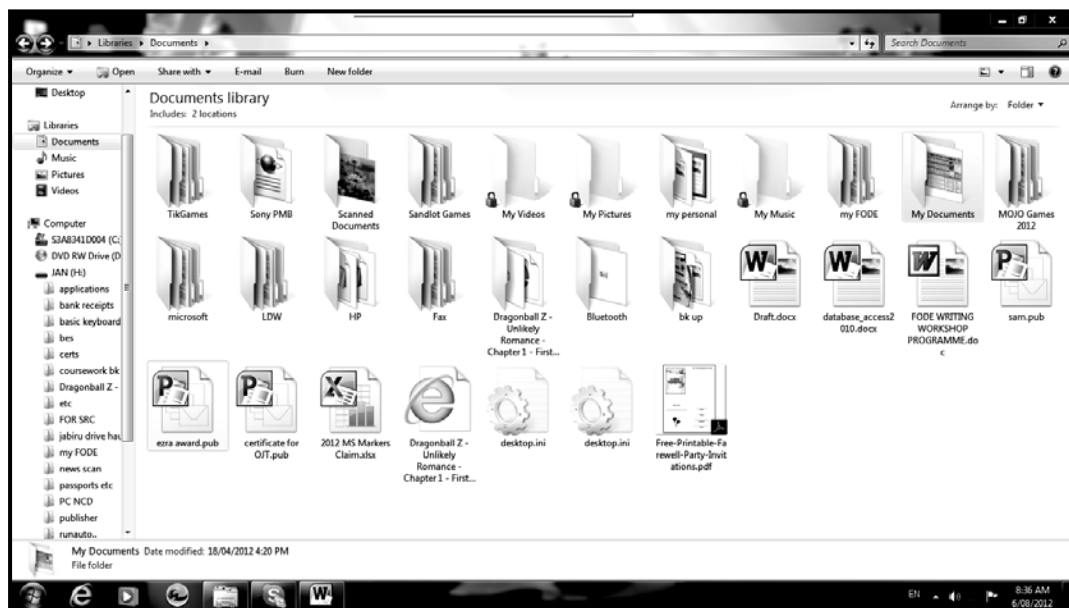
It uses specific software for each type of peripheral device. This specific software is referred to as a **device driver** or driver. For example, a mouse driver is the software that tells the computer how to receive data from a mouse. Printers are relatively slow devices compared to other peripheral devices.

4. File management

The operating system organises and keeps track of files.

A file is a collection of data that is recognised by a file name. It can be work you create on the computer, a data file or an application. File names consist of unique names followed by a period (.) and file name extension. Example would be —Spooling.doc”. The file name extension indicates the type of information stored in the file. Files are stored and organised into folders or directories. A folder can hold both files and additional folders.

Looking at the figure below, the contents of a folder are displayed in a window. The window shows the properties of each file, such as the file name, size, type, or date modified. It is possible to create new files, delete files, open files, close files, rename files and copy/move files.



The window displaying files and folders

5. System settings

The operating system is used to change the computer's settings. For example, the control panel allows you to change a computer's theme, desktop background, screen saver, screen resolution, time and communication settings. For security the operating system may provide each user with a name and password. It is possible to change the way users log on and off.

The OS also has two types: the single tasking and the multi tasking.

a. Single Tasking

Single-tasking allows only one task to be performed at one time. Palm OS is used on a Palm handheld computer and it is a single-task operating system.

b. Multi-tasking

Multi-tasking allows several applications to work at the same time. Windows and Mac OS are multitasking operating systems.

Lastly, in addition to single and multitasking, operating systems are classified as single-user and multi-user. A multi-user operating system allows many different users to access the computer's resources at the same time. UNIX is an example of a multi-user operating system.

**Activity 1: Answer the following questions.**

1. What are the two components of the System Software?

2. What is the function of the **Operating System**?

3. Name the different tasks of the OS.

4. Briefly explain this statement, "The OS is the basic software that controls a computer."

5. Give the difference between the Palm OS and Windows OS.

Thank you for completing this activity. Now, you may go to the end of this lesson to check your answers. Make sure you do the necessary corrections before moving on to the next part of this lesson.

Summary



You have come to the end of Lesson 19. In this lesson, you learnt about the operating system (OS) which is a set of programs that controls how a hardware of a computer works. There are different tasks of the operating system such as scheduling hardware operations, memory management, controlling peripheral devices, file management and system settings.

NOW DO PRACTICE EXERCISE 19 ON THE NEXT PAGE

Practice Exercise 19

A. Choose the best answer. Circle the letter.

1. The operating system determines when the CPU will perform each task is _____.
 - a. system settings
 - b. memory management
 - c. scheduling software operations
 - d. controlling peripheral devices
2. The operating system is used to change the computer's settings is the _____.
 - a. system settings
 - b. memory management
 - c. controlling peripheral devices
 - d. scheduling software operations
3. The operating system organises and keeps track of files is called _____.
 - a. file management
 - b. system settings
 - c. controlling peripheral devices
 - d. scheduling software operations
4. The operating system controls how the CPU relates to memory is called _____.
 - a. file management
 - b. system settings
 - c. memory management
 - d. controlling peripheral devices
5. The operating system that provides the communication with all input, output and storage devices is called _____.
 - a. file management
 - b. system settings
 - c. memory management
 - d. controlling peripheral devices

B. Identify whether the given statement is TRUE or FALSE.

1. The operating system can only do single task at a time. _____
2. Windows and Mac OS are multitasking operating systems. _____
3. Palm OS is used on a Palm handheld computer and it is a single-task operating system. _____

4. The operating system starts automatically when the computer is turned on. _____
5. The operating system is the most important program that runs on a computer. _____
6. Every general-purpose computer must have an operating system to run other programs.

C. Explain the differences between:

1. Single tasking and multi tasking

2. Memory management and File management

CHECK YOUR WORK. ANSWERS ARE AT THE END OF TOPIC 4.

Answers to Activity

1. The two components of the system software includes the operating system and utility software.
2. The OS supervises and controls the hardware part of the computer
3. File management, system settings, memory management, scheduling software operations and controlling peripheral devices
4. OS is the basic software that controls a computer. Which further means that every general-purpose computer must have an operating system to run other programs.
5. Palm OS is used on a Palm handheld computer and it is a single-task operating system while Windows OS is a multitasking operating system.

Lesson 20: Utility Software



Welcome to Lesson 20 of Unit 1. In Lesson 19 you learnt about the System Software which manages all the operations needed by the computer to run. The Operating System is one of the two categories of the System Software which supervises and controls the hardware.

In this lesson you shall learn about the second category which is the Utility Software.



Your Aims:

- define utility software
- identify the functions of the utility software
- identify the types of utility software
- identify the importance of the utility software

The Utility Software

The second major category of the system software is the utility software or program.

A **utility program** is designed to do one or two tasks very well and nothing else. For example, you may want to send a compressed file attached to your email. For this, you may opt to choose the file compression utility program.

A utility program is built in to the operating system. For example, Windows have a built in compression utility you can use to compress a file or a folder.

Utility software is system software designed to help analyze, configure, optimize or maintain a computer.



Utility software performs routine tasks to support the operation of the computer system.

A single piece of utility software is usually called a **utility** or **tool**.

Since utility software usually focuses on how the computer infrastructure operates it is often rather technical and targeted at people with an advanced level of computer knowledge - in contrast to application software, which allows users to do things like creating text documents, playing games, listening to music or viewing websites.

Most operating systems contain utilities to assist in the management of the system.

Types of Utility Software

1. **File compression** to reduce the size of a file - it allows the user to store more data and makes data transmission faster
2. **Diagnostic tools** to compile technical information about a computer's hardware and software
3. **Disk scanner** to detect and correct problems on a disk and search for and remove unwanted files
4. **Disk defragmenter** to reorganise files and unused space on a computer's hard disk - allows data and programs to be accessed faster

5. **Un-installer** to remove an application and any associated entries in the system files
 6. **Device drivers** to provide communication with a peripheral device - provided with the peripheral device or can be downloaded from the Internet
 7. **Backup utility** to copy selected files or the entire hard drive onto another disk
 8. **Anti-virus program** to prevent, detect and remove viruses.
-



Activity 1: Answer the following questions.

1. What is the difference between utility software and operating system?

2. Why is the use of utility software accorded for highly technical persons?

Thank you for completing this activity. Now, you may go to the end of this lesson to check your answers. Make sure you do the necessary corrections before moving on to the next part of this lesson.



Summary

You have come to the end of Lesson 20. In this lesson, you learnt about utility software which is used to perform routine tasks to support the operation of the computer system. There are different kinds of utility software. Some of them would include anti virus program, back up utility, disk scanner and disk fragmenter.

NOW DO PRACTICE EXERCISE 20 ON THE NEXT PAGE

Practice Exercise 20

A. Identify the term that is described in each item.

1. A utility used to detect and correct problems on a disk and search for and remove unwanted files. _____
 2. A utility used to prevent, detect and remove viruses. _____
 3. A utility used to reorganise files and unused space on a computer's hard disk. _____
 4. A utility used to remove an application and any associated entries in the system files. _____
 5. A utility used to store more data and makes data transmission faster. _____
-

B. Write whether the given statement is TRUE or FALSE.

1. A utility is built in to the operating system. _____
 2. A single piece of utility software is usually called a utility or tool. _____
 3. Utilities are often rather technical and targeted at people with an advanced level of computer knowledge. _____
 4. Utility software performs routine tasks to support the operation of the computer system. _____
 5. Most operating systems contain utilities to assist in the management of the system. _____
-

C. Substantially answer the following questions.

1. What is the difference between the utility program and the application software?

 2. What is the importance of the different utility programs?

-

CHECK YOUR WORK. ANSWERS ARE AT THE END OF TOPIC 4.
--

Answers to Activity

1. The Operating System is a system software which supervises and controls the hardware while the Utility software is a system software designed to help analyze, configure, optimize or maintain a computer.
2. Since utility software usually focuses on how the computer infrastructure operates it is often rather technical and targeted at people with an advanced level of computer knowledge.

Lesson 21: Software Packages



Welcome to Lesson 21 of Unit 1. In Lesson 20 you learnt about utility software which assists in the management of the computer system. In this lesson you shall learn about the software packages.



Your Aims:

- identify software packages
- identify the uses of software packages

The Application Software

The **Application Software** is a program used for a specific task. It allows the computer to achieve the task for which it was bought. Application software consists of software packages and custom software.

This lesson will guide you to the first two kinds of application software, the Software package.

The Software Packages

A **software package** is a complete and documented set of programs supplied to several users.

Software packages can be bought to cover nearly all requirements. They include word processing, desktop publishing, spreadsheets, database management systems, paint programs, draw programs, web browsers, video editing software, animation software, presentation software and authoring software.

Software packages usually include printed documentation with instructions for installing the software.

Installing software transfers files to the hard disk to enable the software to work.

Referring to the figure below, most software packages contain onscreen tutorials, onscreen reference material and help files.



Onscreen Tutorials

It is also common for software companies to supplement and update their help files with online help from their website. This requires the user to register their software package with the software company using the product code.

When you purchase a new version you are **upgrading** your application software. It is important when upgrading or purchasing new software to check that your hardware and operating system are compatible.

Upgrading your software may require an upgrade in your hardware and operating system. Compatibility requirements are usually specified on the software package and should be checked before the application is bought.

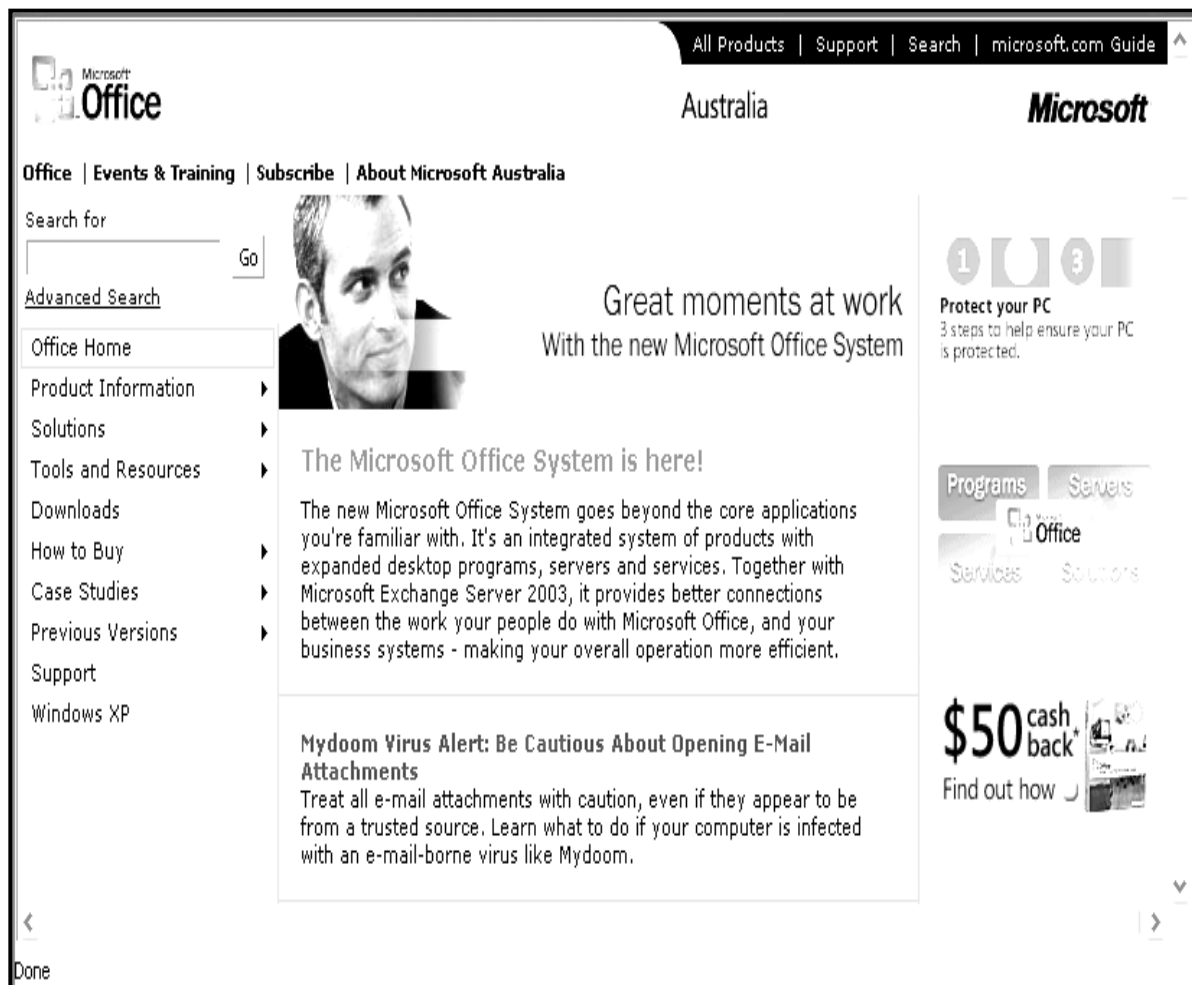


The version of the software package is often recognised by the year, such as Macromedia Dreamweaver MX2004.

Office suites contain several applications. Microsoft Office comes in different versions for different users. It includes the core applications of Microsoft Word, Excel, Access, PowerPoint and Outlook. The cost of an office suite is less than the total price of each application.

Integrated software contains several applications that work together as a stand-alone product. For example, Microsoft Works includes word processing, database, spreadsheet and graphics.

Each application is not as powerful as a separate application. However, it is cheaper than buying an office suite. It also meets the needs of many users. Both office suites and integrated software allow data to be easily moved between applications.



Microsoft Office bundles word processing, database and other applications together

**Activity 1: Answer the following questions.**

1. What makes the Application Software important for computers?

2. Differentiate Office Suite from Integrated Software.

3. What should you consider when purchasing a new version of your application software?

Thank you for completing this activity. Now, you may go to the end of this lesson to check your answers. Make sure you do the necessary corrections before moving on to the next part of this lesson.

**Summary**

You have come to the end of Lesson 21. In this lesson, you learnt about the first kind of application software which is the software package that is a complete and documented set of programs supplied to several users. Moreover, details needed to consider when upgrading your application software was also discussed.

NOW DO PRACTICE EXERCISE 21 ON THE NEXT PAGE

Practice Exercise 21

A. Identify the term that is described in each item.

1. A complete and documented set of programs supplied to several users.

2. A program used for a specific task which allows the computer to achieve the task for which it was bought. _____
3. It includes the core applications of Microsoft Word, Excel, Access, PowerPoint and Outlook. _____
4. It contains several applications that work together as a stand-alone product.

B. Write whether the given statement is TRUE or FALSE.

1. It is optional when upgrading or purchasing new software to check that your hardware and operating system are compatible. _____
2. Most software packages have new versions being developed. _____
3. The user does not need to register their software package with the software company using the given product code. _____
4. Software package contains only the word processing, desktop publishing, spreadsheets and database management systems. _____
5. The version of the software package is often recognised by the year.

6. The cost of an office suite is more than the total price of each application.

7. Both office suites and integrated software allow data to be easily moved between applications. _____
8. Compatibility requirements are usually specified on the software package.

9. Compatibility requirements need not be checked before the application is bought. _____
10. It is also common for software companies to supplement and update their help files with online help from their website. _____
11. The latest versions of the software often place greater demands on the hardware and operating system. _____

CHECK YOUR WORK. ANSWERS ARE AT THE END OF TOPIC 4.
--

Answers to Activity

1. The Application Software is a program used for a specific task. It allows the computer to achieve the task for which it was bought.
2. Office suites contain several applications while Integrated software contains several applications that work together as a stand-alone product.
3. When you purchase a new version you are upgrading your application software. It is important when upgrading or purchasing new software to check that your hardware and operating system are compatible.

Upgrading your software may require an upgrade in your hardware and operating system. Compatibility requirements are usually specified on the software package and should be checked before the application is bought.

Lesson 22: Custom Software



Welcome to Lesson 22 of Unit 1. In Lesson 21 you learnt about the software packages as the first type of application software.

In this lesson you shall learn about the second type of application software, the custom software.



Your Aims:

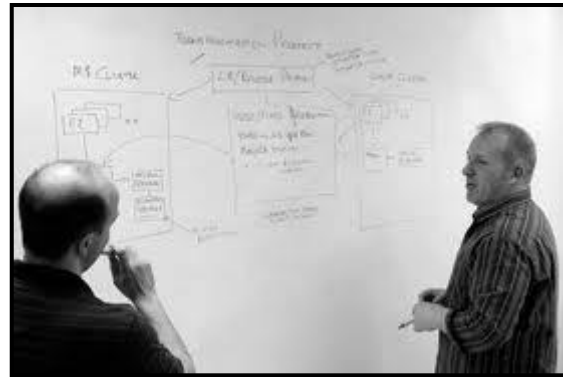
- identify custom software
 - determine different programming languages used
 - identify the importance of custom software
-

The Custom Software

This lesson will focus with the second kind of application software, the Custom Software.

Custom software (also known as **bespoke software**) is software that is specially developed for some specific organization or other user.

Even though software packages are very flexible they cannot be used for some specific tasks.



Custom software is written for a customer and is not for several users. Some custom software is developed for a single customer or client. It is written to fit the exact requirements of the problem and is labour intensive. For these reasons custom software is very expensive. Custom software is written by a programmer using a programming language.

Programmers designing a custom software



Programming languages are a set of codes and rules that enable the computer to operate in a desired way.

They are divided into two groups: low-level languages and high-level languages.

1. **Low-level languages** are the lowest level of computer languages and depend on the hardware of the computer system. They process calculations much faster than high-level languages. Low-level languages include machine language and assembly language.
2. **High-level languages** use English-like codes where each statement corresponds to several lines of machine code. It does not depend on the hardware of the computer system, so the programs are portable. Since high-level languages are closer to English, programs are easier to write and often shorter in length than programs in low-level languages.

Programmers write software using high-level languages. These are some examples of high-level languages: BASIC, Java, Pascal, C, COBOL, FORTRAN, APL,

PROLOG, Ada and Logo. Each is designed for a particular purpose. Today most programmers use Visual BASIC, C++ or Java.

Now you will distinguish one language from the other.

- a. **Visual BASIC** - developed by Microsoft to allow users to create Windows applications. It is an object-oriented language that allows users to create the interface using objects, set the properties for those objects and write instructions for the interface using BASIC programming language.
- b. **C++** - based on the original C programming language for the UNIX operating system. It is an object-oriented language. However, it does not contain visual objects found in Visual BASIC. Many commercial applications are written using C++.
- c. **Java** - developed by Sun Microsystems to create small applications is an object-oriented language that excels at producing web-based applets that work on different platforms. Java is similar to C++.

Custom software can be developed by an in-house software development group, or be commissioned from a software developer. Large companies commonly use custom software for critical functions, including content management, inventory management, customer management, human resource management, or otherwise to fill needs that existing software packages cannot.



Activity 1: Answer the following questions.

1. What is the importance of custom software?

2. Differentiate application software from custom software.

3. Explain the difference between low level languages and high level languages.

Thank you for completing this activity. Now, you may go to the end of this lesson to check your answer. Make sure you do the necessary corrections before moving on to the next part of this lesson.

Summary



You have come to the end of Lesson 22. In this lesson, you learnt about the second kind of application software which is the custom package that is specially developed for some specific organization or other user. This software is written by computer programmers using programming languages. Programming languages has two kinds: the high level languages and the low level languages. Examples of high level languages are C++, Java and Visual Basic.

NOW DO PRACTICE EXERCISE 22 ON THE NEXT PAGE

Practice Exercise 22

A. Identify what is described in each item.

1. This is also known as bespoke software. _____
 2. It is used to create small applications is an object-oriented language that excels at producing web-based applets that work on different platforms. _____
 3. It allow users to create Windows applications. _____
 4. This is based on the original C programming language for the UNIX operating system. _____
 5. These are a set of codes and rules that enable the computer to operate in a desired way. _____
 6. With this language, programs are easier to write and often shorter in length. _____
 7. It is written for a customer and is not for several users. _____
-

B. Write whether the given statement is TRUE or FALSE.

1. Custom software development is often considered affordable. _____
 2. Custom software can be developed by an in-house software development group, or be commissioned from a software developer. _____
 3. Custom software cannot be designed in stage by stage processes. _____
 4. Java is exactly the same to C++. _____
 5. Java is an object-oriented language. _____
 6. COBOL, FORTRAN and APL are examples of high level languages. _____
 7. High-level languages include machine language and assembly language. _____
 8. Custom software is written by a programmer using a programming language. _____
-

CHECK YOUR WORK. ANSWERS ARE AT THE END OF TOPIC 4.
--

Answers to Activity

1. Custom software is written for a customer and is not for several users. Some custom software is developed for a single customer or client. It is written to fit the exact requirements of the problem and is labour intensive. Hence, it provides the exact need of specific clients or users.
2. Custom software is a type of Application software.

3. Low-level languages are the lowest level of computer languages and depend on the hardware of the computer system. They process calculations much faster than high-level languages while High-level languages use English-like codes where each statement corresponds to several lines of machine code. It does not depend on the hardware of the computer system, so the programs are portable.

Lesson 23: Hardware Requirement



Welcome to Lesson 23 of Unit 1. In Lesson 22 you learnt about the custom software as the second type of application software.

In this lesson you shall learn about the hardware requirement for all computer softwares.



Your Aims:

- identify the different system requirements
 - identify the importance of determining system requirement
-



Hardware Requirement

To be used efficiently, all computer software needs certain hardware components or other software resources to be present on a computer.

These certain hardware components or other software resources are known as (computer) **system requirements** and are often used as a guideline as opposed to an absolute rule.

Most software defines two sets of system requirements: minimum and recommended. With increasing demand for higher processing power and resources in newer versions of software, system requirements tend to increase over time. Industry analysts suggest that this trend plays a bigger part in driving upgrades to existing computer systems than technological advancements.

A computer system is made up of hardware and software that work together, processing data to achieve a purpose. The relationship between hardware and software is important.

Software depends on a particular hardware configuration to work effectively. It is written and tested using a certain processor, memory and peripherals. This is often described as the **system requirements** for the software. All software companies are required to clearly state the system requirements of their products.

Application software as discussed in Lesson 21 is available to complete many different tasks. Each task may require different data types and levels of processing. This affects the hardware requirements of the system.

For example, authoring software that combines text, graphics, animation, video and audio will place greater hardware demands on the system than a word processor that only processes text. The system requirements for application software are frequently changing as new and more powerful versions of the software are developed.

The system requirements may also include specific peripheral devices. For example, it is suggested for authoring software that the system includes a DVD burner to create a DVD.

To elaborate, the most common set of requirements defined by any operating system or software application is the physical computer resources, also known as hardware,

A hardware requirements list is often accompanied by a hardware compatibility list (**HCL**), especially in case of operating systems.

An HCL lists tested, compatible, and sometimes incompatible hardware devices for a particular operating system or application.

Now you will study the various aspects of hardware requirements on the next page.

Aspects of Hardware Requirements

1. **Architecture**

All computer operating systems are designed for a particular computer architecture. Most software applications are limited to particular operating systems running on particular architectures. Although architecture-independent operating systems and applications exist, most need to be recompiled to run on a new architecture.

2. **Processing power**

The power of the central processing unit (CPU) is a fundamental system requirement for any software. Most software running on x86 architecture define processing power as the model and the clock speed of the CPU. Many other features of a CPU that influence its speed and power, like bus speed, cache, and MIPS are often ignored.

3. **Memory**

All software, when run, resides in the random access memory (RAM) of a computer. Memory requirements are defined after considering demands of the application, operating system, supporting software and files and other running processes. Optimal performance of other unrelated software running on a multi-tasking computer system is also considered when defining this requirement.

4. **Secondary storage**

Hard-disk requirements vary, depending on the size of software installation, temporary files created and maintained while installing or running the software, and possible use of swap space (if RAM is insufficient).

5. **Display adapter**

Software requiring a better than average computer graphics display, like graphics editors and high-end games, often define high-end display adapters in the system requirements.

6. **Peripherals**

Some software applications need to make extensive and/or special use of some peripherals, demanding the higher performance or functionality of such peripherals. Such peripherals include CD-ROM drives, keyboards, pointing devices and network devices.



Activity 1: Answer the following questions.

A.

1. Explain the relationship between software and hardware in relation to computer system.

2. List the aspects of hardware requirement.

B. Identify what hardware requirement is described. Circle the letter only.

1. This speaks of the Central Processing Unit (CPU).
a. peripherals b. memory c. processing power
2. Optimal performance of other unrelated software running on a multi-tasking computer system is also considered when defining this requirement.
a. memory b. architecture c. display adapter
3. All computer operating systems are designed for this particular hardware requirement.
a. peripherals b. secondary storage c. architecture
4. These include CD-ROM drives, keyboards, pointing devices, network devices, etc.
a. display adapter b. peripherals c. processing power

Thank you for completing this activity. Now, you may go to the end of this lesson to check your answer. Make sure you do the necessary corrections before moving on to the next part of this lesson.

Summary



You have come to the end of Lesson 23. In this lesson, you learnt about the the hardware requirements of all computer software needs. There are various aspects necessary to consider for hardware requirement and these are: architecture, processing power, memory, secondary storage, display adapter and peripherals.

NOW DO PRACTICE EXERCISE 23 ON THE NEXT PAGE

Practice Exercise 23

A. Choose the best answer. Circle the letter.

1. A fundamental system requirement for any software.
 - a. Architecture
 - b. Processing
 - c. Memory
 - d. Peripherals
 2. It include CD-ROM drives and keyboards.
 - a. Architecture
 - b. Processing
 - c. Memory
 - d. Peripherals
 3. This can vary, depending on the size of software installation, temporary files created and maintained while installing or running the software.
 - a. Architecture
 - b. Processing
 - c. Memory
 - d. Peripherals
-

B. Write whether the given statement is TRUE or FALSE.

1. Not all computer operating systems are designed for a particular computer architecture. _____
 2. Optimal performance of other unrelated software running on a multi-tasking computer system is also considered when defining peripherals. _____
 3. Most software defines two sets of system requirements: minimum and recommended. _____
 4. System requirements are absolute rules. _____
 5. Hardware is the most common set of requirements defined by any operating system or software application. _____
 6. A computer system is made up of only the hardware to process data to achieve a purpose. _____
 7. Software depends on a particular hardware configuration to work effectively. _____
 8. The system requirements for application software are stable as new and more powerful versions of the software are developed. _____
 9. All software companies are required to clearly state the system requirements of their products. _____
 10. Application software is available to complete many different tasks. _____
-

C. Substantially answer the given question.

1. What is the importance of knowing the hardware requirements of a system?

CHECK YOUR WORK. ANSWERS ARE AT THE END OF TOPIC 4.

Answers to Activity

A.

1. A computer system is made up of hardware and software that work together, processing data to achieve a purpose. The relationship between hardware and software is important.
To be used efficiently, all computer software needs certain hardware components or other software resources to be present on a computer.
2. Arcitecture, Processing Power , Memory, secondary Storage, Display adapter and Peripherals

B.

1. C
2. A
3. C
4. B

Lesson 24: Graphical User Interface



Welcome to Lesson 24 of Unit 1. In Lesson 23 you learnt about the hardware requirement for all computer softwares.

In this lesson you shall learn about the graphical user interface (GUI).



Your Aims:

- define the meaning, functions and importance of GUI
- identify the main features of a GUI
- apply GUI

The User Interface

Before discussing the graphical user interface, it would be proper to know first what a user interface is.

The **user interface** is the way the user interacts with the software. The function of the user interface is to provide a means of communication between the user and the computer.

Now, there are two common types of user interfaces: the character-based (or command line) user interface and the graphical user interface (GUI).

Let us discuss them one at a time.

1. Character-based User Interface

The character-based user interface requires the user to give instructions using only characters. The user types the characters using a keyboard. The first widely used operating system was the OS/360 system and it used a character-based interface. The OS/360 system was developed in 1964 for all computers in IBM's System/360 family.

The figure below displays the **MS-DOS** (Microsoft disk operating system) which uses a character-based interface. It was very popular and became the industry standard for IBM-compatible computers in the 1980s.

```

C:\WINDOWS\System32\cmd.exe
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\Program Files\Common Files\System\MAPI\1033\nt>dir /w
Volume in drive C has no label.
Volume Serial Number is C01C-5C3B

Directory of C:\Program Files\Common Files\System\MAPI\1033\nt

[.]          [..]          CMC.DLL          CNFNOT32.EXE     CONTAB32.DLL
DUMPSTER.DLL EMSABP32.DLL     EMSMDB32.DLL     EMSUI32.DLL      ESCONF.DLL
EXCHNG.HLP   EXSEC32.DLL     GAPI32.DLL       INETAB32.DLL     MAPI32.DLL
MAPISP32.EXE MAPISUC.INF     MINET32.DLL      MLCFG32.CPL      MMFMIC32.DLL
MSMAPI32.DLL MSPST32.DLL     NEWPROF.EXE      OMINT.DLL         OMIPSTNT.DLL
OUTEX.DLL    PSTPRX32.DLL    SCANPST.EXE      SCANPST.HLP      SCRPXTN.DLL
                28 File(s)      6,719,672 bytes
                2 Dir(s)  37,314,662,400 bytes free

C:\Program Files\Common Files\System\MAPI\1033\nt>
  
```

MS DOS Interface

Character-based interfaces are still being used. **UNIX** (pronounced you-nicks') is a multi-user operating system that was developed by AT&T Bell Laboratories. It enables the timesharing of a host computer (usually a mainframe) with several other computers at the same time.

The character-based UNIX interface is similar to MS-DOS although the commands are different. It is still widely used on Internet servers. However, there are variations of UNIX that provide a graphical user interface.

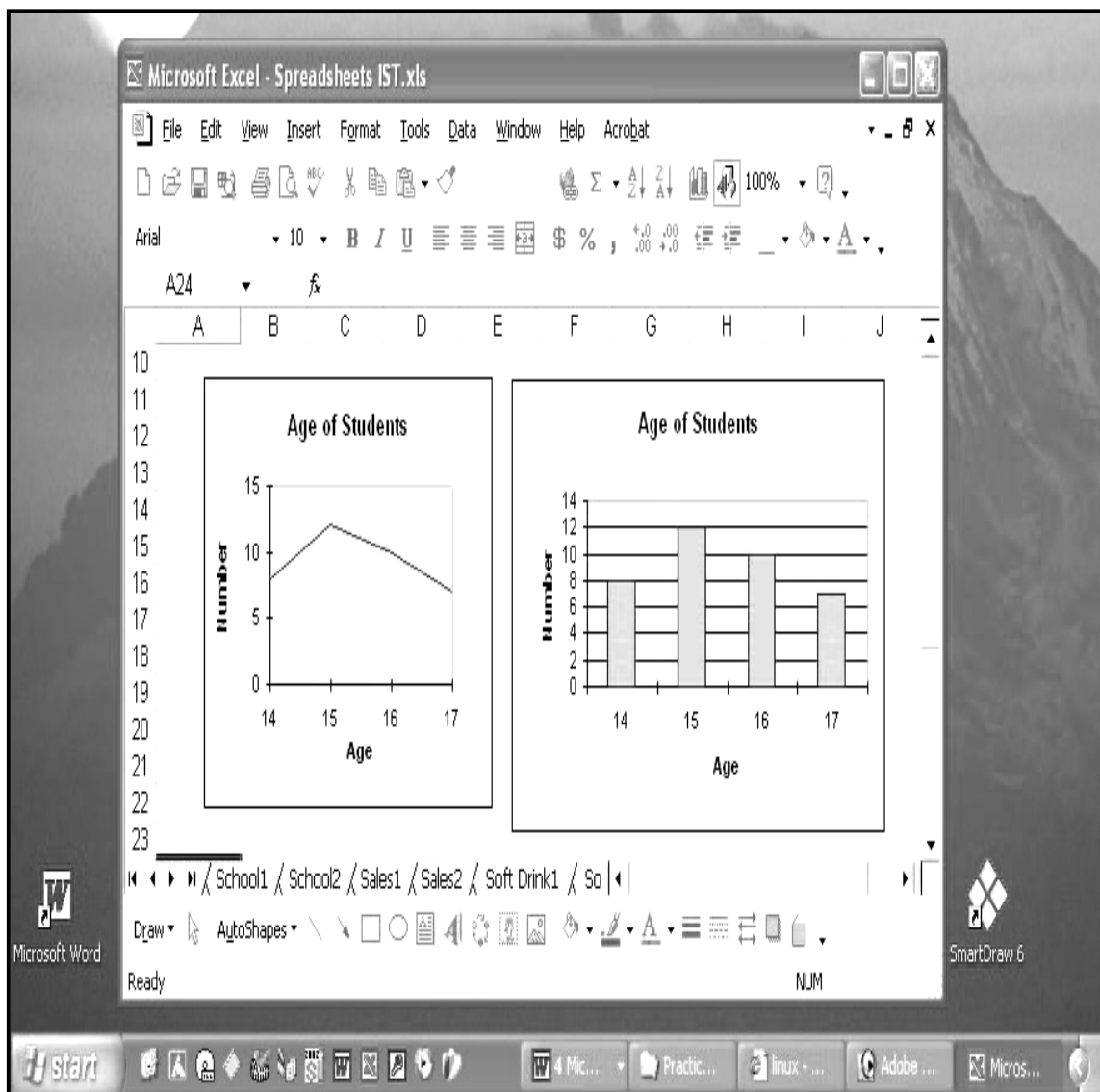
Character-based user interfaces are also commonly used on devices with a limited amount of memory and options for the user. For example, some mobile phones and microwave ovens use a character-based user interface.

2. Graphical User Interface

The **graphical user interface** (GUI, pronounced goey') allows the user to give instructions using a mouse, and clicking on icons and menus.

A GUI provides an easy-to-use and consistent interface for a range of applications.

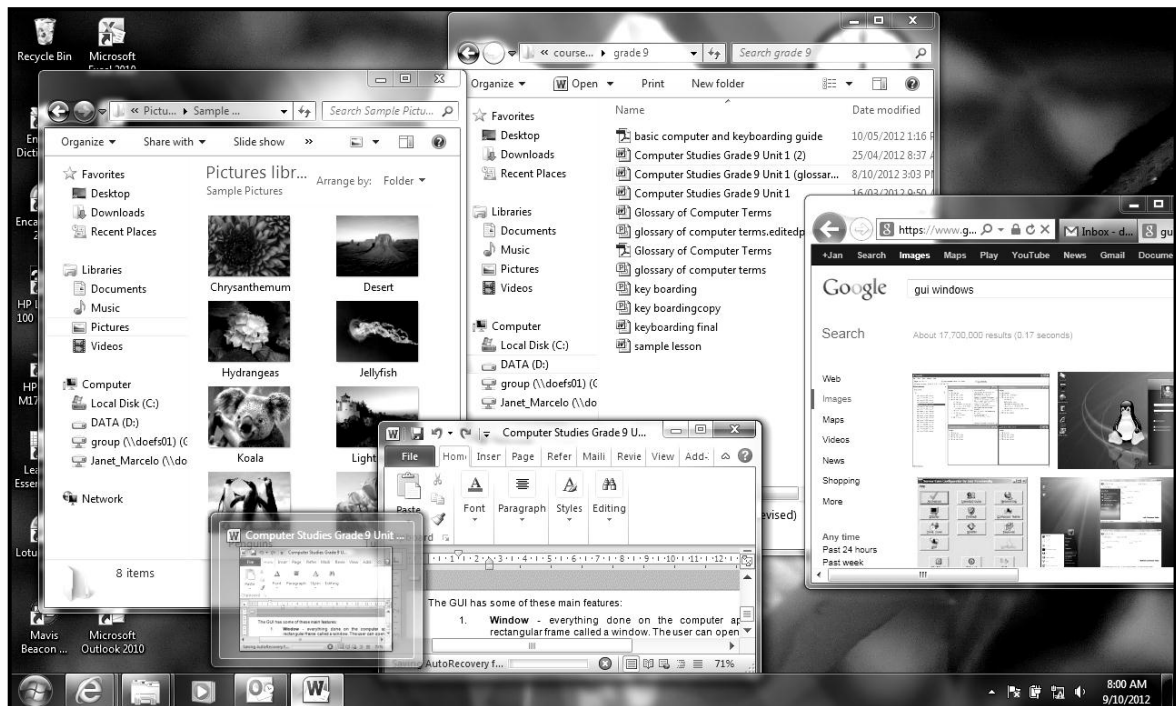
The picture below displays the Microsoft Windows (or Windows) which is the most popular GUI.



The Windows desktop

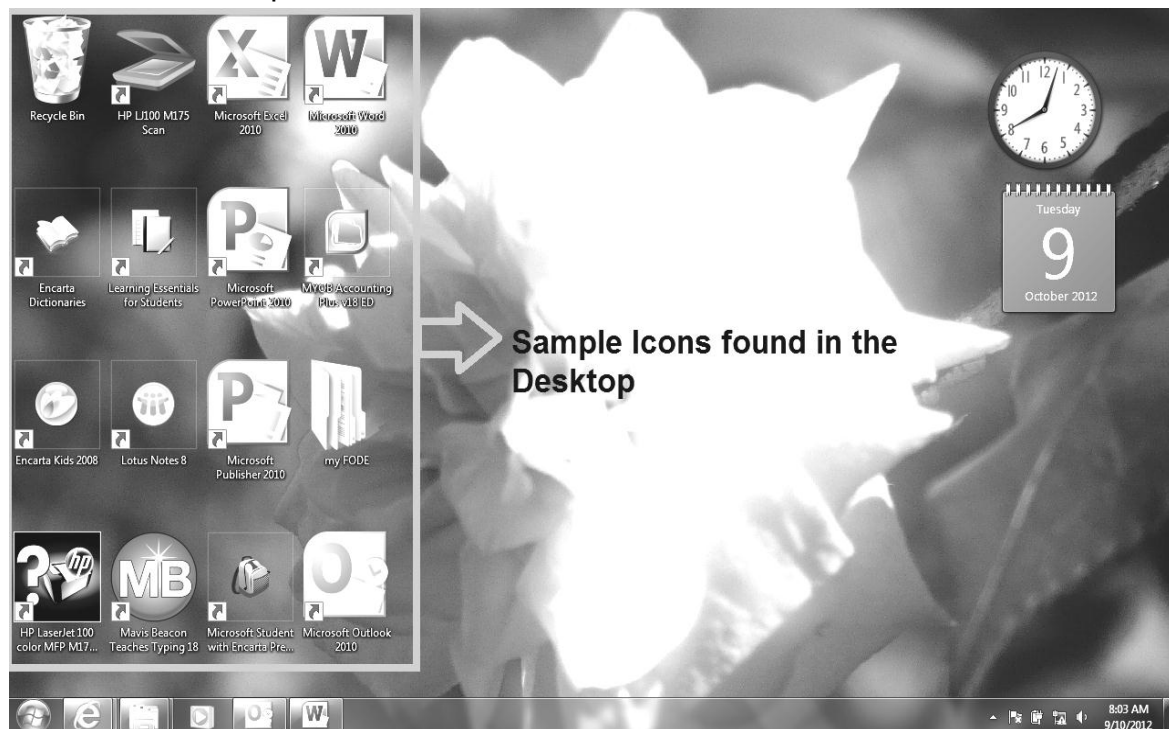
Main Features of GUI

1. **Window** - everything done on the computer appears within a rectangular frame called a window. The user can open several windows at the same time and work on different programs. Each window can be closed, resized, moved, minimised or maximised.



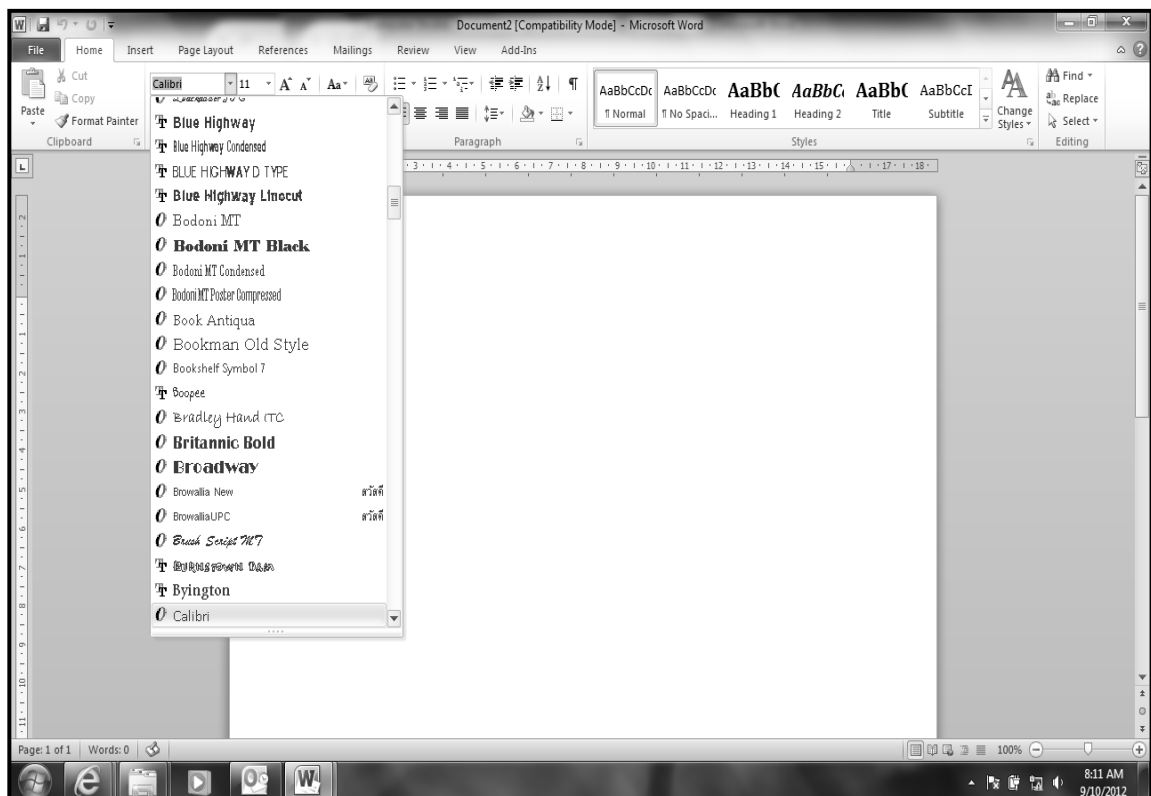
Several opened Windows on computer screen

2. **Icon** - a small picture that represents a program, file, folder or shortcut. Text describing the icon appears when the user points at the icon. Double-clicking the icon will open the file.



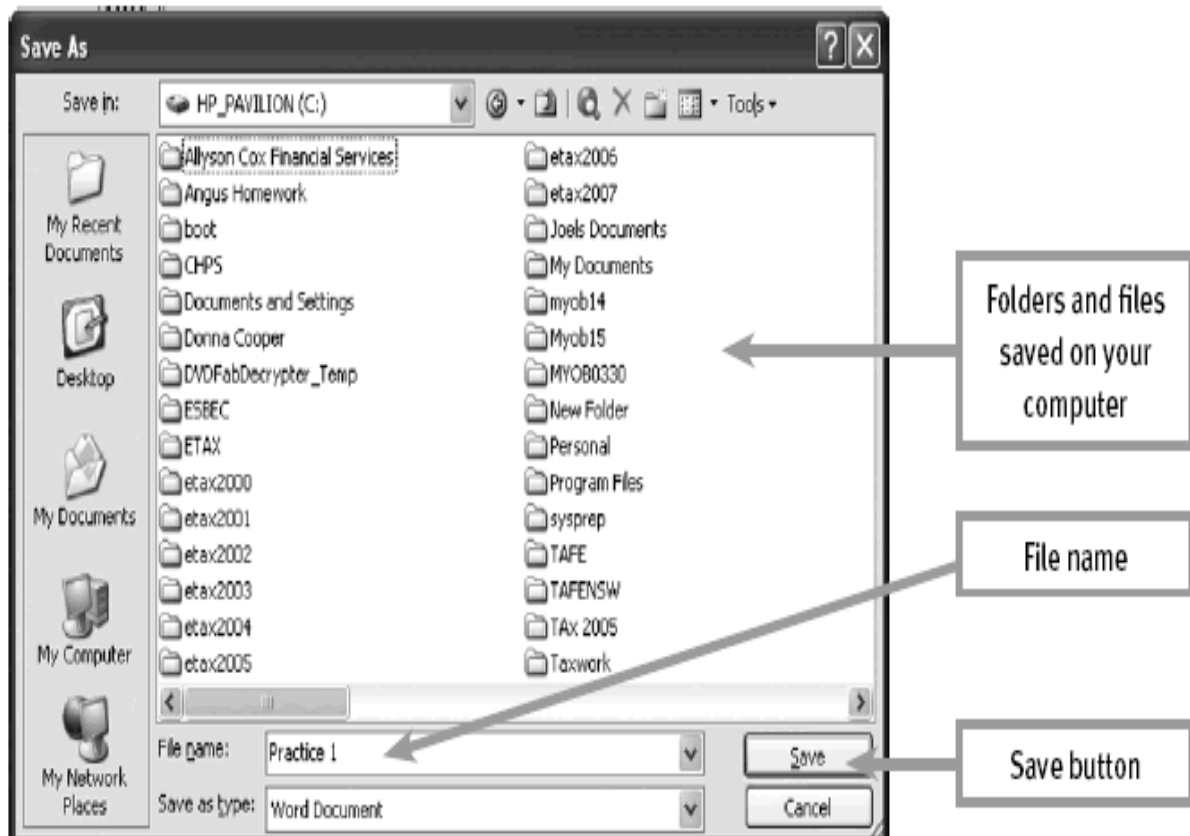
Some Icons found on the computer desktop

3. **Menu** - an onscreen list of available commands and tools. To open a menu, click on the menu name. A pull-down menu will be displayed. A command is then chosen by clicking on its name.



Font Style Menu for Microsoft Word

4. **Dialog box** - a secondary window that contains buttons and various kinds of options through which you can carry out a particular command or task.



Dialog Box for Saving Command

5. **Desktop** - the onscreen work area on which windows, icons, menus and dialog boxes appear. It is like the physical desktop we use in day-to-day work.



Desktop

6. **Recycle or trash bin** - a special folder to store deleted files. To delete a file drag the file to the recycle bin or right-click the file and press delete.



Recycle Bin icon

You can use these features of the GUI by following how it works from the given description for each.

It is also important to take note that the GUI was first used by the Xerox Corporation in the 1970s. However, it was not until the Apple Macintosh in 1984 that the GUI became popular. Microsoft Windows introduced the GUI to IBM compatible computers in 1985. Both Mac OS and Windows have added new features to their GUI to make them easier to use.

Even though there are differences, many users can easily switch between operating systems. **Linux** (pronounced Lim-uks') operating system is freely distributed and supported. It was developed by Linus Torvalds using a scaled down version of UNIX.

There are advantages that the GUIs offer compared to character-based user interfaces.

- a. Applications developed for a GUI have the same consistent appearance as the operating system.
- b. The features described above make it easier for people to understand and learn commands compared to a character-based interface.
- c. The GUIs are also more forgiving. Most dialog boxes have a Cancel button and the Undo command allows users to reverse the last action.

However, there are disadvantages with GUIs. These are:

- a. They require faster processors, more memory, more disk space, higher quality screens and more complex software.



Activity 1: Answer the following questions.

A. Answer the questions.

1. What is a **Graphical User Interface**?

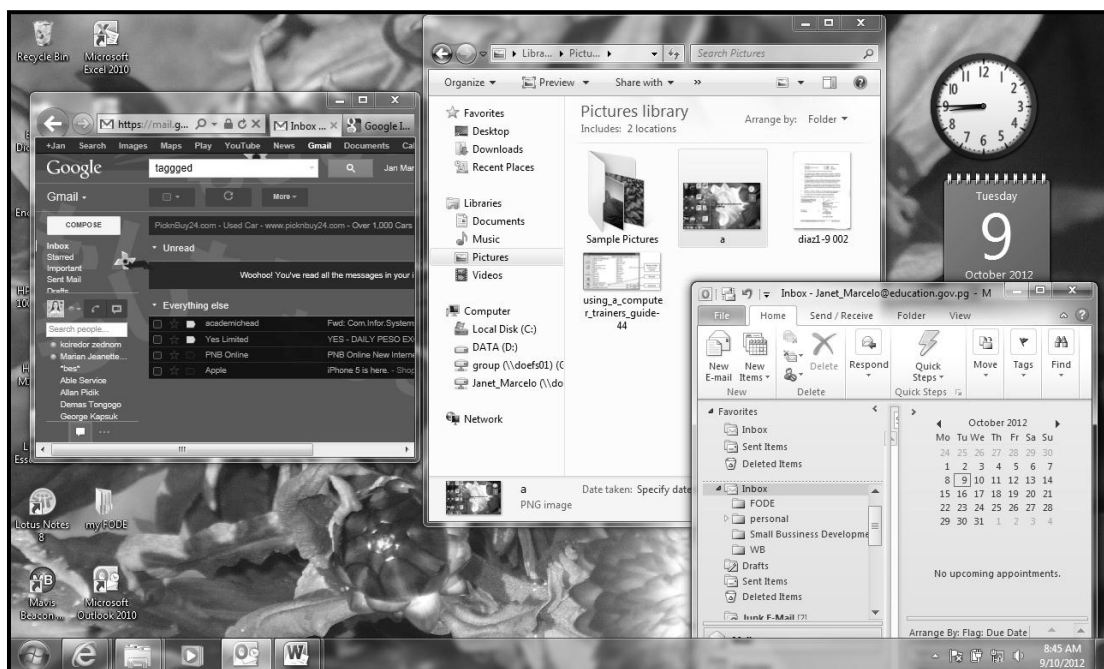
2. What is the difference between character- based user interface and graphical user interface?

3. Give two of the main features of a GUI and describe how it is important to you.

B. Identify the GUI feature based from the picture below. Circle the letter of the correct answer.



- a. Icon b. Desktop c. Recycle Bin



- a. Window b. Desktop c. Menu

Thank you for completing this activity. Now, you may go to the end of this lesson to check your answers. Make sure you do the necessary corrections before moving on to the next part of this lesson.

Summary



You have come to the end of Lesson 24. In this lesson, you learnt about the user interface which is the way the user interacts with the software. The function of the user interface is to provide a means of communication between the user and the computer.

The lesson focused on the two common types of user interfaces: the character-based (or command line) user interface and the graphical user interface (GUI). The GUI offers more advantages of use than the character-based user interface

NOW DO PRACTICE EXERCISE 24 ON THE NEXT PAGE

Practice Exercise 24

A. Identify the term that is described in each item.

1. A small picture that represents a program, file, folder or shortcut.

 2. A special folder to store deleted files. _____
 3. An onscreen list of available commands and tools. _____
 4. The first widely used operating system. _____
-

B. Copy and complete the following by replacing the letter in brackets with a suitable term:

The GUI gives instructions using a _____ and clicking on icons and _____.

In 1984 the Apple _____ made the GUI popular. Today a GUI provides a consistent _____ for a range of applications.

C. Unjumble these words:

- a. srue faircntee _____
 - b. nuxli _____
 - c. dlogia xbo _____
-

D. Answer the following questions.

1. What is a character-based user interface?

2. Outline the advantages of a GUI over a character-based user interface.

3. List 2 main features of a GUI.

CHECK YOUR WORK. ANSWERS ARE AT THE END OF TOPIC 4.

Answers to Activity

A.

1. The graphical user interface (GUI, pronounced goey') allows the user to give instructions using a mouse, and clicking on icons and menus. A GUI provides an easy-to-use and consistent interface for a range of applications.
2. The character-based user interface requires the user to give instructions using only characters. The user types the characters using a keyboard. On the other hand, the GUI allows the user to give instructions using a mouse, and clicking on icons and menus.
3. Window - everything done on the computer appears within a rectangular frame called a window. I can open several windows at the same time and work on different programs.

Icon - a small picture that represents a program, file, folder or shortcut. Text describing the icon appears when the user points at the icon. I can do double-clicking the icon and it will open the file immediately.

Menu - an onscreen list of available commands and tools. I can open a menu by clicking on the menu name.

Dialog box - a secondary window that contains buttons and various kinds of options through which I can carry out a particular command or task.

Desktop - the onscreen work area on which windows, icons, menus and dialog boxes appear. I can use in day-to-day work in the computer.

Recycle or trash bin - a special folder to store deleted files. I can delete a file by dragging the file to the recycle bin or right-click the file and press delete.

B. B and A

Answers to Practice Exercises in Topic 4

Practice Exercise 19

A.

1. D
2. A
3. A
4. C
5. D

B.

- | | |
|----------|---------|
| 1. FALSE | 4. TRUE |
| 2. TRUE | 5. TRUE |
| 3. TRUE | 6. TRUE |

C.

1. Single-tasking allows only one task to be performed at one time while Multitasking allows several applications to work at the same time.
2. Memory management speaks on the operating system controlling how the CPU relates to memory where it must ensure that data is efficiently accessed and not overwritten while File management talks on how the operating system organises and keeps track of files.

Practice Exercise 20

A.

1. Disk scanner
2. Anti-virus program
3. Disk defragmenter
4. Un-installer
5. File compression

B.

1. TRUE
2. TRUE
3. FALSE
4. TRUE
5. TRUE

C.

1. Utility software usually focuses on how the computer infrastructure (including the computer hardware, operating system, application software and data storage) operates while application software allows users to do things like

creating text documents, playing games, listening to music or viewing websites.

2. Utility software is necessary as it is a system software designed to help analyze, configure, optimize or maintain a computer. Therefore, it is very important as it performs routine tasks to support the operation of the computer system.
-

Practice Exercise 21

A.

1. Software packages
2. Application software
3. Microsoft Office
4. Integrated software

B.

- | | |
|----------|----------|
| 1. FALSE | 6. FALSE |
| 2. TRUE | 7. TRUE |
| 3. FALSE | 8. TRUE |
| 4. FALSE | 9. FALSE |
| 5. FALSE | 10. TRUE |
| 11. TRUE | |
-

Practice Exercise 22

A.

1. Custom software
2. Java
3. Visual Basic
4. C++
5. Programming languages
6. High-level languages
7. Custom software

B.

1. FALSE
2. TRUE
3. FALSE
4. FALSE
5. TRUE
6. TRUE
7. FALSE
8. TRUE

Practice Exercise 23

A.

1. B
2. D
3. C

B.

- | | |
|----------|----------|
| 1. FALSE | 6. FALSE |
| 2. FALSE | 7. TRUE |
| 3. TRUE | 8. FALSE |
| 4. FALSE | 9. TRUE |
| 5. TRUE | 10. TRUE |

C.

1. Hardware requirements fall under the system requirements of computers which act as guidelines needed to be used efficiently defined for all computer software present on a computer to accordingly function.
-

Practice Exercise 24

A.

1. Icon
2. Recycle or trash bin
3. Menu
4. OS/360

B.

The GUI gives instructions using a mouse and clicking on icons and menus.

In 1984 the Apple Macintosh made the GUI popular. Today a GUI provides a consistent interface for a range of applications.

C.

1. user interface
2. linux
3. dialog box

D.

1. The character-based user interface requires the user to give instructions using only characters. The user types the characters using a keyboard.

2. A GUI provides an easy-to-use and consistent interface for a range of applications. Applications developed for a GUI have the same consistent appearance as the operating system. The features described above make it easier for people to understand and learn commands compared to a character-based interface. The GUIs are also more forgiving. Most dialog boxes have a Cancel button and the Undo command allows users to reverse the last action.
 3. Window
Icon
-

End of Topic 4.

Now Do Exercise 4 in Assignment Book 4.

A

Access. To call up information out of **storage**.

Random access. A technique that permits information to be directly retrieved, regardless of its location on the storage medium.

Sequential access. A technique for retrieving stored information that requires a sequential search through one item after another on the storage medium.

Access time. The amount of time it takes for requested information to be delivered from **disks** and **memory**.

Active matrix display. A type of **monitor** typically used on **laptop** or portable **computers**; provides a brighter, more readable display than older **LCD** equipment.

Adapter. A **circuit board** that plugs into a **computer** and gives it additional capabilities. (See also *Circuit board*.)

AI. See *Artificial intelligence*.

Algorithm. A step-by-step procedure designed to solve a problem or achieve an objective.

Alpha testing. First-stage testing of **computer** products, typically done in house by the developer. (See also *Beta testing*; *Gamma testing*.)

Alphanumeric. Consisting of letters, numbers, and symbols.

Antivirus software. A **program** designed to look for and destroy **viruses** that may infect the **memory** of a **computer** or **files** stored on a **computer**.

Applet. A small **application**, that is, a **program** designed to perform a simple task. An applet is usually embedded within a larger program or **downloaded** from the **Internet** when needed.

Application (or app). A **program** designed to perform **information processing** tasks for a specific purpose or activity (for example, **desktop publishing** and **database management**). (See also *Applet*; *Killer app*.)

Archive. A **file** compressed for more efficient use of storage space. The compression of files may be accomplished by means of such **programs** as Stuffit.

Artificial intelligence (AI). **Computer** systems that attempt to imitate human processes for analysing and solving problems.

Ascending sort. Sorting records from A to Z or 0 to 9. (See also *Descending sort*.)

ASCII (pronounced as-kee). An acronym derived from American Standard Code for Information Interchange.

ASCII is a standard 7-bit code that represents 128 **characters**. The use of this standard code permits **computers** made by different manufacturers to communicate with one another.

B

B, b. *B* is the abbreviation of **byte**; *b* is the abbreviation of **bit**.

Background printing. The ability of a **computer** to print a **document** while other work is being done on the **keyboard** and the **display screen** at the same time.

Backup. **Storage** of duplicate **files** on **disks**, **diskettes**, or some other form of magnetic medium (such as tapes) as a safety measure in case the original medium is damaged or lost. (One word as a noun or an adjective: *backup* procedures; two words as a verb: *back up* your hard disk.)

Bacn. An **e-mail** message that might be considered **spam** except for the fact that the recipient has elected to receive it. Bacn (pronounced *bacon*) has been described as “e-mail you want but not right now.” Newsletters, alerts and automated reminders are considered examples of bacn.

Bandwidth. The volume of information that a network can handle (usually expressed in bits per second). The greater the bandwidth, the more quickly **data** can be **downloaded** from the **Internet** or moved from a **network** to a user’s **computer**. The term *bandwidth* is now also used to refer to a person’s attention span (as in “Burt is a low-bandwidth kind of guy”) or a person’s ability to handle an assignment (as in “Sally lacks the bandwidth to do this job”).

The question “How’s your bandwidth?” means “Are you busy?”

Basic Input/Output System (BIOS). A set of **programs** stored in read-only **memory** (ROM) on IBM or IBM-compatible **computers**. These programs control the **disk drives**, the **keyboard** and the **display screen** and they handle start-up operations.

BBS. See *Bulletin board system*.

Beta testing. Second-stage testing of **computer** products, typically done by potential customers and outside experts to identify problems that need to be fixed before the product can be released for sale. (See also *Alpha testing*; *Gamma Testing*.)

Binary code. The language used by **computers** in which **data** and instructions are represented by a series of 1s and 0s.

Binary numbering system. A numbering system in which all numbers are represented by various combinations of the digits 0 and 1.

BIOS. See *Basic Input/ Output System*.

Bit (b). An acronym derived from binary digit. The smallest unit of information that can be recognized by a **computer**. Bits are combined to represent **characters**. (See also *Byte*.)

Bitmap. A method of storing a graphic image as a set of **bits** in a computer's **memory**. To display the image on the screen, the **computer** converts the bits into **pixels**.

Bits per second (bps). A measurement that describes the speed of **data** transmission between two pieces of equipment. (See also *Transfer rate*.)

BlackBerry. A wireless **palmtop computer** that is especially helpful to business travellers. It permits users to send and receive e-mail and view other documents that they have on file. (See also *Wi-Fi*.)

Blawg. See *Blog*.

Bloatware. A **program** that uses an excessive amount of **disk** space and **memory**.

Block. A segment of **text** that is selected so that it can be moved to another location or processed in some other way. (See also *Block delete*; *Block move*; *Cut and paste*.)

Block delete. A **command** to delete (or erase) a segment of **text**.

Block move. A **command** to reproduce a segment of **text** in another place and at the same time erase it from its original position. (See also *Cut and paste*.)

Block protect. A **command** to prevent a **page break** from occurring within a block of **text** (for example, a table). (See also *Orphan protection*; *Widow protection*.)

Blog. A *blog* (short for Web log) is an online diary in which an individual records and publishes his or her thoughts on one or more subjects. A blog devoted to legal matters is known as a *blawg*.

Blogger. Someone who creates and maintains an online diary.

Blogosphere. The complete set of **blogs** on the Internet.

Blook. A *blook* is a **blog** that has been turned into a book or an online book that is published on a blog.

Bluetooth. A **protocol** that permits a wireless exchange of information between **computers**, cell phones, and other electronic devices within a radius of about 30 feet.

Board. See *Circuit board*.

Boilerplate. Standard wording (for example, sentences or paragraphs in form letters or clauses in legal documents) that is held in **storage**. When needed, it can be used as is, with minor modification, or in combination with new material to produce tailor-made **documents**.

Bookmark list. See *Favorites*.

Boot (short for *bootstrap*). To start a **computer** and load the **operating system** to prepare the computer to **execute** an **application**.

Bozo filter. A **program** that screens out unwanted **e-mail** or other messages from individuals or organizations you no longer want to hear from.

bps. See *Bits per second*.

Bricks-and-clicks. Refers to a traditional business with a Web site. (See also *Clicks-to-bricks*.)

Bricks-and-mortar. Refers to a traditional business that sells merchandise only in stores. (See also *Clicks-and-mortar*.)

Brochureware. A product that is being actively marketed, even though the product is not yet (and may never be) ready for sale. (See also *Vaporware*.)

Browser. See *Web browser*.

B2B. Business-to-business (online transactions).

B2C. Business-to-consumer (online transactions).

B2G. Business-to-government (online transactions).

Buffer. A holding area in **memory** that stores information temporarily. Also called *cache*.

Bug. A **software** defect that causes a **program** to malfunction or cease to operate. Some writers now use *bug* to refer to **hardware** problems as well. (See also *Debugging*; *Glitch*.)

Bulletin board system (BBS). An **online** information system, usually set up by an individual (called a *system operator*, or **SYSOP**) on a non-profit basis for the enjoyment of other individuals with similar interests. (See also *Internet*.)

Bundled software. **Software** that is sold along with a **computer** system; several software **programs** that are packaged together (also called *software suites*).

Burn. To record information on a disc such as a **CD-R**, a **CD-RW**, a **DVD-R**, or a **DVD-RW**.

Bus. A pathway along which electronic signals travel between the components of a **computer** system.

Button bar. See *Toolbar*.

Byte (B). An acronym for binary term. The sequence of **bits** that represents a **character**. Each byte has 8 bits.

C

Cache. See *Buffer*.

Cancelbot (from *cancel robot*). A **program** that detects **spamming** in **newsgroups** and automatically issues a cancel **command**. (See also *Ham*.)

Card. See *Circuit board*; *Adapter*.

Carpal tunnel syndrome. A wrist or hand injury caused by using a **keyboard** for long periods of time. A type of repetitive strain injury (**RSI**). (See also *Mouse elbow*.)

Cathode-ray tube (CRT). See *Display screen*.

CD-R. Compact disc-recordable.

CD-ROM (pronounced *cee-dee-rom*). An acronym derived from compact disc-read-only memory. A form of optical **storage**. One compact **disc** can hold up to 250,000 text pages; it can also be used to store **graphics**, sound and video. (See also *DVD-ROM*.)

CD-RW. Compact disc-rewritable.

Cell. A box or rectangle within a table or **spreadsheet** where a **column** and a **row** intersect; an area in which information can be entered in the form of **text** or figures.

Central processing unit (CPU). The brains of an **information processing** system; the processing component that controls the interpretation and execution of instructions. (See also *Motherboard*.)

Character. A single letter, figure, punctuation mark, or symbol produced by a **keystroke** on a **computer**. Each character is represented by a **byte**.

Character set. The complete set of **characters**-alphabetic, numeric, and symbolic-displayable on a **computer**. (see also *ASCII*.)

Character string. A specified sequence of typed **characters**, usually representing a word or phrase. A character string is often used to locate a particular word or phrase wherever it appears in a **document** so that it can be automatically replaced with another word or phrase. If a person's name has been consistently misspelt or a date appears incorrectly in several places, the error can be easily corrected. (See also *Search and replace*.)

Characters per inch (cpi). The number of **characters** in a **fixed-pitch font** that will fit within 1 inch. **Characters per second (cps).** The number of **characters** printed in 1second; a measurement frequently used to describe the speed of a **printer**.

Chat. A method of communication in which people type text messages to each other, thereby holding a conversation over a **network** such as the **Internet**. (See also *Newsgroup*.)

Check box. A small box that appears on screen alongside each option displayed in a **dialog box**. When an option is selected, an **X** or a check mark appears inside the box.

Chip. An **integrated circuit** used in **computers**.

Chip jewelry. An obsolete **computer**.

Circuit board. A board or card that carries the necessary electronic components for a particular **computer** function (for example, **memory**). The circuit boards that come with the original equipment perform the standard functions identified with that type of equipment. Additional circuit boards expand the kinds of functions that the equipment can perform. Also called a *board*, a *card*, or an *expansion board*.

Clear. A **command** to erase information.

Click. To quickly press and release a **mouse** button *once* while the **cursor** (mouse pointer) is positioned over a specific item on the screen. (See also *Double-click*.)

Clicks-and-mortar. Refers to a business that sells merchandise online as well as in stores. (See also *Bricks-and-mortar*.)

Clicks-to-bricks. Refers to an **Internet** company that opens stores. (See also *Bricks-and-clicks*.)

Client/server computing. A **network of computers** that consists of a file server (a computer that runs a **database management system**) and individual clients (computers that request and process **data** obtained from the file server).

Clipboard. A holding area in **memory** where information that has been copied or **cut** (**text**, **graphics**, sound, or video) can be stored until the information is inserted elsewhere. (See also *Copy*; *Cut*; *Cut and paste*.)

Column. A vertical block of **cells** in a table or **spreadsheet**. (See also *Row*.)

Command. An instruction that causes a **program** or **computer** to perform a function. A command may be given by means of a special **keystroke** (or series of keystrokes), or the command may be chosen from a **menu**.

Commercial online service. See *Internet service provider*.

Compatibility. The ability of one type of **computer**, device, data file, or **program** to share information or to communicate with another. (See also *ASCII*.)

Computer. An electronic device that is capable of (1) accepting, storing, and logically manipulating **data** or **text** that is **input** and (2) processing and producing **output** (results or decisions) on the basis of stored programs of instructions. Some computers are also capable of processing **graphics**, video and voice input. Most computers include a **keyboard** for **text entry**, a **central processing unit**, one or more **disk drives**, a **display screen** and a **printer**—components referred to as **hardware**.

Control menu. An onscreen Windows element that appears in a box in the upper left corner of a **window**. The control menu allows the user the option of adjusting the size of the window, closing or reopening the window or switching to another window.

Cookie. A small text **file** that a Web **server** stores on a user's hard drive when the user visits certain **Web sites**. A cookie contains all the information that a user has to submit on a first visit to a particular Web site in order to gain access. When a user revisits that Web site, the cookie makes it unnecessary for the user to enter the same information all over again. The positive aspect of cookies is that they make it possible for users to take advantage of the convenient "shopping cart" feature of many Web sites. Unfortunately, cookies also make it possible for marketing organizations to monitor users' browsing patterns; users then find themselves the targets of custom-tailored marketing campaigns.

Copy. To reproduce information elsewhere. The original information remains in place. (See also *Cut*.)

cpi. See *Characters per inch*.

cps. See *Characters per second*.

CPU. See *Central processing unit*.

Cracker. The preferred term (rather than **hacker**) used to refer to a **computer** criminal who penetrates a computer to steal information or damage the program in some way.

Crash. A malfunction in **hardware** or **software** that keeps a **computer** from functioning. (See also *Bug*; *Glitch*.)

CRT. Cathode-ray tube. (See also *Display screen*.)

Cursor. A special **character** (usually a blinking underline, dot, or vertical line) that indicates where the next typed character will appear on the **display screen**. Also known as the **mouse** pointer (arrow) or **I-beam pointer**. Microsoft Word refers to the cursor as the *insertion point*. (See also *Prompt*.)

Cursor positioning. The movement of the **cursor** on the **display screen**. Most **computers** have four keys to control up, down, left and right movement. Many computers also permit the use of a **mouse** to position the cursor.

Cut. To remove **text** from its original location and place it on a **clipboard**. (See also *Copy*; *Paste*.)

Cut and paste. To move a **block** of **text** from one place to another.

Cyberspace. A realistic simulation of a three-dimensional world created by a **computer** system; also referred to as *virtual reality*. Now commonly used to refer to the world of the **Internet** as a whole.

Cybersquatting. Registering a potentially valuable Internet address in the hope of selling it at a profit later on to an organization for which this address would be ideal.

Cybrarian. The electronic equivalent of a librarian. A person who makes a career of **online** research and **data** retrieval.

D

Data. Information consisting of letters, numbers, symbols, sound, or images-in a form that can be processed by a **computer**.

Data compression. A procedure for reducing the volume of **data** so as to shorten the time needed to transfer the data or to reduce the amount of space needed to store the data.

Database. A stored collection of information.

Database Management System (DBMS). The **software** needed to establish and maintain a **database** and manage the-stored information.

DDE. See *Dynamic data exchange*.

De1ad-tree edition. The paper version of a publication available online.

Debugging. Locating and eliminating defects in a program. (See also *Bug*.)

Decimal tab. A type of tab that aligns columns of figures on the decimal point.

Default settings. The pre-established settings (for margins, font, type size, tab stops, and so on) that a program will follow unless the user changes them.

Delete. A command to erase information in storage.

Denial of Service (DoS) attack. A malicious act intended to shut down a Web site or a network by flooding it with too much information. Users who attempt to visit the site will be denied access.

Descending sort. Sorting records from Z to A or 9 to 0. (See also *Ascending sort*.)

Desktop. The electronic work area on a display screen.

Desktop computer. A microcomputer that is bigger than a laptop.

Desktop Publishing (DTP). A system that processes the text and graphics and, by means of page layout software and a laser printer, produces high-quality pages suitable for printing or in-house reproduction.

Dialog box. A message box on the screen that supplies information to - or requests information from - the user.

Dictionary. A **program** used to check the spelling of each word entered in the **computer**.

Digerati. A term referring to the elite group of intellectuals in the computer world (in the same way that *literati* refers to the elite group of intellectuals in the literary world).

Directory. A list of the **files** stored on a **disk**.

Disc. A nonmagnetic **storage** medium that is used in conjunction with optical technology. (See also *CD-ROM*.)

Disk. A random-access, magnetically coated **storage** medium used to **store** and **retrieve** information. (See also *Diskette*; *Hard disk*.)

Disk drive. The component of a **computer** into which a **disk** is inserted so that it can be read or written on.

Disk operating system. See *DOS*.

Diskette. A small, nonrigid **disk** with limited **storage** capacity. Also known as a *floppy disk*.

Display screen. A device similar to a television screen and used on a **computer** to display **text** and **graphics**. Also called a *video display terminal (VDT)* or a *monitor*.

Distributed processing system. A form of a **local area network** in which each user has a fully functional **computer** but all users can share **data** and **application software**. The data and software are distributed among the linked computers and not stored in one central computer.

DNS. Domain name system.

Document. Any printed business communication-for example, a letter, memo, report, table, or form. (See also *File*.)

Documentation. The manuals or guides distributed with hardware or software.

Domain. Typically, a three-letter element in a Web address or an **e-mail** address. The domain- commonly referred to as the *zone*-indicates the type of organization that owns the **computer** being identified in the address. For example, *.com* signifies a commercial organization; *.edu* signifies an educational institution.

DOS (pronounced *dahs* or *doss*). An acronym derived from disk operating system. The term refers to a **program** that allows the **computer** to manage the **storage** of information on **disks** and controls other aspects of a computer's operation.

DoS (pronounced *dee-oh-ess*). See *Denial of service attack*. (Note the differences in spelling and pronunciation between DOS and DoS.)

Dot. The period symbol used in **e-mail** and Web addresses. Always referred to as a *dot* (never as a period).

Thus the **domain name** *aol.com* would be pronounced *ay-oh-ell-dot-com*. **Internet** surfers who spend a lot of time in the *.com* domain are sometimes referred to as *dot communists*.

Dot-com. An organization that sells its products or services on a **Web site** (with a URL ending in *.com*). A dot-com that fails to stay in business is referred to as a *dot-bomb*.

Dot matrix printer. A **printer** that uses pins to produce **characters** made up of small dots. This kind of printer is generally used by organizations that want to produce form letters or mailing labels economically.

Double-click. To quickly press and release a **mouse** button *twice* while the **cursor** (mouse pointer) is positioned over a specific item on the **screen**. (See also *Click*.) The expression “Double-click on that” means “That’s really quite good.”

Download. To transfer information to the user’s **computer** from another computer.

Drag-and-drop editing. A **software** feature that allows the user to (1) highlight **text** to be moved and (2) use a **mouse** to drag the text to a new location.

DRAM. Dynamic Random Access Memory.

Drop-down menu. See *Menu*.

DSL. Digital Subscriber Line. DSL is a high-**bandwidth** method of connecting to the **Internet** by means of telephone lines.

DSL. Digital subscriber line. DSL is a high-**bandwidth** method of connecting to the **Internet** by means of telephone lines.

DTP. See *Desktop publishing*.

Duplexing. A procedure that permits two **computers** to transmit **data** to each other simultaneously.

DVD. Digital video **disc** or digital versatile disc.

DVD-E. Digital video **disc**-erasable.

DVD-R. Digital video **disc**-recordable.

DVD-RAM. Digital video **disc**-random-access **memory**.

DVD-ROM. Digital video **disc**-read-only **memory**.

DVD-RW. Digital video **disc**-read/write.

Dynamic data exchange (DDE). A technology that permits the user to transfer or **paste data** from one **application** (for example, a **spreadsheet**) to another (for example, a report). Because of the dynamic link created by this technology, any

change in the data in the original application will be automatically reflected in the data copied in the second application. (See also *Object linking and embedding*.)

E

Easter egg. An unexpected image or message that pops up on the **display screen** when the user innocently enters a secret combination of **keystrokes**. Programmers playfully code Easter eggs into **software** and **operating systems** as a way of surprising and amusing users engaged in more serious tasks.

E-book. A small reading device that displays **downloaded** digital text.

Editing. The process of changing information by inserting, deleting, replacing, rearranging and reformatting. Also known as *changing* or *customizing*.

Ellipsis marks. Three spaced dots (. . .) that appear as part of a **menu** option. Ellipsis marks indicate that a **dialog box** will appear if that option is selected.

E-mail (short for *electronic mail*). The term *e-mail* refers to the transfer of messages or **documents** between users connected by an electronic **network**. The term is also used to refer to the message that is being transmitted in this way. The original form-*E-mail*-is rarely seen except at the beginning of a sentence, and industry professionals now commonly write the word without a hyphen-*email*. One wit has suggested replacing the term *e-mail* with *e-pistle*.

Emoticon. See *Smiley*.

Encryption. Coding confidential **data** so that only a user with the right **password** can read the data.

Enter. To **input data** into **memory**. (See also *Type*.) Also the name of a key on a **computer keyboard**. **Enter.** To **input data** into **memory**. (See also *Type*.)

Also the name of a key on a **computer keyboard**.

Escape key. A key that permits the user to leave one segment of a **program** and move to another.

Ethernet. A type of **computer network**.

Ethernet card. A **circuit board** that allows a **computer** to be connected to a **network** by cable.

Execute. To perform an action specified by the user or the **program**.

Expansion board. See *Circuit board*.

Expert system. See *Artificial intelligence*.

Export. To save information from one **computer** or **program** to another.

Extranet. A technology that permits users of one organization's **intranet** to enter portions of another organization's intranet in order to conduct business transactions or collaborate on joint projects.

E-zine. A magazine published in an electronic format. Also called *Webzine*.

F

Face time. Time spent dealing with someone face to face (as opposed to time spent communicating electronically). Sometimes referred to as *facemail*. (See also *f2f*.)

FAQ. Frequently asked question. Pronounced as a word (to rhyme with *pack*) or as separate letters.

Favorites. A customized list of a user's favorite **Web sites** that permits the user to access a particular web site..

Fax (n.). A shortened form of the word *facsimile*. A copy of a **document** transmitted electronically from one machine to another.

Fax (v.). To transmit a copy of a **document** electronically.

Fax modem. A device built into or attached to a **computer** that serves as a facsimile machine and a **modem**.

Field. A group of related **characters** treated as a unit (such as a name); also, the area reserved for the entry of a specified piece of information.

File. A collection of information stored electronically and treated as a unit by a **computer**. Every file must have its own distinctive name. (See also *File name*.)

File name. The name assigned to a **file** stored on a **disk**.

File transfer protocol (FTP). A set of guidelines or standards that establish the **format** in which **files** can be transmitted from one **computer** to another.

Firewall. A security system usually consisting of **hardware** and **software** that prevents unauthorized persons from accessing certain parts of a **program**, **database** or **network**.

Fixed-pitch font. A **typeface** such as Courier in which each **character** has exactly the same **width** (like this). Also referred to as a *monospace font*.

Flame (n.). An inflammatory **e-mail** message; one deliberately designed to insult and provoke the recipient. (See also *Rave*.)

Flame (v.). To send an inflammatory message.

Flat-panel display. A type of **desktop computer** monitor that consists of an **LCD** in a thin case. A flat panel display has a much smaller **footprint** than the traditional **CRT**.

Floppy disk. See *Diskette*.

Folder. A **storage** area on a **disk** used to organize **files**.

Font. A typeface of a certain size and style. Includes all letters of the alphabet, figures, symbols, and punctuation marks. (See also *Monospace font*)

Footer. Repetitive information that appears at the bottom (the foot) of every page of a **document**. A page number is a common footer. (See also *Header*.)

Footnote feature. The ability of a **program** to automatically position footnotes on the same page as the **text** they refer to. If the text is moved to another page, any related footnotes will also be transferred to that page.

Footprint. The amount of space a **computer** occupies on a flat surface.

Forelash. Negative reactions to a technology not yet in existence but excessively promoted in advance.

Format. The physical specifications that affect the appearance and arrangement of a **document**-for example, margins, spacing, and **font**.

Forms mode. The ability of a **program** to store the **format** of a blank **document** or form so that it can later be viewed on the **display screen** and completed by the user. Once a fill-in has been entered, the **cursor** automatically advances to the beginning of the next area to be filled in. (See also *Style sheet;Template*.)

Forum. See *Newsgroup*.

Freenet. A local **network** that offers free (or low-cost) **access** to **host computers** located in libraries and to other public-interest groups in the community. A freenet may also offer limited access to the **Internet**.

Freeware. Copyrighted **software** that is available for use without charge. (See also *Shareware*.)

f2f. Communicating face to face.

FTP. See *File transfer protocol*.

Function keys. Keys on a **keyboard** (for example, F1) that give special **commands** to the **computer**— for example, to set margins or tabs.

G

G or GB. See *Gigabyte*.

Gamma testing. Third-stage testing of **computer** products, typically done just before the products are released for sale. (See also *Alpha testing*; *Beta testing*.)

Gateway. A machine that links two **networks** using different **protocols**.

Gigabyte. A measurement of the **storage** capacity of a device. One gigabyte represents 1024 **megabytes**. This term may be abbreviated as *G* or *GB*; however, *GB* is the clearer abbreviation since *G* also stands for the metric prefix *giga* (meaning 1 billion). A gigabyte is often referred to as a *-gig*."

Gigahertz (GHz). A measurement used to identify the speed of the **central processing unit**. One gigahertz is equal to 1 billion cycles per second.

GIGO. Garbage in, garbage out. In other words, your **computer output** is only as good as your computer **input**.

Glitch. A **hardware** problem that causes a **computer** to malfunction or **crash**. (See *Bug*.)

Global. Describing any function that can be performed on an entire **document** without requiring individual **commands** for each use. For example, a global **search-and-replace** command will instruct the **computer** to locate a particular word or phrase and replace it with a different word or phrase wherever the original form occurs in the document.

Gopher. A **protocol** used for locating and transferring information on the **Internet**. The use of Gopher has diminished as diminished as the Web's **hypertext transfer protocol (HTTP)** has become the dominant protocol.

Graphical user interface (GUI). A visual computer environment that permits the user to **click** on **icons** or select options from a **menu**.

Graphics. Pictures or images presented or stored using a **computer**.

Grok. To research and comprehend something in great detail and great depth.

Groupware. Software that lets **network** users collaborate on a variety of **documents**.

GUI (pronounced goo-ee). See *Graphical user interface*

H

Hack. To work on an electronic project.

Hacker. A dedicated **computer** programmer. The term *hacker* is sometimes used erroneously to refer to a computer criminal who penetrates and tampers with computer **programs** or systems. The preferred term for a computer criminal is **cracker**.

Ham. A legitimate **e-mail** message that is blocked because it contains one or more **keywords** associated with **spam** messages.

Handheld computer. A portable computer smaller than a **notebook computer**. Also called a **palmtop computer**.

Hard copy. **Text** or **graphics** printed on paper; also called a **printout**. (See also *Soft copy*.)

Hard disk. A rigid type of magnetic medium that can store large amounts of information.

Hard drive. Another name for the hard disc that stores information in a computer.

Hard hyphen. A hyphen that is a permanent **character** in a word. A word that contains a hard hyphen will not be divided at this point if the word comes at the end of a line. (See also *Soft hyphen*.)

Hard page break. A page-ending code or **command** inserted by the user that cannot be changed by the **program**. A hard page break is often used (1) to prevent a table from being divided between two pages and (2) to signify that a particular section of a **document** has ended and the following **text** should start on a new page.

Hard return. A **command** used to end a paragraph, end a short line of **text**, or insert a blank line in the text. (See also *Soft return*.)

Hard space. A space inserted between words in a phrase that should remain together (for example, the word *page* and the number, month and day, number and unit of measure). The hard space ensures that the phrase will not be broken at the end of a line.

Hardware. The physical components of a **computer**: the **central processing unit**, the **display screen**, the **keyboard**, the **disk drive**, the **modem**, the **mouse** and the **printer**. (See also *Software*.)

Hardwired. Describes something physically built into a system using hardware, instead of being accomplished by programming.

Header. Repetitive information that appears at the top (the head) of every page of a **document**. A page number is a common header. (See also *Footer*.)

Hit. A single request for information made by a client **computer** from a Web **server**. The popularity of a given **Web site** is often measured by the number of hits it receives. However, this number can be extremely misleading, since a particular Web page may contain a number of elements, each one of which will be counted as a hit when a visitor opens that page. Thus the number of hits recorded for a particular Web page can be significantly greater than the actual number of visitors to that page.

Home. The upper left corner of the **display screen**; the starting position of a page or **document**.

Home page. The main page for a **Web site** established by an organization or an individual; it usually serves as the entrance for a series of related pages.

Host computer. A **computer** that provides information or a service to other computers on the **Internet**.

Every host computer has its own unique host name.

Hot key. A **keyboard** shortcut that allows quick access to a **command** or **menu** option.

Hot list. See *Favorites*.

HTML. See *Hypertext markup language*.

HTTP. See *Hypertext transfer protocol*.

Hyperlink. An element in a **hypertext document** that is highlighted by means of underlining or the use of a different color. When a user clicks the highlighted element, the user is connected with another element in the same document or another document.

Hypermedia. An extension of **hypertext** that integrates audio, video, and **graphics** with **text**.

Hypertext. A technology that links **text** in one part of a **document** with related text in another part of the document or in other documents. A user can quickly find the related text by clicking on the appropriate **keyword**, key phrase, **icon**, or button.

Hypertext markup language (HTML). The formatting language used to establish the appearance of a Web page.

Hypertext transfer protocol (HTTP). The **protocol** used on the **World Wide Web** that permits Web clients (**Web browsers**) to communicate with Web **servers**. This protocol allows programmers to embed **hyperlinks** in Web documents, using **hypertext markup language**.

Hyphenation. The ability of a **program** to automatically hyphenate and divide words that do not fit at the end of a line. If the **text** is later revised so that the divided word no longer begins at the right margin, the hyphen is automatically removed and the word prints solid. (See also *Soft hyphen*.)

I

I-beam pointer. A **mouse-** or **keyboard-** controlled **cursor** that looks like a capital I.

Icon. A symbol (such as a picture of a trash can or a file folder) that represents a certain function. When the user **clicks** on the icon, the appropriate function is **executed**. (See also *Graphical user interface*.)

ICQ (from I seek you). An instant messaging service.

IM. See *Instant messaging*.

Import. To **retrieve** any **text** or other information created by one **program** (for example, images created by a **graphics** program) and transfer it to another program (for example, a **spreadsheet** program).

Indexing. The ability of a **program** to accumulate a list of words or phrases that appear in a **document** (along with their corresponding page numbers) and to print or display the list in alphabetic order.

Information processing. The coordination of people, equipment, and procedures to handle information, including the **storage**, **retrieval**, distribution and communication of information. The term *information processing* embraces the entire field of processing words, figures, **graphics**, video and voice **input** by electronic means.

Information Superhighway (or I-way). The **Internet**. Also referred to as the *Infobahn* (based on the German term for its network of highways, the *Autobahn*).

Ink-jet printer. A nonimpact **printer** that forms **characters** by spraying tiny, electrically charged ink droplets on paper.

Input (n.). Information entered into the **computer** for processing.

Input (v.). To **enter** information into the **computer**. (See also *Type*; *Key*.)

Input device. A **hardware** component (such as a **mouse**, a **keyboard**, or a microphone) that lets the user **input** information.

Insert. To add information to a **file**.

Insertion point. See *Cursor*.

Instant Messaging (IM). A **chat** program that lets people communicate over the **Internet** in real time.

Integrated circuit. Multiple electronic components combined on a tiny silicon **chip**. (See also *Microprocessor*.)

Integrated software. **Software** that combines in one **program** a number of functions normally performed by separate programs.

Interface. The electrical connection that links two pieces of equipment so that they can communicate with each other. Also, the **software** that controls the interaction between the **hardware** and the user.

Internesia. Forgetting where one obtained a piece of information on the **Internet**.

Internet (or Net). A system that links existing **computer networks** into a worldwide network. The Internet may be accessed by means of commercial online services (such as America Online) and **Internet service providers**.

Internet community. A group of individuals with common interests who frequently exchange ideas on the **Internet**.

Internet protocol (IP) address. A unique set of numbers that identifies a **computer** over a **network**.

Internet Service Provider (ISP). An organization that provides access to the **Internet** for a fee. Companies like America Online are more properly referred to as *commercial online services* because they offer many other services in addition to Internet access—for example, news, travel services and financial and shopping information.

Internet telephony. Another name for **Voice over Internet Protocol (VoIP)**.

Intranet. A private **network** established by an organization for the exclusive use of its employees.

Firewalls prevent outsiders from gaining access to an organization's intranet. (See also *Extranet*.)

I/O. An abbreviation for *input/output*.

IP address. See *Internet Protocol address*.

ISP. See *Internet service provider*.

J

Java. A programming **language** designed for **programs** or **applets** used over the **Internet**.

JPEG. _Joint Photographic Experts Group. A format for storing complex **graphics** in compressed form. The file extension. *.jpeg* or *.jpg* indicates that a particular file uses this format.

Justification. Aligning lines of **text** at the left margin, the right margin, both margins, or the center. Text aligned at both margins is considered *fully justified*. Text aligned only at the left margin is said to have a *ragged right margin*.

K

K or KB. See *Kilobyte*.

Kern. To make fine adjustments in the space between any two **characters**.

Key. To **enter characters** into the **memory** of a **computer**. (*Key* is being replaced by the word *type*. See also *Type*.)

Keyboard. The device used to **enter** information into a **computer**.

Keystroke. The depression of one key on a **keyboard**.

Keyword. A word or phrase that briefly identifies a **document**. Keywords serve as the basis for a variety of computer operations-for example, conducting an **online** search.

Killer app (short for *application*). **Software** that is considered –so great it will blow you away.”

Kilobyte. A measurement of the **storage** capacity of a device. One kilobyte represents 1024 **bytes**. *Kilobyte* may be abbreviated *K* or *KB*; however, *KB* is the clearer abbreviation since *K* also stands for the metric prefix *kilo* (meaning 1000).

Kluge (pronounced *klooj*). An expedient (but often inelegant) way to solve a problem when time is of the essence.

L

LAN. See *Network, local area*.

Landscape orientation. The positioning of a page so that information is printed across the long dimension of the paper. (See also *Portrait orientation*.)

Language. The **characters** and procedures used to write **programs** that a **computer** is designed to understand.

Laptop computer. A portable **computer**. Also known as a *notebook computer*.

Laser printer. A nonimpact **printer** that produces sharper **text** and **graphics** than any other type of printer. (See also *Dot matrix printer*; *Ink-jet printer*.)

LCD. See *Liquid crystal display*.

L33t. The term *l33t* (pronounced *leet*) is an **alphanumeric** expression derived from “elite.” This term is used to describe a person’s prowess in accessing restricted **Web sites**. (See also *W00t*.)

Line or paragraph numbering. The ability of a **program** to automatically number each line or paragraph sequentially in a **document**. The line or paragraph numbers can be deleted before the preparation of the final **printout**.

Line spacing. The ability of a **program** to automatically change vertical line spacing (for example, from double to single to double again).

Linux. A type of **open source software**. When combined with other components, Linux serves as an increasingly popular **operating system** that competes with Microsoft Windows.

Liquid Crystal Display (LCD). A type of **monitor** typically used on **laptop computers** or portable **computers**. (See also *Active matrix display*; *Flat-panel display*.)

Listserv. Any **software** that manages a **mailing list**. The most widely used programs are LISTSERV (as distinct from the generic terms *listserv* and *listserve*), Listproc, and Majordomo.

Load. To transfer information or **program** instructions into a **computer's memory**.

Local Area Network (LAN). See *Network, local area*.

Log off or log out (v.). To exit or leave a **computer** system.

Logoff or logout (n.). The process of exiting a **computer** system.

Log on or log in (v.). To **access** a **computer** system. *Log onto* and *log into* are not correct.

Logon or login (n.). The process of accessing a **computer** system.

M

M or MB. See *Megabyte*.

Macro. A time-saving feature (like telephone speed dialling) that allows the user to store in **memory** a set of **keystrokes** or **commands** that will accomplish a certain task.

Macro virus. A type of **virus** that attaches itself to **documents** or **word processing templates**.

Mail merge. The *mode*.)

Mailbomb. A deluge of process of taking information from a **database** and inserting it into a form letter or other **document** in order to customize the document for an individual recipient. For example, mail merge can be used to create the inside address and the salutation for a form letter. (See also *Forms e-mail* messages from one or more sources, deliberately intended to overload the recipient's **computer** and make it **crash**. A mailbomb is typically sent to punish someone guilty of **spamming** or some other serious breach of **netiquette**.)

Mailing list. An **e-mail** discussion group devoted to one or more specific topics.

Mainframe. A large **computer** system.

Malware. **Software** that disrupts normal **computer** functions or sends a user's personal **data** without the user's authorization.

Maximize. A **command** used in a **graphical user interface (GUI)** that enlarges a **window** so that it fills a desktop.

Megabyte. A measurement of the **storage** capacity of a device. One megabyte represents more than 1 million **bytes**. *Megabyte* may be abbreviated *M* or *MB*;

however, *MB* is clearer since *M* also stands for the metric prefix *mega* (meaning 1 million). A megabyte is often referred to as a “meg.”

Megahertz (MHz). A measurement used to identify the speed of the **central processing unit**. One megahertz is equal to 1 million cycles per second.

Memory. The part of a **computer** that stores information. (See also *Storage*.)

Random-Access Memory (RAM). The temporary memory that allows information to be stored randomly and accessed quickly and directly (without the need to go through intervening **data**).

Read-Only Memory (ROM). The permanent memory of a **computer**; a set of instructions that has been built into the computer by the manufacturer and cannot be accessed or changed by the user.

Menu. A list of choices shown on the **display screen**. For example, a **format** menu would include such options as the type style and the type size to be selected. A menu is often referred to as a *pull-down menu*, a *drop-down menu* or a *pop-up menu* because it appears **onscreen** after the user **clicks** the **menu bar** or some other item on the screen.

Menu bar. The bar across the top of the **screen** or **window** that displays the names of available **menus**.

Merge. A **command** to create one **file** by combining information that is stored in two different locations.

For example, a **computer** can merge the **text** in a form letter with a mailing list to produce a batch of letters with a different name, address and salutation on each letter. (See also *Mail merge*.)

Microcomputer. A small and relatively inexpensive **computer**, commonly consisting of a **display screen**, a **keyboard**, a **central processing unit**, one or more **disk drives** and a **printer**, with limited **storage** based upon a **microprocessor**. (See also *Desktop computer*; *Laptop computer*.)

Microprocessor. An **integrated circuit** on a silicon **chip** that serves as the **central processing unit** of a **computer**.

Middleware. A type of **software** that connects different **applications** that were not originally designed to work together.

Minimize. A **command** used in a **graphical user interface (GUI)** that reduces a **window** to an **icon** or a label, usually at the bottom of a **desktop**.

MIPS. An acronym derived from millions of instructions per second. Used to measure the speed of a processor.

Modem. An acronym derived from modulator/demodulator. A device that (1) converts digital signals into tones for transmission over telephone lines and (2) converts the tones back into digital signals at the receiving end.

Monitor. The **display screen** of a **computer**.

Monospace font. See *Fixed-pitch font*.

Morph (from *metamorphosis*). To change one image into another by means of digital technology.

Motherboard. The **computer's** main **circuit board**, which contains the **central processing unit**, the **memory**, and expansion slots for additional circuit boards called *adapters* or *cards*. (See also *Adapter*.)

Mouse. A hand-operated electronic device used to move a **cursor** or pointer on the **display screen**. Mostly used with **microcomputers**. Referred to in Spanish as *el maus*. (See also *Word of mouse*.)

Mouse arrest. To be placed under mouse arrest is to be denied further access to an **Internet service provider** or a **commercial online service** as a result of violating the terms of service.

Mouse elbow. A repetitive strain injury (similar to tennis elbow) that is caused by repeatedly using a **mouse**. (See also *Carpal tunnel syndrome*.)

Mouse potato. A person who sits glued to a **computer screen** (in the same way that a couch potato sits glued to a TV screen).

Mousetrapping. Blocking someone's exit from a **Web site**.

MS-DOS (pronounced *em-ess-dahs* or *-doss*). Derived from Microsoft disk operating system. An operating system used on the first IBM and IBM-compatible **microcomputers**.

MP3. Compact audio and video file format. The small size of the files makes them easy to download and e-mail. Format used in portable playback devices.

Multimedia. The use of several types of media (such as **text**, **graphics**, animation, sound and video) in a **document** or an **application**.

Multitasking. The ability of a **computer** to **execute** more than one **program** at a time. The derivative term “multitasking” means playing games at the computer instead of working.

MS-DOS. An early operating system developed by Microsoft Corporation (Microsoft Disc Operating System).

N

Net. See *Internet*.

Netiquette. A set of guidelines for formatting and composing **e-mail** messages.

Netizen. A “citizen” of the Net; an active participant in the **Internet community**. Netizens in general are sometimes referred to as *netkind*.

Network. A system of interconnected **computers**. (See also *Notwork*; *Sneakernet*.)

Local Area Networks (LANs) use cable to connect a number of computers within the same location or in close proximity.

Wide Area Networks (WANs) use telephone lines or other **telecommunications** devices to link computers in widely separated locations.

Internet is a system that links existing networks into a worldwide network.

Newbie. A newcomer to a **bulletin board system** or some other **network** facility.

Newsgroup. An electronic discussion group maintained over the **Internet** or tied into a **bulletin board system**. Each newsgroup is typically organized around a specific interest or matter of concern. Also called a *forum*.

Newsreader. A **program** that permits users to read and respond to messages posted on **Usenet**.

Notebook computer. A portable **computer**. Also known as a *laptop computer*.

Notwork. A **network** that does not live up to its advance billing. Also called a *nyetwork*.

Number crunching. Processing large amounts of numerical **data**.

O

Object Linking and Embedding (OLE). A process that permits the user to take material (referred to as an *object*) from one source and **insert** (*embed*) it in another **document**. If the user subsequently makes changes in the original material, those

changes will be automatically transferred to the second document as a result of the OLE linking process.

OCR. See *Optical Character Reader*.

Offline. Refers to the state in which a **computer** is temporarily or permanently unable to communicate with another computer (even though it is turned on and capable of performing other functions). The term *offline* is also used humorously to refer to “real life.” The expression “Let’s take that offline” means “Let’s discuss that in private.”

Offscreen. Refers to any **computer** function that does not produce a display on the **screen**.

OLE (pronounced oh-lay). See *Object linking and embedding*.

Online. Refers to the state in which a **computer** is turned on and ready to communicate with other computers.

Onscreen. Refers to anything displayed on the **screen** of a **computer**.

Open. To transfer a file from a **disk** into the **memory** of a **computer**.

Open source software. **Software** that makes the underlying source code available to all users at no charge. Users may make changes and improvements as long as they do not try to sell the software commercially. **Linux** is the best example of open source software currently available.

Operating System (OS). **Software** that manages the internal functions and controls the operations of a **computer**.

Optical Character Reader (OCR). A device that can scan **text** from **hard copy** and **enter** it automatically into a **computer** for **storage** or **editing**. Also called an *optical scanner*.

Option button. An **onscreen** element that allows a user to select one option from a group of items. An empty circle precedes each option not selected. A dot appears in a circle to signify that the user has selected that option. Also referred to as a *radio button*.

Orphan protection. The ability of a **program** to prevent the first line of a paragraph from printing as the last line on a page. When the first line of a paragraph does appear as the last line on a page, it is referred to as an *orphan*. (See also *Widow protection*.)

OS. See *Operating system*.

Outlining. The ability of a **program** to automatically number and letter items typed in an indented **format**.

Output. The results of a **computer** operation.

Output device. A **hardware** component (such as a **monitor**, a **printer** or a sound speaker) that delivers the results of **computer** operations to the user.

Overwriting. Recording and storing information in a specific location on a **storage** medium that destroys whatever had been stored there previously.

P

Page break. A **command** that tells the **printer** where to end one page and begin the next. (See also *Hard page break*; *Soft page break*.)

Page numbering. The ability of a **program** to automatically print page numbers on the pages that make up an entire **document**. If the document is revised and the total number of pages changes, the page numbering is automatically adjusted.

Pagination. The ability of a **program** to take information and automatically divide it into pages with a specified number of lines per page. If the information is changed because of the addition, deletion, or rearrangement of copy, the material will be automatically repaged to maintain the proper page length. (See also *Soft page break*.)

Palmtop computer. A portable computer smaller than a **notebook** (or **laptop**) **computer** that fits on the palm of your hand. Also called a **handheld computer**.

Papernet. Ordinary mail service. (See also *Voicenet*.)

Password. A user's secret identification code, required to **access** stored material. A procedure intended to prevent information from being accessed by unauthorized persons.

Paste. A **command** that transfers information from a **clipboard** and inserts it in another location. (See also *Cut and paste*.)

Patch. A small **program** that improves an existing piece of **software** or corrects an error in it.

PC. See *Personal Computer*.

PDA. See *Personal Digital Assistant*.

PDF. See *Portable Document Format*.

Peripheral. A device that extends the capabilities of a **computer** (for example, a **printer**).

Personal Computer (PC). A **microcomputer** for personal and office use.

Personal Digital Assistant (PDA). A palm-sized, handheld **computer**.

Personal Information Manager (PIM). A **database management system** that permits a user to **store** and **retrieve** a wide range of personal information (for example, names, addresses, phone numbers, appointments and lists of people to call and things to do).

Phishing. A type of computer fraud that tries to trick users into their passwords and other confidential information.

Pica. A measurement used for a **font**; equal to 1/6 inch or 12 **points**.

PIM. See *Personal Information Manager*.

Piracy. The illegal copying of **software** or other creative works.

Pitch. The number of monospace **characters** (each with exactly the same width) that will fit in a 1-inch line of **text**. (See also *Fixed-pitch font*.)

Pixel. An acronym derived from picture element. The smallest element (a dot) on a **display screen**. Pixels are used to construct images on the screen.

Platform. A term used to define the type of **microprocessor** and **operating system** on which a **computer** is based.

Plug-and-play. The ability to plug in a **peripheral** and have it work without difficulty. The term *plug-and-play* is now sometimes used to refer to a new employee who can immediately do the job without any preliminary training. Because of the problems some users have experienced with items so labelled, they refer instead to *plug-and-pray*.

POD. Publishing On Demand. A process that allows for the printing of individual copies as orders come in (as distinguished from the traditional method of printing a number of copies on the basis of estimated sales for the foreseeable future).

Podcasting. Posting audio **files** online so that they can be **downloaded** to a portable audio player such as an MP3 player.

Point. A measurement that indicates the size of a **font**; 72 points equals 1 inch and 12 points equals 1 **pica**.

Pointer. An **onscreen** device that indicates the current position of the **mouse**.

Pop-up menu. See *Menu*.

Port. A socket on a **computer** into which an external device (such as a **printer** cable) can be plugged.

Portable Document Format (PDF). A **format** that makes it possible-with the help of Adobe Acrobat- to view documents that employ different **fonts**, various types of **graphics** and complex layouts.

Portrait orientation. Positioning paper so that information is printed across the short dimension of the paper. (See also *Landscape orientation*.)

Posting. A message entered into a **network** (such as a **newsgroup**) or on a **Web site**.

Print preview. A **software** feature that reduces the pages of a **document** so that a full page (or two facing pages) can be seen on the screen before being printed. This feature permits the user to spot and correct problems in **format** and **page breaks**.

Printers. Output devices of various types that produce copy on paper. (See also *Dot matrix printer*; *Inkjet printer*; *Laser printer*.)

Printout. The paper copy of information produced on a **printer**.

Program. An established sequence of instructions that tells a **computer** what to do. The term *program* means the same as **software**.

Programming language. The rules, conventions and specific **commands** used to write a **computer program**. Most programs must be converted into machine **language** or **binary code** so that the instructions can be performed on a specific **computer platform**.

Prompt. An onscreen symbol (for example, a **cursor**) that indicates where to **type** a **command**; a message that indicates what action is to be taken.

Proportional font. A **typeface** in which the width of each **character** varies (as in this sentence), so that the letter I takes much less space than the letter M. (See also *Font*.)

Protocol. A set of standards that permits **computers** to exchange information and communicate with each other.

P2P. Peer-to-peer (network).

Publishing on demand. See *POD*.

Pull-down menu. See *Menu*.

Push technology. A process that allows a user to obtain automatic delivery of specified information from the **Internet** to the user's **computer**-for example, stock market quotes, weather forecasts, and sports scores.

R

Radio button. See *Option button*.

RAM. See *Memory, random-access*.

Rave. To annoy someone by persistently talking about something. The act of raving is different from **flaming** in that flaming is deliberately provocative and even insulting, whereas raving is simply annoying because it goes on so long.

Read. To transfer information from an external **storage** medium into internal storage. (See also *Storage, external* and *internal*.)

Record (n.). A collection of all the information pertaining to a particular subject.

Redlining. A **word processing** feature that allows writers and editors to display (by means of a shaded panel or some other method) the additions and deletions they have made in a **document**. Redlining in drafts of reports, contracts and manuscripts makes it easy for others to see the changes that have been made. All redlining is removed from the final version of the document.

Response time. The time a **computer** takes to **execute** a **command**.

Retrieve. To call up information from **memory** or **storage** so that it can be processed in some way.

Right-click. Using the right mouse button to open context-sensitive drop-down menus.

ROM. See *Memory, read-only*.

Row. A horizontal block of **cells** in a table or **spreadsheet**. (See also *Column*.)

RSI. Repetitive strain injury; sometimes referred to as *chiplash*. (See also *Carpal tunnel syndrome*; *Mouse elbow*.)

Ruler. A bar (displayed on the **screen**) that shows the width of the page, the margin settings, the paragraph indentions and the tab stops.

S

Save. To store a **program** or **data** on a **storage** device such as a **disk**.

Scanner. An **input** device that can copy a printed page into a **computer's memory**, thus doing away with the need to **type** the copy. A scanner can also convert artwork and photographs into a digital format and store these in memory.

Screen. See *Display screen*.

Screen dump. A **printout** of what is displayed on the **screen**.

Screen saver. A **program** that changes the **screen** display while the user is away from the **computer**. Originally intended to prevent images from becoming etched on a **monitor's** screen when that was still a problem. Now used primarily for aesthetic purposes.

Scroll. To move information horizontally or vertically on a **display screen** so that one can see parts of a **document** that is too wide or too deep to fit entirely on one screen.

Scroll bar. An **onscreen** element that allows a user to **scroll** by using a **mouse**.

SCSI (pronounced *scuz-zy*). See *Small computer system interface*.

Search and replace. A **command** that directs the **program** to locate a **character string** or information (**text**, numbers, or symbols) wherever it occurs in a **document** and replace this material with new information. (See also *Global*.)

Search engine. A free **program** that helps Web users locate **data** by means of a **keyword** or concept. Among the most popular search engines are Google, Yahoo!, Excite, WebCrawler, and AltaVista.

Server. A **computer** that delivers **data** to other computers (**clients**) linked on the same **network**.

Shareware. **Software** that usually may be **downloaded** and used initially without charge; the author may subsequently ask for some payment. (Compare with *Freeware*.)

Shouting. The use of all caps in **e-mail**. This practice is considered a violation of **netiquette** and is actively discouraged.

Shovelware. Mediocre material used to fill up space on a **CD-ROM** or a **Web site**.

Sig block. The signature block that automatically appears at the end of every outgoing **e-mail** message. Also referred to as a *.sig file*.

Small computer system interface (SCSI). A type of **hardware** and **software interface** for connecting **peripherals** such as a **disk drive** or a **CD-ROM**.

Smiley. In **e-mail** messages, a facial expression constructed sideways (for the “lateral-minded”) with standard **characters**. Also referred to an *emoticon* (emotional icon). For example:

:-) I’m smiling. >:-(I’m angry. :-J I’m being tongue-in-cheek.

:-D I’m laughing. :-@ I’m screaming. :-+ I’m exhausted—my tongue :- (I’m sad. :-& I’m tongue-tied. is hanging out.

:-< I’m very sad. :-x My lips are sealed. %-) I’ve been staring at the :- (I’m crying. #-) I’m feeling no pain. screen too long.

;-) I’m winking. :-O I’m shocked. 8-| What next?

Japanese smileys do not require you to turn your head sideways. For example:

^L^ I’m happy. (>_<) I’m angry. (^_^)/^ I’m waving hello.

^o^ I’m laughing out loud. (@_@) I’m stunned. (;_;)/ I’m waving good-bye. \(^_^)/ I’m joyful. (!_!) I’m shocked. (= _ =) I’m sleepy.

Although smileys tend to be quite amusing, many people find them excessively cute. In any case, do not insert smileys in business correspondence except in informal messages, when you are sure the recipient will welcome them.

Snail mail. A term employed by **e-mail** users to refer to regular mail service.

Sneakernet. The procedure for transferring **files** from one **computer** to another when the computers are not connected by an electronic **network**. (Users remove **diskettes** or other **storage** devices from one computer and carry them on foot to another.)

Soft copy. Information shown on the **display screen**. (See also *Hard copy*.)

Soft hyphen. A hyphen that divides a word at the end of a line; considered soft (non-permanent) because the hyphen will automatically be deleted if the word moves to another position as a result of a change in the **text**. (See also *Hard hyphen*; *Hyphenation*.)

Soft page break. A line inserted by the **program** to show where a page will end. If copy is added or deleted, the original **page break** will be replaced with a new soft page break at the appropriate place. (By contrast, a **hard page break** will remain fixed, no matter what changes are made in the copy.) (See also *Pagination*.)

Soft return. A **software** feature that automatically breaks **text** between words at the right margin. The line ending is considered soft (non-permanent) because the line

ending will change if the user adds or deletes **text**. (See also *Hard return*; *Word wrap*.)

Software. The instructions that a **computer** needs to perform various functions. The term *software* means the same as **program**. (See also *Hardware*.)

Sort. To arrange **fields**, **records** or **files** in a predetermined sequence.

Spam (n.). The electronic equivalent of junk mail; also called *unsolicited commercial e-mail* (UCE). (See also *Ham*.)

Spam (v.). To send an **e-mail** message to a great number of recipients without regard for their need to know. A user who spams sometimes receives a **mailbomb** in return as a form of retaliation.

Spider. An automated **program** that searches the **Internet** for new **Web sites** and indexes their **URLs** and content descriptions in a **database** for examination by a **search engine** for matches.

Spim. **Spam** that is delivered by **instant messaging** (IM Spim).

Spit. **Spam** that is delivered by **Internet Telephony** (IT).

Split screen. The ability of some **programs** to display information in two or more different areas on the screen at the same time.

Spreadsheet. A **program** that provides a worksheet with **rows** and **columns** to be used for calculations and the preparation of reports.

Spyware. **Software** that enables a user to track someone's **computer** activities without that person's consent.

Storage. The **memory** of a **computer**.

External storage. A magnetic medium such as a **disk**, **diskette** or tape used to store information; can be removed from the **computer**.

Internal storage. An integral component of a **computer**; cannot be removed.

Store. To place information in **memory** for later use.

Streaming. The process of sending and temporarily storing large amounts of audio or video information in small pieces and playing them back on the **computer** so that there is a continuous flow.

Style sheet. A collection of the user's formatting decisions regarding **font**, type size, margins, **justification**, paragraph indentions and the like.

Surfing the Net. Browsing through various **Web sites** on the **Internet** in search of interesting things.

Surge protector. A device that protects **computer hardware** from being damaged by sudden increases in voltage.

SYSOP (pronounced *sis-op*). An acronym derived from system operator. A person who operates a **bulletin board system**.

T

Tab grid. A series of preset indentions (usually a half inch apart). If the tabs are reset by the user, the grid will change to show the new location of the tabs.

Tablet. A computer that accepts handwritten notes entered on the **display screen** by means of an electronic pen. The notes are then converted into text.

TCP/IP. See *Transmission Control Protocol/Internet Protocol*.

Telecommunications. The process of sending and receiving information by means of telephones, satellites and other devices.

Telecommuter. An employee who works away from the office (usually at home) and uses a **computer** (1) to **access** needed information on the organization's **intranet** and the **Internet** and (2) to communicate with other employees, suppliers and customers or clients.

Teleconferencing. Conducting a conference by using **computers**, video and **telecommunications** to share sound and images with others at remote sites.

Telnet. A **protocol** that allows a **computer** to connect with a **host computer** on the **Internet**. The use of Telnet has diminished as the Web's **Hypertext Transfer Protocol (HTTP)** has become the dominant protocol.

Template. A pre-established **format** for a **document**, stored in a **computer**. The template determines the margins, the type style and size to be used for the **text**, placement instructions for various elements (such as the date line), and design specifications for certain items (such as a letterhead). The user can modify the original template or create a new template to satisfy personal preferences.

Terminal. Any device that can transmit or receive electronic information.

Terabytes (TB). A thousand gigabytes.

Text. Broadly speaking, the material displayed on a **screen** or printed on paper. Within a given **document**, the term refers to the body of the document as distinct from **headers**, **footers** and other elements.

Text entry. The initial act of typing that places **text** in **storage**. (See also *Type*.)

Thread. A series of posted messages that represents an ongoing discussion of a specific topic in a **bulletin board system**, a **newsgroup**, or a **Web site**.

Toolbar. An onscreen element that offers instant **access** to commonly used **commands**. The commands are represented by **icons** on a row of buttons at the top of the **screen**. Also called a *button bar*.

Touchpad. The device on a **laptop computer** that takes the place of a **mouse**.

Touchscreen technology. The technology that permits a user to perform a function simply by touching the **screen** in an appropriate spot.

Trackball. An input device in which the user rolls a ball (usually with a thumb) to move the **pointer**.

Transfer rate. The rate at which **data** is transmitted between two **computers** or other electronic equipment.

Transmission Control Protocol/Internet Protocol (TCP/IP). A collection of over 100 **protocols** that are used to connect **computers** and **networks**.

Treeware. Anything printed on paper.

Trojan horse. A type of **computer virus** that is hidden within an innocent-looking program.

Type. To enter **characters** into the **memory** of a **computer**. For a number of years the verb *type* began to be replaced by the verb *key* as a way of emphasizing the difference between a **computer** and a typewriter. However, the simpler verb *type* has made a comeback in computer terminology and is now the word commonly seen in users' manuals and on **display screens**.

Typeface. See *Font*.

Typeover. See *Overwriting*.

U

Uniform Resource Locator (URL). The specific **Internet** address for a resource such as an individual or an organization. (See also *World Wide Web*.)

Uninterruptible Power Supply (UPS). A battery-powered backup system that provides enough electricity to a **computer** during a power outage (or, in most cases, a brownout or power surge) so that the user can save **files** before shutting down the computer.

UNIX. A very powerful operating system used as the basis of many high-end computer applications.

Universal Serial Bus (USB). A common standard for connecting multiple **peripherals** to a **computer** as needed.

Upload. To transfer information from a **client computer** to a **host** computer.

UPS. See *Uninterruptible power supply*.

URL (pronounced *you-are-el* or *erl*). See *Uniform resource locator*.

USB. See *Universal Serial Bus*.

Usenet (from Users' Network). A **bulletin board system** or **Internet** site that hosts thousands of **newsgroups**.

User-friendly. Describes **hardware** or **software** that is easy to use. A related phrase, *user-obsequious*, describes hardware or software that is so simplistic in design that it is virtually unusable.

Userid (pronounced *user-eye-dee*). The name a person must use, along with a **password**, to gain **access** to restricted areas on a **network**.

V

Vaporware. **Software** that is being widely advertised, even though it is still in the developmental stage and has serious problems that may doom its eventual release. The premature marketing of software is designed to deter prospective customers from buying competitive products already available for sale. (See also *Brochureware*.)

Video teleconferencing. A remote "face-to-face chat," when two or more people using a webcam and an Internet telephone connection chat online. The webcam enables both live voice and video.

Video display terminal (VDT). See *Display screen*.

Virtual reality. See *Cyberspace*.

Virus. A piece of **computer** code designed as a prank or malicious act to spread from one computer to another by attaching itself to other **programs**. Some viruses

simply cause a humorous message to appear on the screen. Some cause minor **glitches**, but others cause serious damage to a computer's **memory** or **disks**. Some viruses flood an organization's Web site, interrupting or entirely preventing access to the organization's customers. (See also *Antivirus software*; *Denial of service attack*.)

Voice over Internet Protocol (VoIP). The transmission of voice communications by means of the **Internet Protocol**. VoIP is an inexpensive alternative to long-distance telephone calls.

Voicenet. Ordinary telephone service.

VoIP. See *Voice over Internet Protocol*.

W

WAIS (pronounced ways). See *Wide-Area Information Server*.

WAN. See *Network, wide area*.

Web. See *World Wide Web*.

Web browser. Software that permits a user-with a click of a **mouse**-to locate, display and download **text**, video, audio and **graphics** stored in a **host computer** on the Web. The most common Web browsers now in use are Internet Explorer and Mozilla Firefox.

Web site. One or more related pages created by an individual or an organization and posted on the **World Wide Web**. (See also *Home page*.)

Webcam. A video camera that sends live images over the **Internet** to a **Web site**.

Webcaster. An **application** that can be custom-tailored to satisfy an individual user's need for constantly updated information in specific areas. A Webcaster, when appropriately programmed, will automatically deliver the needed information to the user's **computer**. (See also *Push technology*.)

Webmaster. The person who maintains a specific **Web site** and is responsible for what appears there.

Webzine. See *E-zine*.

Wide-Area Information Server (WAIS). An **Internet** search system that will locate **documents** that contain **keywords** specified by the user.

Wide area network (WAN). See *Network, wide area*.

Widow protection. The ability of a **program** to avoid printing the last line of a paragraph as the first line on a page. When the last line of a paragraph does appear as the first line on a page, it is referred to as a *widow*. (See also *Orphan protection*.)

Wi-Fi. Wireless fidelity. A process that permits high-speed wireless transmission of **data**.

Wiki. A procedure that permits a **Web site** to be continually edited or added to by those who visit the site.

Window. A frame that permits users to view messages they have received or **documents** they are working on.

Windowing. The ability of a **program** to split its **display screen** into two or more segments so that the user can view several different **documents** or perform several different functions simultaneously. (See also *Split screen*.)

Windows. A Microsoft **operating system** used on the vast majority of **PCs**.

Wizard. An interactive feature within an **application** that helps a user through each step of a task, such as creating a customized **document** or adding **hardware**. The term *wizard* is also used to refer to the person in an organization who can quickly find and fix everyone else's **computer** problems.

W00t. The term *w00t* is an **alphanumeric** acronym that stands for "we owned the other team." This term is typically employed by Internet users to express happiness or joy. **Word of mouse.** Gossip spread by **e-mail**.

Word processing. The electronic process of creating, formatting, **editing**, proofreading and printing **documents**. (See also *Information processing*.)

Word wrap. A **software** feature that detects when a word will extend beyond the right margin and automatically transfers it to the beginning of the next line.

Workstation. A **desktop computer** that runs **applications** and serves as an access point in a local area **network**. (See also *Network*.)

World Wide Web. The component of the **Internet** that combines audio, video, and **graphics** with **text**. Also called the *Web* or *WWW*. (*WWW* is sometimes pronounced *triple-dub*, to avoid pronouncing each *W* separately.)

Worm. A type of **computer virus** that runs a **program** to destroy **data** on a user's **hard drive**. Worms spread by sending copies of themselves to everyone on the user's list of e-mail addresses.

WWW. See *World Wide Web*.

WYSIWYG (pronounced wiz-zy-wig). An acronym derived from what you see is what you get. A **computer** design standard that lets the user see on the screen how a page will look when it is printed.

Z

Zombie. A **computer** that has been hijacked by a **cracker** without the owner's knowledge and used to perform malicious tasks on Internet.

Zone. See *Domain*.

FODE SUBJECTS AND COURSE PROGRAMMES

GRADE LEVELS	SUBJECTS/COURSES
Grades 7 and 8	1. English
	2. Mathematics
	3. Personal Development
	4. Social Science
	5. Science
	6. Making a Living
Grades 9 and 10	1. English
	2. Mathematics
	3. Personal Development
	4. Science
	5. Social Science
	6. Business Studies
	7. Design and Technology- Computing
Grades 11 and 12	1. English – Applied English/Language & Literature
	2. Mathematics - Mathematics A / Mathematics B
	3. Science – Biology/Chemistry/Physics
	4. Social Science – History/Geography/Economics
	5. Personal Development
	6. Business Studies
	7. Information & Communication Technology

REMEMBER:

- For Grades 7 and 8, you are required to do all six (6) subjects.
- For Grades 9 and 10, you must complete five (5) subjects and one (1) optional to be certified. Business Studies and Design & Technology – Computing are optional.
- For Grades 11 and 12, you are required to complete seven (7) out of thirteen (13) subjects to be certified. Your Provincial Coordinator or Supervisor will give you more information regarding each subject and course.

GRADES 11 & 12 COURSE PROGRAMMES

No	Science	Humanities	Business
1	Applied English	Language & Literature	Language & Literature/Applied English
2	Mathematics A/B	Mathematics A/B	Mathematics A/B
3	Personal Development	Personal Development	Personal Development
4	Biology	Biology/Physics/Chemistry	Biology/Physics/Chemistry
5	Chemistry/ Physics	Geography	Economics/Geography/History
6	Geography/History/Economics	History / Economics	Business Studies
7	ICT	ICT	ICT

Notes: You must seek advice from your Provincial Coordinator regarding the recommended courses in each stream. Options should be discussed carefully before choosing the stream when enrolling into Grade 11. FODE will certify for the successful completion of seven subjects in Grade 12.

CERTIFICATE IN MATRICULATION STUDIES		
No	Compulsory Courses	Optional Courses
1	English 1	Science Stream: Biology, Chemistry, Physics
2	English 2	Social Science Stream: Geography, Intro to Economics and Asia and the Modern World
3	Mathematics 1	
4	Mathematics 2	
5	History of Science & Technology	

REMEMBER: You must successfully complete 8 courses: 5 compulsory and 3 optional.

FODE PROVINCIAL CENTRES CONTACTS

PC NO.	FODE PROVINCIAL CENTRE	ADDRESS	PHONE/FAX	CUG PHONES	CONTACT PERSON		CUG PHONE
1	DARU	P. O. Box 68, Daru	6459033	72228146	The Coordinator	Senior Clerk	72229047
2	KEREMA	P. O. Box 86, Kerema	6481303	72228124	The Coordinator	Senior Clerk	72229049
3	CENTRAL	C/- FODE HQ	3419228	72228110	The Coordinator	Senior Clerk	72229050
4	ALOTAU	P. O. Box 822, Alotau	6411343 / 6419195	72228130	The Coordinator	Senior Clerk	72229051
5	POPONDETTA	P. O. Box 71, Popondetta	6297160 / 6297678	72228138	The Coordinator	Senior Clerk	72229052
6	MENDI	P. O. Box 237, Mendi	5491264 / 72895095	72228142	The Coordinator	Senior Clerk	72229053
7	GOROKA	P. O. Box 990, Goroka	5322085 / 5322321	72228116	The Coordinator	Senior Clerk	72229054
8	KUNDIAWA	P. O. Box 95, Kundiawa	5351612	72228144	The Coordinator	Senior Clerk	72229056
9	MT HAGEN	P. O. Box 418, Mt. Hagen	5421194 / 5423332	72228148	The Coordinator	Senior Clerk	72229057
10	VANIMO	P. O. Box 38, Vanimo	4571175 / 4571438	72228140	The Coordinator	Senior Clerk	72229060
11	WEWAK	P. O. Box 583, Wewak	4562231/ 4561114	72228122	The Coordinator	Senior Clerk	72229062
12	MADANG	P. O. Box 2071, Madang	4222418	72228126	The Coordinator	Senior Clerk	72229063
13	LAE	P. O. Box 4969, Lae	4725508 / 4721162	72228132	The Coordinator	Senior Clerk	72229064
14	KIMBE	P. O. Box 328, Kimbe	9835110	72228150	The Coordinator	Senior Clerk	72229065
15	RABAU	P. O. Box 83, Kokopo	9400314	72228118	The Coordinator	Senior Clerk	72229067
16	KAVIENG	P. O. Box 284, Kavieng	9842183	72228136	The Coordinator	Senior Clerk	72229069
17	BUKA	P. O. Box 154, Buka	9739838	72228108	The Coordinator	Senior Clerk	72229073
18	MANUS	P. O. Box 41, Lorengau	9709251	72228128	The Coordinator	Senior Clerk	72229080
19	NCD	C/- FODE HQ	3230299 Ext 26	72228134	The Coordinator	Senior Clerk	72229081
20	WABAG	P. O. Box 259, Wabag	5471114	72228120	The Coordinator	Senior Clerk	72229082
21	HELA	P. O. Box 63, Tari	73197115	72228141	The Coordinator	Senior Clerk	72229083
22	JIWAKA	c/- FODE Hagen		72228143	The Coordinator	Senior Clerk	72229085