COURSE GUIDE

NOUN-IFT 191
COMPUTER LABORATORY I

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First Printed: 2025

ISBN: 978-058-470-6

Introduction

Computer laboratory I: is a semester, 1-unit, 100- level core course available to students registered for the B.Sc. (Hons.) Information Technology and B.Sc. Computer Science. The course will consist of fifteen (15) units of lectures organized into four (4) modules. The lectures will cover the concepts of Computer Hardware, Networking and Computer Programming. The course aims to assist you in gaining practical understanding of the diverse contexts of Computer Hardware Networking and Computer Programming.

This course requires you to gain some practical experience on how to configure a computer network and also write simple computer programs. To achieve this, you will be required to perform various practical exercises in each of the lectures. You should endeavor to do these exercises, in addition to the tutor marked assignments (TMAs) that you are required to submit for marking during this course. Some of the exercises will also require you to use microcomputer software, for which basic skills in computer operation is required. The course will enable you to obtain skill as a prerequisite for CIT104.

This Course Guide tells you briefly what the course is all about, what course materials you will be using, and how you can work your way through these materials. It suggests some general guidelines for the amount of time you are likely to spend on each unit of the course in order to complete it successfully. It also gives you some guidance on your tutor-marked assignments (TMAs). You will be required to attend some tutorial classes that are linked to the course. Details of times and locations of, and tutors for, the tutorials will be communicated later.

Working Through this Course

Main components of the course are:

1. Course Guide
2. Study units
3. Assignment File (will be available at the NOUN website)
4. Presentation Schedule (will be available at the NOUN website)

Course Competencies

By the end of this course, students should be able to understand:

i. The basic hardware architecture of a computer system
ii. The basics of computer networking, also using packet tracer for network simulation and
iii. Some basic concepts of computer programming using Visual Basic programming language.

Course Objectives

Basic objectives to be achieved in this course include to be able to:

i. Understand the workings of a computer and assemble it
ii. Know about computer networks and network computers in a local environment
iii. Understand the basics of object-oriented programming and demonstrate same using Visual Basic

Study Units

There are 13 study units in this course organized into three modules as follows:

Module 1: Computer Hardware

Unit 1: Hardware Components (1)
Unit 2: Hardware Components (2) – Peripheral Devices
Unit 3: Auxiliary Equipment

Module 2: Computer Networking

Unit 1: Network Cables
Unit 2: Network Devices
Unit 3: Network Internet Protocols Addressing
Unit 4: Local Area Network
Unit 5: Basic Network Command

Module 3: Packet Tracer as a Computer Simulation Tool

Unit 1: Basics of Packet Tracer
Unit 2: Creating a Simple Network using Packet Tracer
Unit 3: Packet Tracer Multiuser Connections

Module 4: Introduction to Object Oriented Programming

Unit 1: Programming in Visual Basic
Unit 2: Visual Basic Project Window
Unit 3: Creating Menu Applications
Unit 4: Data Processing using Visual Basic

References and Further Readings

References and further readings for Unit in the course material are added at the end of the Unit. Students are encouraged to consult the references and read further.

Presentation Schedule

Presentation Schedule (will be available at the NOUN website)

Assessment

Assignment File (will be available at the NOUN website)

How to get the Most from the Course
Students are advised to study the course material critically to understand and apply the concepts presented herein. Assessment and further readings are also presented in the material. This will help the students to test their knowledge acquired in the course and read further to know more and understand better by using the references provided.

Online Facilitation

Online facilitation schedule will be made available on the NOUN website

Course Information
Course Code: NOUN-IFT191
Course Title: Computer laboratory I
Credit Unit: 1
Course Status:
Course Blub:
Semester:
Course Duration:
Required Hours for Study

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Ice Breaker
Students will be asked to introduce themselves and share basic knowledge they may have acquired or had in the past. This knowledge will cut across areas like fundamentals of computers, introduction to networking and object-oriented programming basics. This will guide the lecturer/instructor in gauging their knowledge and knowing the best approach to follow so that the students will gainfully understand the concepts to be covered in the course.

MAIN COURSE

CONTENT

Module 1 COMPUTER HARDWARE

Module Introduction

Computer hardware refers to the physical pieces that, when assembled, constitutes the hardware of a computer system. These elements are tangible and can be physically seen and touched. These parts are the foundation of a computer and are an integral necessity for its operation. The significance of computer hardware cannot be understated. It serves as the platform on which system software and applications operate, enabling us to execute many types of tasks on our computers. Without hardware, a computer would be useless, unable to process information, store data, or display output. Computer hardware also refers to the tangible parts of a computer system, including the motherboard, central processing unit (CPU), memory, and storage devices, among others. Gaining knowledge about these elements will be a crucial step for anyone with an interest in building, maintaining and fixing computers as a career aspiration. In this module, the following units which helps to explain some fundamentals about computer hardware will be covered. The units are: 1; Hardware Component, 2; Hardware Components (peripheral devices) and 3; Auxiliary Equipment.

Unit 1 Hardware Components
Unit 2 Hardware Components- Peripheral Devices
Unit 3 Auxiliary Equipment

UNIT 1 HARDWARE COMPONENTS

1.0 Introduction

Your Personal Computer (PC) is really a collection of separate items working together as a team-with you as the captain. Some of these components are essential; others simply make working more pleasant or efficient. Adding extra items expands the variety of tasks you can accomplish with your machine.

2.0 Intended Learning Outcomes (ILOs)

The Learning Outcomes of this unit are to:

i. Familiarize the student with the components of the computer.
ii. Enable the student to appreciate the importance of each of the components to the overall smooth operations of the computer.
iii. Make students to be able to couple a system together.

3.0 Main Content

3.1 The System Unit

The system unit is the main unit of a personal computer (PC). It is the computer itself while other units attached to it are regarded as peripherals. It could be viewed as the master conductor orchestrating your PC's operation. It is made up of several components like the motherboard, processor, buses, memory, power supply unit, etc. This unit (system unit) has been confused over the years by novices as the Central Processing Unit (CPU). This is not true. The CPU or simply processor is a component within the system unit and it is not the only thing that makes up the system unit. Hence, it will be wrong to equate the system unit with the CPU.

3.1 Front of System Unit

Light
Your system may display a variety of colored light on the front panel, including power and turbo signals, and light to indicate if the hard or other disks are being read or written to.

Key Lock
You can stop intruders tampering with your PC by using the Lock on the front panel. Turning the key prevents the key board from working.

Turbo Button
Some PCs offer a choice of speeds at which they can run. A turbo switch is usually left so the computer runs at its fastest speed.

Reset Button
If your PC "freezes" and won't respond to any command, try starting it up again using the reset button. Pressing the reset button loses all the work you have not saved in that session, so use it only as a last resort.

Power On/Off
All PCs have main power switch on the system unit. Sometimes this control is placed on the outside back panel.

CD-ROM Disk Drive
A CD-ROM drive or optical drive is the device used to read Compact Disc Read-Only Memory (CD-ROM). CD-ROM drives have speeds ranging from 1x to 72x, meaning it reads the CD roughly 72 times faster than the 1x version. As you would imagine, these drives are capable of playing audio CDs and reading data CDs, including CD-R and CD-RW discs where R and W stands for read and write respectively.

3.2 Back of the System Unit

Fan Housing
The electronic components in your PC generate a lot of heat. To prevent overheating, a fan at the back of the unit removes hot air from the system. Power "in" and "out" sockets cables plugged into these sockets carry power from the electrical outlet to the system unit and from the system unit to the monitor.

USB Ports
A Universal Serial Bus (USB) port is a standard cable connection interface for personal computers and consumer electronics devices. It is an industry standard for short-distance digital data communications. USB ports allow devices such as keyboard, mouse etc. to be connected to each other with and transfer digital data over USB cables.

3.3 Inside the System Unit

The brain behind everything that happens in your PC is contained within the system unit. Inside the unit are the impressive electronics that run programs, handle instructions, and determine the results. Most of the more important items are described below:

Battery
A small battery powers a clock to keep track of the time when the PC is turned off. It also maintains low electricity to certain random-access memory (RAM) chips that record which components are installed.

Disk Drive Controller Card
This card controls the PC's disk drive motors and transfers data. The serial and parallel ports at the back of the card link internal PC components with external devices such as mouse and printer.

Display Adapter Card (Video Card)
All the information your computer will display is stored in its memory. To be useful, you need to see the information. The display adapter card is the link between the PC's memory and the monitor.

Expansion Slots
These long narrow connectors allow you to plug in expansion cards (also known as adapter cards), which offer extra options not available on a basic PC.

ROM Chips
Read-only memory (ROM) chips have data written on them during manufacturing that tells the CPU what to do when the PC is switched on. The data is always there, even when you switch the PC off.

RAM Chips
When a computer is switched on and running a program, RAM (Random Access Memory) is used for purposes such as holding the program and its data. But when the PC is switched off, anything held in RAM is lost.

Empty RAM Chip Slots
These slots let you expand your computer's memory by adding extra RAM chips or modules. Some PC's work even faster because they come equipped with Cache Memory. Cache Memory consists of expensive and very fast memory chips that store the data or instructions that the CPU will look at next. Cache memory can speed up work on your computer enormously.

Central Processing Unit (CPU)

Intel Processor

The Microprocessor, or Central Processing Unit (CPU), is the computer's most important single item. It does all the PC's thinking and runs the programs (series of instructions) that you request. An Intel Processor is

screenshot shown above. There are many other processors from other companies.

CPU Support Chips
These chips help the CPU manage all the other parts of the computer.

Math Coprocessor Slot
A math coprocessor, present in some PCs, assists the CPU in its number-crunching activities (if programs have been designed to use it).

CPU fan

Speaker
The speaker emits the computer's sound output.

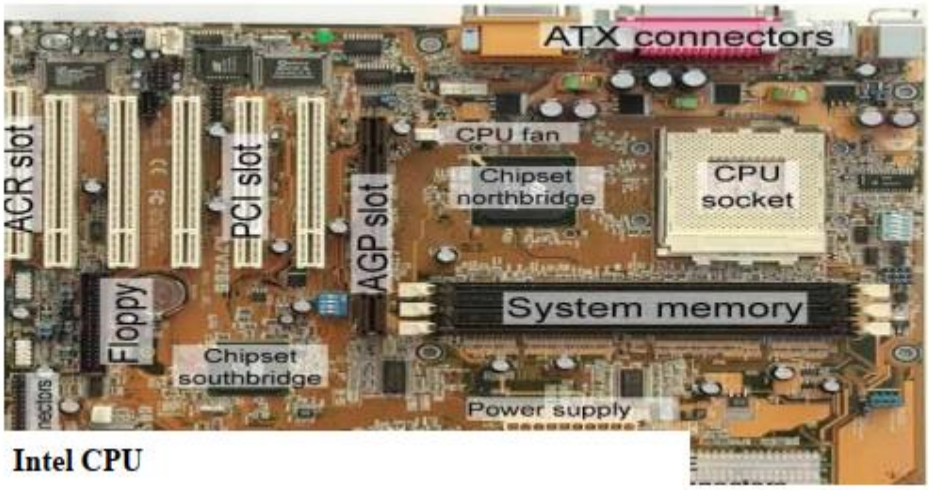
Power Supply Unit
All the components in a PC need electrical supply. Most need a 5-volt supply although some disk drive motors required 12 volts. If the components were connected to normal household current, they would blow up, so the power supply unit converts high voltage electrical current to a low voltage.

Hard Disk Drive
The hard disk is your computer's main permanent storage unit, holding large amount of data and programs. Unlike data held in RAM, the information on the hard disk is not affected when the PC is turned off – it remains there unless you instruct the PC to overwrite it or the hard disk is damaged.

Hard drive (Hard disk)

Motherboard

All the electronic components in a PC are mounted on a piece of fiberglass called the motherboard. Fiberglass cannot conduct electricity, so each component is insulated from all the others. Thin lines of metal on the surface of the fiberglass connect pins from one component to another, forming the computer's electrical circuits.



Intel CPU

Some of the earliest PCs were equipped with a CPU from Intel Corporation called the 8088. The next generation of PCs used CPU known by the number "80286 and were called "PC/AT" computers. Subsequently, PCs have been supplied with more and more powerful CPUs – the 80386, the 80486, and the more recent and impressive of all, the Intel Pentium (I, II, III, IV& M). All these PC processors belong to a family called 80 x 86. In general, you can run the same software on PCs containing different CPUs within this family. From the outside, the chips look different only in sizes and number of pin-put inside, an 80486 has over one million components to the 3,500 that were in the first 8088. Because of these differences, the latest Pentiums runs over ten times faster.

More recent advances in the computer processors is the introduction of the Intel Core processors. This has seen to the development of Intel Cores to the latest Intel Core i9 which can deliver up to 24 cores for seamless 4k ultra-HD and 360-degree video, robust game play and multitasking performance. Similarly other families of processors have their own histories.

4.0 Self-Assessment Exercise(s)

a. Make a list of 5 components that could be found inside the computer systems unit.
b. Describe the functions of each of them.
c. Differentiate between CPU and the Systems unit.

5.0 Conclusion

Basic computing units were presented and discussed. This gives an overview of what the computers are and how they can be used to achieve the best of results.

6.0 Summary

Understanding these hardware components and their functions is essential for understanding how best the computers can be put to use, upgrading them, and improving computer system's performance.

7.0 References/Further Readings

Akinyokun, O.C, (1999). Principles and Practice of Computing Technology. International Publishers Limited, Ibadan.

Balogun, V.F., Daramola, O.A., Obe, O.O., Ojokoh, B.A., and Oluwadare S.A., (2006). Introduction to Computing: A Practical Approach. Tom-Ray Publications, Akure

Richard H. Austing and Lillian Cassel (1986). *Computers in Focus*. Books/Cole Publication Company. Monterey, California.

Larry Long (1984). *Introduction to Computers and Information Processing*. Prentice-Hall Inc., New Jersey.

UNIT 2 HARDWARE COMPONENT (2) – PERIPHERAL DEVICES

1.0 Introduction

The computer peripheral devices are those devices which are attached to the system unit. The devices are necessary to ensure that the computer is able to accept input and display the result for the user. This section therefore discusses the input unit and the output unit.

2.0 Intended Learning Outcomes (ILOs)

The learning outcomes of this unit are to:

i. Expose the students to those components that make up the input unit and the output unit.
ii. Enable students get deeper understanding of the functions of the input and the output unit.
iii. Guide the students on the type of input unit and output unit suitable for or a particular computing environment.

3.0 Main Content

1. Input Devices

3.1.1 Computer Keyboard

A Computer keyboard is identical to the conventional typewriter keyboard. However, it has more keys than the typewriter keyboard. A computer keyboard can be a dummy type or intelligent type. A computer keyboard is considered to be intelligent if, in addition to performing the routine functions characteristic of a typewriter keyboard, it can initiate a series of actions for a computer to carry out by mere pressing a key or combination of two or more keys. An intelligent computer keyboard has a set of keys and when one of them is pressed, the computer can be made to carry out a specific function. For example, the pressing of a key may cause the computer to display a menu list from which a human being may be prompted to select one. The intelligent computer keyboard has four major divisions, namely: Function keys, Alphanumeric keys, Numeric keys and Control keys. In addition to the four types of keys, there are some special or important keys such as the following:

(a) Return or Enter key

(b) Escape key denoted by ESC
(c) Control key denoted by CTRL
(d) Alternate key denoted by ALT
(e) Delete key denoted by DEL
(f) Insert key denoted by INS
(g) Backspace key
(h) Shift key.

2. Mouse

A mouse looks like the electrical clipper in a barbing saloon. It consists of a pointing device very sensitive to movements. It has a roller ball and two or more buttons which can be pressed to make selection. By moving the mouse on a flat smooth surface and clicking one or combination of two buttons on its upper surface, a computer to which it is connected can be sensitized and commanded to carry out some specific tasks.
A mouse can be used to draw diagrams on computer screen more effectively and efficiently than the computer keyboard. Generally, the keyboard and the mouse do complement each other. For example, the mouse can be used to highlight an item in a menu list while the keyboard Enter Key can be pressed to activate or evoke the command associated with the highlighted item.

A mouse is the primary input device for modern computers that feature operating systems with a graphical user interface, such as Windows 98 or Windows XP. While keyboards obviously excel at entering text, numbers, and symbols, your mouse is the tool you'll use to tell your computer what to do with all the data you've entered.

3.1.3 Scanners

Scanners are peripheral devices used to *digitize* (convert to electronic format) artwork, photographs, text, or other items from hard copy. In a sense, a scanner works as a pair of eyes for your PC. Your eyes see an image and translate the image into electrical impulses that travel to and are interpreted by your brain. Similarly, a scanner captures images and converts them to digital data that travel to and are interpreted by the computer. A scanner works by dividing an image into microscopic rows and columns and measuring, like the film in a camera, how much light (or lack thereof) reflects from each individual intersection of the rows and columns. Each reflection is recorded as a dot, or picture element (pixel). After the scanner collects information from each dot, it compiles the result into a digital file on the computer. There are a wide variety of scanners that work in a number of different ways, but the technology behind them is essentially the same.

2. Output Device

3.2.1 Printers

A printer is the computer component that lets you create copies of the information stored in your computer on paper. The printed material is often called hard copy, to differentiate it from the data stored on a disk, or held in the computer's memory, which is called soft copy.

3.2.2 Monitors

The monitor does not do any processing itself. The monitor only displays the information that the video card tells it to. The two most common monitor sizes are 15-inch and 17-inch. If you have an older, hand- me-down PC or a very inexpensive starter PC, you may have a smaller 14-inch monitor. 21-inch monitors are also available but mostly used by graphics professionals.

3.2.3 Speakers and Sound

The built-in speakers in most PC cases are used just for making system sounds, such as warning beeps and action indicators. To play more sophisticated sounds on your PC, you need a set of external speakers. Usually speakers come in pairs, and there is a plug that connects them to your sound card. Arrange the speakers with one on the left and one on the right of your desk or work area to get a stereo effect. Optionally, some speakers come with a *subwoofer*. This improves the bass (low notes) sound. If you have a subwoofer with your speakers, it should go on the floor under your desk.

4.0 Conclusion

The system unit cannot function without the peripheral devices. The input and the output units are very important peripheral devices that must be taken care of in setting up a computer system.

5.0 Summary

In this unit we have learnt the following:

i. Input unit which comprises
   (a) The keyboard – the different categories of keys on the keyboard and their functions.
   (b) The scanner – different types of scanners

(ii) The output unit is made up of the
   a. monitor
   b. printer and
   c. speakers

6.0 Tutor-Marked Assignment

a. Justify the need for the input and the output units in a computer system.
b. Describe the functions of the following keys: the numeric keys, control keys, shift keys and the function keys.
c. In what situation will you recommend the laser jet printer and the dot matrix printer.

7.0 References/Further Reading

Akinyokun, O.C, (1999). *Principles and Practice of Computing Technology*. International Publishers Limited, Ibadan.

UNIT 3 AUXILLARY EQUIPMENT

1.0 Introduction

The auxiliary equipment as their name suggests are not computers but are necessary in a computing environment in order to ensure proper functioning and smooth running of computing activities. In this unit, we shall address in some details the importance of equipment such as air conditioner, voltage stabilizer, uninterruptible power system and line transformer in a data processing environment.

2.0 Learning Outcomes

The Learning Outcomes of this unit are to:

i. Identify the auxiliary equipment in a computing environment.
ii. Discuss the importance of the auxiliary equipment to the smooth running of a computing centre.

3.0 Main Content

3.1 Air Conditioners

A Computer is an electronic machine. It is, therefore, capable of generating heat. A computer is manufactured to operate in an environment with a specific temperature range. When the temperature of the environment in which a computer is kept falls outside the specific range, the computer may malfunction and consequently get damaged.

The free air is basically, dust laden. Dust is metallic in nature and, as such, capable of conducting electricity. If dust is allowed to settle on a computer, particularly the electronic circuits, the dust can bridge two circuits. The bridging of two electronic circuits may cause a serious damage to the computer. Thus, air conditioners are needed in a computer environment to:

(a.) Control the temperature
(b.) Prevent dust.

3.2 Voltage Stabilizer

A computer when switched on, takes off at a cold state, warms up and gradually gets to a hot state. At a hot state, a computer is always roaming

in an attempt to find something to do. In a situation where the public electricity such as that of PHCN in Nigeria is cut suddenly, the computer would suddenly be brought to a halt. The sudden power cut may cause the computer to lose the memory of some basic housekeeping operations when power eventually returns and the computer is switched on. The sudden power cut may also cause irreparable damages to the file the computer was processing at the time the power was suddenly cut. The voltage stabilizer is then used to control the effect of these sudden power changes.

3.3 Line Voltage Transformer

We note that computers are built to operate within a specific range of voltages. In the United State of America, computers are built to operate on 110V. A voltage transformer is a device meant to step up or step down a voltage as the case may be. In Nigeria, for example, a 110V computer requires a voltage transformer to step down the 240V to 110V. Similarly, in USA, if a 240V current is connected directly to a 110V computer, the computer power unit will blow up almost immediately Today, the technology has improved tremendously such that if a 240V current is connected directly to a 110V computer, only a fuse, rather than the power unit will blow up. It is worth mentioning, too, that there is an advanced technology today which permits a computer to operate effectively and efficiently with the power line voltage ranging between 110V and 240V. The technology supports an inbuilt switch which can be operated at two terminals namely: the 110V terminus and 240V terminus. In recent times, the technology has been improved upon such that computers are manufactured in such a way that they can sense the voltage that is adequate. Thus, if one connects a 110V computer to a 240V current, the 110V computer has an in-built line transformer which automatically steps down the 240V current to 110V.

3.4 Uninterruptible Power Supply System (UPS)

An Un-interruptible Power System (UPS) is an auxiliary hardware that is capable of:

(a) Converting the public electricity raw line into fine line, that is, conditioning the voltage that is fed into the computer.
(b) Storing electrical energy when the public electricity line is life
(c) Releasing the stored electrical energy to the computer when the public electricity line is dead.

4.0 Conclusion

The computer is an expensive resource and as such requires adequate protection from electrical damage. Similarly, the UPS is an expensive resource; hence there is the need for it to be protected from electrical damage, too. Therefore, in practice, it is desirable that the UPS be protected by a voltage stabilizer which is rugged and less expensive.

5.0 Summary

In this unit you have learnt the following:

i. Auxiliary devices create a facilitative and conducive environment for smooth operation of computers and the user.
ii. Voltage stabilizers help to protect computing equipment from damage due to power surge.
iii. UPS protects the computing equipment and the software from power outage during computing session. The UPS with the help of its internal battery stores electrical energy while power is on and releases power stored to the computer whenever power is off. This enables the user to end the working session and shut down normally.
iv. A voltage transformer is a device meant to step up or step down a voltage as the case may be.

6.0 Tutor-Marked Assignment

With the aid of annotated diagram, describe the arrangement of the following auxiliary equipment: UPS, line voltage transformer and voltage stabilizer in relation to PHCN power source and the computer.

7.0 References/Further Reading

Akinyokun, O.C, (1999). Principles and Practice of Computing Technology. International Publishers Limited, Ibadan.

Balogun, V.F., Daramola, O.A., Obe, O.O., Ojokoh, B.A. & Oluwadare S.A., (2006). Introduction to Computing: A Practical Approach. Tom-Ray Publications, Akure.

MODULE 2 COMPUTER NETWORKING

UNIT 1 NETWORK CABLES

1.0 Introduction

Networking cables are a type of networking hardware used to connect a network device to one or more other network devices, or to connect two or more devices to a single computer or network device. Network cables act as a medium through which information and data travel from one network device to another. The type of cable used for a network depends on the network's topology, size, and procedure. The different types of network cables act as the supporting basis of the network infrastructure.

2.0 Learning Outcomes

By the end of this unit, students will be able to:

i. identify different types of network cables
ii. prepare network cable
iii. connect cables in a network.

3.0 Main Content

3.1 Types of Network Cables

3.1.1 Coaxial Cable

Coaxial cables have a single copper conductor at the center, while a plastic layer provides insulation between the center conductor and braided metal shield. The metal shields outside interference. Coaxial cabling is highly resistant to signal obstruction, although it can be complex to install. It can handle greater cable lengths between network devices than twisted pair cables. The two types of coaxial cables are thick coaxial and thin coaxial cables.

3.1.2 Fiber Optic Cable

Fiber optic cables possess a center glass core surrounded by multiple layers of protective materials. They avoid electrical obstruction by transmitting light instead of electronic signals, making them perfect for environments with large amounts of electrical interference. Fiber optic

cables have become the standard for connecting networks across buildings because of their resistance to moisture and lighting.

3.1.3 Shielded Twisted Pair (STP) Cable

Often referred to colloquially as simply ethernet cables, STP cables employ a special type of copper telephone wiring used for business installations. An external shield functioning as a ground is added to the standard twisted pair of telephone wires. Shielded twisted pair cables can be perfect if you want to set up cables in an area with potential interference and risks to an unshielded twisted pair cable's electrical current. Shielded twisted pair cables can also help to expand the distance between the cables.

3.1.4 Unshielded Twisted Pair (UTP) Cable

Unshielded twisted pair (UTP) cables are broadly used in the telecommunications and computer industries as ethernet cables and telephone wires. In a UTP cable, conductors forming a single circuit are twisted around one another to cancel out electromagnetic interference (EMI) from external sources.

3.2 How to implement the cross-wired cable and straight through cable

Apparatus:

RJ-45 connector, Climping Tool, Twisted pair Cable, Cable Tester

Procedure:

1. Start by stripping off about 2 inches of the plastic jacket off the end of the cable. Be very careful at this point, as to not nick or cut into the wires, which are inside. Doing so could alter the characteristics of your cable, or even worse render is useless. Check the wires, one more time for nicks or cuts. If there are any, just whack the whole end off, and start over.

2. Spread the wires apart, but be sure to hold onto the base of the jacket with your other hand. You do not want the wires to become untwisted down inside the jacket. Category 5 cable must only have 1/2 of an inch of 'untwisted' wire at the end; otherwise, it will be 'out of spec'. At this point, you obviously have A LOT more than 1/2 of an inch of un-twisted wire.

3. You have 2 end jacks, which must be installed on your cable. If you are using a pre-made cable, with one of the ends whacked off, you only have one end to install - the crossed over end. Below are two diagrams, which show how you need to arrange the cables for

each type of cable end. Decide at this point which end you are making and examine the associated picture below.
Figure 2 shows how to prepare Straight and Cross wired connections

RJ45 Pin # (END 1)	Wire Color	Diagram End #1
1	White/Orange	
2	Orange	
3	White/Green	
4	Blue	
5	White/Blue	
6	Green	
7	White/Brown	

RJ45 Pin # (END 2)	Wire Color	Diagram End #2
1	White/Green	
2	Green	
3	White/Orange	
4	White/Brown	
5	Brown	
6	Orange	
7	Blue	
8	White/Blue	

Figure 2: Cable Code for Cross Cable

Exercise 1
Practically implement the cross-wired cable and straight through cable using clamping tool, and RJ45 connectors.
Take a picture of the implementation, print and append.

S/No.	STEPS	COMMENTS	MAX SCORE	SCORE
1	CABLE STRIPPING		2	
2	CABLE ARRANGEMENTS (Cross-cable)		3	
3	CABLE ARRANGEMENTS (Straight-cable)		3	
4	END JACK INSTALLATION		2	

UNIT 2 NETWORK DEVICES

1.0 Introduction

To solve network problems, network designers break a network into smaller portions and connect them with networking devices such as bridges, switches and gateways etc. Depending on the complexities of each of the networks being connected, a choice is made between these different network devices.

2.0 Learning Outcomes

At the end of this unit, students should be familiar with the functions of the following Network device:
• Routers, Gateways, Modems, Repeaters, Bridges, Switches, Hubs

3.0 Main Content

3.1 Repeaters

When a signal is sent over a long network cable, signal gets weakened due to attenuation. This results in some data getting lost in the way. In order to boost the data signal, Repeaters are needed to amplify the weakened signal.

3.2 Bridges

Bridges were created to allow network administrators to segment their networks transparently. It manages network traffic by filtering packets.

3.3 Switches

A switch is a device that incorporates bridge functions as well as point–to–point ‘dedicated connections. They connect devices or networks.

3.4 Hubs

Hubs are multi–port repeaters and as such, they obey the same rule as repeaters. Hubs are used to provide a Physical Star Topology. They are also used to interconnect various incoming connections with different outgoing connections at the Physical layer of the OSI Model.

3.5 Routers

In an environment consisting of several network segments with different protocols and architecture, a bridge may not be adequate for ensuring fast communication among all of the segments. A complex network needs a device which not only knows the address of each segment, but also can determine the best path for sending data and filtering broadcast traffic to the local segment. It is used to connect two devices at the network layer of the OSI Model.

3.6 Gateway

Used to connect totally dissimilar networks because they can perform protocol conversion for all seven layers of the OSI Model.

3.7 Modem

This is a device which is used to convert digital signals generated by the computer into an analog signal to be carried by a public access telephone line. It is also the device that converts the analog signal received over a phone line into digital signal usable by the computer.

Exercise 2

Identify the following devices and outline two functions for each.

a.

(2 marks)

b.

Name ---------- (1mark)

Functions

(2 marks)

c.

Name ---------- (1 mark)
Functions

(2 marks)

UNIT 3 NETWORKING IP ADDRESSING

1.0 Introduction

An IP address is a unique address that identifies a device on the internet or a local network. IP stands for "Internet Protocol," which is the set of rules governing the format of data sent via the internet or local network. IP addresses are the identifier that allows information to be sent between devices on a network: they contain location information and make devices accessible for communication. The internet needs a way to differentiate between different computers, routers, and websites. IP addresses provide a way of doing so and form an essential part of how the internet works.

2.0 Learning Outcomes

At the end of this unit, students should be able to:

- Classify of IP address
- Develop and calculate Sub netting
- Develop and calculate Super netting

3.0 Main Content

3.1 Classification of IP address

TCP/IP defines five classes of IP addresses: class A, B, C, D, and E. Each class has a range of valid IP addresses. The value of the first octet determines the class. IP addresses from the first three classes (A, B and C) can be used for host addresses. The other two classes are used for other purposes – class D for multicast and class E for experimental purposes.

The system of IP address classes was developed for the purpose of Internet IP addresses assignment. The classes created were based on the network size. For example, for the small number of networks with a very large number of hosts, the Class A was created. The Class C was created for numerous networks with small number of hosts. Classes of IP addresses are:

Class	Address Range	Comment
Class A	1.0.0.1 to	Supports 16 million hosts on each of 127
Class B	128.1.0.1 to	Supports 65,000 hosts on each of 16,000
Class C	192.0.1.1 to	Supports 254 hosts on each of 2 million
Class D	224.0.0.0 to	Reserved for multicast group
Class E	240.0.0.0 to	Reserved

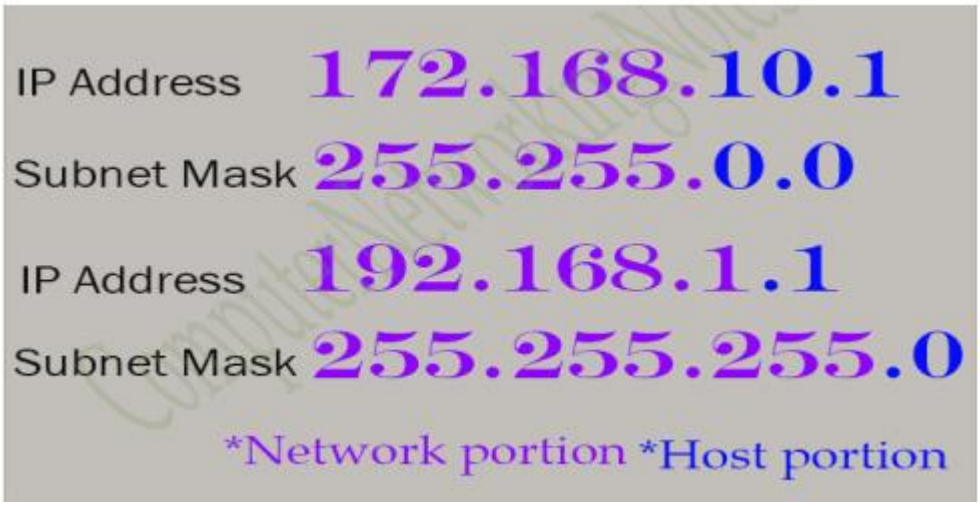
For the IP addresses from Class A, the first 8 bits (the first decimal number) represent the network part, while the remaining 24 bits represent the host part. For Class B, the first 16 bits (the first two numbers) represent the network part, while the remaining 16 bits represent the host part. For Class C, the first 24 bits represent the network part, while the remaining 8 bits represent the host part. Consider the following IP addresses:

- **10.50.120.7** – because this is a Class A address, the first number (10) represents the network part, while the remainder of the address represents the host part (50.120.7). This means that, in order for devices to be on the same network, the first number of their IP addresses has to be the same for both devices. In this case, a device with the IP address of 10.47.8.4 is on the same network as the device with the IP address listed above. The device with the IP address 11.5.4.3 is not on the same network, because the first number of its IP address is different.

- **172.16.55.13** – because this is a Class B address, the first two numbers (172.16) represent the network part, while the remainder of the address represents the host part (55.13). A device with the IP address of 172.16.254.3 is on the same network, while a device with the IP address of 172.55.54.74 is not.

3.2 Sub netting

Subnetting is a process of dividing a single large network in multiple smaller networks. To best utilize available addresses if we put more than 16000000 hosts in a single network, due to broadcast and collision, that network will never work. If we put less hosts then remaining addresses will be wasted. Subnetting provides a better way to deal with this situation. Subnetting allows us to create smaller networks from a single large network which not only fulfill our hosts' requirement but also offer several other networking by Identifying network portion and host portion in an IP address, which is the first step of subnetting. Subnetting can only be done in host portion. Subnet mask is used to distinguish the network portion from host portion in an IP address.

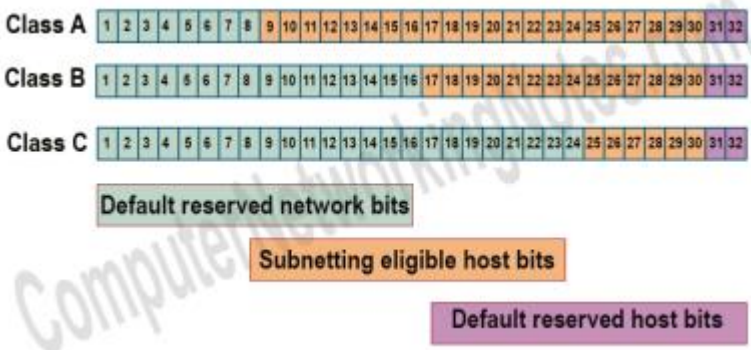


Note: Reserved network bits and host bits cannot be used in subnetting.

IP Class	First IP Address of Class	Last IP Address of Class	Default Subnet Mask	Default Network Bits	Host Bits	Reserved Host Bits
A	0.0.0.0	127.255.255.255	255.0.0	First 8 bits	9 to 30	31,32
B	128.0.0.0	191.255.255.255	255.255.0.0	First 16 bits	17 to 30	31,32
C	192.0.0.0	223.255.255.255	255.255.255.0	First 24 bits	25 to 30	31,32

Subnetting eligible host bits

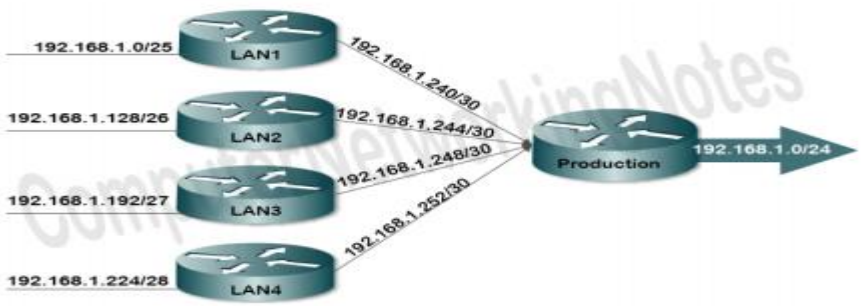
After excluding reserved network bits and host bits, the remaining are considered eligible subnetting host bits.



Subnetting can be done only in subnetting eligible bits

3.3 Super-Netting

Supernetting is the process of summarizing a bunch of contiguous subnetted networks back in a single large network. Supernetting is also known as route summarization and route aggregation. Supernetting is mainly done for optimizing the routing tables. A routing table is the summary of all known networks. Routers share routing tables to find the new path and locate the best path for destination.



The figure shows an example of Supernetting

Advantage of Supernetting

i. It reduces the size of routing updates.
ii. It provides a better overview of network.
iii. It decreases the use of resources such as Memory and CPU.
iv. It decreases the required time in rebuilding the routing tables.

In order to perform the Supernetting, we need Network ID, CIDR Value, Broadcast ID, Subnet Mask and Block Size of each route.

4.0 Conclusion

In this unit, IP addressing, developing and calculating subnet and supernet addresses were presented. The basic understanding will aid the students towards implementing simple networks.

5.0 Summary

Since networks are the foundation of contemporary digital communication, it is essential to comprehend IP addresses and know how to develop and compute subnet and supernet addresses for network design, setup, troubleshooting, and management.

6.0 Tutor Marked Questions

You are given a IPv4 address and the network prefix: Determine the following:

i. Address class (A-E)
ii. Address scope (private, public,...)
iii. The subnetmask in decimals
iv. The IP
v. The subnetmask

7.0 References and Further Reading

Jones, R. (2014). *IP Addressing and subnetting workbook, version 1.5: Instructor's workbook.* Retrieved 5th July, 2024 from https://dce.telkomuniversity.ac.id/wp-content/uploads/2014/09/49445184-IP-Addressing-and-Subnetting-Workbook-Instructors-Version-1-5.pdf.

UNIT 4 LOCAL AREA NETWORK

1.0 Introduction

A Local Area Network (LAN) is a relatively smaller and privately owned network with maximum span of 10km to provide local connectivity within a building or small geographical area. The LANs are distinguished from other kinds of networks by three characteristics; Size, Transmission technology, and Topology.

2.0 Learning Outcomes

By the end of this unit, students will be able to;

- Connect the computers in Local Area Network (LAN)

3.0 Main Content

In this unit, the computers are connected in LAN by configuring both the host and client computers considering the following steps:

3.1 Configuration of the host computer

1. Log on to the host computer as Administrator or as Owner.
2. Click **Start**, and then click **Control Panel**.
3. Click **Network and Internet Connections**.
4. Click **Network Connections**.
5. Right-click the connection that you use to connect to the Internet.

For example, if you connect to the Internet by using a modem, right-click the connection that you want under Dial-up other network available.

6. Click **Properties**.
7. Click the **Advanced** tab.
8. Under **Internet Connection Sharing**, select the **Allow other network users to connect through this computer's Internet connection** check box.
9. if you are sharing a dial-up Internet connection, select the **Establish a dial-up connection whenever a computer on my network attempts to access the Internet** check box if you want to permit your computer to automatically connect to the Internet.
10. Click **OK**. You receive the following message:

When Internet Connection Sharing is enabled, your LAN adapter will be set to use IP address 192.168.0. 1. Your computer may lose connectivity with other computers on your network. If these other computers have static IP addresses, it is a good idea to set them to obtain their IP addresses automatically. Are you sure you want to enable Internet Connection Sharing?

11. Click **Yes**

The connection to the Internet is shared to other computers on the local area network (LAN). The network adapter that is connected to the LAN is configured with a static IP address of 192.168.0.1 and a subnet mask of 255.255.255.0.

3.2 Configuration the client computer

To connect to the Internet by using the shared connection, you must confirm the LAN adapter IP configuration, and then configure the client computer. To confirm the LAN adapter IP configuration, follow these steps:

1. Log on to the client computer as Administrator or as Owner.
2. Click **Start**, and then click **Control Panel**.
3. Click **Network and Internet Connections**.
4. Click **Network Connections**.
5. Right-click **Local Area Connection** and then click **Properties**.
6. Click the **General** tab, click **Internet Protocol (TCP/IP)** in the **connection uses the following items** list, and then click **Properties**.
7. In the **Internet Protocol (TCP/IP) Properties** dialog box, click **Obtain an IP address automatically** (if it is not already selected), and then click **OK**.

Note: You can also assign a unique static IP address in the range of 192.168.0.2 to 254. For example, you can assign the following static IP address, subnet mask, and default gateway:

8. IP Address 192.168.31.202
9. Subnet mask 255.255.255.0
10. Default gateway 192.168.31.1
11. In the **Local Area Connection Properties** dialog box, click **OK**.
12. Quit Control Panel.

Exercise 3

Practically implement the connection of client -host computers in a LAN.

Instructor will inspect each student's LAN implementation. Print and append output.

S/No	**Steps**	**Comments**	**Max Score**	**Score**
1	Configuring the host Computer		4	
2	Configuring the client Computer		4	
3	Output		2	

UNIT 5 BASIC NETWORK COMMANDS

1.0 Introduction

Network commands are used to perform network configuration which includes how to switch to privilege mode and normal mode and how to configure router interface and how to save this configuration to flash memory or permanent memory.

2.0 Learning Outcomes

By the end of this unit, students will be able to;
• use basic network commands for network configuration.

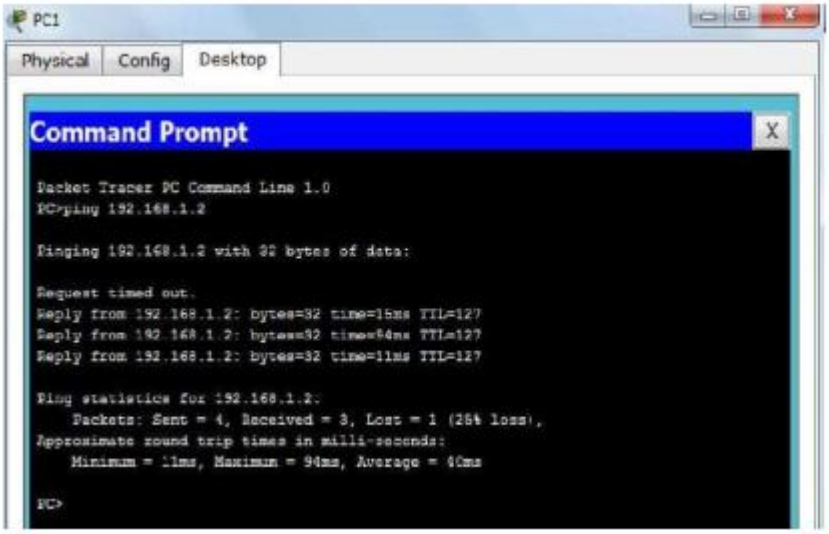
3.0 Main Content

Basic networking commands will be looked into here. These commands include

- Configuring the Router commands
- General Commands to configure network
- Privileged Mode commands of a router
- Router Processes & Statistics
- IP Commands
- Other IP Commands e.g. show it route etc.

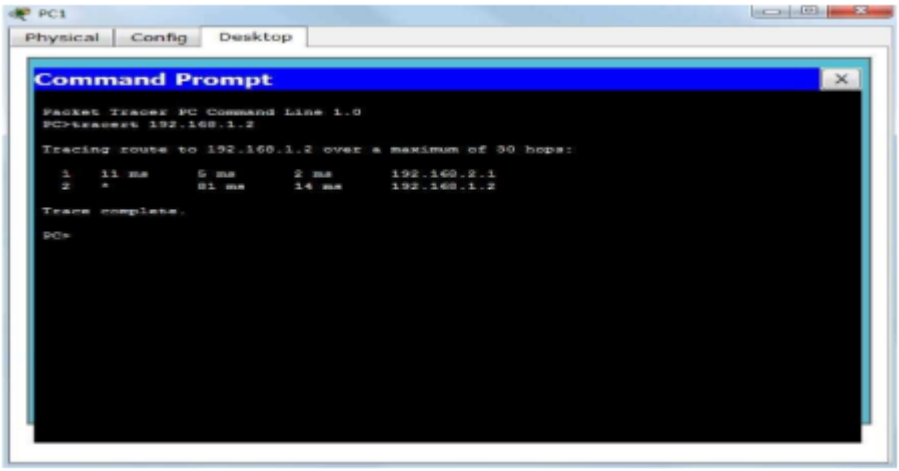
3.1 ping:

ping(8) sends an ICMP ECHO_REQUEST packet to the specified host. If the host responds, you get an ICMP packet back. Sound strange? Well, you can “ping” an IP address to see if a machine is alive. If there is no response, you know something is wrong.



3.2 Tracerout:

Tracert is a command which can show you the path a packet of information takes from your computer to one you specify. It will list all the routers it passes through until it reaches its destination, or fails to and is discarded. In addition to this, it will tell you how long each 'hop' from router to router takes.

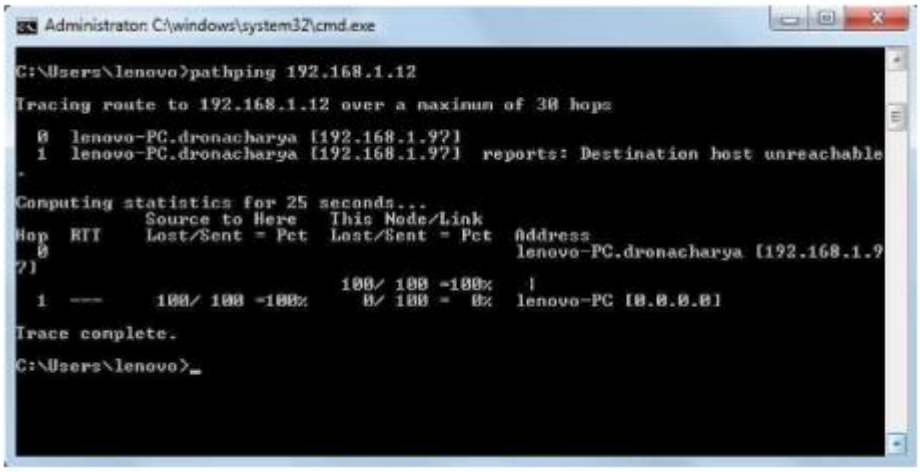


3.3 nslookup:

Displays information from Domain Name System (DNS) name servers.
NOTE: If you write the command as above it shows as default your pc's server name firstly.

3.4 pathping:

A better version of tracert that gives you statics about packet lost and latency



3.5 Getting Help

In any command mode, you can get a list of available commands by entering a question mark (?). Router>**?**

To obtain a list of commands that begin with a particular character sequence, type in those characters followed immediately by the question mark (?).

Router#**co?**
configure, connect, copy To list keywords or arguments, enter a question mark in place of a keyword or argument. Include a space before the question mark.

Router#**configure ?** memory Configure from NV memory network Configure from a TFTP network host terminal. Configure from the terminal.

You can also abbreviate commands and keywords by entering just enough characters to make the command unique from other commands. For example, you can abbreviate the **show** command to **sh**.

3.6 Configuration Files

Any time you make changes to the router configuration, you must save the changes to memory because if you do not, they will be lost if there is a system reload or power outage. There are two types of configuration files: the running (current operating) configuration and the startup configuration.

Use the following privileged mode commands to work with configuration files.

Performing Switch Configuration

Step 1: Configure the switch host name.

a. From the Customer PC, use a console cable and terminal emulation software to connect to the console of the customer Cisco Catalyst 2960 switch.

b. Set the host name on the switch to **CustomerSwitch** using these commands.

Switch>**enabe**
Switch#**configure terminal**

Switch(config)#**hostname CustomerSwitch**

Step 2: Configure the privileged mode password and secret.

a. From global configuration mode, configure the password as **cisco**. CustomerSwitch(config)#**enable password cisco**

b. From global configuration mode, configure the secret as **cisco123**. CustomerSwitch(config)#**enable secret cisco123**

Step 3: Configure the console password.

a. From global configuration mode, switch to configuration mode to configure the console line. CustomerSwitch(config)#**line console 0**

b. From line configuration mode, set the password to **cisco** and require the password to be entered at login.

CustomerSwitch(config-line)#**password cisco**
CustomerSwitch(configline)#**login** CustomerSwitch(config-line)#**exit**

Step 4: Configure the vty password.

a. From global configuration mode, switch to the configuration mode for the vty lines 0 through 15.

CustomerSwitch(config)#**line vty 0 15**

b. From line configuration mode, set the password to **cisco** and require the password to be entered at login. CustomerSwitch(config-line)#**passwordcisco**
CustomerSwitch(config-line)#**login**CustomerSwitch(configline)#**exit**

Step 5: Configure an IP address on interface VLAN1.

From global configuration mode, switch to interface configuration mode for VLAN1, and assign the IP address

192.168.1.5 with the subnet mask of 255.255.255.0. CustomerSwitch(config)#**interface vlan 1**

CustomerSwitch(config-if)#**ip address 192.168.1.5 255.255.255.0**
CustomerSwitch(config-if)#**no shutdown**
CustomerSwitch(config-if)#**exit**

Step 6: Configure the default gateway.

a. From global configuration mode, assign the default gateway to 192.168.1.1.

Customer Switch(config)#**ip default-gateway 192.168.1.1**

b. Click the **Check Results** button at the bottom of this instruction window to check your work.

Step 7: Verify the configuration.

The Customer Switch should now be able to ping the ISP Server at 209.165.201.10. The first one or two pings may fail while ARP converges.

CustomerSwitch(config)#**end**
CustomerSwitch#**ping 209.165.201.10**

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 209.165.201.10, timeout is 2 seconds:
..!!!

Success rate is 60 percent (3/5), round-trip min/avg/max = 181/189/197 ms CustomerSwitch#

Exercise 4

Practically Implement the Switch Configuration using the steps earlier discussed

S/No.	STEPS	COMMENTS	MAX SCORE	SCORE
1	**Configure the switch host name**		1.5	
2	**Configure the privileged mode password and secret**		1.5	
3	**Configure the console password.**		1.5	
4	**Configure the vty password.**		1.5	
5	**Configure an IP address on interface VLAN1**		1.5	
6	**Configure the default gateway**		1.5	
7	**Verify the configuration.**		1	

MODULE 3: PACKET TRACER AS A COMPUTER SIMULATION TOOL

UNIT 1 BASICS OF PACKET TRACER

1.0 Introduction

Packet Tracer is a tool used to demonstrate how networks function at a basic level. In essence, it is a simulator that may be used for network phenomenon design, configuration, troubleshooting, visualization and animation.

2.0 Learning Outcomes

The objective of this unit is to introduce students to;

i. the Packet Tracer environment
ii. the basic interface of Packet Tracer
iii. discuss the basic functions of the tools/menus in the Packet Tracer environment.

3.0 Main Content

3.1 Organization of the Packet Tracer

The Logical Workspace and the Physical Workspace are the two views available in Packet Tracer. Additionally, it operates in two modes: simulation mode and real-time mode. You enter the Logical Workspace in Realtime Mode at startup. Networks can be constructed and observed in real time. You can conduct controlled networking scenarios by switching to Simulation Mode. To arrange the physical elements, such as where your gadgets are placed, you can also switch to the Physical Workspace. Using a network while in a physical workspace is not permitted. Once you have completed your tasks in the Physical Workspace, you must return back to the Logical Workspace.

3.2 Packet Tracer Interface

The figure 3.0 shows the interface of the packet tracer application

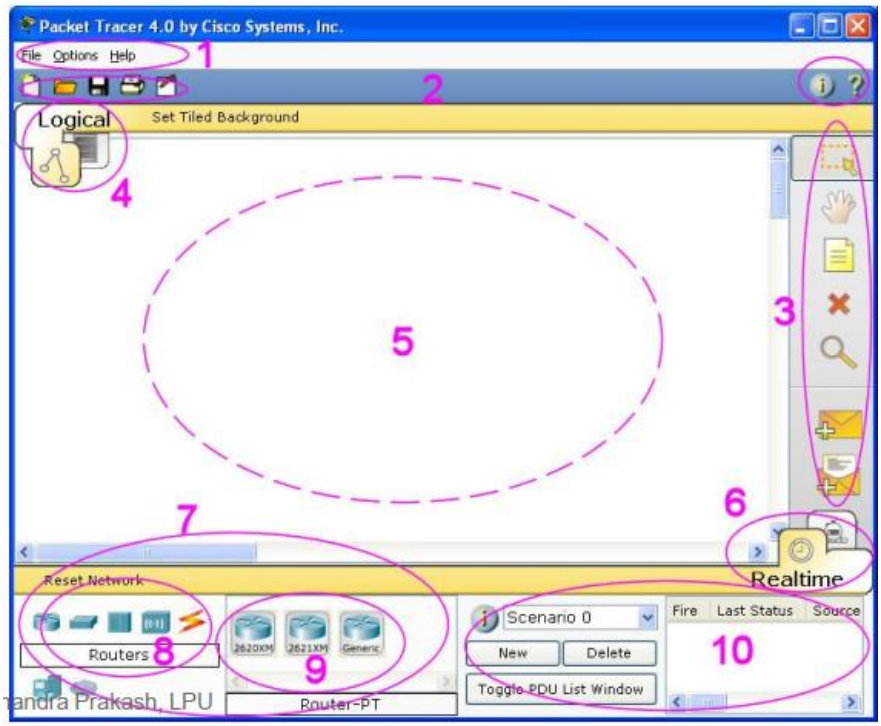


Figure 3.0: Packet Tracer Interface

(Note:Imagefromhttps://cprakash86.wordpress.com/wp-content/uploads/2018/08/tutorial_packet-tracer.pdf; How to use packet tracer, by Prakash (2020)).

The interface is comprised of the following components as shown on the screenshot:

1. Menu Bar

The File, Options, and Help menus are accessible via this bar. These menus contain standard actions like Open, Save, Print, and Preferences. You can also open the Activity Wizard from the File menu by using the Menu bar.

2. Main Tool Bar

This bar offers shortcut icons for the Activity Wizard and other File menu commands. Additionally, there is a Network Information button on the right, which you can use to add any text you want to include or give a description for the network that is now in use.

3. Common Tools Bar

Access to frequently used workspace features including Select, Move Layout, Place Note, Delete, Inspect, Add Simple PDU, and Add Complex PDU is available from this bar.

4. Workspace Type Bar

Using the tabs on this bar, you can switch between the Logical Workspace and the Physical Workspace.

5. Workspace
This part is where you will design your network, watch simulations, and view several sorts of information and statistics.

6. Realtime or Simulation Bar
You can switch between Realtime Mode and Simulation Mode with the tabs on this bar.

7. Network Component Box
This box is where you decide on devices and connections to put onto the workspace. It houses the Device-Type Selection Box and the Device-Specific Selection Box.

8. Device Type Selection Box
This box contains the type of devices and connections available in Packet Tracer. The Device-Specific Selection Box will change based on the type of devices you clicked.

9. Device Selection Box
This box is where you choose precisely which devices you want to have in your network and which connections to make.

10. Created Packet Window
This window manages the packets you put in the network during simulation scenarios.

4.0 Conclusion

This unit introduces and explains basic concepts and tools used in the packet tracer application. Learners can use the knowledge acquired here to begin some basic operations using the packet tracer application.

5.0 Summary

In this unit, we have learnt the fundamentals of packet tracer by looking at its menus and functions that they play.

6.0 Tutor-Marked Assignment

List and state the functions of five common tool bars found on the packet tracer.

7.0 References/Further Reading

Cisco networking Academy (2013). *Packet Tracer Multiuser – Tutorial.* Retrieved July 6th, 2024 from: http://cisco.num.edu.mn/CCNA_R&S1/course/files/10.4.1.2%20Packet%20Tracer%20Multiuser%20-%20Tutorial%20Instructions.pdf.

Cisco Networking Academy (2020). *Introduction to packet tracer 1.0: Overview.* Retrieved July 3rd, 2024 from: https://zsl.gliwice.pl/wp-content/uploads//2020/10/Introduction-to-Packet-Tracer.pdf.

Prakash, C. (2020). *How to use packet tracer.* Retrieved July 6th, 2024 from https://cprakash86.wordpress.com/wp-content/uploads/2018/08/tutorial_packet-tracer.pdf.

UNIT 2 CREATING A SIMPLE NETWORK USING PACKET TRACER

1.0 Introduction

This unit focuses on building a simple network in Packet Tracer from scratch and then saving the network as a Packet Tracer Activity File (.pkt).

2.0 Learning Outcomes

By the end of this unit, students are expected to:

i. Build a Simple Network in the Logical Topology Workspace
ii. Configure the Network Devices
iii. Test Connectivity between Network Devices
iv. Save the File and Close Packet Tracer

3.0 Main Content

To Build a Simple Network in the Logical Topology Workspace
Step 1: Launch Packet Tracer.

a. Launch Packet Tracer on your PC or laptop computer Double click on the **Packet Tracer** icon on your desktop or navigate to the directory that contains the Packet Tracer executable file and launch Packet Tracer. Packet Tracer should open with a blank default **Logical** topology workspace as shown in the figure 3.1.

Figure 3.1: Packet Tracer Logical Topology Workspace

Step 2: Build the topology

a. Add network devices to the workspace

Using the Device Selection box, add the network devices to the workspace as shown in the topology diagram. To place a device onto the workspace, first choose a device type from the **Device-Type Selection** box. Then, click on the desired device model from the **Device-Specific Selection** box. Finally, click on a location in the workspace to put your device in that location. If you want to cancel your selection, click the **Cancel** icon for that device. Alternatively, you can click and drag a device from the **Device-Specific Selection** box onto the workspace.

b. Add network devices to the workspace.

Using the Device Selection box, add the network devices to the workspace as shown in the topology diagram. To place a device onto the workspace, first choose a device type from the **Device-Type Selection** box. Then, click on the desired device model from the **Device-Specific Selection** box. Finally, click on a location in the workspace to put your device in that location. If you want to cancel your selection, click the **Cancel** icon for that device. Alternatively, you can click and drag a device from the **Device-Specific Selection** box onto the workspace.

c. Change display names of the network devices.

To change the display names of the network devices, click on the device icon on the Packet Tracer **Logical** workspace, then click on the **Config** tab in the device configuration window. Type the new name of the device into the **Display Name** box as show in the figure 3.2 below.

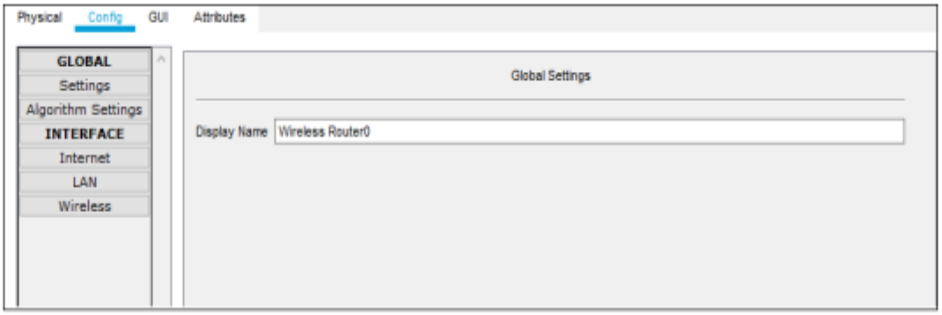


Figure 3.2: Device Configuration window

d. Add the physical cabling between devices on the workspace

Using the Device Selection box, add the physical cabling between devices on the workspace as shown in the topology diagram. The PC will need a copper straight-through cable to connect to the wireless router. Select the copper straight-through cable in the Device Selection box and attach it to the FastEthernet0 interface of the PC and the Ethernet 1 interface of the wireless router.

The wireless router will need a copper straight-through cable to connect to the cable modem. Select the copper straight-through cable in the device-selection box and attach it to the Internet interface of the wireless router and the Port 1 interface of the cable modem. The cable modem will

need a coaxial cable to connect to the Internet cloud. Select the coaxial cable in the device-selection box and attach it to the Port 0 interface of the cable modem and the coaxial interface of the Internet cloud. The Internet cloud will need copper straight-through cable to connect to the Cisco.com server. Select the copper straight-through cable in the device-selection box and attach it to the Ethernet interface of the Internet cloud and the FastEthernet0 interface of the Cisco.com server.

Part 2: Configure the Network Devices

Step 1: Configure the wireless router

a. Create the wireless network on the wireless router

Click on the **Wireless Router** icon on the Packet Tracer **Logical** workspace to open the device configuration window. In the wireless router configuration window, click on the **GUI** tab to view configuration options for the wireless router. Next, click on the **Wireless** tab in the GUI to view the wireless settings. The only setting that needs to be changed from the defaults is the **Network Name (SSID)**. Here, type the name "HomeNetwork" as shown in the figure 3.3:

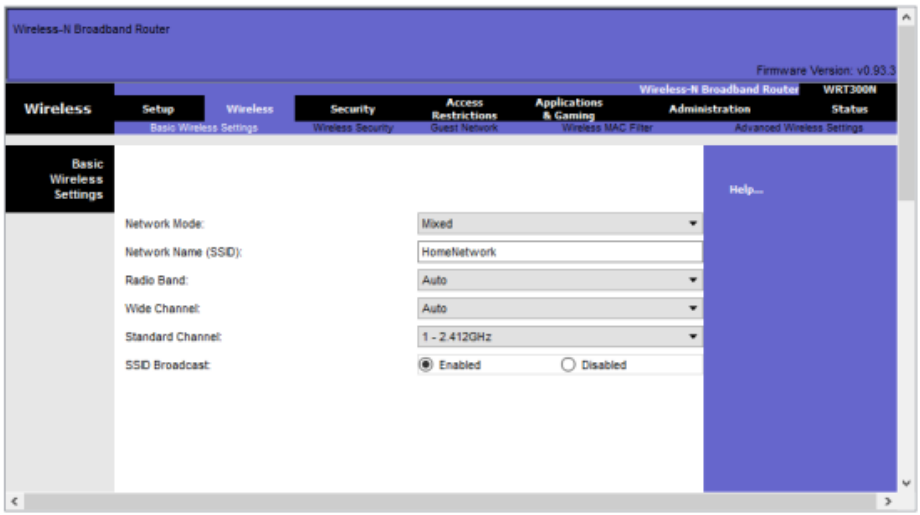


Figure 3.3: Network Configuration Window in Packet Tracer

Configure the Internet connection on the wireless router

Click on the **Setup** tab in the wireless router GUI.

In the **DHCP Server** settings verify that the **Enabled** button is selected and configure the static IP address of the DNS server as 208.67.220.220 as shown in the figure 3.3.

b. Click on the **Save Settings** tab

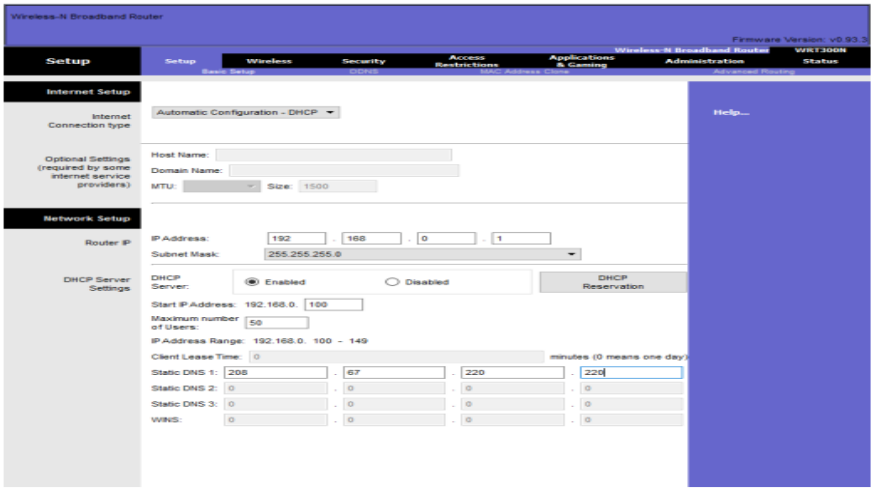


Figure 3.4: Devices Configuration Window in Packet Trace

Step 2: Configure the laptop

a. Configure the Laptop to access the wireless network

Click on the Laptop icon on the Packet Tracer **Logical** workspace and in the laptop configuration windows select the **Physical** tab. In the **Physical** tab you will need to remove the Ethernet copper module and replace it with the Wireless WPC300N module. To do this, you first power the Laptop off by clicking the power button on the side of the laptop. Then remove the currently installed Ethernet copper module by clicking on the module on the side of the laptop and dragging it to the **MODULES** pane on the left of the laptop window. Then install the Wireless WPC300N module by clicking on it in the **MODULES** pane and dragging it to the empty module port on the side of the laptop. Power the laptop back on by clicking on the Laptop power button again.

With the wireless module installed, the next task is to connect the laptop to the wireless network. Click on the **Desktop** tab at the top of the Laptop configuration window and select the **PC Wireless** icon. Once the Wireless-N Notebook Adapter settings are visible, select the **Connect** tab. The wireless network "HomeNetwork" should be visible in the list of wireless networks as shown in the figure. Select the network, and click on the **Connect** tab found below the **Site Information pane.**

Figure 3.5: Site Information Window in Packet Tracer

Step 3: Configure the PC

a. Configure the PC for the wired network

Click on the **PC** icon on the Packet Tracer **Logical** workspace and select the **Desktop** tab and then the **IP Configuration** icon. In the IP Configuration window, select the **DCHP** radio button as shown in the figure so that the PC will use DCHP to receive an IPv4 address from the wireless router. Close the IP Configuration window.

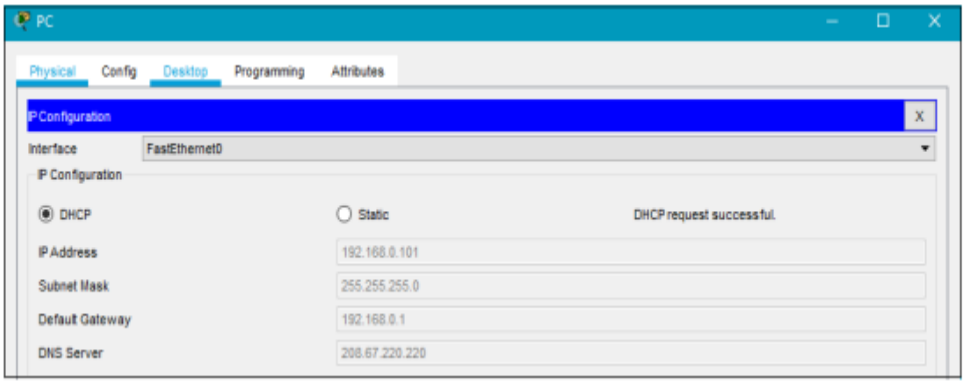


Figure 3.6: Packet Tracer IP Configuration Window

Click on the Command Prompt icon. Verify that the PC has received an IPv4 address by issuing the **ipconfig /all** command from the command prompt as shown in the figure. The PC should receive an IPv4 address in the 192.168.0.x range.

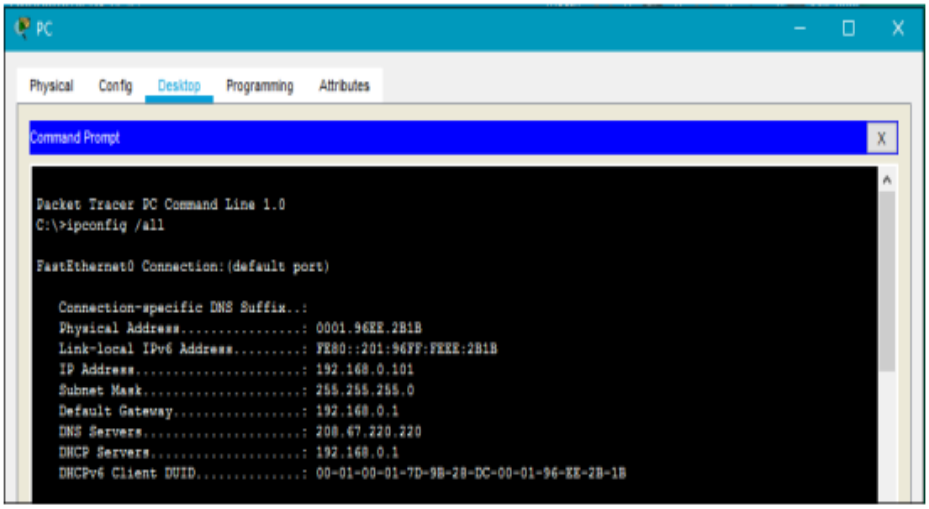


Figure 3.7: IP Config Verification Window

Step 4: Configure the Internet cloud

a. Install network modules if necessary

Click on the **Internet Cloud** icon on the Packet Tracer **Logical** workspace and then click on the **Physical** tab. The cloud device will need two modules if they are not already installed. The PT-CLOUD-NM-1CX which is for the cable modem service connection and the PT-CLOUD-NM-1CFE which is for a copper Ethernet cable connection. If these modules are missing, power off the physical cloud devices by clicking on the power button and drag each module to an empty module port on the device and then power the device back on.

b. Identify the From and To Ports

Click on the **Config** tab in the Cloud device window. In the left pane click on **Cable** under **CONNECTIONS**. In the first drop-down box, choose Coaxial and in the second drop down box choose Ethernet, then click the **Add** button to add these as the **From Port** and **To Port** as shown in the figure 3.8.

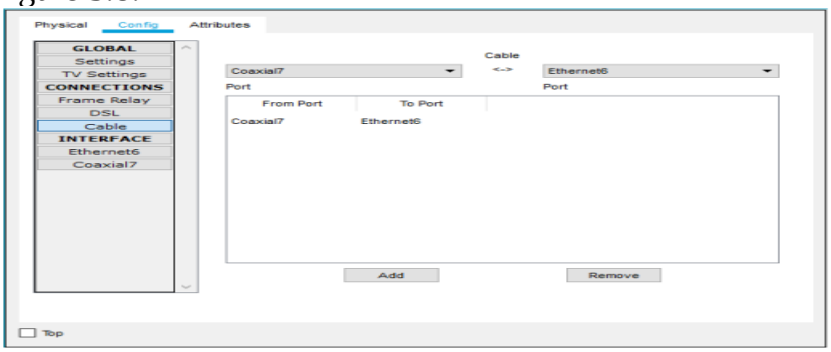


Figure 3.8: Adding Ports in Packet Tracer

c. Identify the type of provider

While still in the **Config** tab click Ethernet under **INTERFACE** in the left pane. In the Ethernet configuration window, select **Cable** as the Provider Network as shown in the figure 3.9.

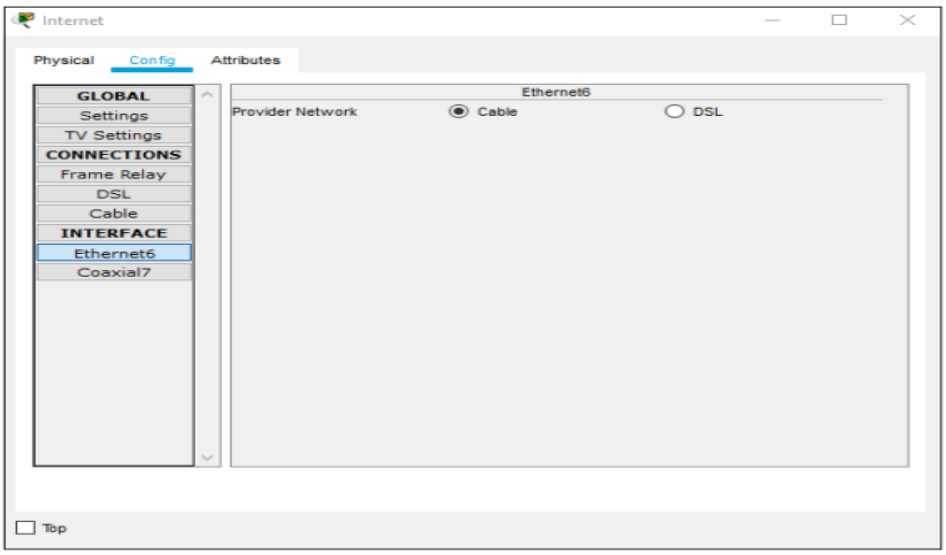


Figure 3.10: Ethernet Configuration Window in Packet Tracer

Step 5: Configure the Cisco.com server

a. Configure the Cisco.com server as a DHCP server

Click on the Cisco.com server icon on the Packet Tracer **Logical** workspace and select the **Services** tab. Select **DHCP** from the **SERVICES** list in the left pane.

In the DHCP configuration window, configure a DHCP as shown in the figure with the following settings.

- Click **On** to turn the DCHP service on
- Pool name: DHCPpool
- Default Gateway: 208.67.220.220
- DNS Server: 208.67.220.220
- Starting IP Address: 208.67.220.1
- Subnet Mask: 255.255.255.0
- Maximum number of Users: 50

Click **Add** to add the pool

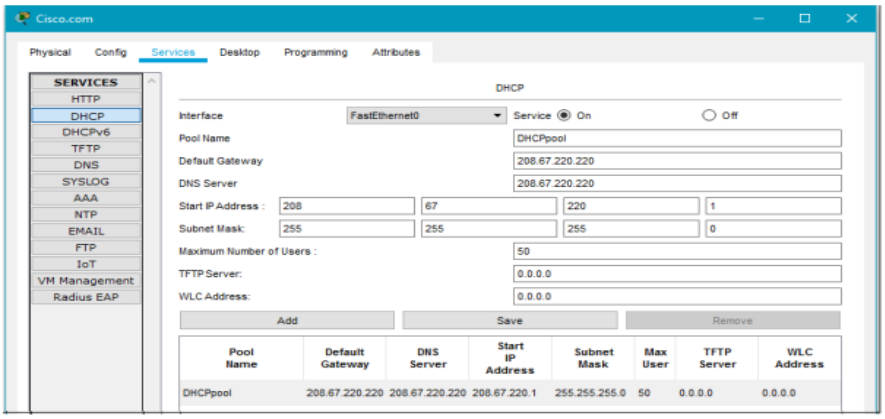


Figure 3.11: DHCP Server Configuration Window

b. Configure the Cisco.com server as a DNS server to provide domain name to IPv4 address resolution.

While still in the **Services** tab, select **DNS** from the **SERVICES** listed in the left pane. Configure the DNS service using the following settings as shown in the figure.

- Click **On** to turn the DNS service on
- Name: Cisco.com
- Type: A Record
- Address: 208.67.220.220

Click **Add** to add the DNS service settings

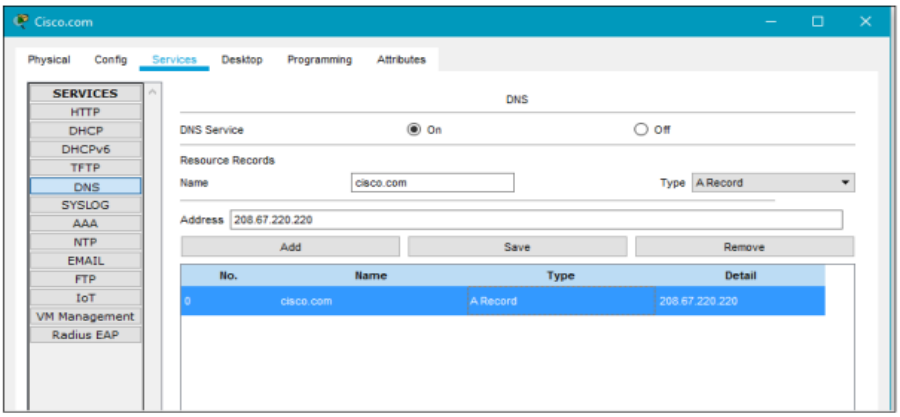


Figure 3.12: DNS Server Configuration Window

c. Configure the Cisco.com server Global settings.

Select the **Config** tab.

Click on **Settings** in left pane.

Configure the Global settings of the server as follows:

- Select **Static**
- Gateway: 208.67.220.1
- DNS Server: 208.67.220.220

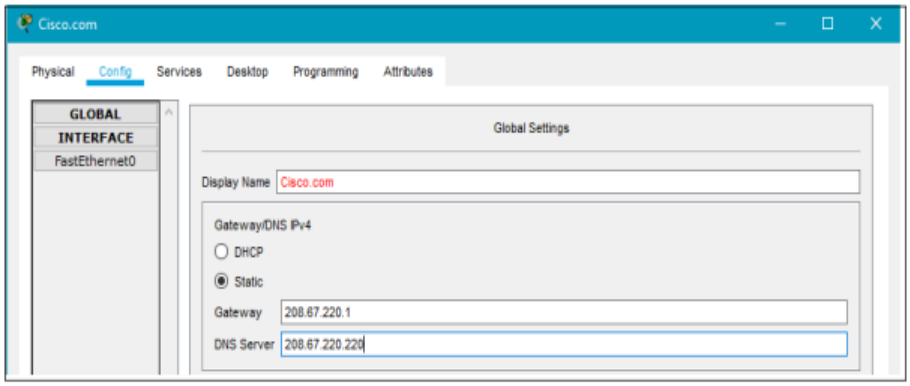


Figure 3.13: DNS Server Configuration Window

d. Configure the Cisco.com server FastEthernet0 Interface settings.

Click on **FastEthernet** in left pane of the **Config** tab

Configure the FastEthernet Interface settings of the server as follows:

- Select **Static** under IP Configuration
- IP Address: 208.67.220.220
- Subnet Mask: 255.255.255.0

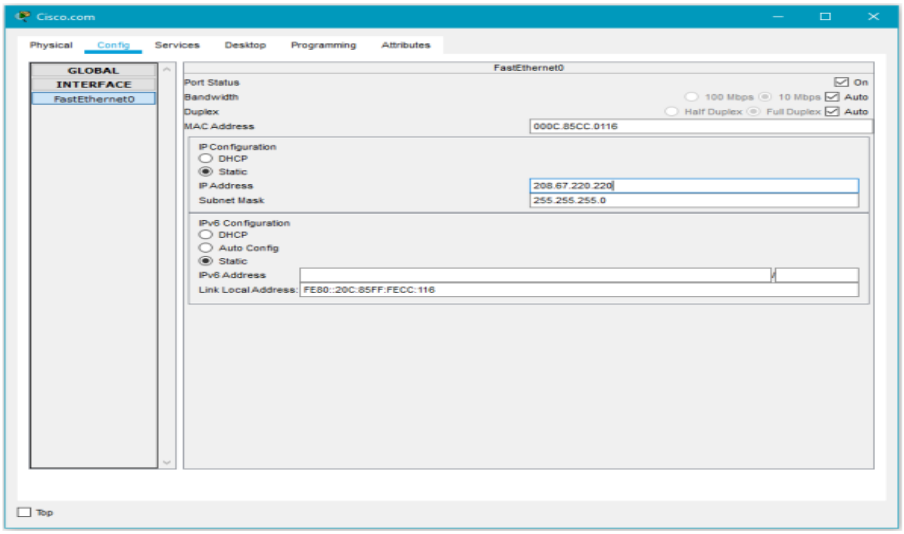


Figure 3.14: Fastethernet Configuration Window

Part 3: Verify Connectivity

Step 1: Refresh the IPv4 settings on the PC

a. Verify that the PC is receiving IPv4 configuration information from DHCP.

Click on the **PC** on the Packet Tracer **Logical** workspace and then the select the **Desktop** tab of the PC configuration window.
Click on the **Command Prompt** icon

In the command prompt refresh the IP settings by issuing the commands **ipconfig /release** and then **ipconfig /renew.** The output should show that the PC has an IP address in the 192.168.0.x range, a subnet mask, a default gateway, and DNS server address as shown in the figure 3.15.

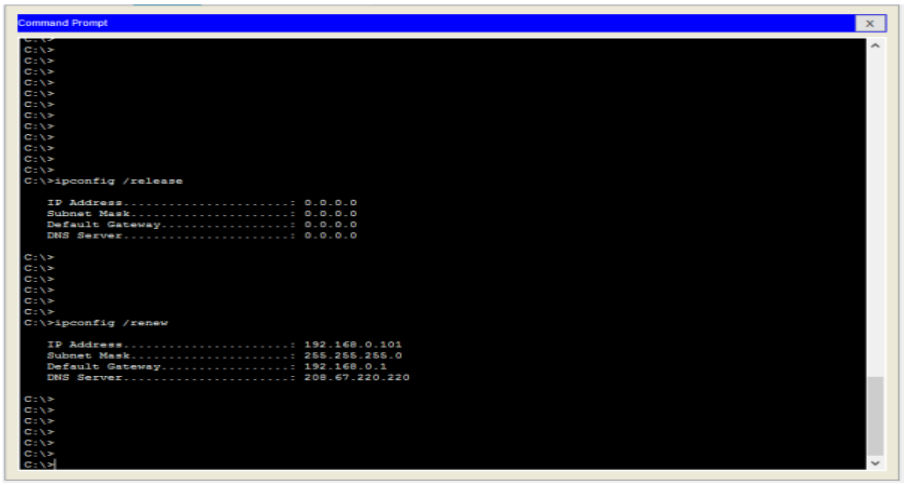


Figure 3.16: Connection Verify Window

b. Test connectivity to the Cisco.com server from the PC

From the command prompt, issue the command **ping Cisco.com.** It may take a few seconds for the ping to return. Four replies should be received as shown in the figure 3.17.

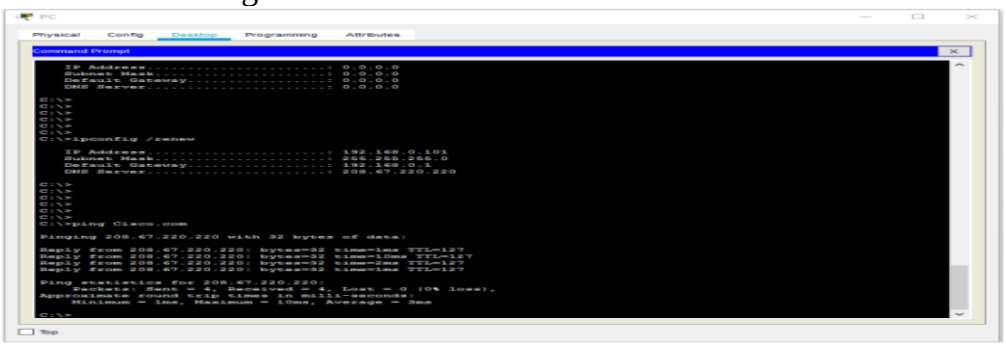


Figure 3.18: Packet Tracer Connectivity Test Window

Part 4: Save the File and Close Packet Tracer

Step 1: Save the File as a Packet Tracer Activity File (*.pkt)

To save the completed network, click on **File** in the Packet Tracer menu bar and then select **Save A** from the dropdown menu. In the **Save File** window, choose a directory to save the file to and give the file an appropriate file name. Then, Save as type defaults to Packet Tracer Activity File (*.pkt).

Click **Save** to save the file.

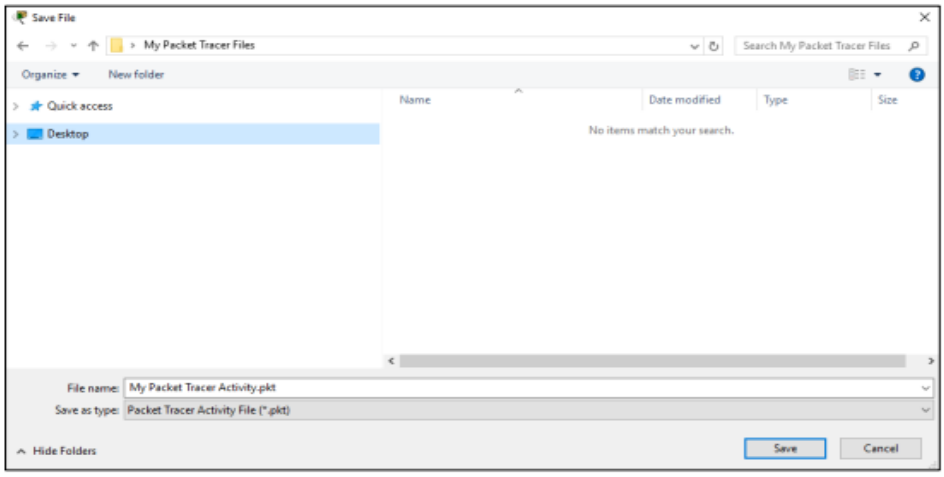


Figure 3.20: Packet Tracer Save Window

Step 2: Close Packet Tracer

To close Packet Tracer you can either click the "**X**" in the top right corner of the Packet Tracer window, or click on **Exit** in the file drop down menu.

4.0 Conclusion

Packet Tracer is a versatile and powerful tool that significantly aids in the learning and understanding of networking concepts. By using Packet

Tracer to create a simple network, users can gain hands-on experience in configuring and managing network devices in a virtual environment.

5.0 Summary

Packet Tracer is a valuable simulation tool used for learning and practicing networking concepts. It provides a user-friendly interface for designing and configuring networks. In essence, it is an essential educational tool for networking students, offering a practical, visual, and scalable environment for mastering networking skills.

6.0 Tutor-Marked Assignment

Create a simple network using Packet Tracer

7.0 References/Further Reading

Cisco Community (2019). *Packet Tracer-Create a Simple Network Using Packet Tracer*. Retrieved on 6th July, 2024 from *https://community.cisco.com › kxiwq67737 › 2.pdf.*

Cisco networking Academy (2013). *Packet Tracer Multiuser – Tutorial.* Retrieved July 6th, 2024 from: http://cisco.num.edu.mn/CCNA_R&S1/course/files/10.4.1.2%20Packet%20Tracer%20Multiuser%20-%20Tutorial%20Instructions.pdf.

Cisco Networking Academy (2020). *Introduction to packet tracer 1.0: Overview*. Retrieved July 3rd, 2024 from: https://zsl.gliwice.pl/wp-content/uploads//2020/10/Introduction-to-Packet-Tracer.pdf.

Prakash, C. (2020). *How to use packet tracer*. Retrieved July 6th, 2024 from https://cprakash86.wordpress.com/wp-content/uploads/2018/08/tutorial_packet-tracer.pdf.

UNIT 3 PACKET TRACER MULTIUSER CONNECTIONS

1.0 Introduction

Packet Tracer's multiuser capability enables numerous point-to-point connections between various Packet Tracer instances. This initial Packet Tracer Multiuser (PTMU) exercise is a brief lesson that walks through the process of creating and confirming a multiuser connection to another Packet Tracer instance on the same local area network. This is an ideal exercise for two students. Still, you may accomplish it on your own by just opening the two different files to launch two different instances of Packet Tracer locally.

2.0 Learning Outcomes

By the end of this unit, students are expected to:

i. Establish a Local Multiuser Connection to another Instance of Packet Tracer
ii. Verify Connectivity across a Local Multiuser Connection

3.0 Main Content

3.1 How to Establish a Local Multiuser Connection to Another Instance of Packet Tracer

Step 1: Select a partner and determine the role for each student.
a. Find a fellow classmate with whom you will cooperate to complete this activity. Your computers must both be connected to the same LAN.
b. Determine which of you will play the server side and which of you will play the client side in this activity.

- The server-side player opens **Packet Tracer Multiuser - Tutorial - Server Side.pka**.
- The client-side player opens **Packet Tracer Multiuser - Tutorial**
- **Client Side.pka**. **Note:** Solo players can open both files and complete the steps for both sides.

Step 2: Server Side Player - Configure the server side of the PTMU link.
The client side player must have the IP address, port number, and password used by the server side player before the client side player can create a connection to the server side player.

a. Configure Packet Tracer to be ready for an incoming connection by completing the following steps:

1) Click the **Extensions** menu, then **Multiuser**, then **Listen**.
2) You have two Local Listening Addresses. If there are more than two listed, refer to the first two only. The first one is the real IP address of the server-side player's local machine. It is the IP address your computer uses to send and receive data. The other IP address (127.0.0.1) can only be used for communications within your own computer's environment.
3) The port number is listed next to your IP addresses and in the Port Number field. If this is the first instance of Packet Tracer you opened on your computer, then the port number will be 38000.

However, if you have multiple instances open, it will increment by 1 for each instance (38001, 38002, etc.). The port number is required by the client-side player to configure the multiuser connection.

4) The password is set to **cisco**, by default. You can change it, but it is not necessary for this activity.
5) Tell the client-side player your IP address, port number, and password. The client-side player will need these three pieces of information to connect to your Packet Tracer instance in Step 3.
6) In the **Existing Remote Networks** section, you must click **Always Accept** or **Prompt** radio button for the client-side player to successfully connect.
7) In the **New Remote Networks** section, confirm that the **Always Deny** radio button is enabled. This will prevent the client-side player from creating a new link that is not specified in this activity.
8) Click **OK.**

b. Click the **Multiuser Connection** icon (represented as a cloud with three lines). Then click the **Remote Network** icon and add a **Remote Network** to the topology.
c. Click the **Peer0** name and change it to **PTMU Link** (it is case-sensitive).
d. Click the **PTMU Link** cloud and verify that the Connection Type is **Incoming** and that the **Use Global Multiuser Password** check box is enabled.
e. Click the **Connections** icon and choose the solid-black **Copper Straight-Through** connection.
f. Click **S1** and choose the GigabitEthernet1/1 connection. Then click **PTMU Link** > **Create New Link**.

Step 3: Client-Side Player - Configure the client side of the PTMU link.

a. Record the following information supplied to you by the server-side player:

Address: Port Number:

Password (**cisco**, by default)

b. The client-side player must add a **Remote Network** to the topology using the following directions: Click the **Multiuser Connection** icon (represented as a cloud with three lines). Then click the **Remote Network** icon and add a **Remote Network** to the topology.

c. Click the **Peer0** cloud and change the Connection Type to **Outgoing**.

1) In the Peer Address field, enter the server-side IP address you recorded in Step 3a.
2) In the Peer Port Number field, enter the server-side port number you recorded in Step 3a.
3) In the Peer Network Name field, enter **PTMU Link**. This is case-sensitive.
4) In the Password field, enter **cisco** or the password configured by the server-side player.
5) Click **Connect**.

d. The **Peer0** cloud should now be yellow, indicating that the two instances of Packet Tracer are connected.

e. Click the **Connections** icon and choose the solid-black **Copper Straight-Through** connection.

f. Click **S2** and choose the **GigabitEthernet1/1** connection. Then click **Peer0** > **Link 0 (S1 GigabitEthernet 1/1)**. The **Peer0** cloud on the client-side player and the **PTMU Link** cloud on the server-side player should now both be blue. After a short period, the link light between the switch and the cloud will transition from amber to green.

The multiuser link is now established and ready for testing.

Part 2: Verify Connectivity Across a Local Multiuser Connection

Step 1: Configure IP addressing.

a. The server-side player configures the **www.ptmu.test** server with the IP address **10.10.10.1**, the subnet mask **255.0.0.0**, and the DNS server address **10.10.10.1**.

b. The client-side player configures the PC with the IP address **10.10.10.10**, the subnet mask **255.0.0.0**, and the DNS server address **10.10.10.1**.

Step 2: Verify connectivity and access a web page on the server side.

a. The server-side player should now be able to ping the PC in the client-side player instance of Packet Tracer.
b. The client-side player should now be able to ping the **www.ptmu.test** server.
c. The client-side player should also be able to open the web browser and access the web page at **www.ptmu.test**. What is displayed on the web page?

4.0 Conclusion

An essential part of networking education is the Packet Tracer Multiuser Connections experience. In addition to improving students' comprehension of real-world networking difficulties, it offers a collaborative and hands-on learning environment that equips students to handle complicated network scenarios. This unit gives students the tools they need to thrive in the ever-evolving business of networking.

5.0 Summary

The Packet Tracer Multiuser Connections lesson provides students with a hands-on experience in designing, configuring, and troubleshooting interconnected networks collaboratively. Overall, it is essential for gaining practical experience and collaborative skills in networking, preparing students for real-world scenarios in network design and troubleshooting.

6.0 Tutor Marked Assignment

Design and implement a collaborative network using Packet Tracer in a multiuser connection’s environment.

7.0 References/Further Readings

Cisco Community (2019). *Packet Tracer-Create a Simple Network Using Packet Tracer.* Retrieved on 6th July, 2024 from *https://community.cisco.com › kxiwq67737 › 2.pdf.*

Cisco Networking Academy (2013). *Packet Tracer Multiuser – Tutorial.* Retrieved July 6th, 2024 from: http://cisco.num.edu.mn/CCNA_R&S1/course/files/10.4.1.2%20Packet%20Tracer%20Multiuser%20-%20Tutorial%20Instructions.pdf.

Cisco Networking Academy (2020). *Introduction to packet tracer 1.0: Overview.* Retrieved July 3rd, 2024 from: https://zsl.gliwice.pl/wp-content/uploads//2020/10/Introduction-to-Packet-Tracer.pdf.

MODULE 4: INTRODUCTION TO OBJECT ORIENTED PROGRAMMING

UNIT 1 PROGRAMMING IN VISUAL BASIC

1.0 Introduction

Visual is an event driven language which has some features of Object-Oriented Programming (OOP). Actions are tied to the occurrence of events e.g. an action may be triggered by clicking the mouse. This approach makes application programs more friendly and natural to the end user. In this unit students are introduced to the concept of working with graphical objects and the general Visual Basic Programming concepts.

2.0 Learning Outcomes

The objective of this unit is to introduce students to;

i. Concepts of working with graphical objects and general Visual Basic programming concepts
ii. How to design a project from the application wizard and
iii. How to use the Visual Basic tool box

3.0 Main Content

These sessions will include learning how to work with graphical objects in the Visual Basic Environment and using general Visual Basic Programming concepts.

3.1 How to Design a Project from the Application Wizard

A project is a collection of files that make up your application. A single application might consist of several files, and the project is the collection of those files.

The application wizard can be selected from the New Project dialog box. If you cancel the New Project dialog box, and then later want to start the Application wizard, select File, New Project to display the New Project dialog box once again. The screen you see looks like that in Figure 1

Figure 1: New Visual Basic Project dialog box

When you select the icon labeled VB Application Wizard on the New tab, the wizard begins its work. The interface type you select will determine how your application will process multiple windows. See figure 2

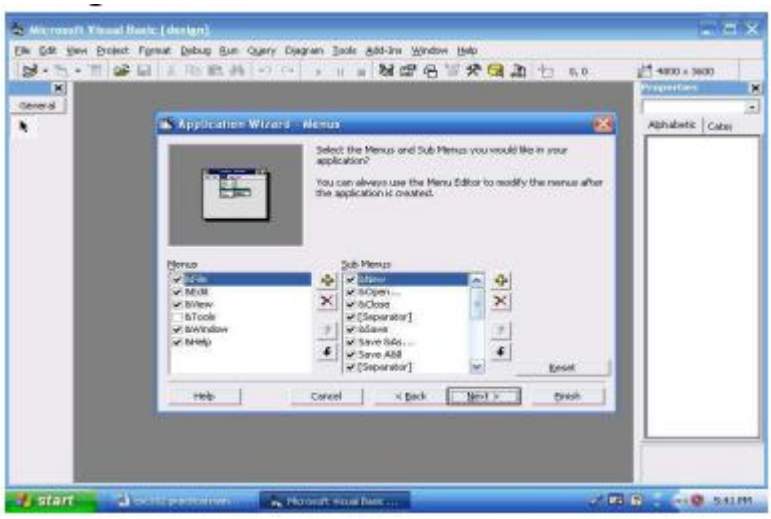


Figure 2: Application windows in the VB Environment

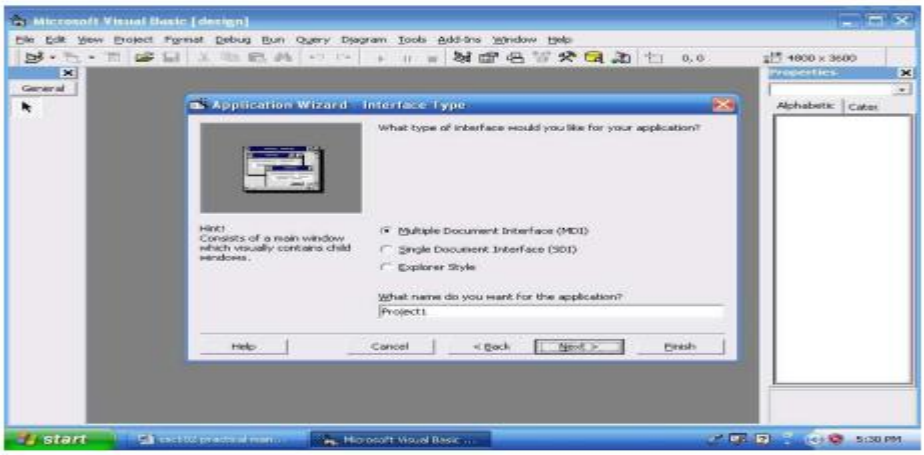


Figure 3: VB Applications Options Window

You can select the options you want your application's menu to contain as shown in Figure 3 above. The options are common Windows options found on most Windows programs. The ampersand (&) next to a letter in a menu name indicates the underscored accelerator key letter; in other words, &New indicates that New appears on the menu and that the use can select the option by pressing Alt+N.

The next wizard screen, shown in Figure 4, lets you select the toolbar buttons that your application will have. Click next to accept all the default toolbar settings.

Figure 4: VB Toolbars Window

The next wizard screen to appear is the Resource screen from which you can select to use resources in your program. The next one is the Internet Connectivity screen from which you can add an Internet interface to your program if you want one. The next screen gives the option of adding one of these standard screens to your application:

- **Splash screen** is an opening title screen that appears when your application first begins.
- **Login dialog** is a dialog box that asks for the user's ID and password as a part of application security that you can add.
- **Options dialog** is tabbed blank dialog box from which your users can specify attributes that you set up for the application.
- **About box** is a dialog box that appears when your users select Help, About from the application menu. You can also select a form template from here. A form template is model of a form that you can customize. Click Next to get to the last screen and click the Button labeled Finish to instruct Visual Basic to complete your initial application.

3.2 How to Create a Project from the New Project Window

The New Project window appears, when you first start Visual Basic or when you select File, New Project. You will always need **toolbars** in your project. Visual Basic has a total of four toolbars:

- **Debug:** This toolbar appears when you use the interactive debugging tools to trace and correct problems.
- **Edit:** This toolbar aids your editing of Visual Basic code.
- **Form Editor:** This toolbar helps you adjust objects on forms.
- **Standard:** This toolbar is the default toolbar that appears beneath the menu bar.

You can display and hide these toolbars from the View, Toolbars menu.

Using the Toolbox

The Toolbox window differs from the toolbar. The toolbox is a collection of tools that act as a repository of **controls** you can place on a form. Figure 5 shows the most common collection of toolbox tools that you will see.

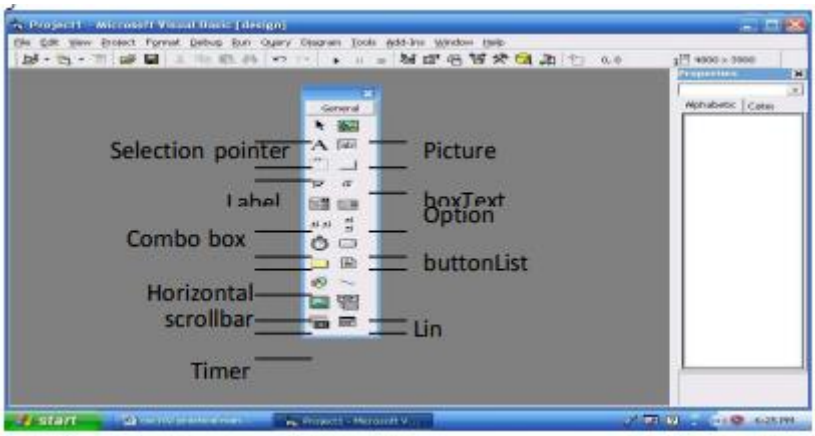


Figure 5: VB Toolbox tools

The Form Window

Most of your work goes on inside the Form window. You will design all your application's forms, which are the background windows that your users see, in the central editing area where the Form window appears. You can resize the Form window to make the windows you create in your application as large or small as needed. An application may contain multiple forms: you can display one or more of those forms in their own Form window editing areas. Activate a form by clicking a form by clicking anywhere within the window or on the title bar.

The Form Layout Window

The Form Layout window is an interesting little window connected closely to the Form window, because the Form Layout window shows you a preview of the Form window's location.

4.0 Conclusion

Visual Basic programming language is one of the most popular application programming languages which is easy to learn. It is event driven and have some attributes of Object-Oriented Programming. These attributes have made it one of the most preferred languages in Windows environment.

5.0 Summary

In this unit, we have learnt the following:

a. The concept of working with graphical objects and the general Visual Basic Programming concepts.
b. How to design a project from the application wizard and,
c. How to use the toolbox.

6.0 Tutor-Marked Assignment

a. What is a toolbox in Visual Basic Programming environment?
b. List and discuss the functions of ten items in Visual Basic toolbox

7.0 References/Further Reading

Akinyokun, O.C, (1999). *Principles and Practice of Computing Technology*.International Publishers Limited, Ibadan.

Balogun, V.F., Daramola, O.A., Obe, O.O., Ojokoh, B.A. & Oluwadare S.A., (2006). *Introduction to Computing: A Practical Approach*. Tom-Ray Publications, Akure.

Francis, S. (1983). *Schaum's Outline Series: Computers and Programming*. Mcgraw-Hill Book Company, Singapore.

UNIT 2 VISUAL BASIC PROJECT WINDOW

1.0 Introduction

The project window enables the user or programmer to navigate the items created in a project such as the forms and modules. The property window on the other hand helps the programmer to choose the appropriate properties for the object. When you display the Properties window for a control, you can modify its values. You can do that by selecting the view option and then Properties window.

2.0 Learning Outcomes

The objective is to enable user gain more mastery of the Visual Basic programming environment.

3.0 Main Content

The project Window

The Project Window helps you to manage your application's components. It lists its components in a tree-structured listing. Related objects appear together. You can expand or shrink the details by clicking the plus sign next to the object labeled *Forms*, a list of the current project's forms will appear.

The following kinds of objects can appear in the Project window:

- Projects
- Forms
- Modules
- Class modules
- User controls
- User documents
- Property pages

The Properties Window

A form can hold many controls. As you add controls to a form, you can select a control by clicking the control. When you select a control, the Properties window changes to list every property related to that control. When you add a control to a Visual Basic application, Visual Basic sets the control's initial property values. When you display the Properties window for a control, you can modify its values. You can do that by

selecting the view option and then Properties window. Figure 6 shows a Properties window listing some of the properties for a Label control.

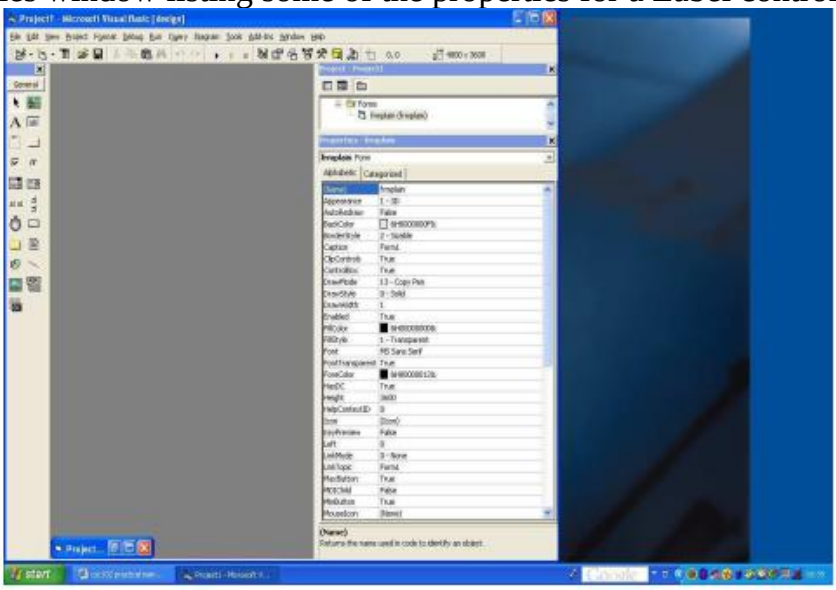


Figure 6.0: Properties Window in VB

Example 1

Create an application with three controls, a label, a command button and an image control to look like what you have in Figure 7

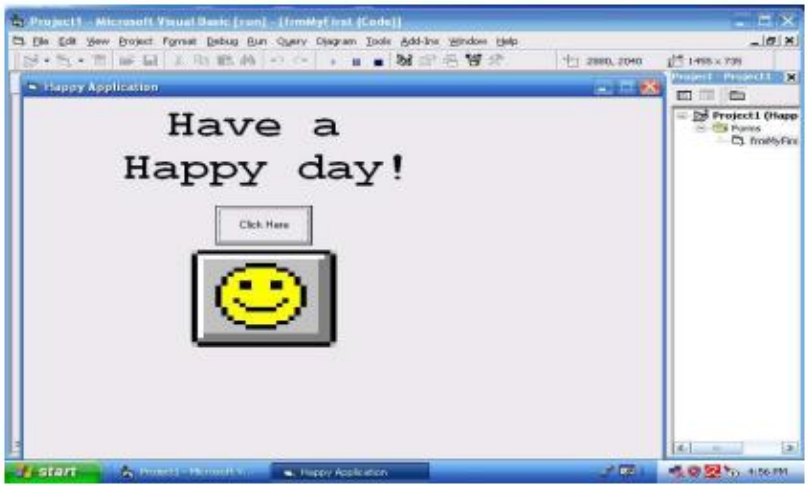


Figure 7.0: Using Tools and Controls in VB

Guide to the solution

To place a control on a form, click on the control's icon on the toolbox and move the crosshair mouse cursor to the form. As you drag the mouse, Visual Basic draws the control's outline on your form. When you have drawn the control at its proper location and size, release the mouse button to place the control at its proper location. Assign the following property values to the application's forms and controls:

Control	Property	Property value
Form	Max Button	False
Label	Alignment	Center
Label	Name	LblHappy
Label	Caption	Have a Happy Day
Label	Font	Courier New
Label	Font Style	Bold
Label	Size	36
Label	Left	1320
Label	Height	1695
Label	Top	120
Label	Width	4695
Image	Name	imgHappy
Image	Stretch	True
Command button	Name	cmdHappy
Command button	Caption	Click Here

While writing your application, you can run the application to see what you have done by pressing F5. You need to add some codes to finalize the application. Double click the form somewhere on the grid inside the Form window to display the code window. Add the codes shown in Figure 8. To return to the Form window, click the Project window's View Object button.

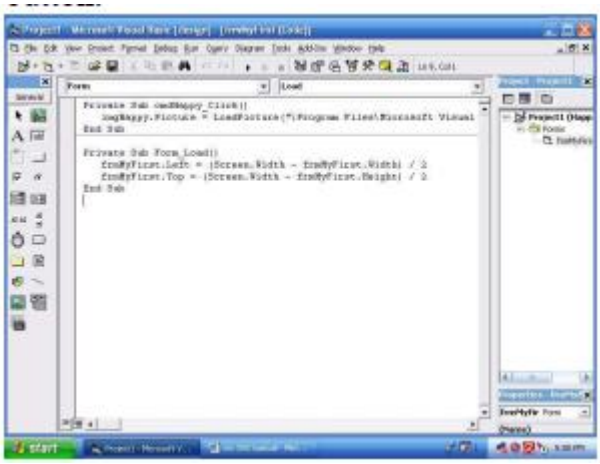


Figure 8.0: VB Codes Window

Run your program and click the command button. An image like that shown in Figure 7 appears. Save your project and click the Close window to terminate the program. To save, Select File, Save Project. The Save Project option saves every file inside your project as well as a project description file with the filename extension. VBP. Visual Basic asks first for the filename you want to assign to your form. Visual Basic then asks first for a project for the project description file. Answer No if Visual Basic asks to add the project to the Source Safe library.

Example 2
Create an application to look like what is shown in Figure 9, to include a label, a textbox (where the secret characters will be entered), an image, and two command buttons.

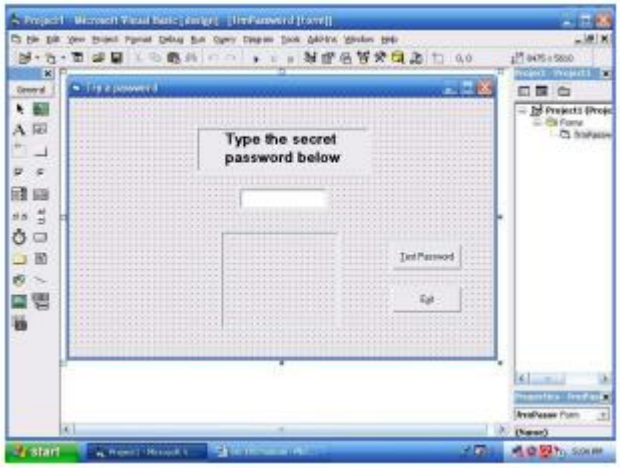


Figure 9.0: VB Codes Window with more Command Buttons

Guide to the solution
Set these controls and properties on the form:

Control Property Name Property Value
Form Name frmPassword
Form Caption Try a password
Form Height 5610
Form Width 8475
Image Name imgPassword
Image Border Style 1-Fixed Single
Image Height 1890
Image Left 3000
Image Stretch True
Image Top 2640
Image Width 2295
Label Name lblPrompt
Label Border Style 1-Fixed Single
Label caption Type the secret password below
Label font MS Sans Serif
Label Font Size 14
Label Font style Bold

Label Height 855
Label Left 2520
Label Top 600
Label width 3375
Text box Name txtPassword

Text box Height 375
Text box left 3360
Text box PasswordChar *
Text box Text (Leave blank by clearing the default value)
Text box Top 1600
Text box width 1695
Command button Name cmdText
Command button Caption and Text Password
Command button Left 6360
Command button Top 3000
Command button #2Name cmdExit
Command button #2 caption E&Exit
Command button #2Left 6360
Command button #2Top 3720

Add the following code seen on the screen in Figure 10 to activate the password- based form:

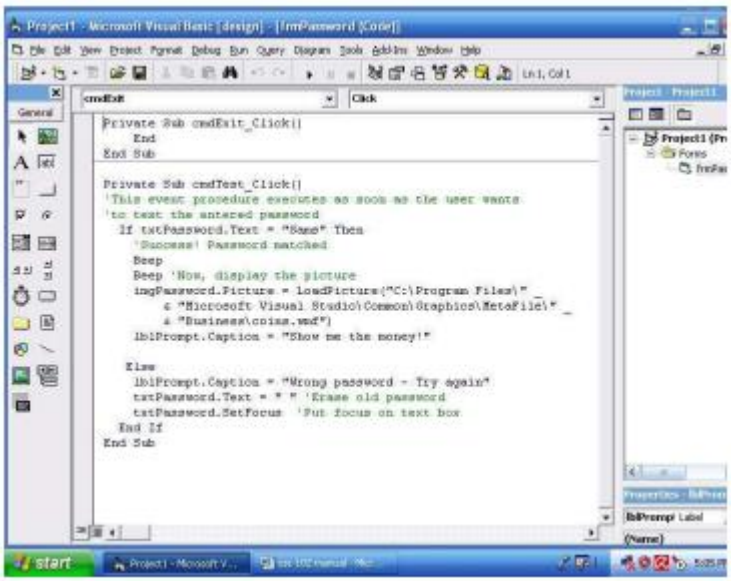


Figure 10: VB Codes to activate Command Buttons

After running the application, you have what is shown in figure 11 below:

Figure 11: Output of VB Codes

4.0 Conclusion

The project window and the property window are very important to features of the Visual Basic programming environment that are of immense importance to the programmer.

5.0 Summary

In this unit we have studied the importance of the project window and the property window.

6.0 Tutor-Marked Assignment

Create an application with three multiline text boxes. Make the text boxes tall enough to display three or four lines of text. Give the first one a vertical scrollbar, the second a horizontal scrollbar, and the third one both kinds of scrollbars. In all the three text boxes, supply the default text "Type here". In addition to the text boxes, include an Exit command button, so the user can press Alt+X to terminate program.

7.0 References/Further Reading

Akinyokun, O.C, (1999). *Principles and Practice of Computing Technology*. International Publishers Limited, Ibadan.

Balogun, V.F., Daramola, O.A., Obe, O.O., Ojokoh, B.A. & Oluwadare S.A., (2006). *Introduction to Computing: A Practical Approach*. Tom-Ray Publications, Akure.

Francis, S. (1983). *Schaum's Outline Series: Computers and Programming.*

UNIT 3 CREATING MENU APPLICATIONS

1.0 Introduction

One of the basic features of the Graphical User Interface (GUI) is that enables user to select the operations to be performed through menus with the aid of the mouse. In this unit students are introduced to the rudiments of creating a menu application.

2.0 Learning Outcomes

The objective of this unit is to enable students learn the steps involved in creating visual basic applications with menu.

3.0 Main Content

3.1 Creating menu applications

You can generate menus for your applications using the application wizard. After you click the menu options and submenus you want in your applications, the application wizard generates the appropriate menu controls and places them in the generated application. The toolbox window does not contain any menu-creation tools. Instead, Microsoft offers a special menu tool called the Menu Editor, shown in Figure 12 that you use to create menus. From the Form window, you can press Ctrl+E to display the Menu Editor. The Menu Editor helps you design menus for your applications. In a way, the Menu Editor acts like a Properties window for the menu bar because you will designate the names of the menu controls as well as the captions that the users see on the menus and other related information from within the Menu Editor.

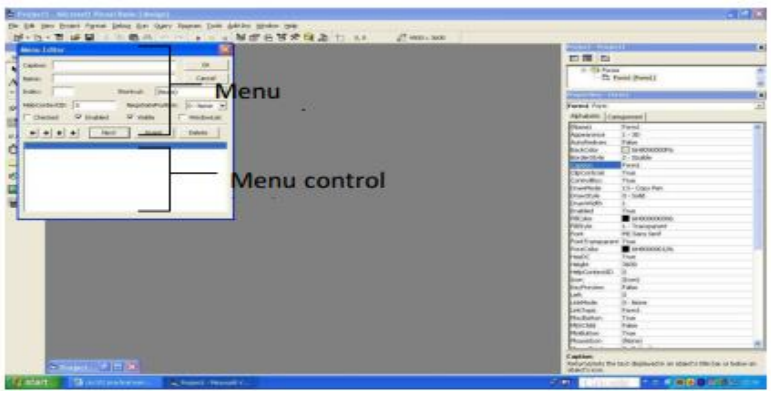


Figure 12: Menu Editor

A menu bar offers a special kind of control that lets your select options and issue Menu bar commands. These options can be found on the Menu Editor: Disabled options, Enabled options, Shortcut, Checked option, Separator Selected option and Submenus.

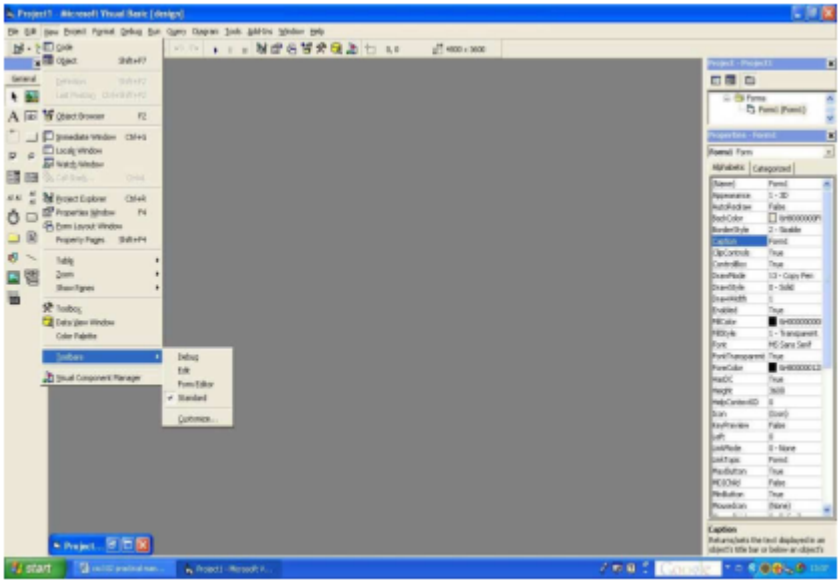


Figure 13: Menu Bars and its parts

Exercise
Practice creating of menu applications

Example 1
Create an application with three menu options and a label. Your screen should look like what you have in Figure 14.

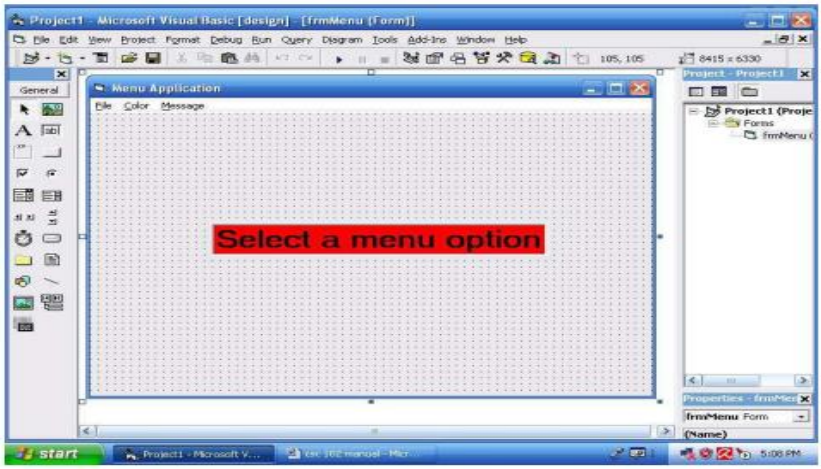


Figure 14: VB Menu Screen

Guide to solution

To create the menu bar, click the form and press Ctrl+E to display the Menu Editor.

- Type &File for the Caption field. As with all other Visual Basic values, the ampersand indicates that the F will be the accelerator key for the menu selection. As you type the caption, Visual Basic displays the caption in the Menu control list box in the bottom half of the Menu Editor.
- Press Tab to move to the Name field. Tab and Shift+Tab shift the focus between the Menu Editor fields.
- Type *mnuFile* for the name of the first menu option.
- Leave all other fields alone and click the Next button to prepare for the remaining menu bar options. The Next button lets the Menu Editor know that you are through with the first option and want to enter another.
- Type &Color for the next menu bar caption and type *mnuColor* for the name.
- Click Next to add the next item.
- Type &Message for the third and final menu bar caption and type mnuMessage for the caption. Your Menu Editor should look like the one in Figure 15.

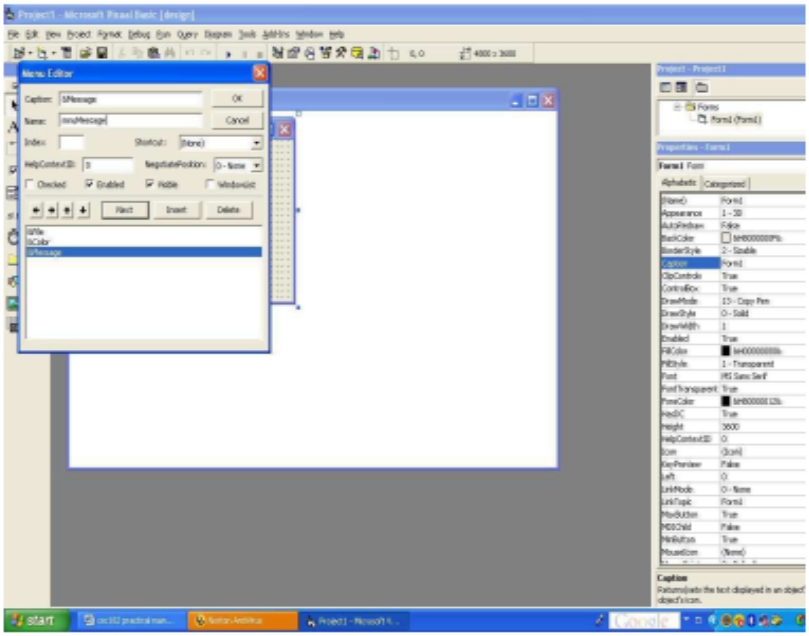


Figure 15: Created Menu Editor

3.2 Adding a Pull-down menu

You can either create pull-down menus as build the menu bar or add the menus later. If you create the complete menu bar first, however as you've done in this exercise, you will have to insert the menu options in their

respective locations when you are ready to add them. The Menu Editor's Insert button lets you do just that.

Example 2

Add three checked options: Blue, Green, and Red, to the second menu, Color. These colors will be mutually exclusive; the label will not be able to be all three colors at once, but only one color at a time. Such colors make perfect candidates for checked menu options. Your application should like Figure 16 after running. Also, include a submenu to the Message menu. Let it contain the checked messages displayed in Figure 17, and include a separator bar as shown.

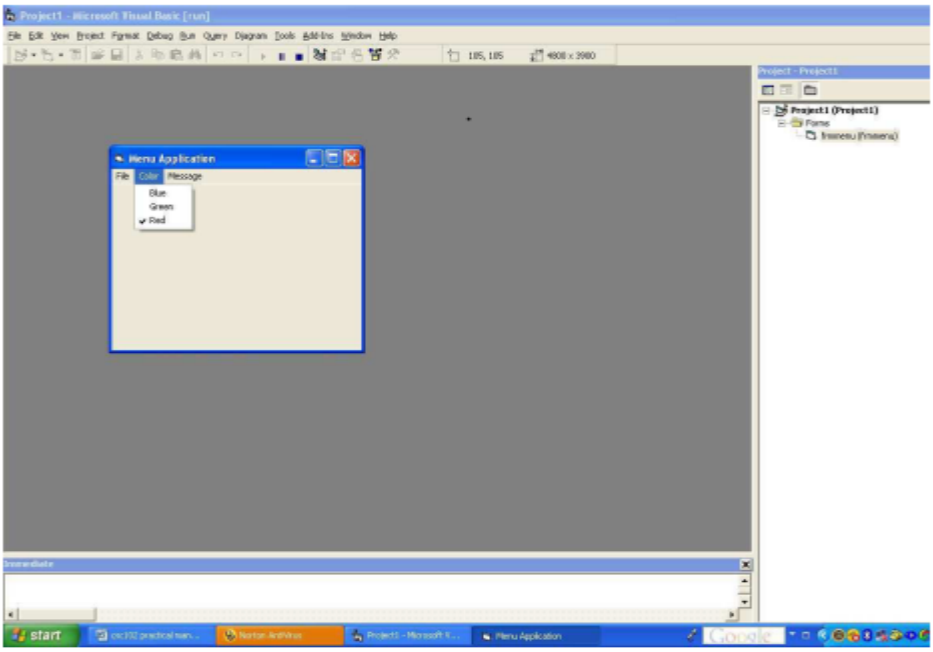


Figure 16: Running Created Menus

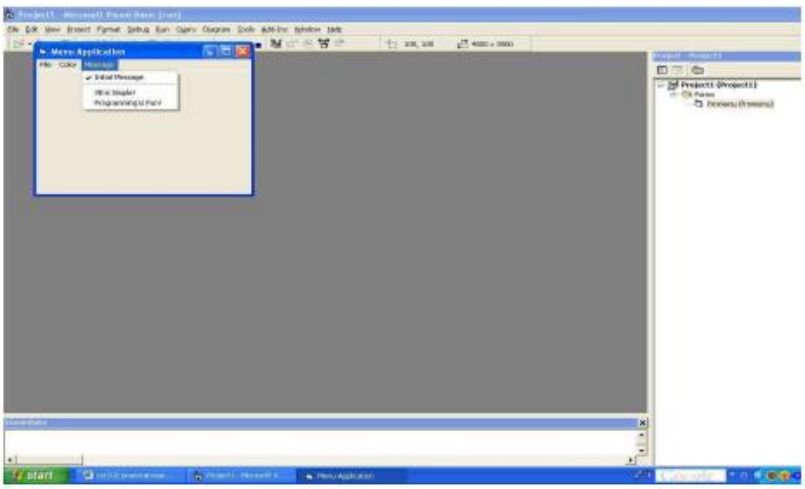


Figure 17: Checked Messages in Running Menus

Follow these steps to do these:

- ► Open the Menu Editor
- ► Click the &Message option in the Menu control list box to highlight that option.
- ► Click the Insert button and right arrow button three times to add three empty rows for the Color menu options.
- ► Highlight the first blank row where you'll add the Blue option.
- ► Type &Blue for the caption and mnuColorBlue in the Name field. When the user first runs the program, the Blue option will be unchecked to indicate that Blue is not currently selected.
- ► Click Next to enter the next option.
- ► Type &Green for the caption and mnuColorGreen in the Name field of the next option.
- ► Click Next to enter the next option.
- ► Type &Red for the caption and mnuColorRed for the name of the next option.
- ► The Red option is to be checked when the user first starts the program. Therefore, click the Checked field to place the check mark next to Red.
- ► Close the Menu Editor and run your application.
- ► To add the Message menu, display the Menu Editor and click the row beneath &Message in the lower half of the Menu Editor to prepare the Menu editor to receive the next option.
- ► Follow the steps as for the Color menu.
- ► To create the separator bar, after entering the first item, click next and type a single hyphen(-) for the caption (all separators bars have this caption). Type mnuMessageSep1 as the separator bar's name.
- ► Fix the other options appropriately and run the application

To finalize the menu with code:

Open the code window and type the code shown in Figures 19 and 20. The code controls the label's colour and contents

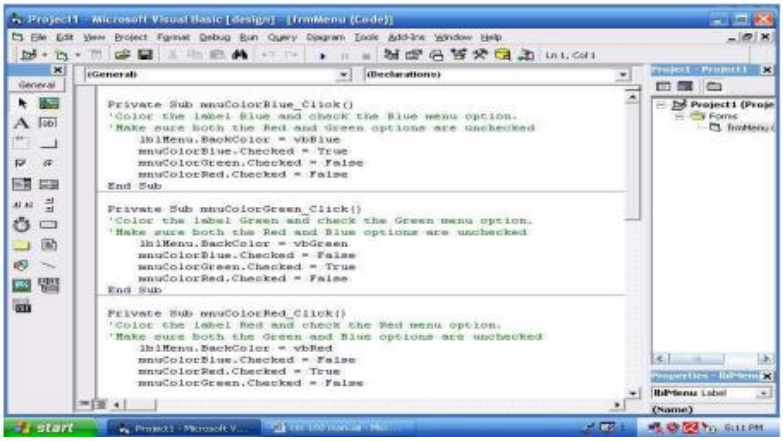


Figure 19: Codes Window in VB

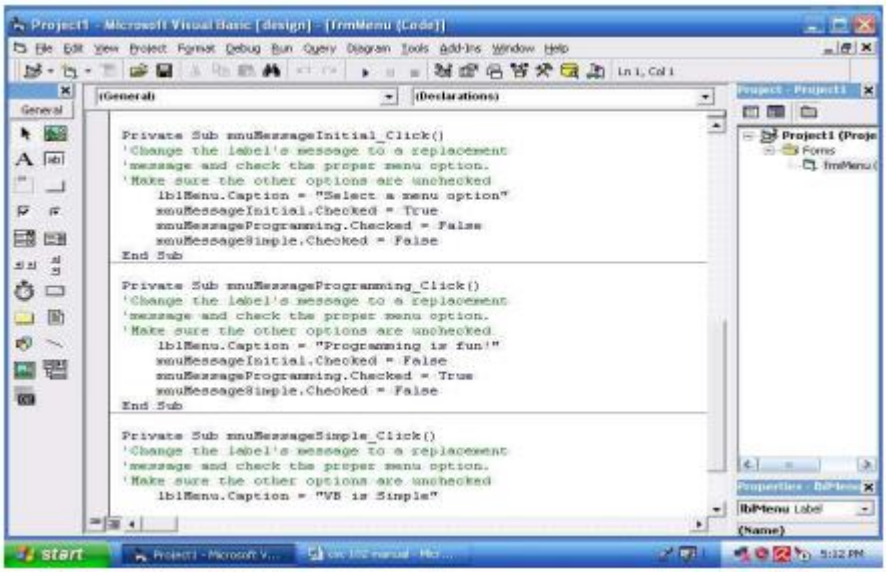


Figure 20: Codes Window in VB

When the application is run, the screens look that those in Figures 21 and 22. For Figure 21, colour blue was selected with the second message “VB is Simple”.

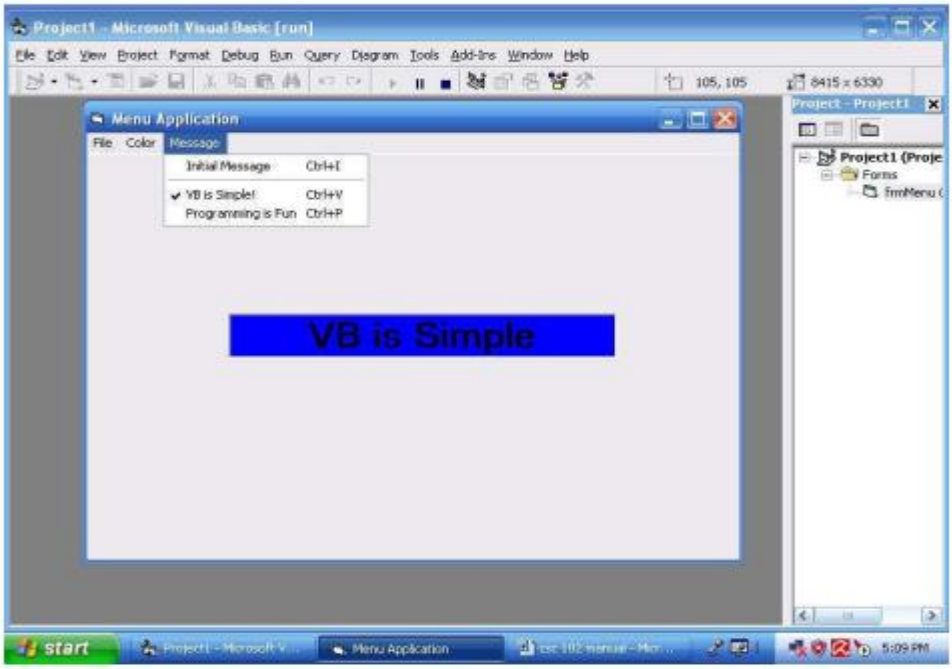


Figure 21:VB Executing Window

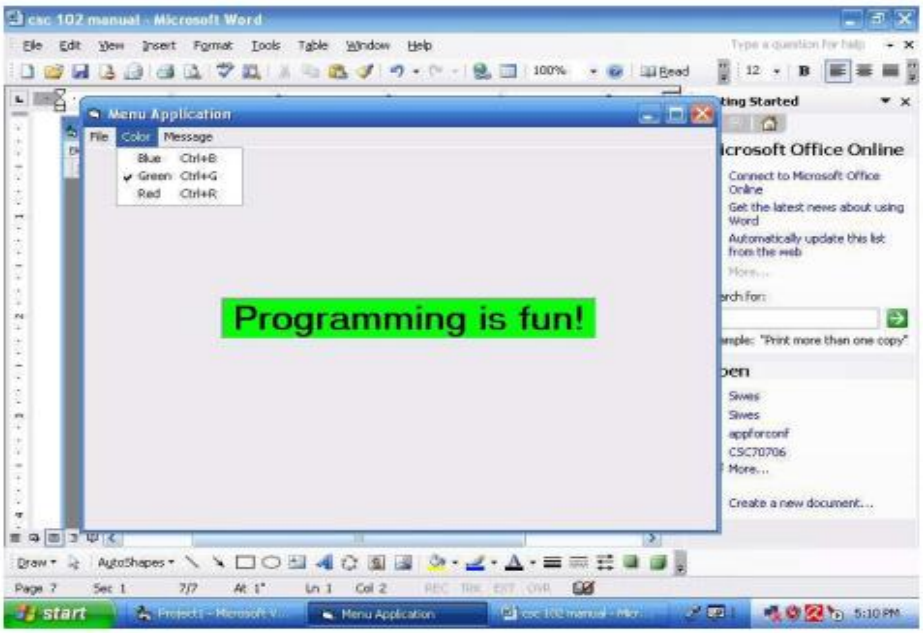


Figure 22: VB Running Window

4.0 Conclusion

Menus make programs interactive and enable programs to be written in modules.

5.0 Summary

In this unit, we have learnt how to create a menu application

6.0 Tutor-Marked Assignment

Enumerate the steps involved in creating a menu application.

7.0 References/Further Reading

Akinyokun, O.C, (1999). *Principles and Practice of Computing Technology*. International Publishers Limited, Ibadan.

Balogun, V.F., Daramola, O.A., Obe, O.O., Ojokoh, B.A. & Oluwadare S.A., (2006).
Introduction to Computing: A Practical Approach. Tom-Ray Publications, Akure.

Francis, S. (1983). *Schaum's Outline Series: Computers and Programming*. Mcgraw-Hill Book Company, Singapore.

UNIT 4 DATA PROCESSING USING VISUAL BASIC

1.0 Introduction

Here, Students will learn more about the Code window, and practice their programming skills on declaration of data, use of variables of different data types and use of operators.

2.0 Learning Outcomes

The objective of this unit is to enable students learn more about the code window and gain mastery of how to operate in the code window.

3.0 Main Content

3.1 Analysing Visual Basic Data Working inside the Code Window

The Code window contains several sections which include:

- The Declarations section
- General-purpose procedures
- Event procedures

Figure 23 shows the declarations sections in the first set of codes. After the first wrapper line, there is an event procedure followed by another one. General-purpose procedures can be meant to perform any kind of function like computing some data, while event procedures will be executed after the clicking of a mouse once or twice, the loading of a form, or any other event.

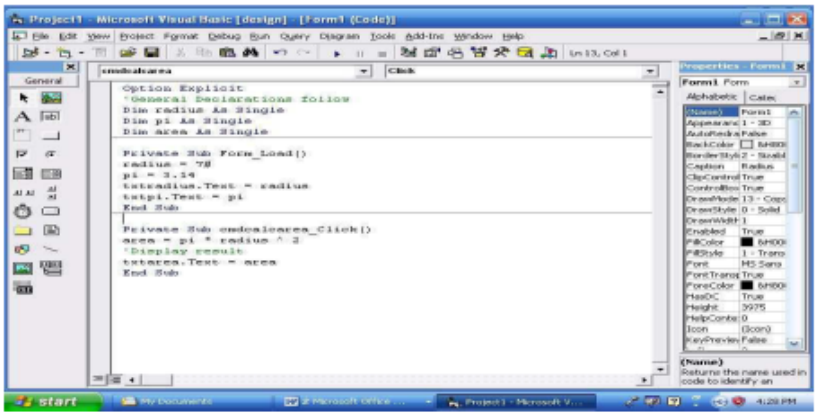


Figure 23: Code declarations sections in VB

The output of the code displayed in Figure 23 is shown in Figure 24.

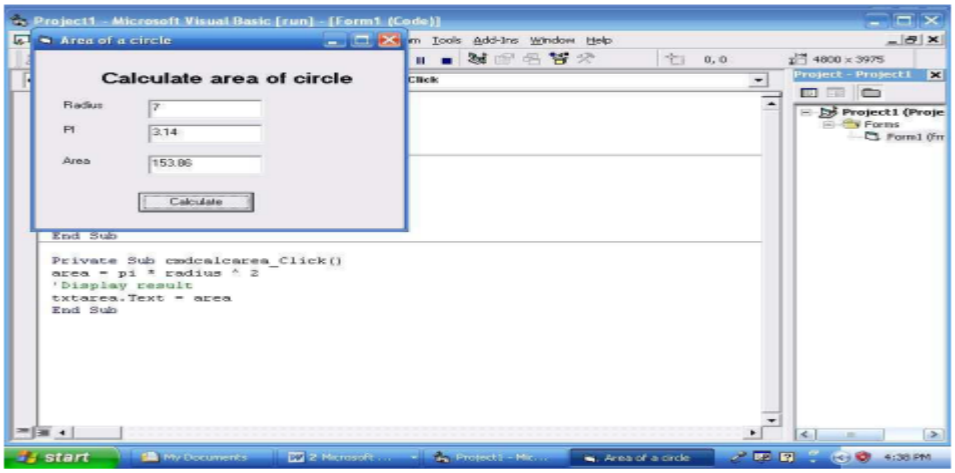


Figure 24: Output Window in VB

More of use of variables together with the control of programs with conditional operators, logical operators and FOR DO loops are described in the Exercises below:

Example 1

Write and Run a Visual Basic Program to solve the Quadratic Equation Problem, ax2+bx+c.

Solution

The codes that provide the solution to the problem using the IF- THEN statement are shown in Figures 25 and 26. This contains statements explaining most of the basic concepts a beginning VB Programmer needs to know. The output of the program is displayed in Figure 27. As it can be seen, key words are in blue, comments are in green while the other codes are in black.

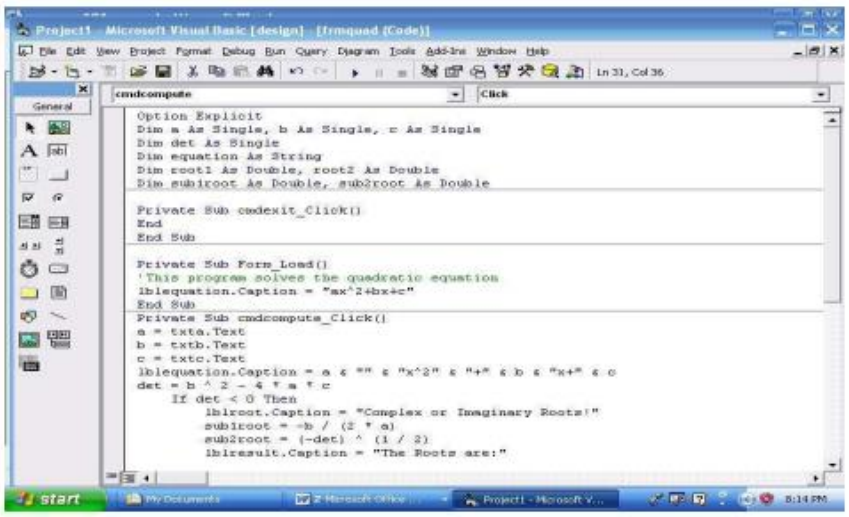


Figure 25: Code for the Problem

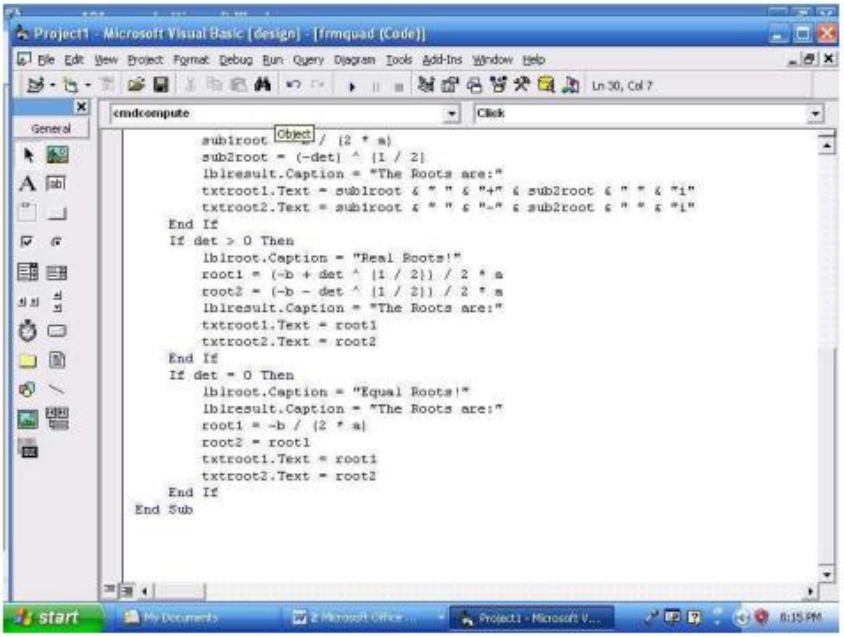


Figure 26: Code for the Exercise

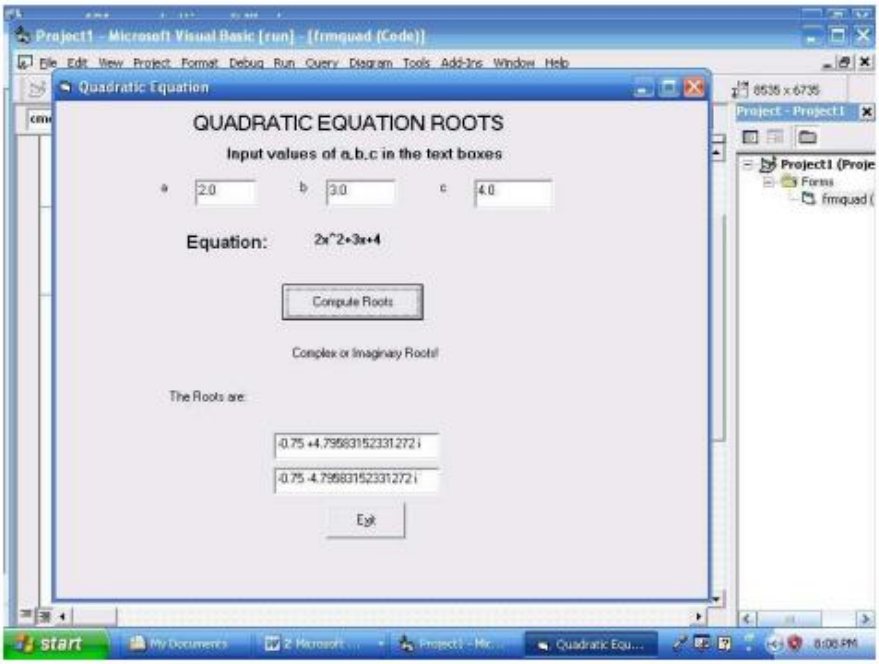


Figure 27: Output Window for the Exercise

Solving the same problem using SELECT CASE statement, we have the codes displayed in Figure 6

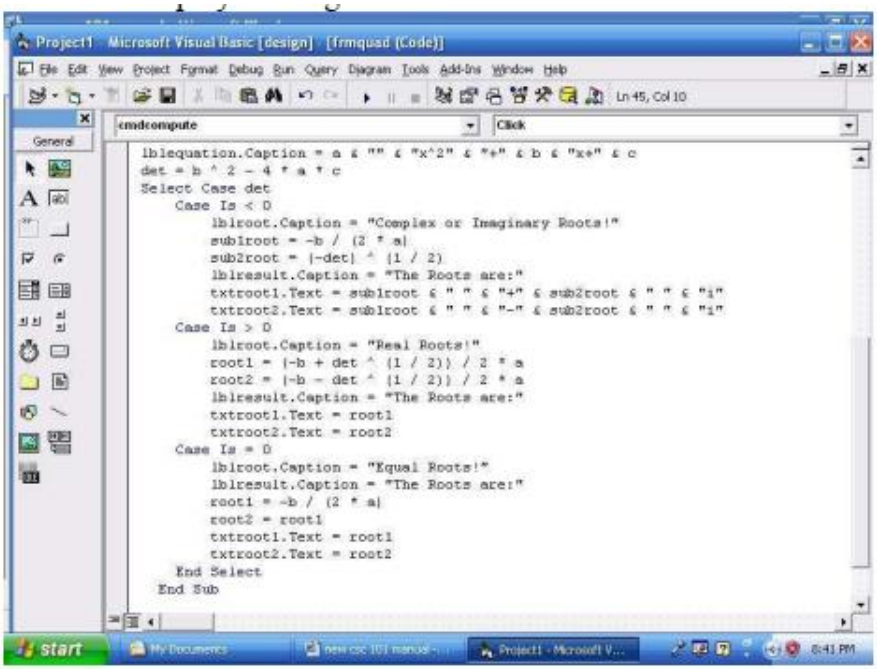


Figure 28: Exercise Solution using Select-Case statement in VB

Example 2

Write and Run a Visual Basic Payroll Program for 10 employees of a company. The Gross pay sums the Basic pay, Housing allowance and Professional allowance (where applicable). Workers' Grade levels range from 1 to 16. Housing allowance of workers is 30% of Basic pay for workers on levels 8-16 and 40% for levels 1-7 workers. Transport allowance is 20% of Basic pay for all workers. Hazard allowance is 15% of Basic pay for only levels 8-16 workers. The Net pay, which is the take home pay, is the Gross pay – Tax (10% of Gross pay). Design a form through which each worker's data can be entered (to look like the one displayed in Figure 29)

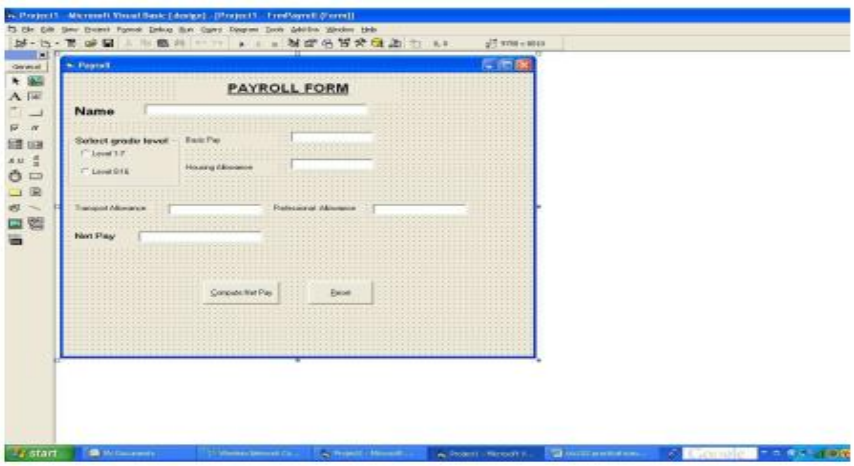


Figure 29: Workers Payroll form in VB

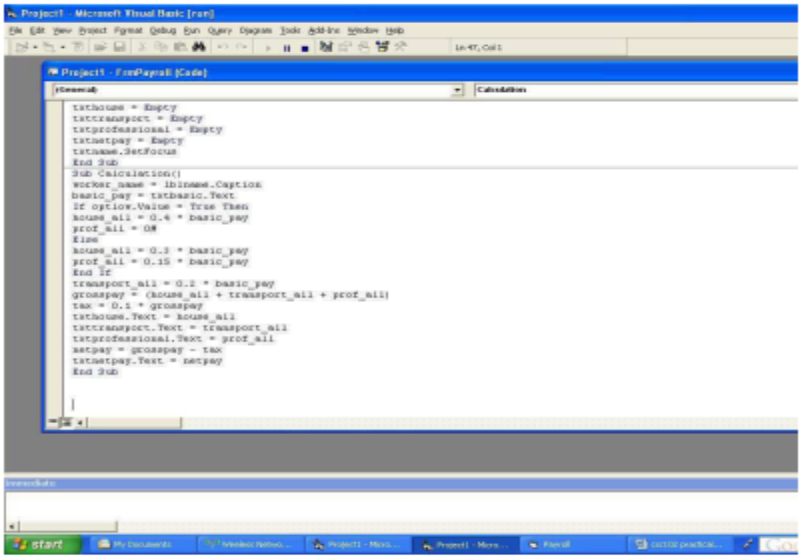


Figure 30: Workers Payroll Application Codes Window in VB

4.0 Conclusion

The code window is very important to visual basic programming. Ability to write good programs depends to a large extent on its mastery.

5.0 Summary

In this unit we have learnt how to program in the code window.:

6.0 Tutor-Marked Assignment

Using the code window, write a program to display the current time.

7.0 References/Further Reading

Akinyokun, O.C, (1999). *Principles and Practice of Computing Technology*. International Publishers Limited, Ibadan.

Balogun, V.F., Daramola, O.A., Obe, O.O., Ojokoh, B.A. & Oluwadare S.A., (2006). *Introduction to Computing: A Practical Approach*. Tom-Ray Publications, Akure.

Francis, S. (1983). *Schaum's Outline Series: Computers and Programming*. Mcgraw-Hill Book Company, Singapore.