CC 102 – FUNDAMENTALS OF PROGRAMMING

Module 1 – Introduction

Module 2 – Fundamentals of Problem Solving and Programming

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MODULE 1 - INTRODUCTION

TOPIC OUTLINE

- Computer Science and Relevant Sciences
- Information and Information Processing
- Computer and its Organization
- Computer Ethics

COMPUTER SCIENCE AND RELEVANT SCIENCES

- **Computer Science:** is the study of computers which includes hardware and software design. It is composed of many broad disciplines such as artificial intelligence and software engineering.
- **Information Technology:** includes the furtherance of computer science and technology and with the design, development, installation and implementation of information systems and applications.
- **Information and Communications Technology:** is an umbrella term that includes any communication device or application, encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as videoconferencing and distance learning.

INFORMATION AND INFORMATION PROCESSING

- The content of human mind can be classified into four categories:
  1. **Data:** consist of raw facts and figures – it does not have any meaning until it is processed and turned into something useful. Example: letter, number, color.
  2. **Information:** is the data that has been processed in such a way as to be useful to the person who receives it.
  3. **Knowledge:** understanding the subject matter that has been acquired through the proper study and experience.
  4. **Wisdom:** the way human being perceived the acquired knowledge.

INFORMATION AND INFORMATION PROCESSING

- **Information Processing:** is the change of information in any manner detectable by an observer.
  - The electronic capture, collection, storage, manipulation, transmission, retrieval and presentation of information in the form of data, text, voice, or image and includes telecommunications and office automation functions.
- **Claudde E. Shannon:** defined information processing as the conversion of latent information into manifest.
- **Karl Steinbuch (1957):** a German computer scientist who coined the term "*informatik*" on his paper *Informatik: Automatische Informationsverarbeitung* (Informatics: automatic information processing).
- **Philippe Dreyfus (1962):** coined the term *informatique*, referring to the application of computers to store and process information.
  - "The term was coined as a combination of information to describe the science of automatic information processing."

COMPUTER AND ITS ORGANIZATION

- **Computer:** any programmable electronic device that can store, retrieve and process data.
- **Generation:** refers to the state of improvement in the development of a product.

COMPUTER AND ITS ORGANIZATION

- Elements of a Computer
  - Hardware
  - Software
  - Peopleware

COMPUTER AND ITS ORGANIZATION

- **Software:** is a general term used to describe a collection of computer programs, procedure and documentation that perform some tasks on a computer system.
- There are three major types of software. These include system software, application software and utility software.
  - **System Software:** is the low – level software required to manage computer resources and support the production and execution of application program. Examples are Operating System, Database Management Software and Development Tools and Programming Language software.
  - **Application Software:** is a software program that perform a specification directly for end – user. Examples are MS Offices, Photo Editing Software and others.
  - **Utility Software:** small program that performs a very specific task such as virus protection and internet browsing. Examples are compression program, antivirus, font, file viewers and others.

COMPUTER AND ITS ORGANIZATION

- **Hardware:** is the physical part of the computer.
- There are three major classification of computer hardware. This includes input, output and storage.
  - **Input:** accepts data from the user. Examples include mouse, keyboard, microphone and others.
  - **Output:** it displays processed information or results. Examples include monitor, printer and speaker.
  - **Storage:** stores data for later retrieval. Examples include flash disk, hard disk and memory card.

COMPUTER AND ITS ORGANIZATION

- **People:** the most important element of a computer system for which they are the one who develop, use and maintain a computer.
- There are two major classification of people namely, expert and novice.
  - **Expert:** these are the user who knows a lot of the technical aspect of a computer system. Examples are programmers, analyst and the like.
  - **Novice:** these are the users who have no or at least a little knowledge about the technical aspect of a computer system. It includes non IT practitioner or equivalent.

COMPUTER ETHICS

- **Ethics:** measures the rightness of one's act.
- It identifies to which extent an action can be considered wrong or right.

COMPUTER ETHICS

1. Thou shalt not use a computer to harm other people.
2. Thou shalt not interfere with other people's computer work.
3. Thou shalt not snoop around in other people's computer files.
4. Thou shalt not use a computer to steal.
5. Thou shalt not use a computer to bear false witness.
6. Thou shalt not copy or use proprietary software for which you have not paid.
7. Thou shalt not use other people's computer resources without authorization or proper compensation.
8. Thou shalt not appropriate other people's intellectual output.
9. Thou shalt think about the social consequences of the program you are writing or the system you are designing.
10. Thou shalt always use a computer in ways that ensure consideration and respect for your fellow human

MODULE 2 – FUNDAMENTALS OF PROBLEM SOLVING AND PROGRAMMING

TOPIC OUTLINE

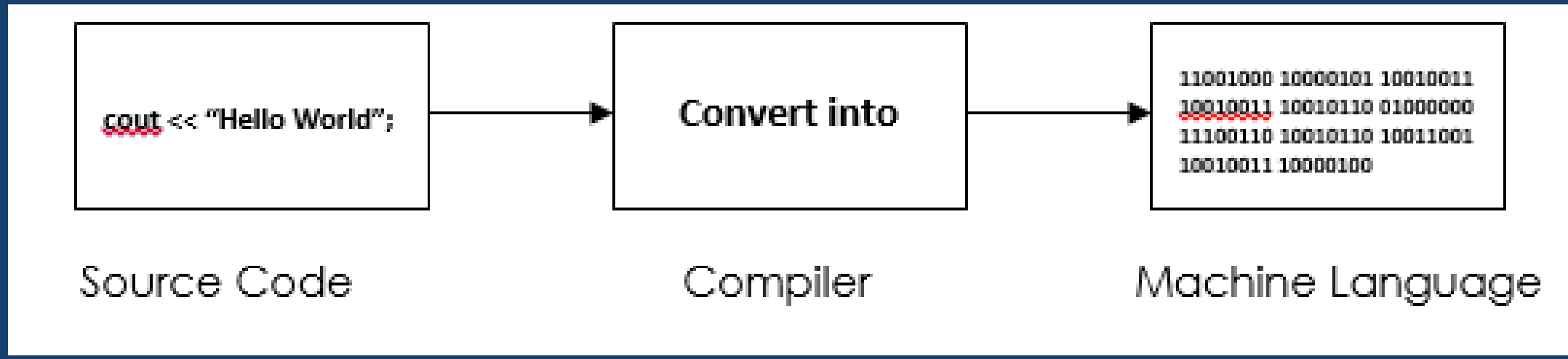
- Computer Program, Compiler, Machine Language and Source Code
- Problem Solving Techniques
- Algorithm and Logic Formulation

COMPUTER PROGRAM, COMPILER, MACHINE LANGUAGE AND SOURCE CODE

- **Computer Program or Program:** sequence of instruction to be performed by a computer.
  - Logical instructions given to a computer for data processing that is interpreted by a compiler to produce useful information.
- **Compiler:** a program which convert the source code into machine language.
- **Machine Language:** a language that can be understood by a computer.
  - Binary version of a character recognized by a computer.

COMPUTER PROGRAM, COMPILER, MACHINE LANGUAGE AND SOURCE CODE

- **Source Code:** a program written in a high level language such as C, C++, Java



PROBLEM SOLVING TECHNIQUES

- Means – Ends Analysis
- Divide and Conquer
- Merging Solution
- Algorithmic Problem Solving Technique

PROBLEM SOLVING TECHNIQUES

- **Means – Ends Analysis**
  - For every problem, there can be more than one solution.
  - Ex. There are so many ways on how you can give me 7 as a result of an equation.
- **Divide and Conquer**
  - A big problem can be solved by identifying its smaller components and solve each component one by one.
  - Ex. Getting the average of two numbers can be solved by getting its sum first and divide the sum by 2.

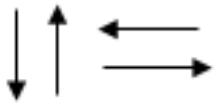
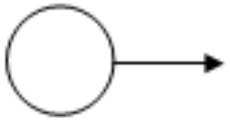
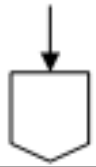
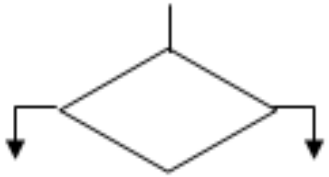
PROBLEM SOLVING TECHNIQUES

- **Merging Solution**
  - Previously solved problems can be used as a basis for solving your current problem.
- **Algorithmic Problem Solving**
  - Provides a step by step solution on how you can solve a problem.

ALGORITHM AND LOGIC FORMULATION

- **Algorithm:** is a step by step procedure in solving a problem.
- Algorithm can be presented in any of the following form.
  - **By words**
    - To present the algorithm in words, we may describe the tasks step by step.
  - **By Flowchart**
    - **Flowchart:** is a visual representation of an algorithm's control flow.
  - **By Pseudocode**
    - **Pseudocode:** is a compact and informal high – level description of a computer programming algorithm that uses the structural conventions of programming languages, but omits detailed subroutines, variable declarations or language specific syntax.

FLOW CHART

SYMBOL	NAME	DESCRIPTION
	**TERMINAL**	Defines the starting and ending point of a flowchart.
	**INITIALIZATION**	The preparation or initialization of memory space for data processing.
	**INPUT / OUTPUT**	The inputting of data for processing, and the printing out of processed data.
	**PROCESS**	Manipulating of data.
	**FLOW LINES**	Defines the logical sequence of the program. It points to the next symbol to be performed.
	**ON – PAGE CONNECTOR**	Connects to the flowchart to avoid spaghetti connection on the same page.
	**OFF – PAGE CONNECTOR**	Connects the flowchart on different page to avoid spaghetti connection.
	**DECISION**	Process conditions using relational operators. Used for trapping and filtering data.