

PROGRAMMING FOR PROBLEM SOLVING -- PPS SUBJECT CODE- BTPS-101-18



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UNIT-1

Topic-
Algorithms, Flowchart and Pseudocode

◦ Problem Solving

To solve problem, the steps in software development lifecycle are:

1.Program Analysis

2.Program Design

3.Program Development

4.Program Documentation and Maintenance

WHAT IS AN ALGORITHM?

- ▶ An algorithm is a set of ordered steps for solving a problem.
- ▶ Examples:
 - An algorithm for preparing breakfast.
 - An algorithm for converting Gregorian dates to Islamic dates.
 - An algorithm for calculating moon phase.
 - An algorithm for drawing a curve.

ALGORITHM IN REAL LIFE

- ▶ Consider the following ...

Problem: Prepare a Coffee

How to solve:

1. Start
2. Heat water in a kettle
3. Add coffee powder in a filter
4. Add boiled water to the filter to avail decoction
5. Boil milk
6. Pour required decoction in a cup, add sugar and boiled milk.
7. Enjoy your coffee
8. End

WHY DO WE NEED TO BUILD ALGORITHMS?

- ▶ If we wish to build a house, we need to design it first.
 - Can you think of some possible consequences of not designing a house before building it?
- ▶ Similarly, computer programs (especially large and complex ones) need to be designed before they are written.
 - Can you think of some possible consequences of not designing a program before building it?
- ▶ One of the things considered when designing a computer program is the algorithm which it will be based on.

ALGORITHMS IN PROGRAM DESIGN

- ▶ A computer program is built to solve a certain problem.

Examples:

1. A program to calculate the grade obtained given a mark.
2. A program to convert a degree into fahrenheit
3. A program to produce a document.

ALGORITHMS IN PROGRAM DESIGN

- ▶ Below are steps (in fact, an algorithm) for building a program to solve a particular problem:
 - Analyse the problem
 - Design a computer solution to the problem by developing an algorithm.
 - Write a computer program based on the algorithm.
 - Test the program.

HOW TO SPECIFY AN ALGORITHM?

- ▶ An algorithm must be specific enough so that it can be conveniently translated into a computer program (using C, for example).
- ▶ An algorithm can be specified:
 - Textually
For example, using pseudo code
 - Graphically
For example, using flowcharts or UML activity charts

Algorithm

To find sum of two numbers

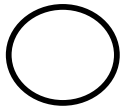
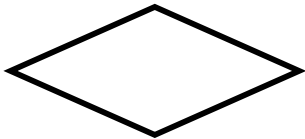
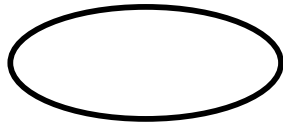
- ▶ Start the program
- ▶ Read two numbers
- ▶ Add the two numbers and store in a resultant variable sum
- ▶ Display the sum
- ▶ End the program

FLOWCHARTS

- ▶ A flowchart is a graphical representation of the sequence of operations in a program.
- ▶ An algorithm can be represented graphically using a flowchart.

Flowchart notations

Symbol



Semantic

Start/End

Process

Input/Output

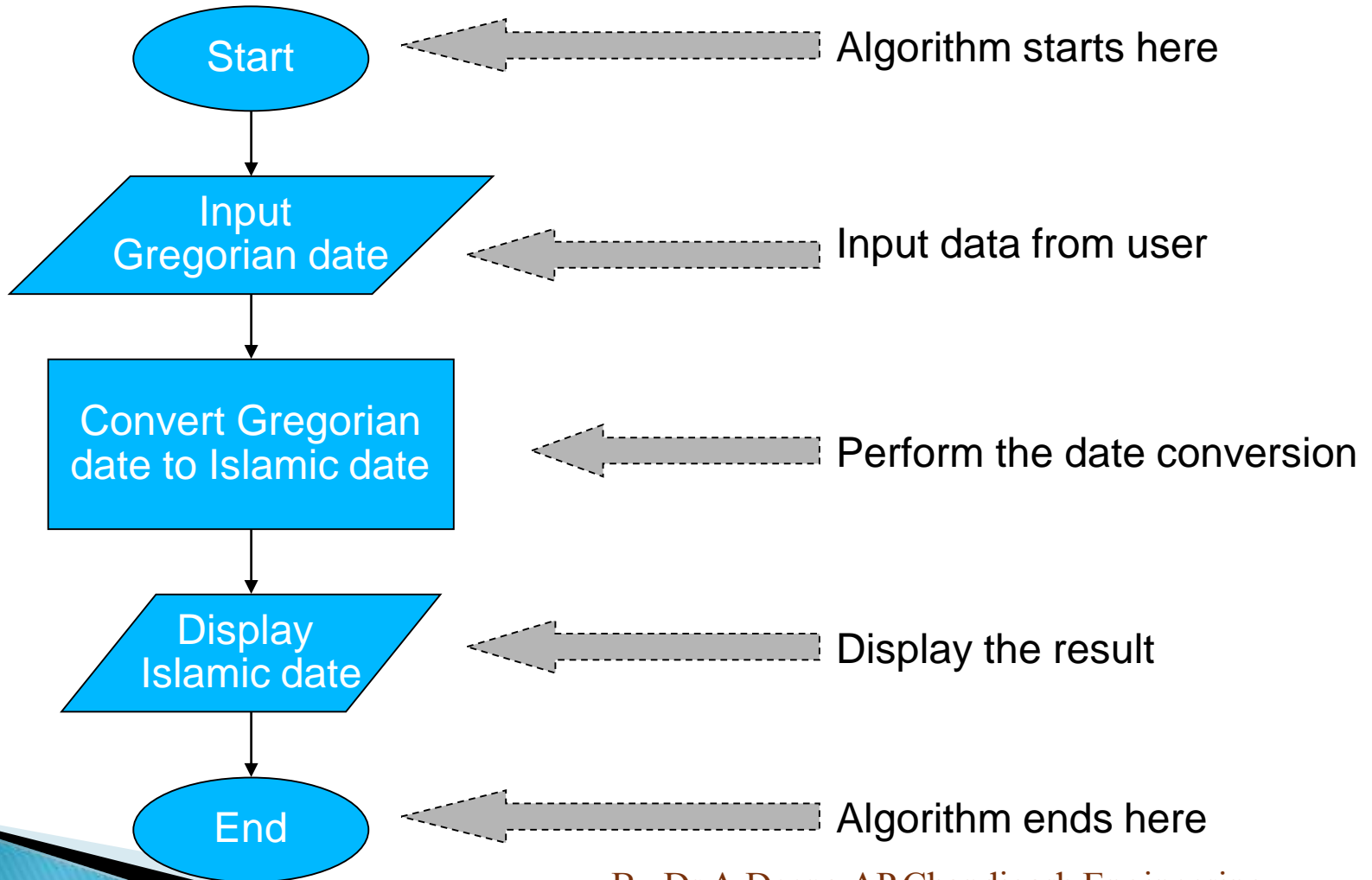
Test

Connector

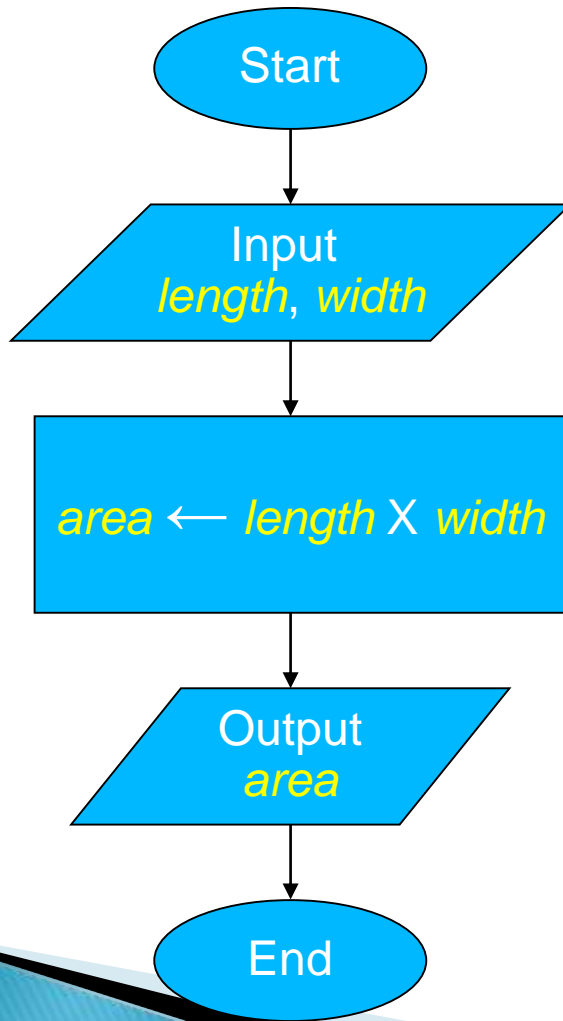
Flow of activities

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FLOWCHART: EXAMPLE 1



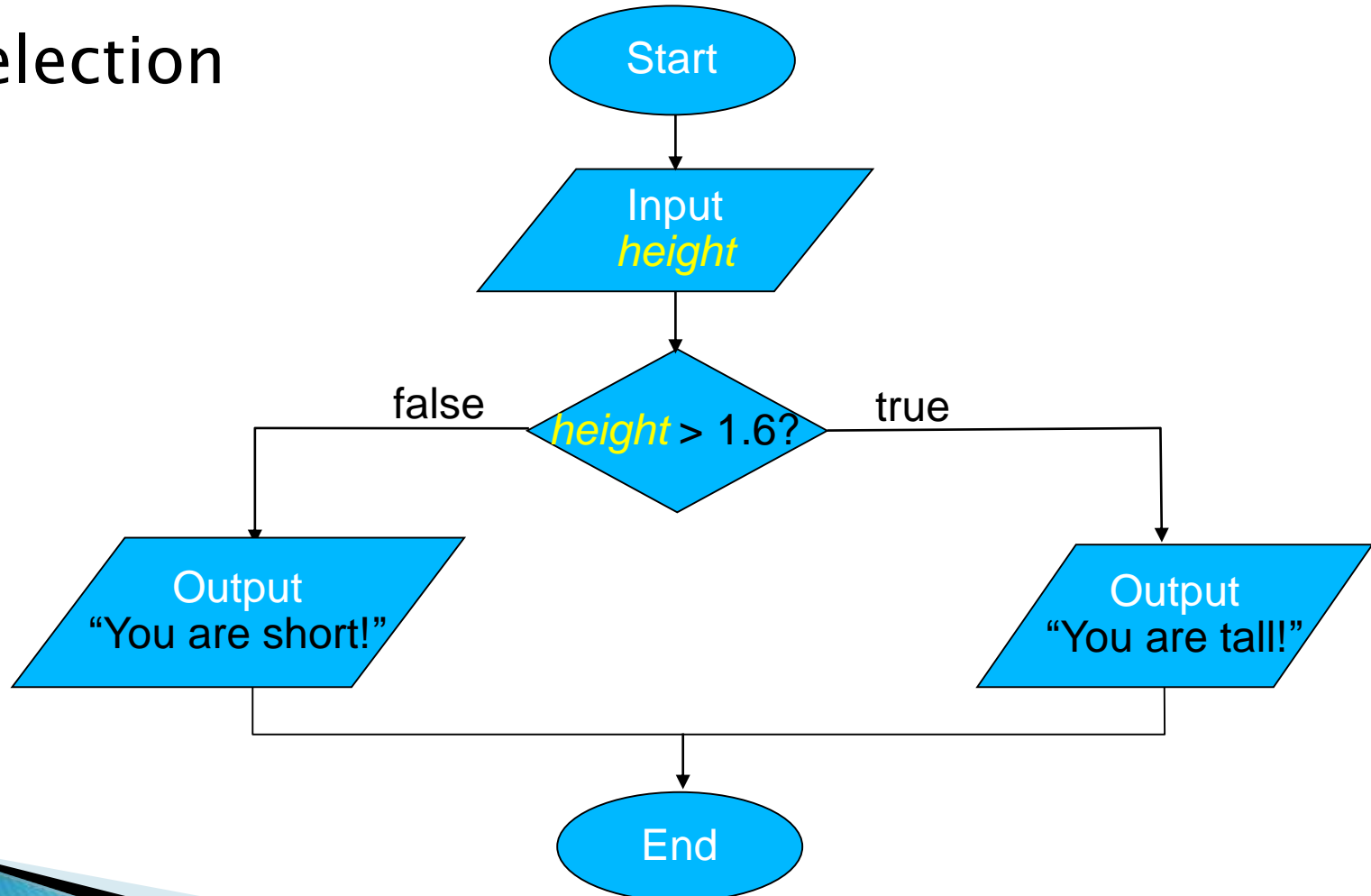
FLOWCHART: EXAMPLE 2



- **length**, **width** and **area** are referred to as variables.
- A variable is like a box in which a value can be stored

FLOWCHART: EXAMPLE 3

► Selection



Pseudocode

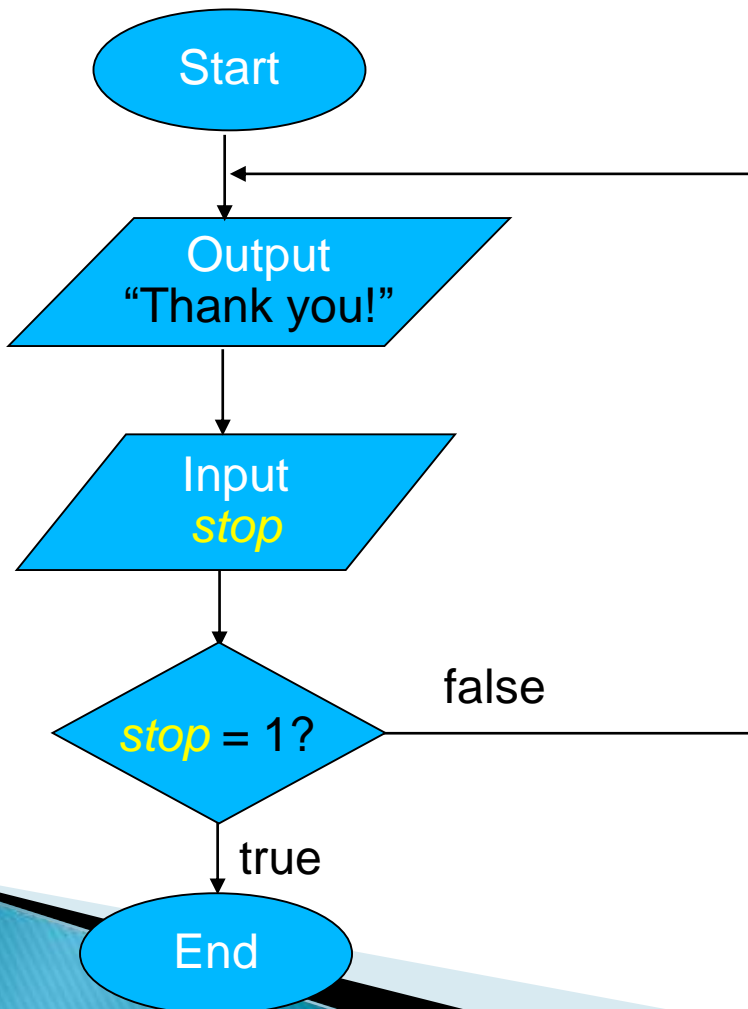
- ▶ An outline of a program, written in a form that can easily be converted into real programming statements. It resembles the actual program that will be implemented later. However, it cannot be compiled nor executed.
- ▶ Pseudocode normally codes the following actions:
 - Initialisation of variables
 - Assignment of values to the variables
 - Arithmetic operations
 - Relational operations

Example of Pseudocode

1. Start
2. Read `quantity`
3. Read `price_per_kg`
4. `price` \leftarrow `quantity` * `price_per_kg`
5. Print `price`
6. End

FLOWCHART: EXAMPLE 4

▶ Repetition (looping)



Covered Today...

- ▶ what an algorithm is.
- ▶ when an algorithm should be developed when building a computer program.
- ▶ the basic steps in building a computer program to solve a problem.
- ▶ what flowcharts are.
- ▶ how to represent algorithms graphically using flowcharts.

Homework for Today...

- ▶ Write an algorithm, pseudocode and flowchart to find greatest of three given numbers.

Thank You

Queries????