Computer Science Department

Lesson 1 from

PROGRAMMING FUNDAMENTALS

First Class

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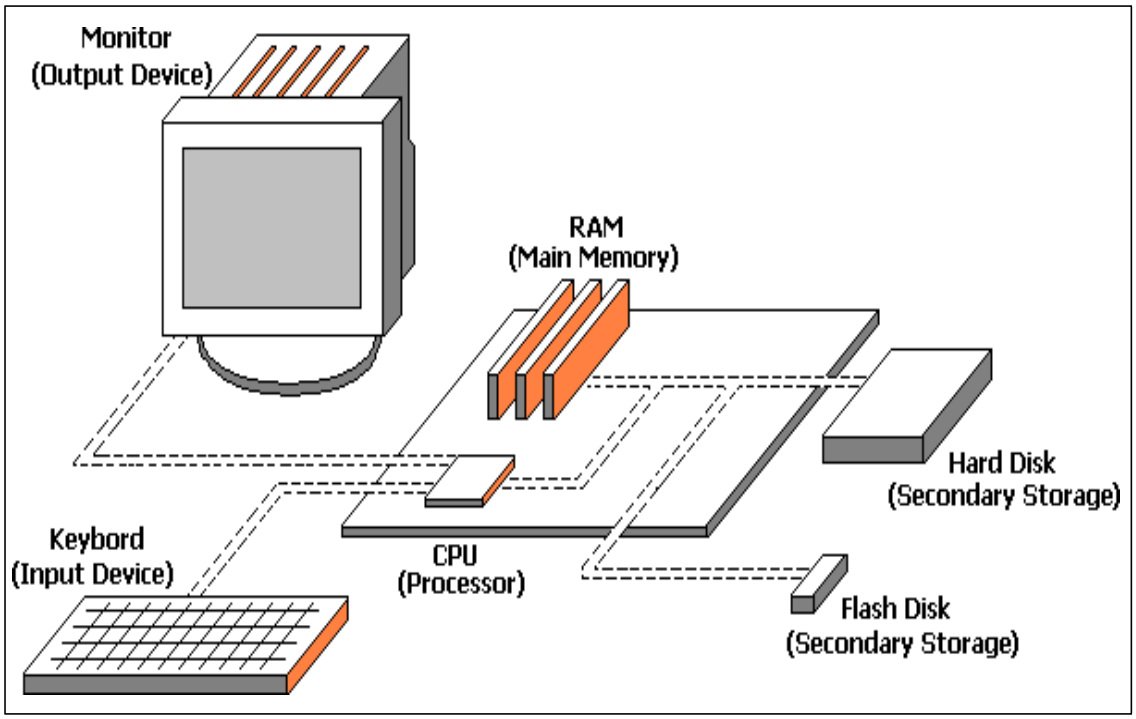
1. Introduction:



Hardware Components

A computer is a device capable of performing computations and making logical decisions at speeds millions and even billions of times faster than human beings.

Computers process data under the control of sets of instructions called computer programs.

Programming is the process of writing instructions for a computer in a certain order to solve a problem.

The computer programs that run on a computer are referred to as **software(SW)**. While the hard component of it is called **hardware** (HW).
Developing new software requires written lists of instructions for a computer to execute. Programmers rarely write in the **language** directly understood by a computer.

2. Algorithm:

To write a logical step-by-step method to solve the problem is called algorithm, in other words, an algorithm is a procedure for solving problems. In order to solve a mathematical or computer problem, this is the first step of the procedure. An algorithm includes calculations, reasoning and data processing. Algorithms can be presented by natural languages, pseudo code, etc.

In programming, algorithm are the set of well-defined instruction in sequence to solve a program. An algorithm should always have a clear stopping point.

Algorithm properties:

1. Inputs and outputs should be defined precisely.
2. Each steps in algorithm should be clear and unambiguous.
3. Algorithm should be most effective among many different ways to solve a problem.
4. An algorithm shouldn't have computer code. Instead, the algorithm should be written in such a way that, it can be used in similar programming languages.

Examples of Algorithms in Programming

Example 1:

Write an algorithm to add two numbers entered by the user.

Step 1: Start

Step 2: Declare variables num1, num2 and sum.

Step 3: Read values num1 and num2.

Step 4: Add num1 and num2 and assign the result to the sum.

sum←num1+num2

Step 5: Display sum

Step 6: Stop

Example 2:

Write an algorithm to find the largest among three different numbers entered by user.

Step 1: Start

Step 2: Declare variables a,b and c.

Step 3: Read variables a,b and c.

Step 4: If a>b

    If a>c

      Display a is the largest number.

    Else

      Display c is the largest number.

  Else

    If b>c

      Display b is the largest number.

    Else

      Display c is the greatest number.

Step 5: Stop

3. Flowcharts

A flowchart is a graphical representation of an algorithm or of a portion ofan algorithm. Flowcharts are drawn using symbols. The main purpose ofa flowchart is to analyze different processes. The main symbols used to drawa flowchart are shown in the following figures.

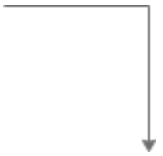
- Terminal Box - Start / End

- Input / Output

- Process / Instruction

- Decision

- Connector / Arrow



Example 1:

Algorithm: Print numbers from 1 to 20:

Step 1: Start

Step 2: Initialize X as 0

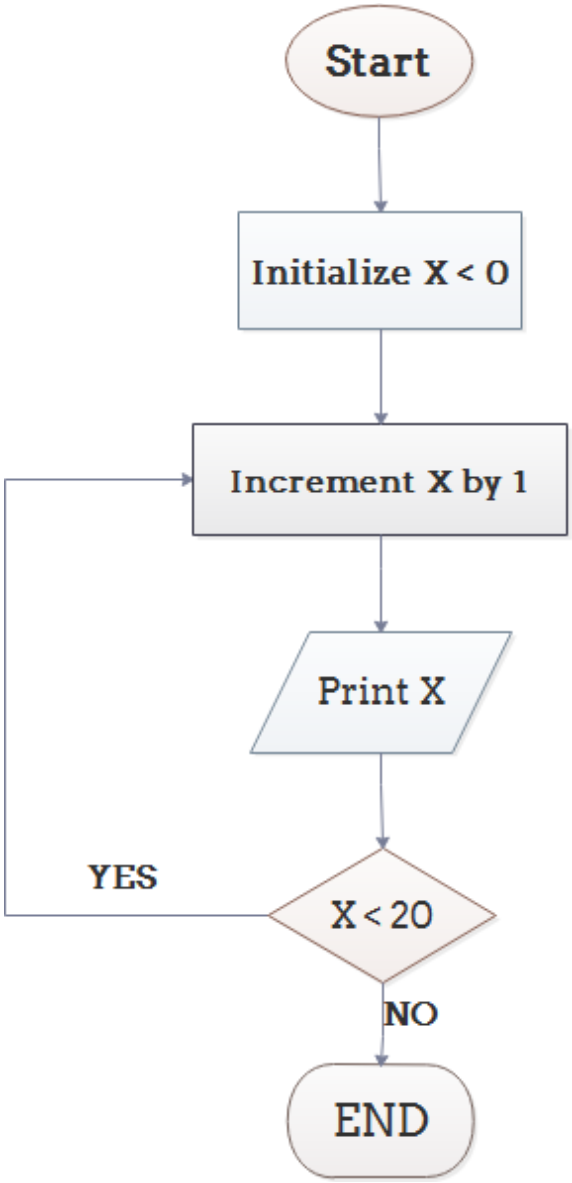
Step 3: Increment X by 1

Step 4: Print X

Step 5: If X is less than 20 then go back to step 3

Step 6: Stop

Flowchart:



Example 2:

Algorithm: Convert Temperature from Fahrenheit (°F) to Celsius (°C)

Step 1: Start

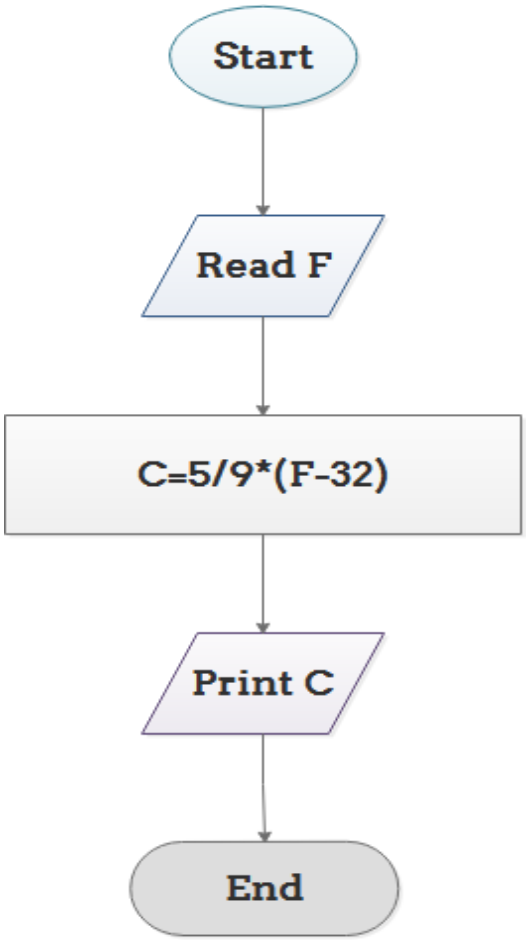
Step 2: Read the temperature in Fahrenheit

Step 2: Calculate temperature with formula C=5/9*(F-32)

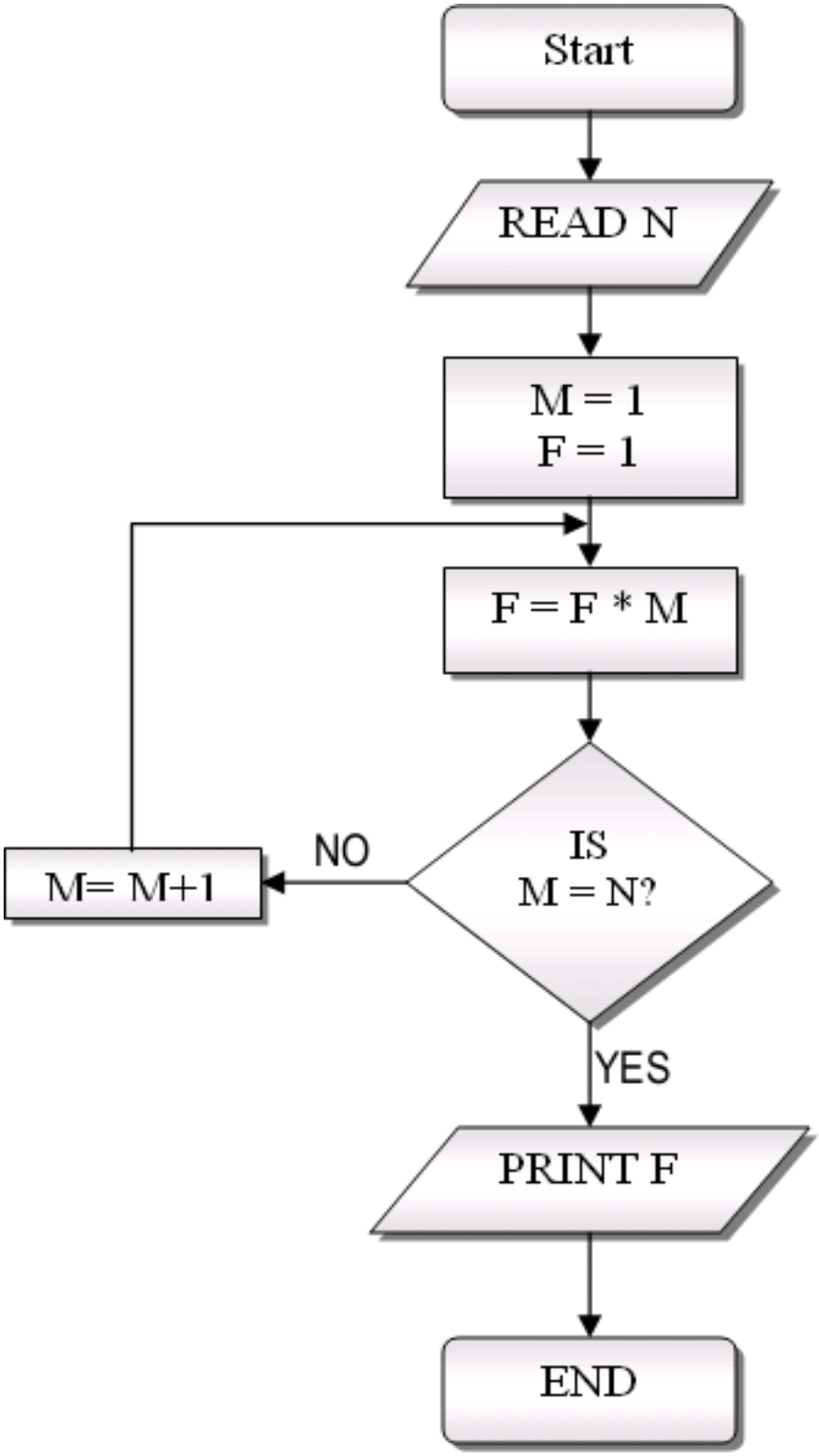
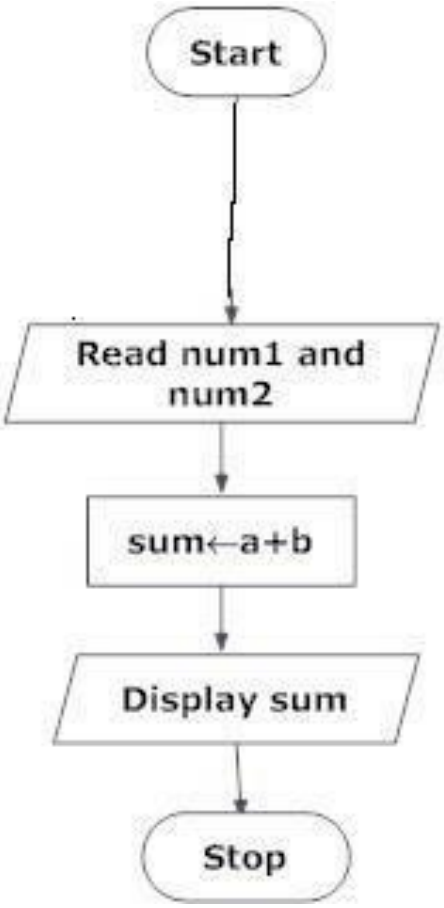
Step 3: Print C

Step 4: Stop

Flowchart:



Example 3:



Example 4: