CS1002 – Programming Fundamentals

Lecture # 04
FALL 2023
FAST – NUCES, Faisalabad Campus

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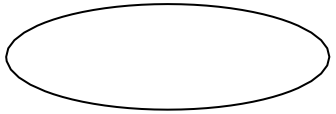
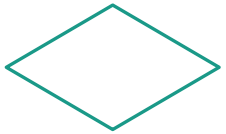
Introduction to Flowcharts

Name	Symbol	Use in flowchart
Oval		Denotes the beginning or end of the program
Parallelogram		Denotes an input
Rectangle		Denotes a process to be carried out (e.g. addition, subtraction etc.)
Diamond		Denotes a decision (or branch) to be made. The program should continue along one of two routes. (e.g. IF/THEN/ELSE)
Flow Line		Denotes the direction of logic flow in the program
Off-page Connector		Denotes the connection of flow chart elements across pages

The Flowchart

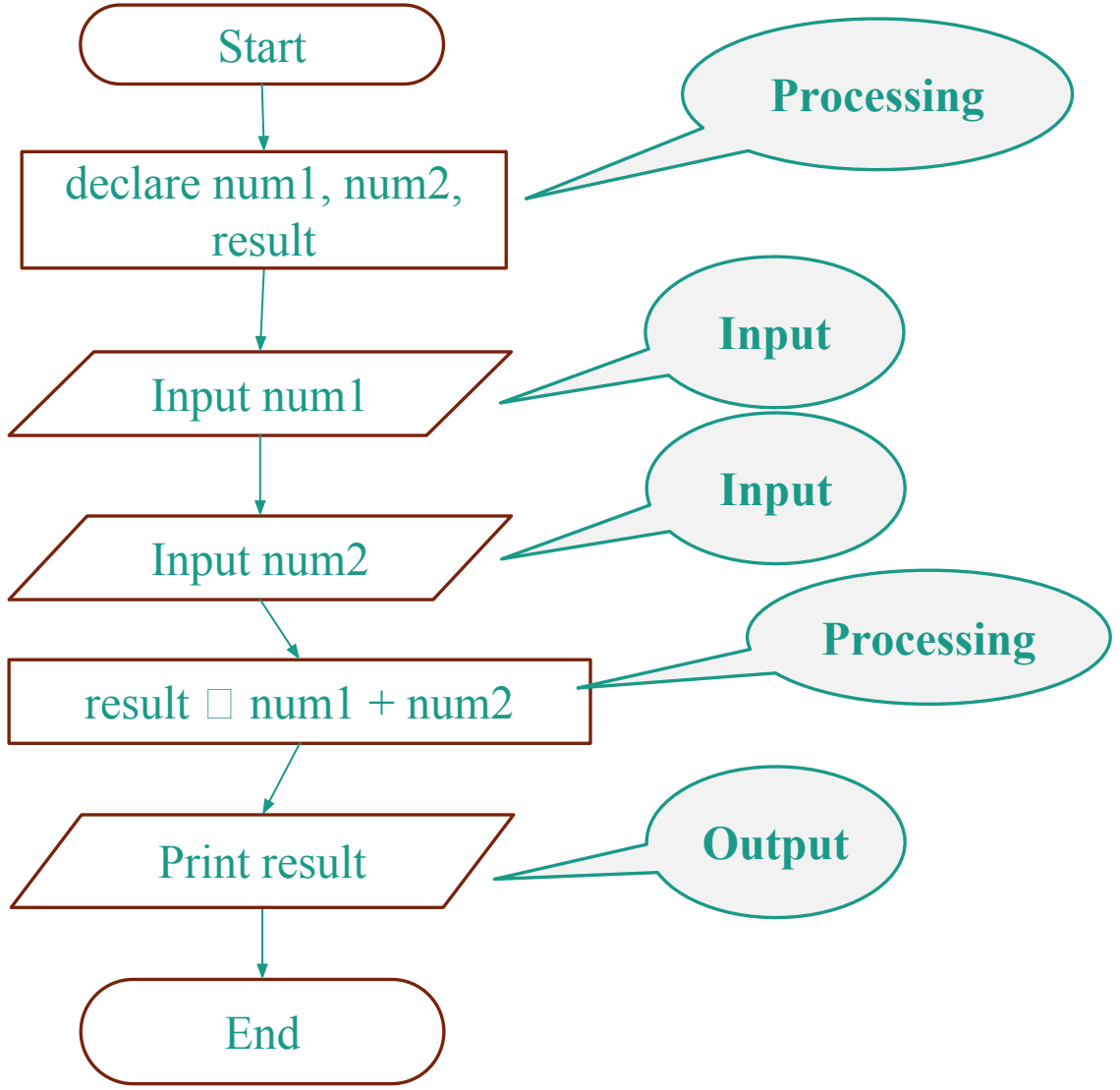
- **Dictionary Definition:** A schematic representation of a sequence of operation, as in a manufacturing process or computer program
- **Technical Definition:** A graphical representation of the sequence of operations in an information system or program
  - **Program flowcharts:** show the sequence of instructions in a single program or subroutine
- Different symbols are used to draw each type of flowchart

The Flowchart

- A flowchart
  - Shows logic of an algorithm
  - Emphasizes individual steps and their interconnections
  - E.g. control flow from one action to another

Example 1 (Pseudo code)

1. Start
2. declare num1, num2, result
3. input num1
4. input num2
5. results □ num1 + num2
6. Print results
7. End

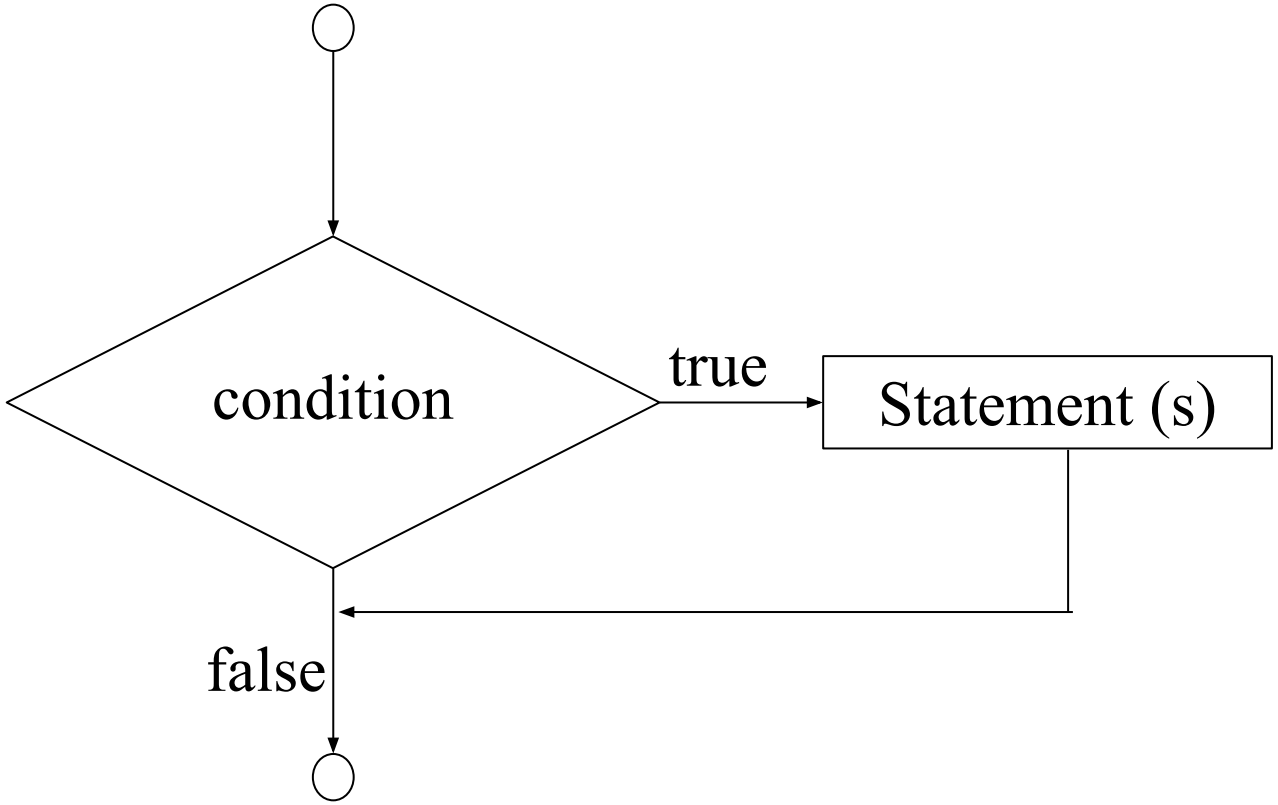


Class Task

- Draw flow chart for the following task
- Take 3 numbers from the user and print the average and sum of these three numbers

If selection structure

- Generic Format



A decision can be made on any expression.

zero - **`false`**

nonzero - **`true`**

Example:

`3 - 4` is **`true`**

if Selection Structure

Translation into Algorithm

If student's grade is greater than or equal to 60

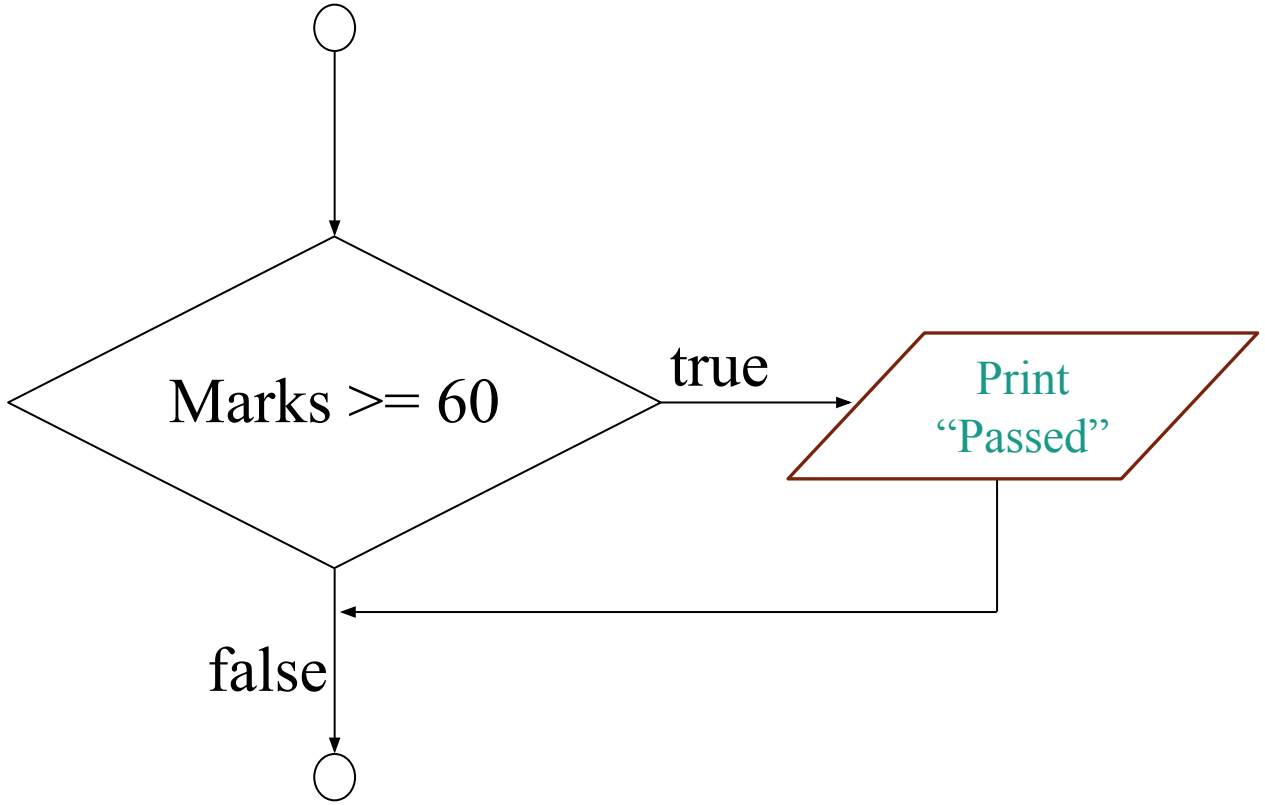
Print "Passed"

```
if ( marks >= 60 )
    print "Passed";
```

- **Diamond symbol (decision symbol)**
  - Indicates decision is to be made
  - Contains an expression that can be true or false
    - Test condition, follow path
- **if structure**
  - Single-entry/single-exit

if Selection Structure

- Flowchart of pseudocode statement



A decision can be made on any expression.

zero - **`false`**

nonzero - **`true`**

Example:

`3 - 4` is **`true`**

Example 2: Flow chart

Pseudocode:

1.0 Start

2.0 Declare M1, M2, M3, M4, average

3.0 Input M1, M2, M3, M4

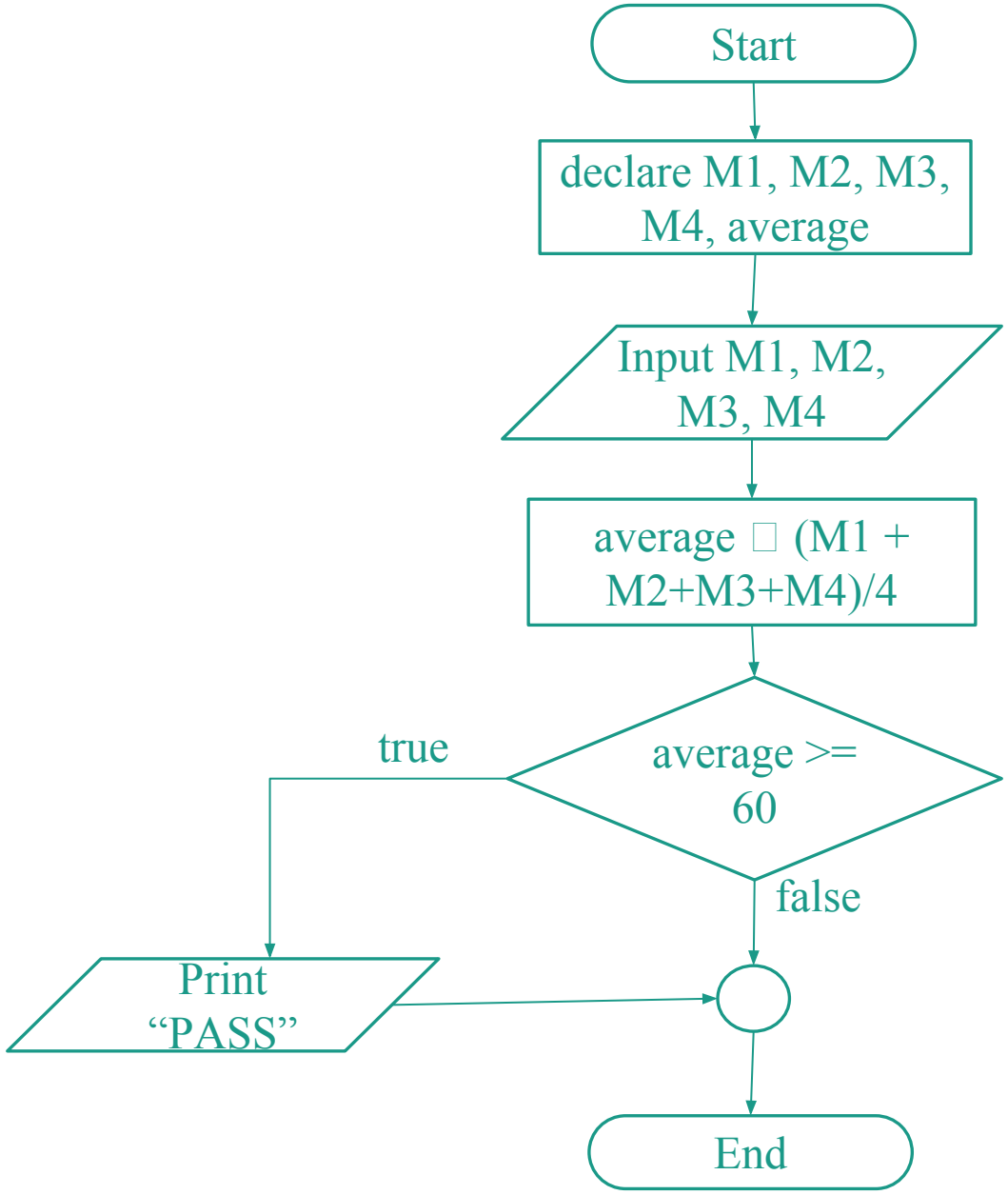
4.0 average = (M1+ M2+ M3+ M4) / 4

5.0 if (average > 50) then

    5.1 Print “PASS”

6.0 endif

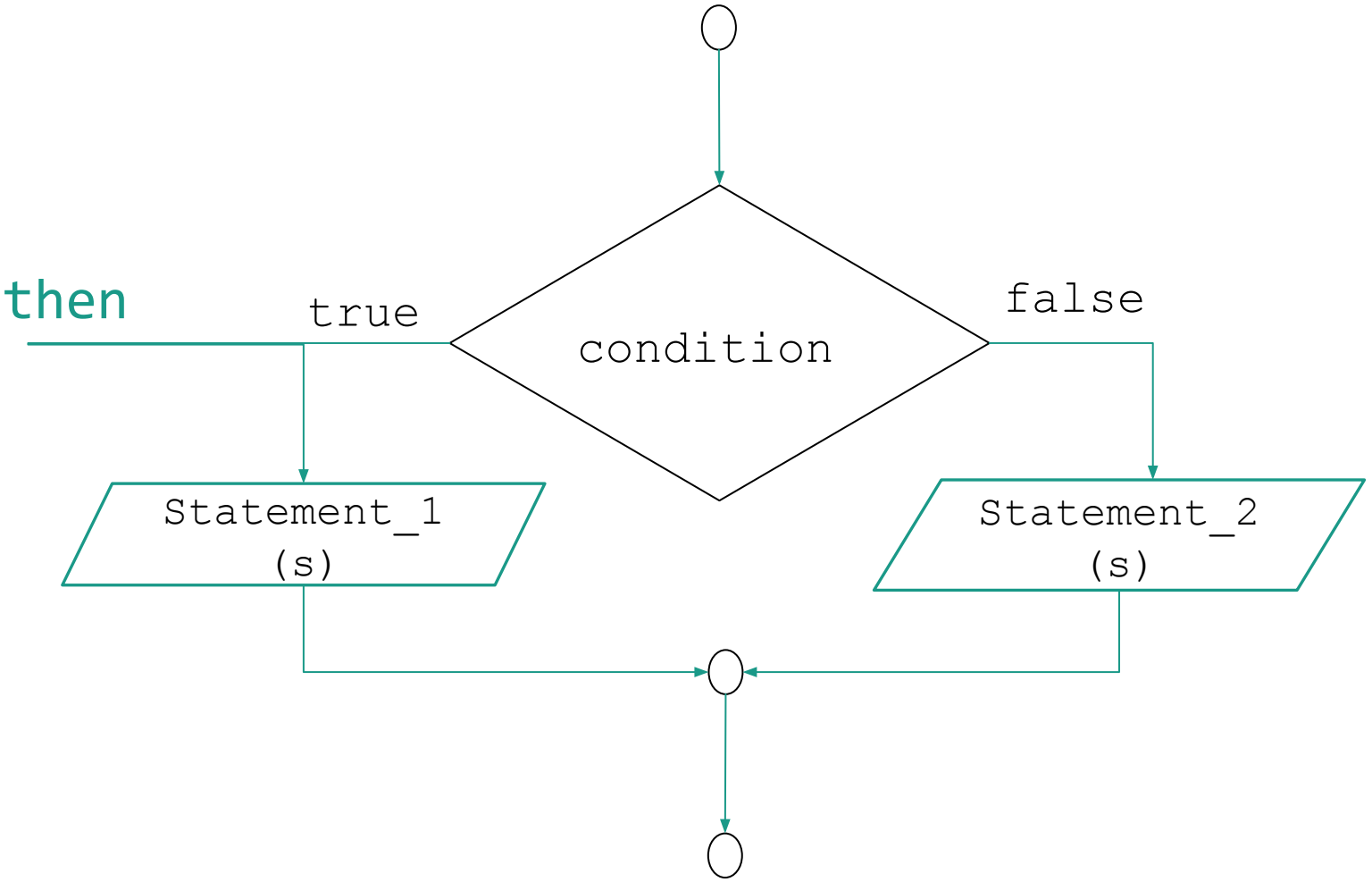
7.0 End



if/else Selection Structure

- **General Structure**

```
if condition is met then
   statement_1 (s)
else
   statement_2 (s)
endif
```



if/else Selection Structure

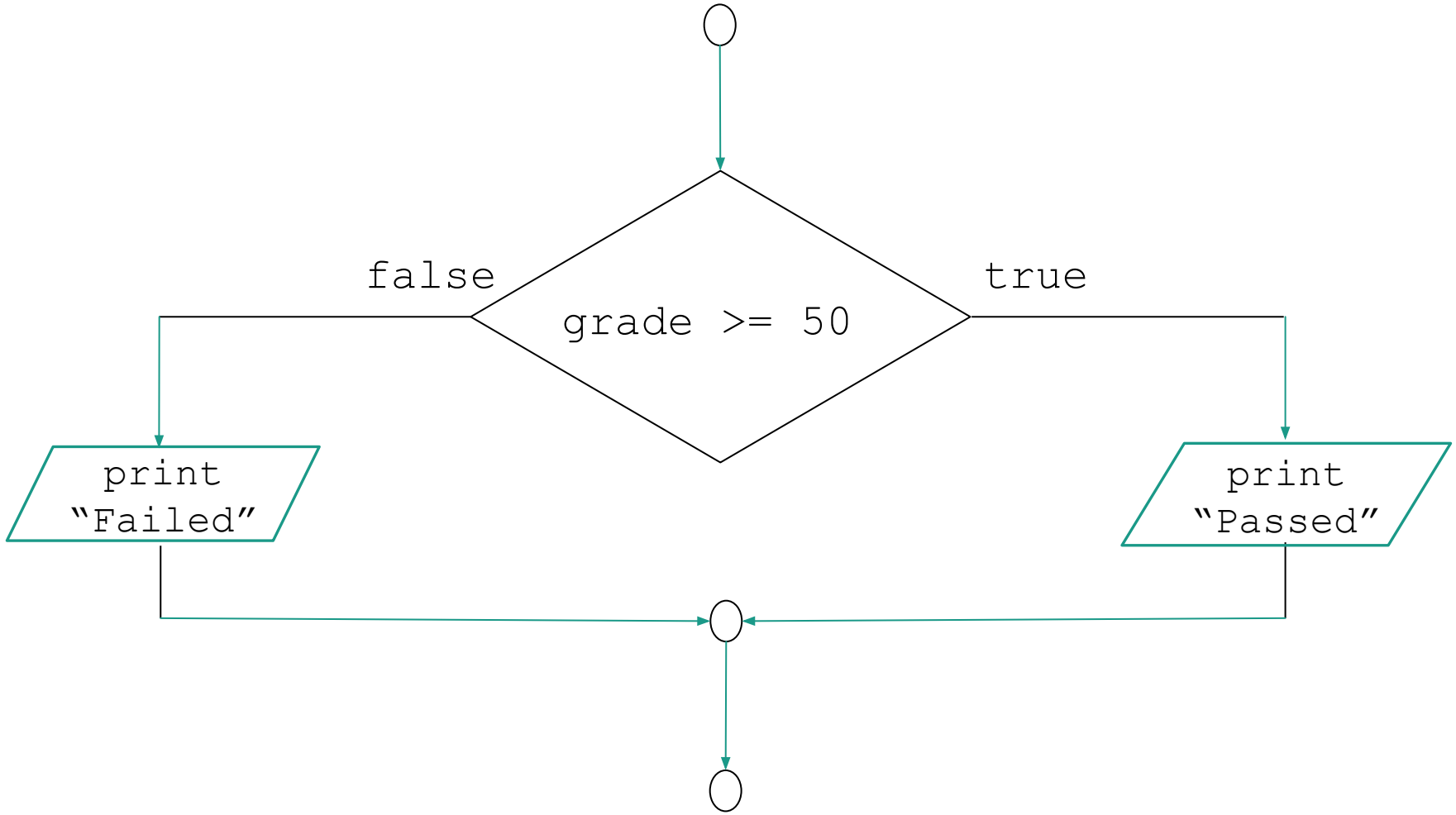
- if
  - Performs action if condition true
- if/else
  - Different actions if conditions true or false

Pseudocode

```
if student's grade is greater than or equal to 60
        print "Passed"
else
        print "Failed"
```

```
if ( grade >= 50 )
        Print "Passed";
else
        Print "Failed";
```

if/else Selection Structure



Example 3: Flow chart

Pseudocode:

1.0 Start

2.0 Declare M1, M2, M3, M4, average

3.0 Input M1, M2, M3, M4

4.0 average = (M1+ M2+ M3+ M4) / 4

5.0 if (average >= 50) then

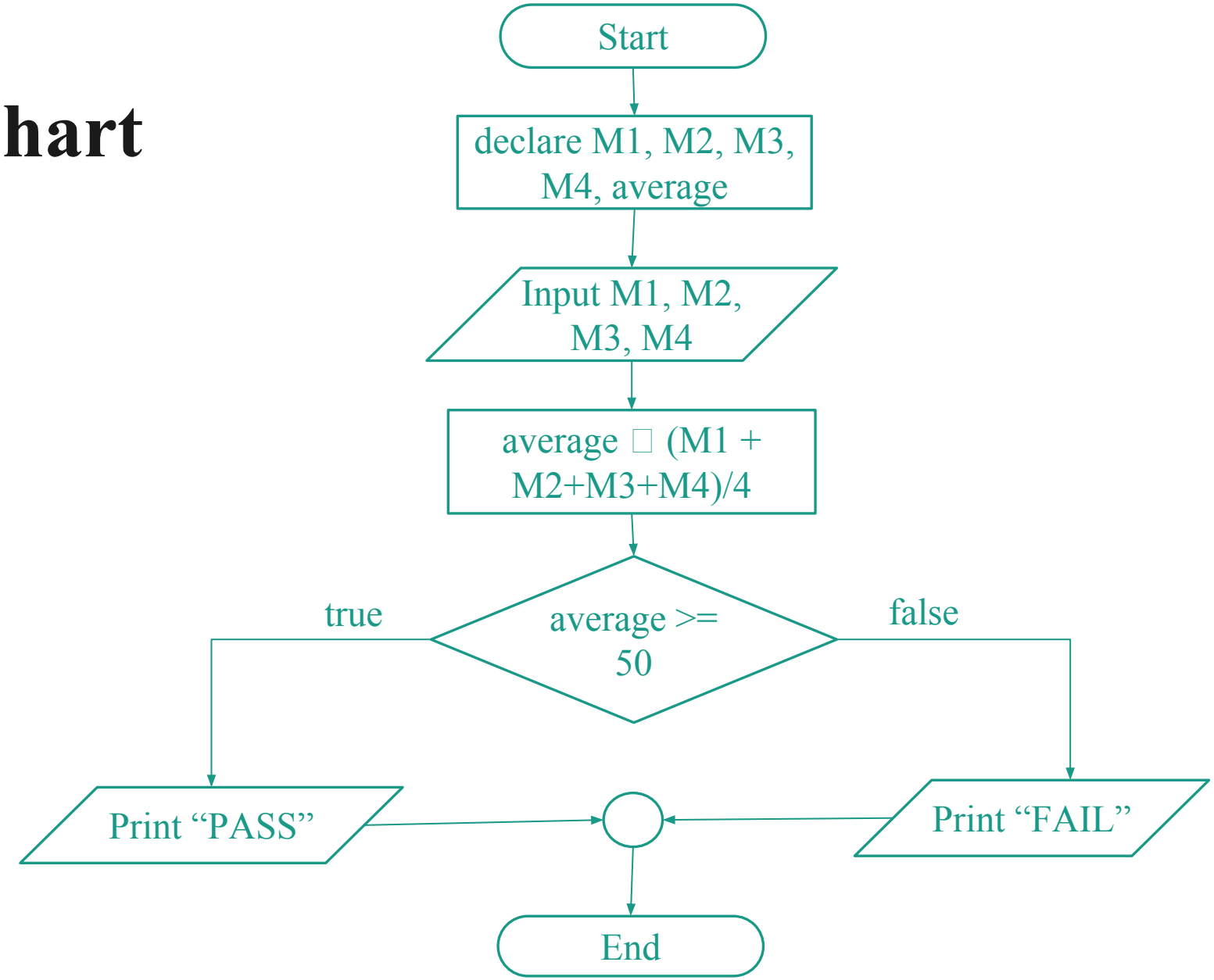
    5.1 Print “PASS”

6.0 else

    6.1 Print “FAIL”

7.0 endif

8.0 End



Example 4

- Write a pseudocode and draw a flowchart to convert the length in feet to centimeter
- Algorithm:
  - Input the length in feet (L*ft*)
  - Calculate the length in cm (L*cm*) by multiplying L*ft* with 30
  - Print length in cm (L*cm*)

Example 5

- Draw a flowchart to calculate area of a rectangle
- The program should ask the user to input Length and Width and then display the Area.
- Area = Length * Width

Example 6

Draw a flowchart that reads two values, determines the largest value and prints the largest value with an identifying message

Pseudocode

1.0 Declare VALUE1, VALUE2, MAX

2.0 Input VALUE1, VALUE2

3.0 if (VALUE1 > VALUE2) then

3.1 MAX □ VALUE1

4.0 else

4.1 MAX □ VALUE2

5.0 end if

6.0 Print “The largest value is”, MAX

Questions