INTRODUCTION TO PROGRAMMING CONCEPTS

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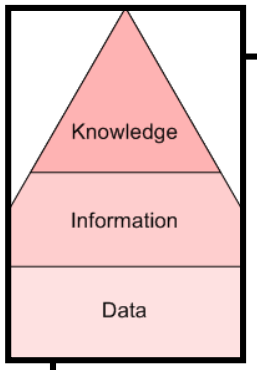
Introduction to Programming Language

Topic 1&2

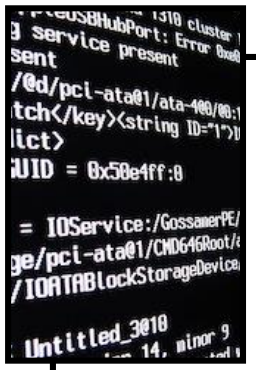


Data, Information & Knowledge

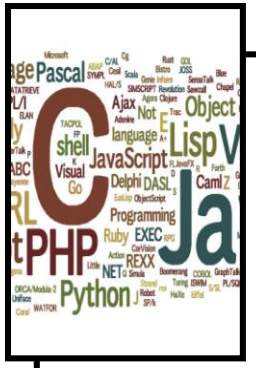
- **D :**
- **I:**
- **K:**

Computer?

Programmer?



Program?



Programming Language?

History Of Programming Language

Topic 1&2

GENERATION of PROGRAMMING LANGUAGE

1st GL

- ✓
- ✓ Translator :
- ✓ Example:

TABLE 4-3
A *machine code* program for adding 1234 and 4321. This is the lowest level of programming: direct manipulation of the digital electronics. (The right column is a continuation of the left column).

10111001	00000000
11010010	10100001
00000100	00000000
10001001	00000000
00001110	10001011
00000000	00011110
00000000	00000010
10111001	00000000
11100001	00000011
00010000	11000011
10001001	10100011
00001110	00000100
00000010	00000000

2nd GL

- ✓
- ✓ Translator: -
- ✓ Example:

```
; Example of IBM PC assembly language
; Accepts a number in register AX;
; subtracts 32 if it is in the range 97-122;
; otherwise leaves it unchanged.

SUB32   PROC            ; procedure begins here
        CMP   AX,97     ; compare AX to 97
        JL    DONE      ; if less, jump to DONE
        CMP   AX,122    ; compare AX to 122
        JG    DONE      ; if greater, jump to DONE
        SUB   AX,32     ; subtract 32 from AX
DONE:   RET             ; return to main program
SUB32   ENDP            ; procedure ends here
```

3rd GL

- ✓
- ✓ Translator:
  1)
  2)
- ✓ Example:

```
Program HelloWorld;
Begin
   Writeln('Hello World');
End.
```

4th GL

- ✓
- ✓ Example:

```
h1 {
    font-family: courier, courier-new, serif;
    font-size: 20pt;
    color: blue;
    border-bottom: 2px solid blue;
}
p {
    font-family: arial, verdana, sans-serif;
    font-size: 12pt;
    color: #6B6BD7;
}
.red_txt {
    color: red;
}
```

LOW LEVEL LANGUAGE

-

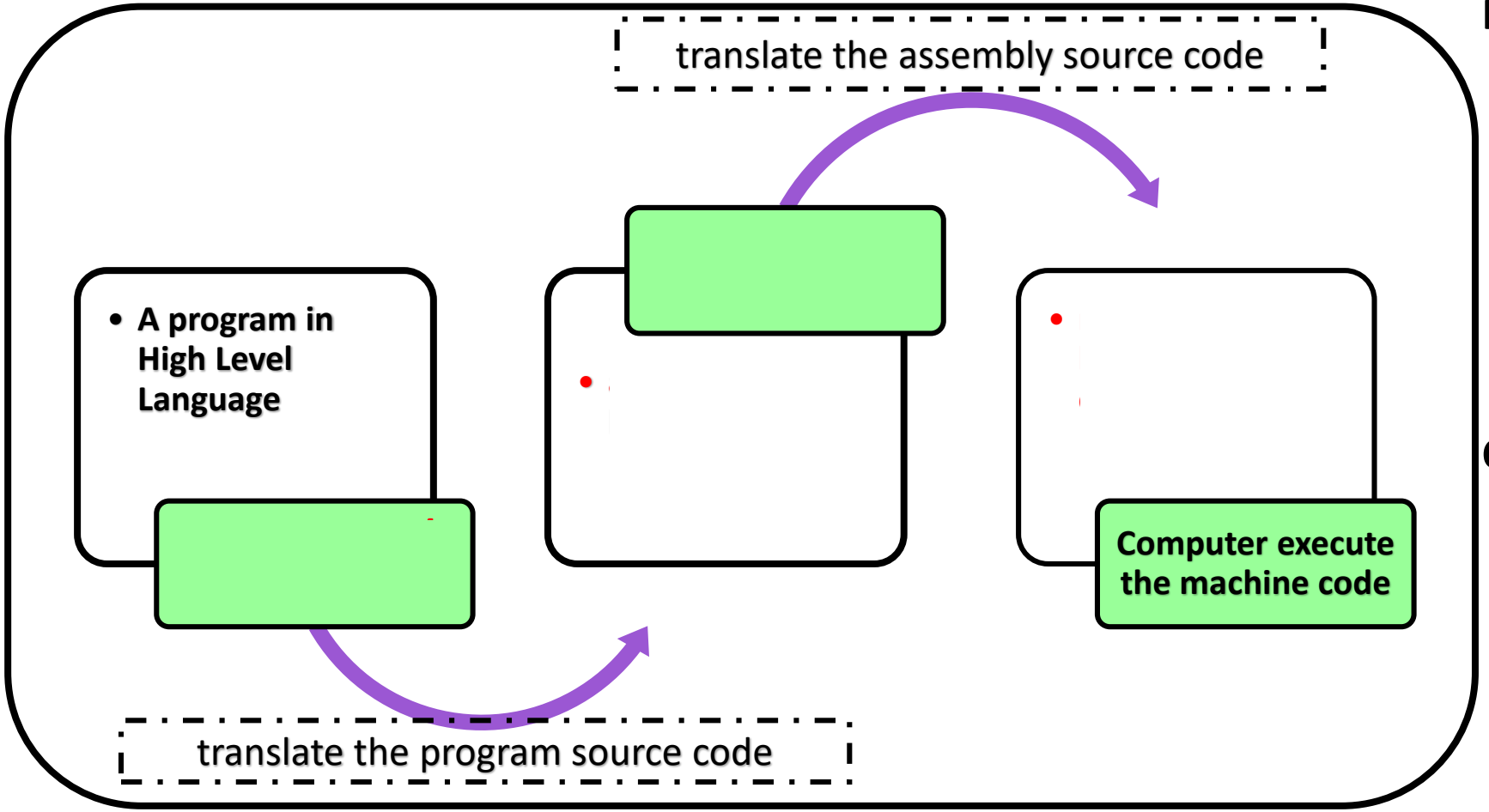
HIGH LEVEL LANGUAGE

-

History Of Programming Language

http://www.codeconquest.com/what-is-coding/how-does-coding-work/

How Coding Works?



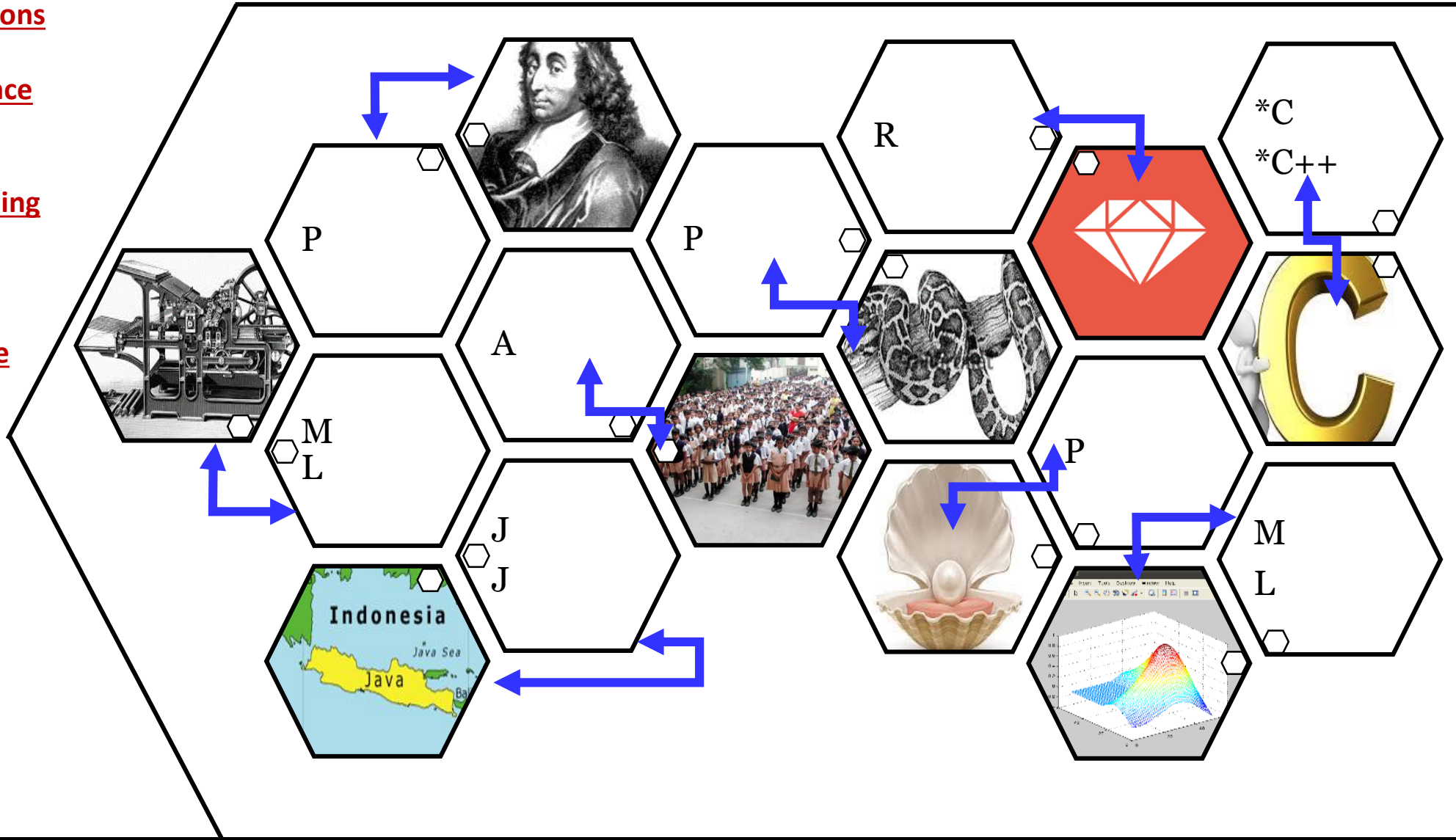
Interpreter?

Compiler?

Programming Language Names:

- Scientific Applications
  -
- Business Applications
  -
- Artificial Intelligence
  -
  -
- System Programming
  -
  -
  -
- Scripting Language
  -
  -
  -
  -
  -

- A GOOD LANGUAGE
  -
  -
  - Cost of use
    -
    -
    -



PROGRAMMING LIFE CYCLE (PLC): Introduction

Computer Programming is the art of making a computer do what you want it to do.

1

At the very fundamental level, it consists of issuing a sequence of commands to computers to achieve an objective.

A computer program is simply a set of instructions computers follow to perform a specific task.

A program to computers is similar to a recipe to cooks to make a dish.

It describes the ingredients (Data/Input) and the sequence of steps (Process) needed to convert the ingredients into a dish of food (Result/Output).

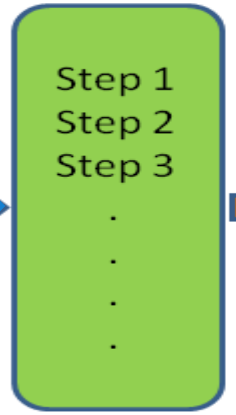
PROGRAMMING LIFE CYCLE (PLC): Introduction

The development of the system/program

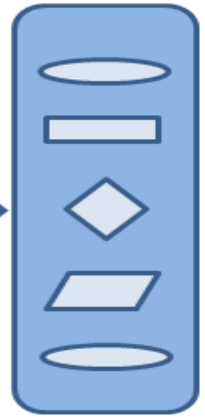
The general steps programmers go through to develop the system

Problem Analysis → Program Modeling → Coding → Testing → Documentation → Maintenance

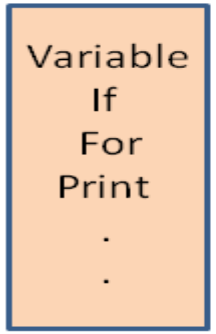
Algorithm



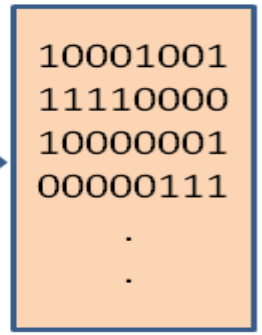
PseudoCode



FlowChart

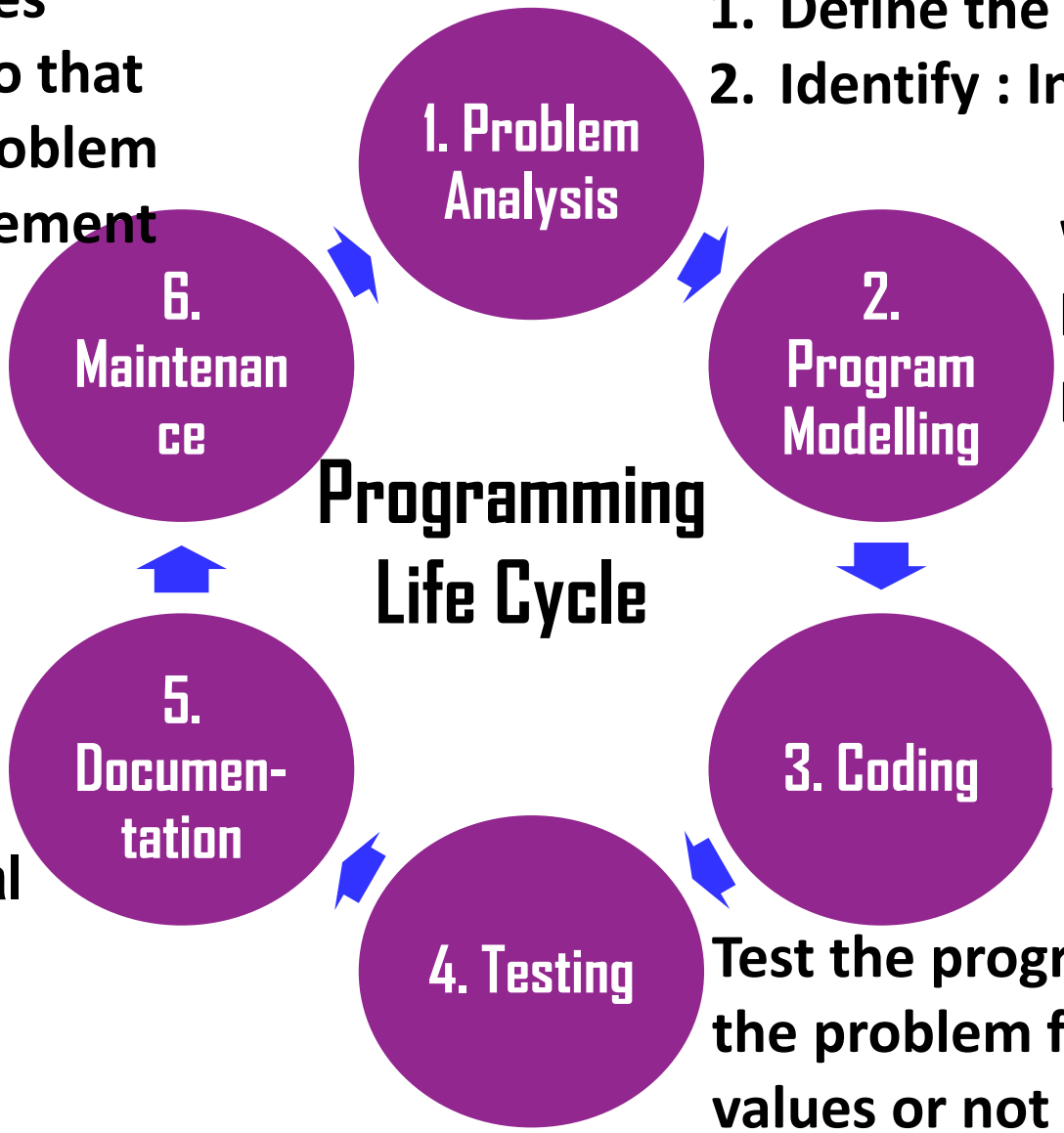


Use Programming Language



Program being executed

PROGRAMMING LIFE CYCLE (PLC): Introduction



1. Define the purpose of the program
2. Identify : Input, Process, Output

Write the solution in step by step statements : pseudocode & flowchart

Write the program using programming languages like C, C++, Java etc

Test the program whether it is solving the problem for various input data values or not

Create user manual

Repeat all the phases from the starting, so that the encountered problem is solved or enhancement is added.

PROGRAMMING LIFE CYCLE (PLC): Problem Analysis

1. Define the purpose of the program

2. Identify the problem:

Input >> **Process** >> **Output**

Input : a list of the data provided to solve the problem.

Define:

- Variable for each of the data (being input).
- Data type for variable (being input).
  - i. String or Character
  - ii. Integer or Float

Process: a list of actions needed to produce the required output.

Actions:

- Process the input data.
- Manipulate data into information

Output: a list of the outputs required.

Display the results as output:

- Send it to the screen
- Write to a file

Example:

Problem : Who get the highest score in class?

Data/Input: Student name & score

Table 1: Midterm Score

ID.	STUDENT NAME	SCORE
1	Ahmad	62
2	Zulkifli	60
3	Suraya	65
4	Siti	61

Process:

1. Look at the table
2. Find the maximum score by scanning, now you get 65
3. Look at the left side and you know the student name Suraya.
4. Answer Suraya

Output: Suraya

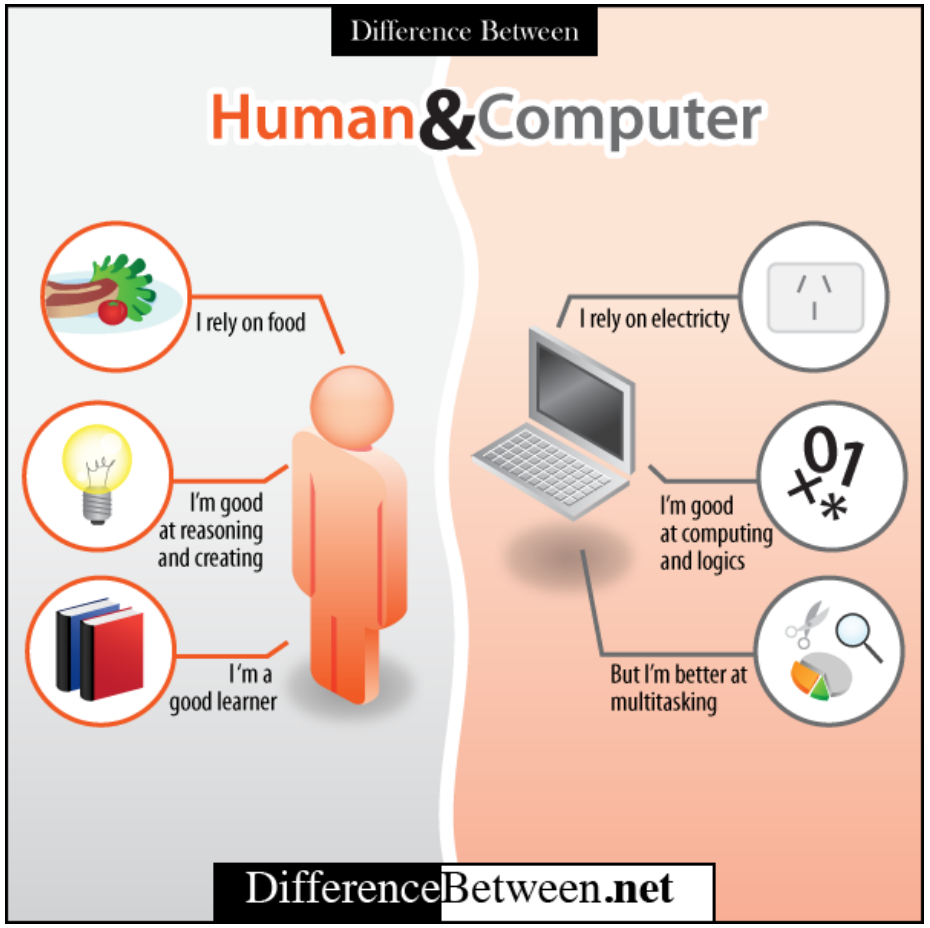
- However, if the given data is as below:

Table 2: Other Midterm Score

NO.	STUDENT NAME	SCORE
1	Anuar	62
2	Zakaria	60
3	Salmi	62
4	Norliza	61
5	Shamsudin	59
6	Khairul	65
7	Sazali	62
8	Milah	65
9	Maria	66
10	Emy	62
11	Johari	65
12	Azizan	63

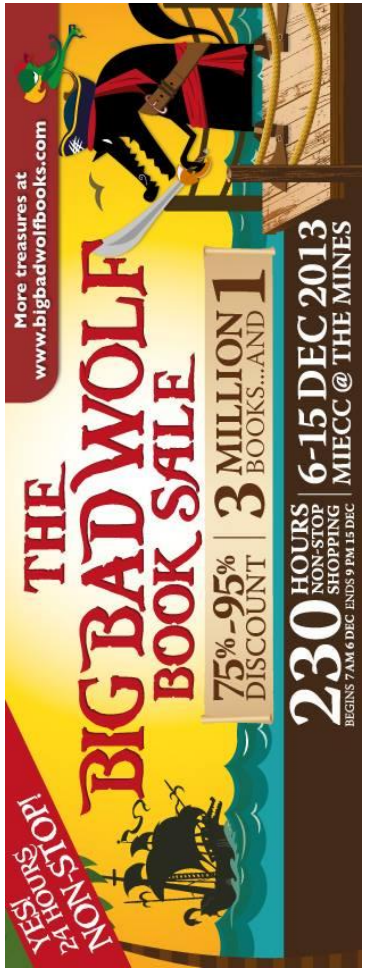
- By the same processes above, you need to spend more time to find out that Maria has the highest score of 66.
- You might be in a worse scenario if you are given 100 data.
- Once the table size becomes bigger and bigger, you may need more concentration, with additional tool: notepad and pencil, or calculator to solve this problem.

PROGRAMMING LIFE CYCLE (PLC): Problem Analysis



- This example exhibits one of the human limitations to work with a large volume of data. It is impractical for humans to solve the massive and complex problem without using tools.
- Computers consist of 2 main components: hardware and software. These two components work collaboratively to carry out tasks users required to accomplish.
- Hardware is controlled by software, and software is written by humans;
- To make computers work effectively, humans (in this case, programmers) must think logically in order to solve the problem.
- Problem Analysis consists of input, process and output

Problem Analysis



Problem 1:

- ***Ali need to create a program to allow a bookstore clerks to enter quantity of books sold in 3 days of The Big Bad Wolf Sale and display the total of book sold.***

Variables for 3 days sales

▪**Problem Analysis:**

1. **INPUT** : BookDay1, BookDay2, BookDay3

Variables for total book sold

2. **PROCESS:** Calculate
   TotalBooksSold = BookDay1+ BookDay2+BookDay3

3. **OUTPUT** : TotalBooksSold

Problem Analysis

Problem:

- *Create a program to read 5 workers salary from keyboard. Program will calculate the average of that salaries.*
- *Print the average.*

Variables for 5 workers salary

▪**Problem Analysis:**

1. **INPUT** : salary1, salary2, salary3, salary4, salary5

Variables for average salary

2. **PROCESS** : Calculate

AverageSalary = (salary1+salary2+salary3+salary4+salary5) / 5

Do not use ÷

3. **OUTPUT** : AverageSalary

Program Modelling=ALGORITHM

✓ creating model of solution.

✓ algorithm, the step-by-step instruction to solve a problem, then the program will be written based on the algorithm using a programming language.

✓There are many ways to represent an algorithm; however 2 techniques commonly used are pseudo code and flowchart.

[pseudocode]

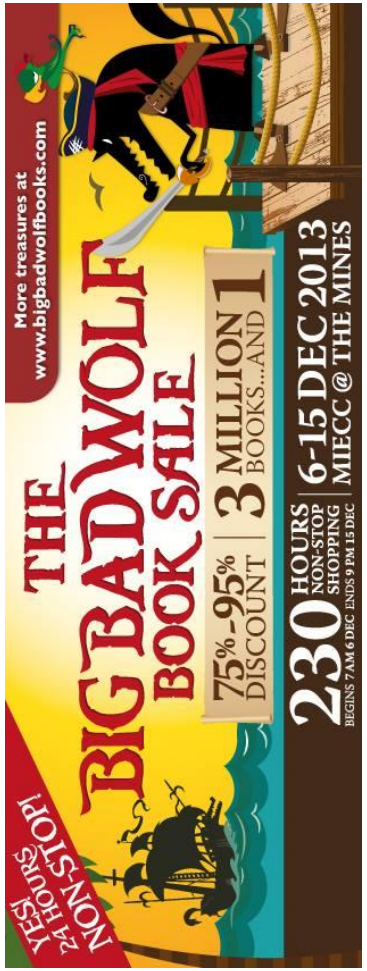
…is a Structured English used to represent an algorithm. It is easy for both users and programmers to read and write algorithms regardless of the programming experience. There is no standard pseudo code but we should follow some conventional rules:

- 1) Statements are written in simple English.
- 2) Each statement is written on a separate line.
- 3) Statements are starting with the text START.
- 4) Statements are ending with the text END.

Pseudo Code Structure:

1. START
2. *Statement1*
3. *Statement2*
4. *Statement3*
5. END

Problem Analysis > Pseudo Code



1. START
2. DECLARE
   BookDay1, BookDay2, BookDay3
   TotalBooksSold

Variables for 3 days sales

Variables for total book sold

3. INPUT BookDay1, BookDay2, BookDay3

4. CALCULATE
   TotalBooksSold =BookDay1+BookDay2+BookDay3
5. OUTPUT/PRINT TotalBooksSold
6. END

You may use Output or Print

Problem Analysis > Pseudo Code

EXAMPLE

1. START
2. DECLARE
   Salary1, Salary2, Salary3, Salary4, Salary5
   AverageSalary
3. INPUT Salary1, Salary2, Salary3, Salary4, Salary5
4. CALCULATE
   AverageSalary =(Salary1+Salary2+Salary3+Salary4+Salary5) / 5
5. OUTPUT/PRINT AverageSalary
6. END

Variables for 5 workers salary

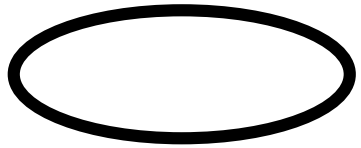
Variables for average salary

Do not use ÷

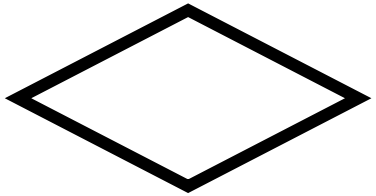
You may use Output or Print

- A graphic help us describe the logic of our algorithm
- Each type of operation, e.g. input, output, calculation, test a condition , etc.. is represented by a symbol
- Symbols are connected by arrows to represent the order of the operations
- A flowchart can be relatively easily translated to a programming language

A flowchart is a graphical diagram that define the "flow" of a program using a series of standard geometric symbols and lines, which are connected according to the logic of the algorithm. There are a lot of symbols used in flowcharting but the common 6 are:

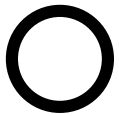


Terminal symbol



Decision/ condition Testing symbol

Calculation/Process symbol



Branch symbol

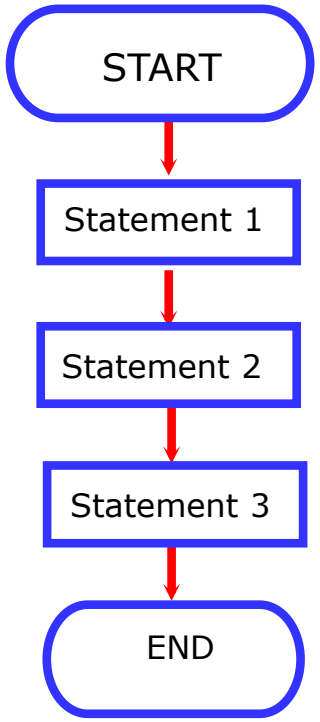
Input/Output symbol

Data flow symbol

Flowcharts Symbols

Terminal: Start/End

- ✓ Every algorithm starts somewhere, and terminates somewhere
- ✓ Every flowchart must have one start symbol and one end symbols
- ✓ A start symbol denotes the start of the algorithm
- ✓ When an end symbol is encountered this indicates the algorithm has terminated.



Calculation (rectangle)

- ✓ You use it to specify a calculation, e.g. arithmetic expression
- ✓ Examples:
  - x = z + y
  - pi=3.142
  - a = pi * r * r
  - z = z + 1 (add one to the current value of z and make that the new value of z)
  - c = SQRT(x*x+y*y)
  - Status="LULUS"
- ✓ x,z,y,a,pi,r, c and Status are variables

x = z + y

pi=3.142
a = pi * r * r

z = z + 1

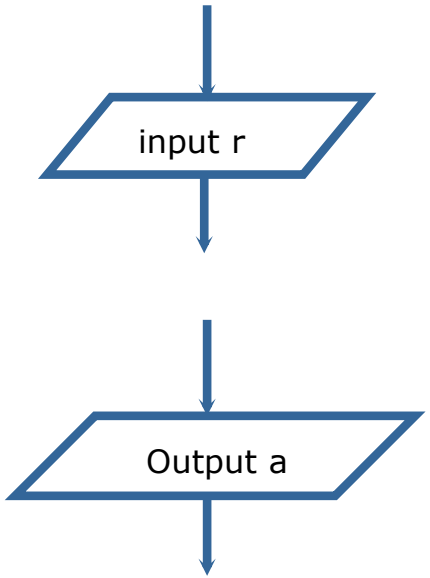
c = SQRT(x*x+y*y)

Status= "LULUS"

Flowcharts Symbols

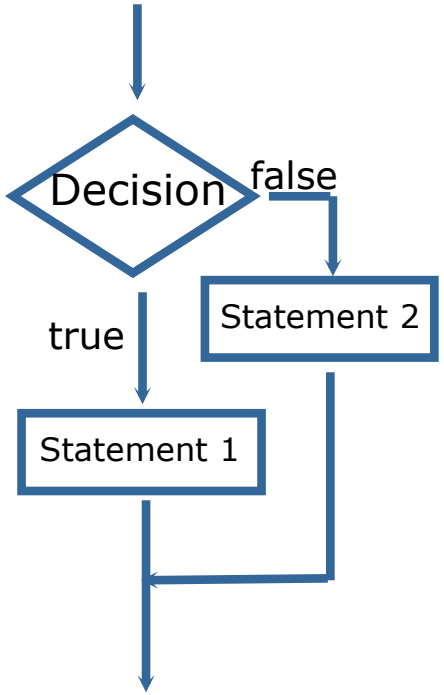
Input/Output

- ✓ Use this to specify an input or an output operation
- ✓ By an input operation we mean a read operation of data from a peripheral device to Main Memory
- ✓ By an output operation we mean a write operation of data to a peripheral device from Main Memory
- ✓ Examples:
  - Read a value for the radius, r, from the keyboard;
  - print value of the area, a, on the screen



Decision or condition Testing (Diamond)

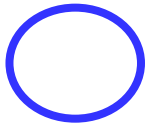
- ✓ Use it to specify a condition to be tested. Based on the condition being true or false the next operation will be determined
- ✓ A decision is composed of :
  1. A condition
  2. An operation to be done if condition is true
  3. An operation to be done if condition is false
- ✓ We use decisions to enable repeating a set of operations multiple times; we call this construct a loop.

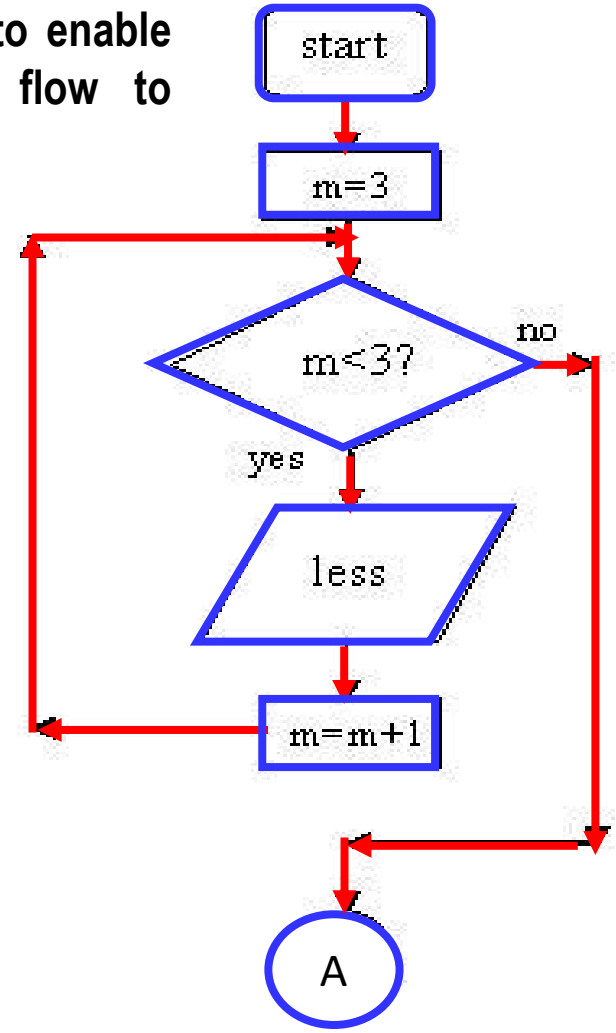


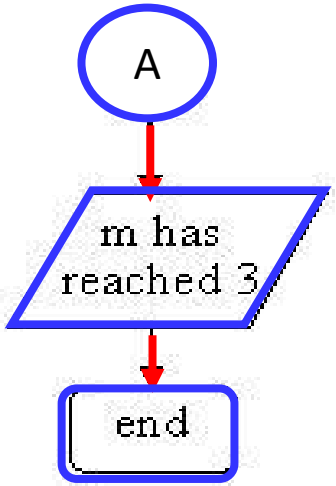
Flowcharts Symbols

Branch

- ✓ Use branch symbol to enable connection to one flow to another flow.

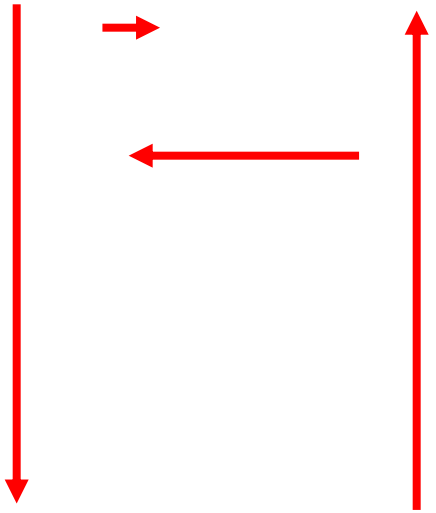




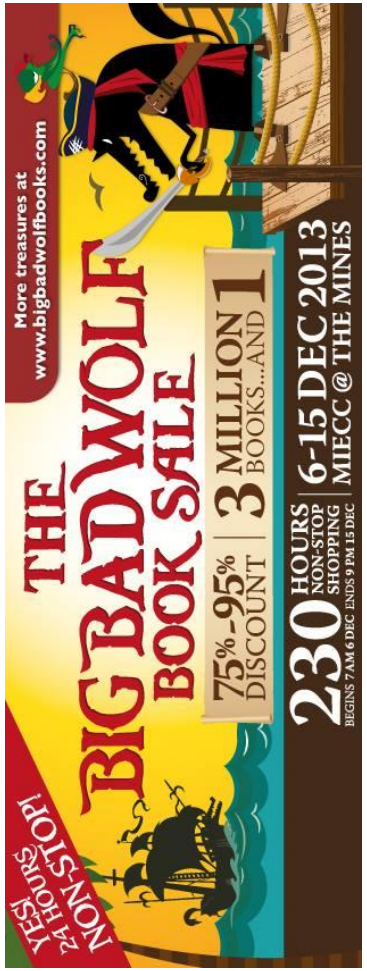


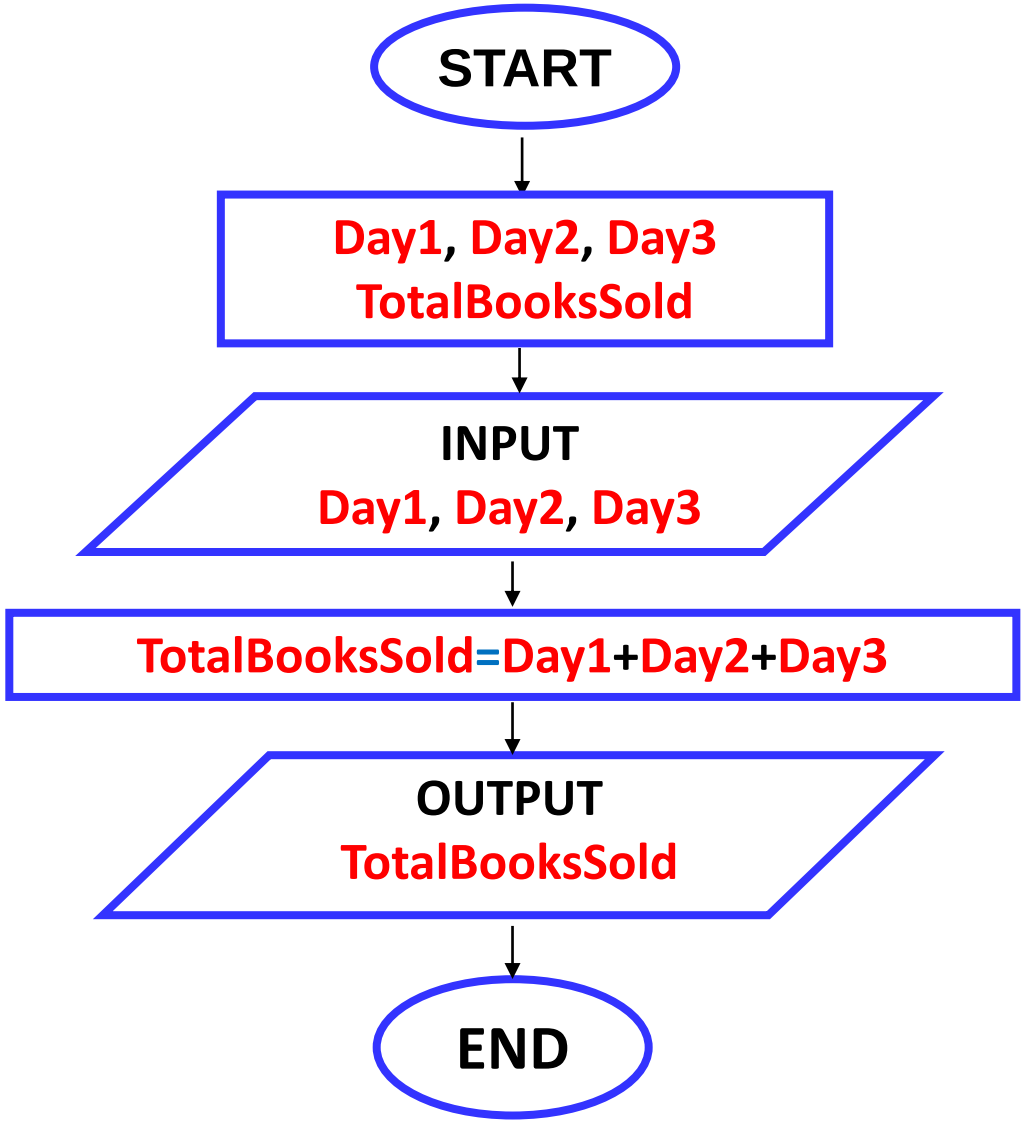
Arrow

- ✓ Symbols are connected by arrows to represent the sequence (flow) of operation.



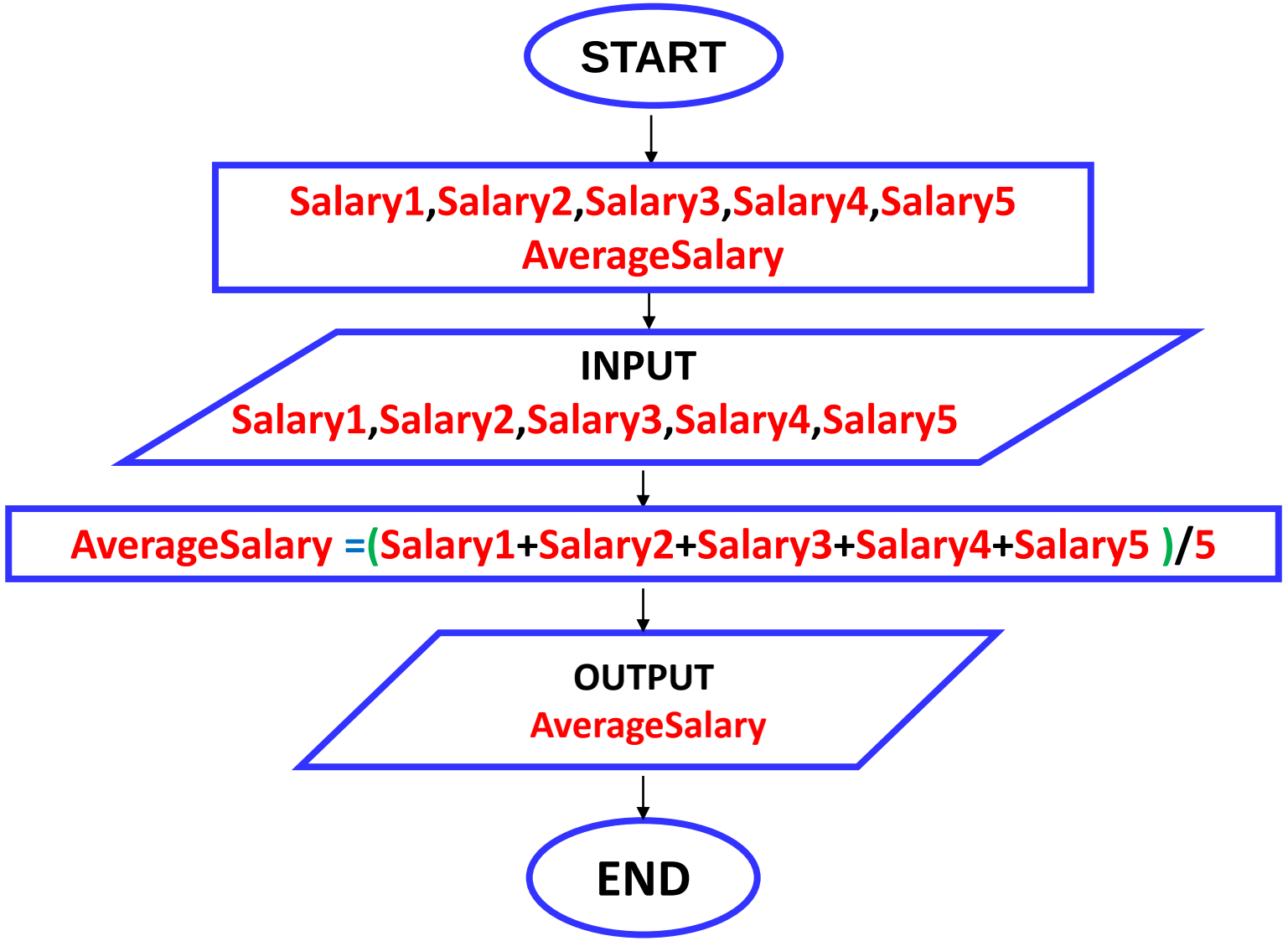
Problem Analysis > Pseudo Code > Flow Chart





Problem Analysis > Pseudo Code > Flow Chart

EXAMPLE



VARIABLES & DATA TYPE

❑Variables?

- are symbolic names that represent a value within a computer program
- Variables are "containers" for storing information.

❑Valid example?

Variable	Explanation
NAME Name name	Capital Letter and Small Letters are Allowed
name_1	Digits and Underscore is allowed along with alphabets
_SUM	Underscore at the first position is allowed.
Total_Sales	We can concatenate multiple words with underscore
firstName	Best Style to concatenate multiple words (Changing case of First Letter of Successive Word)

❑Rules?

- A variable name must start with a alphabet or underscore (_).
- A variable name can only contain alphabets and underscores (A-z, 0-9, and _).
- A variable cannot start with a number.
- Blank space is not allowed in variables

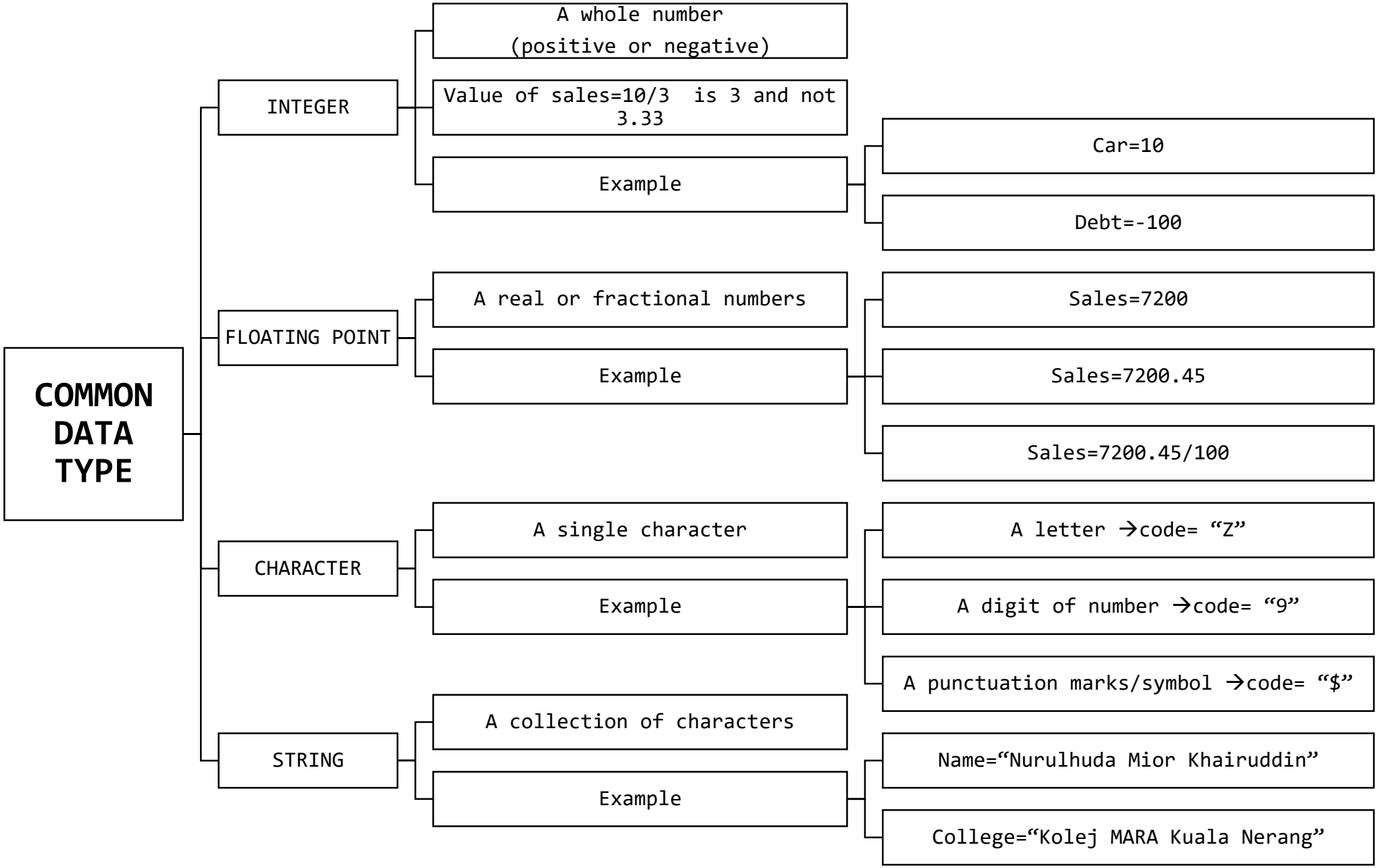
❑Invalid example?

Variable	Explanation
int	Keyword name cannot be given to variable.
num^2	Special characters are not allowed.
num 1	Spaces are not allowed.
2num	Digits are allowed but NOT as first Character

VARIABLES & DATA TYPE

❑Data Type?

- is a classification that specifies which **type** of value a variable has and what **type** of mathematical, relational or logical operations can be applied to it without causing an error



EXPRESSION & OPERATION : Introduction

❑Expression?

In **programming**, an **expression** is any legal combination of symbols that represents a value. Each **programming** language and application has its own rules for what is legal and illegal. For example, in the C language x+5 is an **expression**, as is the character string "MONKEYS."

What is expression? Webopedia Definition
www.webopedia.com/TERM/E/**expression**.html

❑Example?

- x = 2
- y = x + 5
- animal = “monkey”

- Every expression consists of at least one *operand* and one or more *operators*. Operands are values, whereas operators are symbols that represent particular actions.

EXPRESSION & OPERATION : Introduction

Operations?

A specific action that represents by operator

3 types of Operation in Programming?

- Mathematical
- Relational
- Logical
- Increment / Decrement

EXPRESSION & OPERATION :Mathematical Operation

Mathematical operation

- Addition (+)
  - A=A+1
  - X=10/100
  - COMMISION=SALES +(SALES* X)
- Multiplication (*)
  - Y=X*2
  - A=81
  - TOTAL=A*9
- Subtraction (-)
  - Y=X-2
  - A=A-1
- Division (/)
  - Y=X/2
  - A=81
  - TOTAL=A/9
- Modulus (%)
  - REMINDER =VALUE % DIVISOR

PRECEDENCE

- First : ( ) - bracket
- Second : Multiplication (*), Division (/), Modulus (%)
- Third : Addition (+) Subtraction (-)

Expression & Operation :Relational Operation

❑Relational operation

❑Equal To (==)
❑Less Than(<)
❑Greater Than (>)
❑Not Equal To (!=)
❑Less Than Or Equal To (<=)
❑Greater Than Or Equal To (>=)

- Used to form expression that can be evaluated as TRUE or FALSE.
- Example : we might ask if there are more than 30 students in a class using the following expression:- NumStudent>30
- If there are more than 30 students in the class then the expression output is TRUE
- If there 30 students or less then the expression output is FALSE.

SITUATION?	EXPRESSION
Does Abu make more than RM35 000.00 per year?	AbuSalary > 35000
Did Kedah defeat the PKNS in football match?	KedahGoals > PKNSGoals
Did anyone get a perfect score on the Mid Sem Test	MidSemScore == 100

Expression & Operation :Logical Operation

- Logical operation
  - AND(&&)
  - OR (||)
  - NOT(!)

- The logical operators for AND (&&) and OR ( ) are used to combine simple relational statements into more complex expressions.

- The NOT (!) operator is used to negate a boolean statement.

P	Q	P && Q	P || Q	!P
false	false	false	false	true
false	true	false	true	true
true	false	false	true	false
true	true	true	true	false

Expression & Operation :Logical Operation

- Logical operation :

EXAMPLE (situation)

- All employee belong to a department.(dept)
- All employee working in dept. A have salaries greater than RM25 000.00.
- All employee working in dept. B make exactly RM40 000.00 per year.
- Abu is an employee and he works at dept A.
- Bazli is an employee and he works at dept B.

- Given the left situation are facts, consider the truth values of the following expression:

EXPRESSION	**Abu_Salary < 25000 AND Abu_Dept == A**
Evaluation:	(False) && (True) **=False**
EXPRESSION	**NOT Abu_Salary < 25000**
Evaluation:	! (False) **=TRUE**
EXPRESSION	**Abu_Salary < 25000 OR Bazli_Salary == 40000**
Evaluation:	(False) || (True) **=TRUE**
EXPRESSION	**Abu_Salary >25000 AND NOT Bazli_Salary < 40000**
Evaluation:	(True) && !(False) (True) && (True) **=TRUE**

Expression & Operation :Logical Operation

- Logical operation :

EXERCISE (Situation)

- All employee belong to a department.(dept)
- All employee working in dept. A have salaries greater than RM25 000.00.
- All employee working in dept. B make exactly RM40 000.00 per year.
- Abu is an employee and he works at dept A.
- Bazli is an employee and he works at dept B.

- Given the left situation are facts, consider the truth values of the following expression:

EXPRESSION	**Abu_Salary < 25000 OR Abu_Dept == B**
Evaluation:	(False) || (False) **=False**
EXPRESSION	**Abu_Salary >= 25000 AND Bazli_Dept == B**
Evaluation:	(False) && (True) **=False**
EXPRESSION	**Abu_Salary < 25000 OR Bazli_Salary < 40000 OR Abu_Dept == B**
Evaluation:	(False) || (False) || (False) (False) || (False) **=FALSE**
EXPRESSION	**NOT (Abu_Salary >25000 AND Bazli_Salary < 40000)**
Evaluation:	! ((True) && (False)) ! (False) **=TRUE**

Expression & Operation :In / De - crement Operation

- 3 types of Operation in Programming?
  - Mathematical operation
  - Relational
  - Logical
  - **Increment/ Decrement**

Increment operation :

- Use to add value 1 to the variable
- Format:
  - Variable++ OR
  - Variable=variable+1
- Example:
  - A++ OR
  - A=A+1

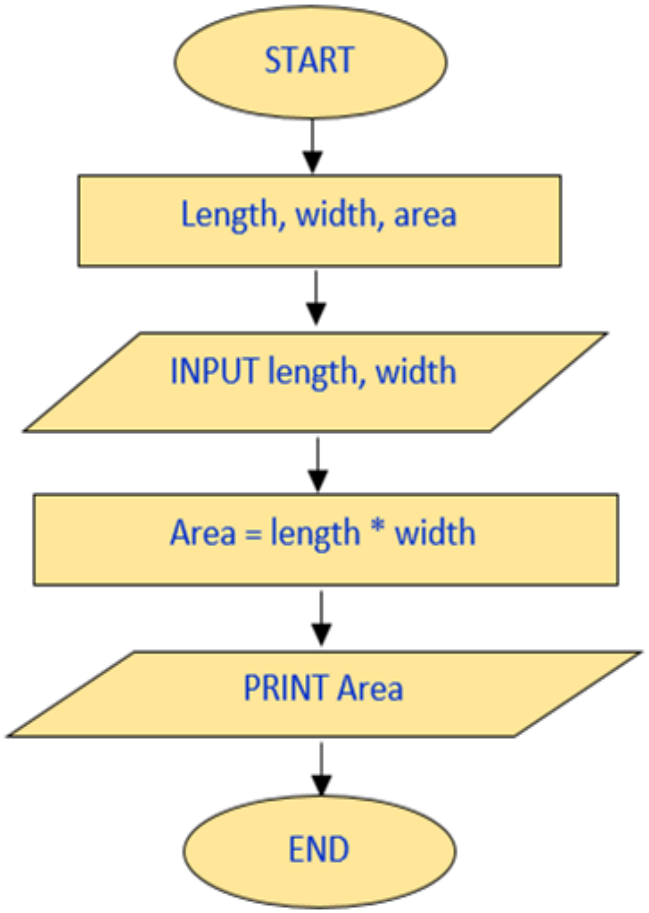
Decrement operation :

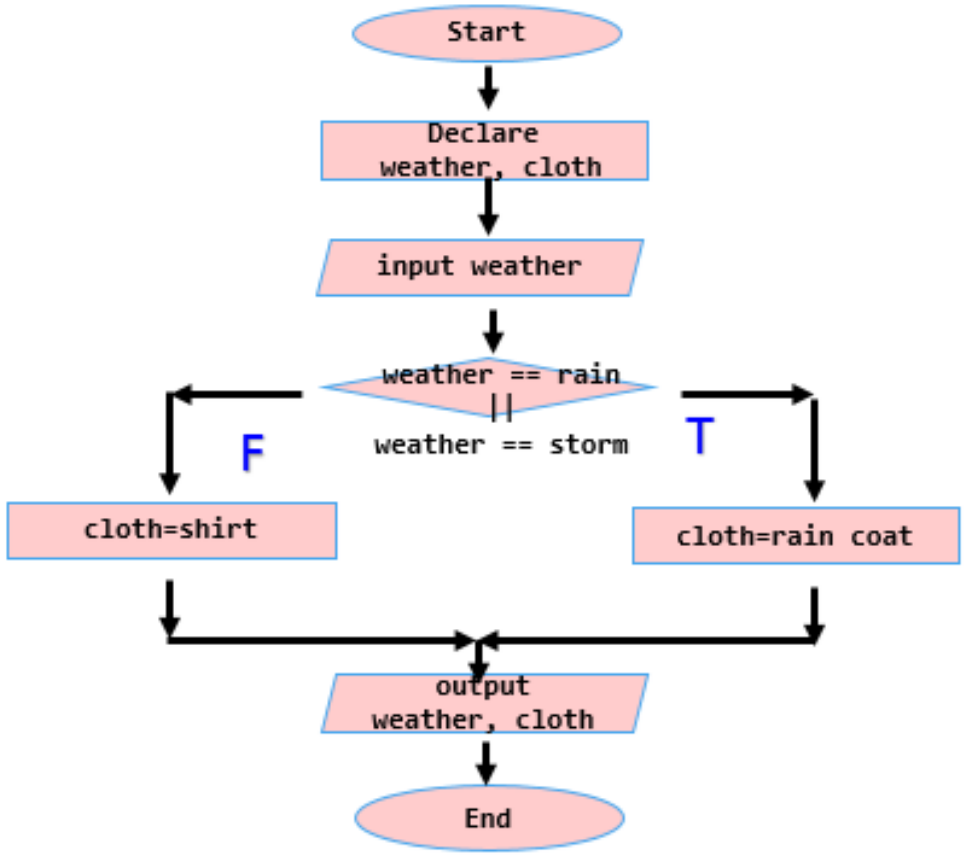
- Use to minus value 1 from the variable
- Format:
  - Variable-- OR
  - Variable=variable-1
- Example:
  - A- - OR
  - A=A-1

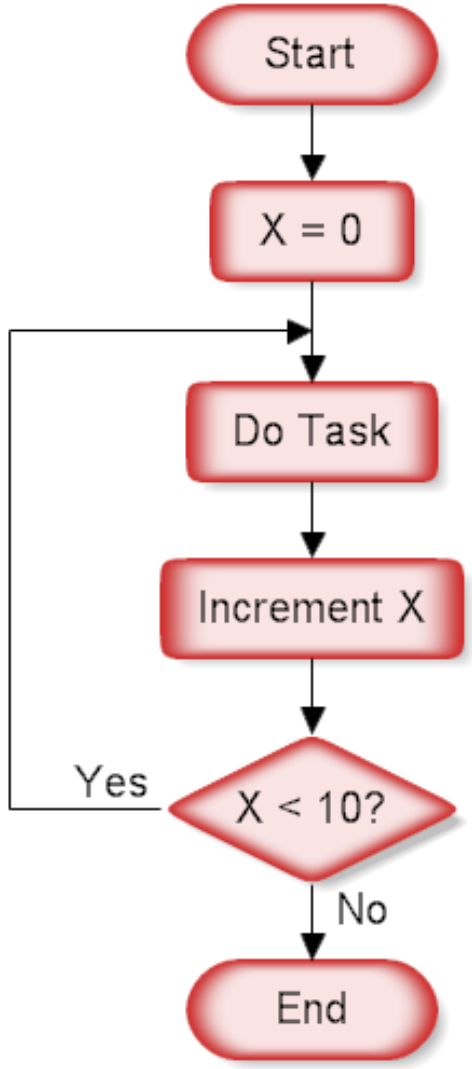
PROGRAM CONTROL STRUCTURE: Introduction

❑PCS controls how each step of the algorithm executes? There are 3 structures:

- Sequence
- Selection
- Iteration/ looping







The sequence control structure is the straightforward execution of one processing step after another.

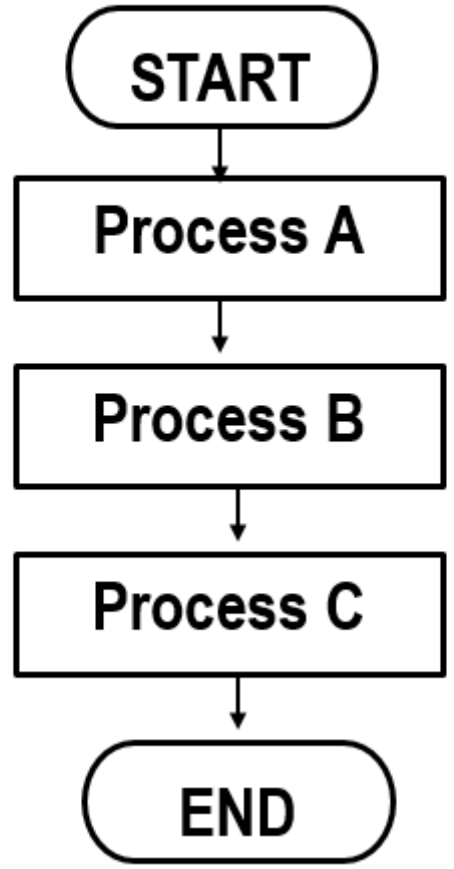
PSEUDOCODE

Sequence's pseudo code:

1. Start
2. Process A
3. Process B
4. Process C
5. End

FLOWCHART

Sequence's flowchart:



PROGRAM CONTROL STRUCTURE: Sequence

Problem 1:

- *Ali need to create a program to allow a bookstore clerks to enter quantity of books sold in 3 days of The Big Bad Wolf Sale and display the total of book sold.*

PROB.ANALYSIS

- **INPUT** BookDay1, BookDay2, BookDay3
- **PROCESS:**

Calculate

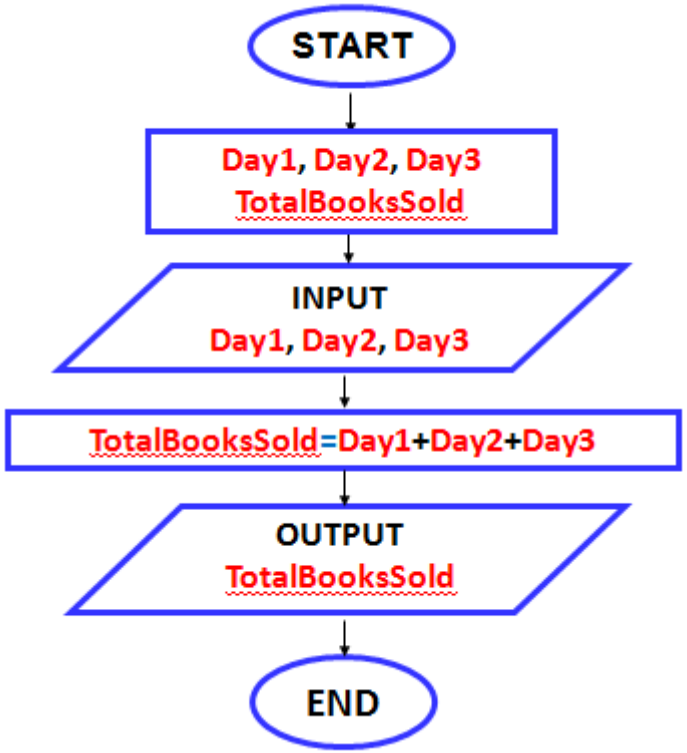
TotalBooksSold = BookDay1+ BookDay2+BookDay3

OUTPUT : TotalBooksSold

PSEUDOCODE

1. START
2. DECLARE
   - Int BookDay1, BookDay2, BookDay3
   - Int TotalBooksSold
3. INPUT BookDay1, BookDay2, BookDay3
4. CALCULATE
   - TotalBooksSold =BookDay1+BookDay2+BookDay3
5. OUTPUT/PRINT TotalBooksSold
6. END

FLOWCHART



PROGRAM CONTROL STRUCTURE: Sequence

Problem 1:

- *Create a program to read 5 workers salary from keyboard. Program will calculate the average of that salaries.*
- *Print the average.*

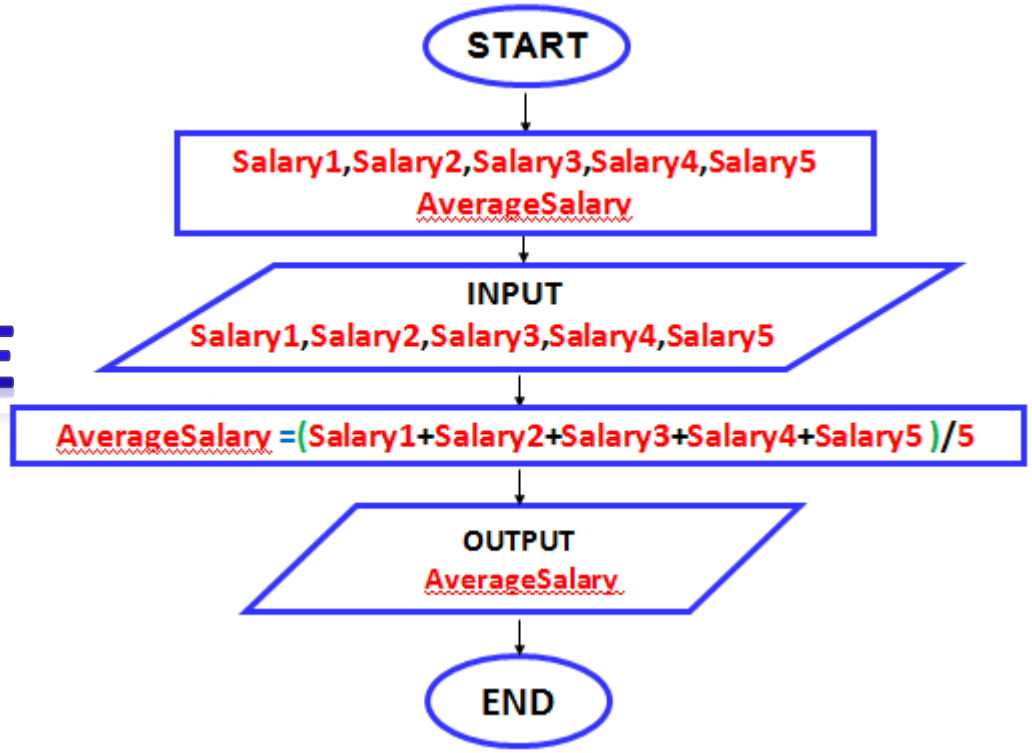
PROB.ANALYSIS

1.INPUT : salary1, salary2, salary3, salary4, salary5
2.PROCESS :
Calculate
AverageSalary =(salary1+salary2+salary3+salary4+salary5) / 5
3. OUTPUT : AverageSalary

PSEUDOCODE

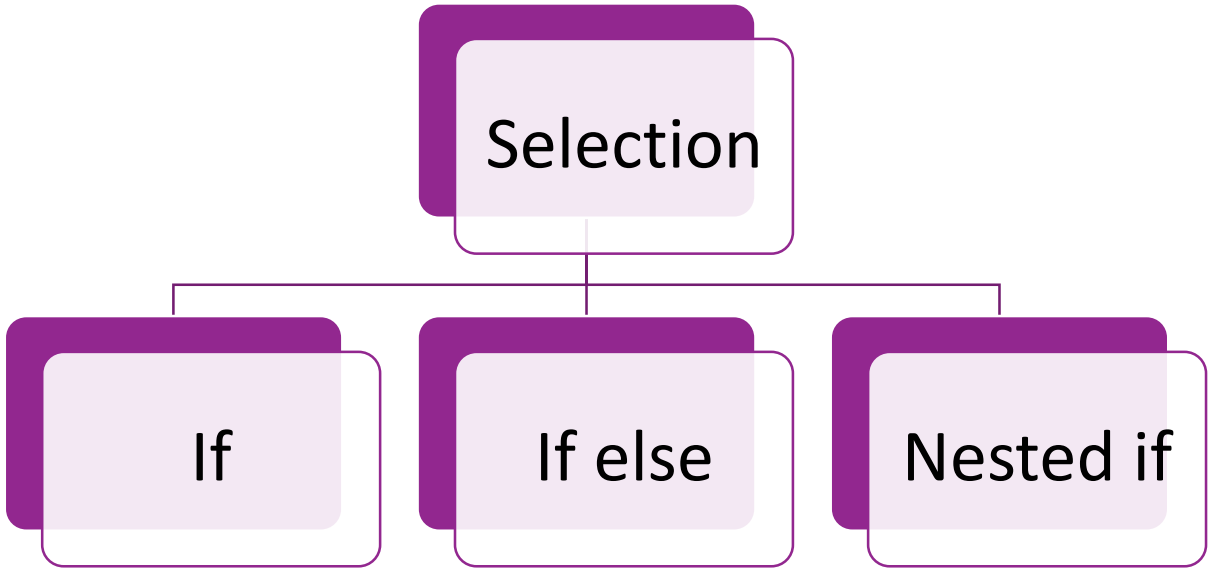
1. START
2. DECLARE
   Salary1, Salary2, Salary3, Salary4, Salary5
   AverageSalary
3. INPUT Salary1, Salary2, Salary3, Salary4, Salary5
4. CALCULATE
   AverageSalary =(Salary1+Salary2+Salary3+Salary4+Salary5) / 5
5. OUTPUT/PRINT AverageSalary
6. END

FLOWCHART



PROGRAM CONTROL STRUCTURE: Selection

- There are three main types of selection control structure:



- This control structure represents the decision-making process.
- The choice depending on whether the condition is true or false.
- Nested IF structure occurs when there is (are) IF statement(s) within an IF statement.

❖ FORMAT: PSEUDOCODE

- **IF**

```
1.  START

2.  IF (Condition) Then
3.     PROCESS 1
4.     PROCESS 2
5.  End IF

6.  END
```

- **IF –ELSE**

```
1.  START

2.  IF (Condition) Then
3.     PROCESS 1
4.     PROCESS 2

5.  ELSE
6.     PROCESS 4
7.     PROCESS 5
8.     PROCESS 6
9.  End IF

10. END
```

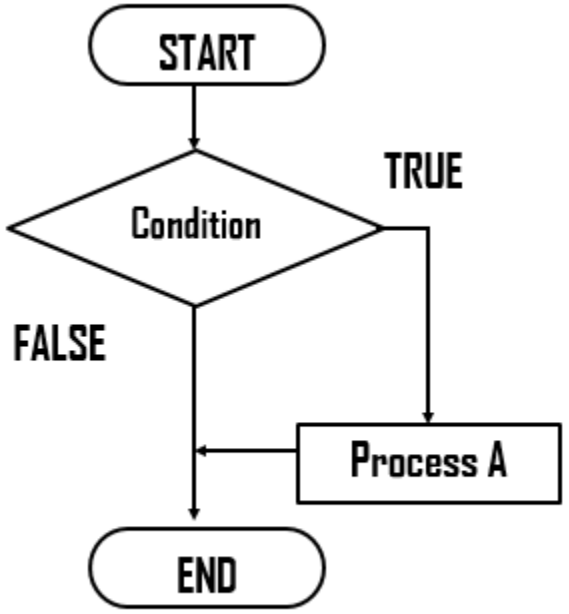
- **NESTED IF**

```
1.  START
2.  IF (Condition1) Then
3.     PROCESS 1
4.        IF (CONDITION2)  THEN
5.           PROCESS 2
6.        ENDIF
7.  ELSE
8.     Process 3
9.  END IF
10. END
```

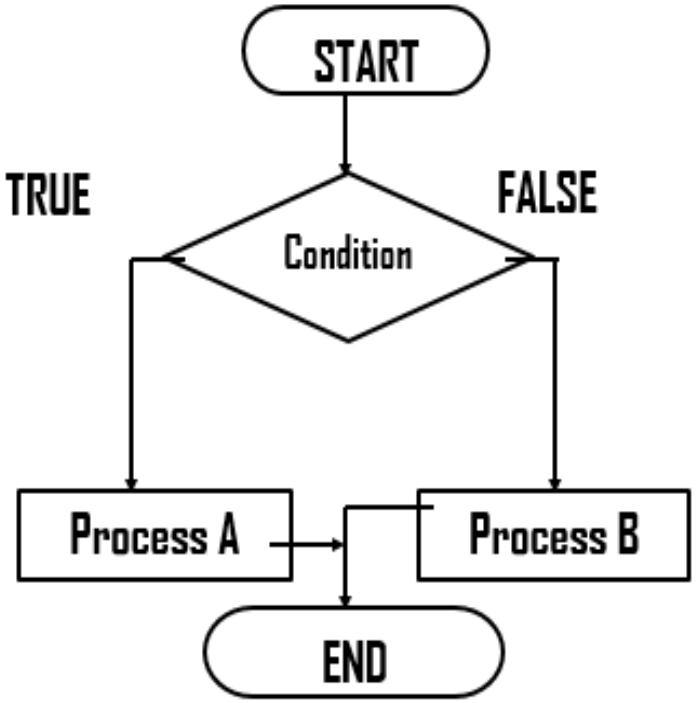
PROGRAM CONTROL STRUCTURE: Selection

❖ FORMAT: FLOWCHART

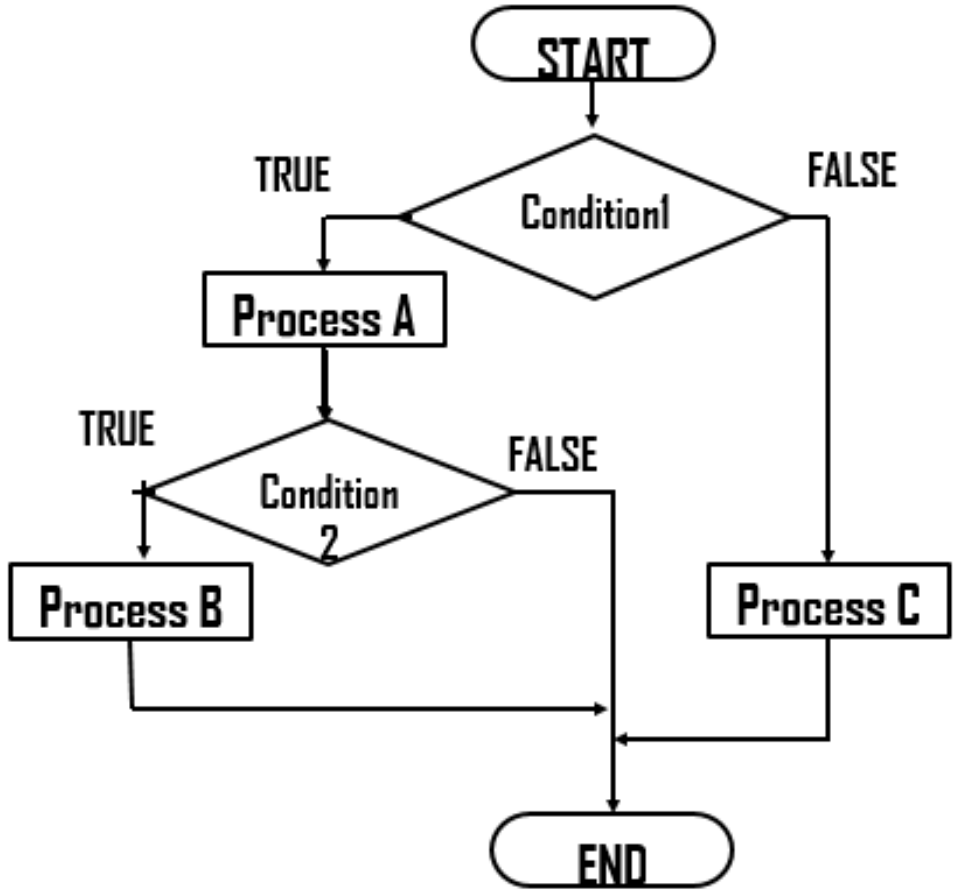
- IF



- IF –ELSE



- NESTED IF



❖ EXAMPLE : SELECTION >> IF

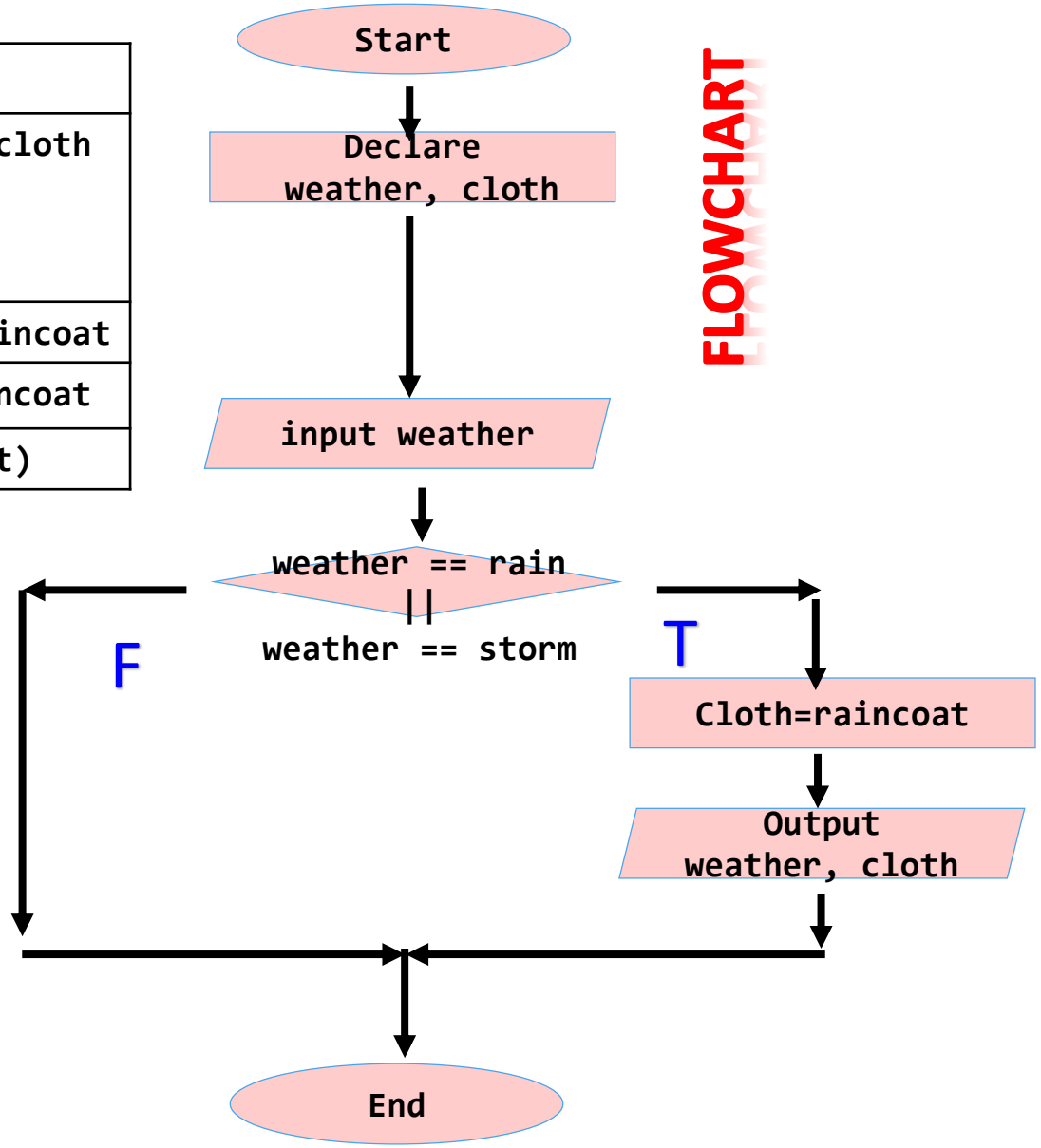
- Create a program that :
  - will display RAIN COAT if user input RAIN or STORM as the weather.
  - Nothing will be displayed for other input.

PROGRAM CONTROL STRUCTURE: Selection IF

PROB.ANALYSIS

	INPUT	PROCESS	OUTPUT
	weather	if weather == rain or weather == storm assign cloth=raincoat Output weather, cloth end if	weather, cloth
test1	storm		storm, raincoat
test2	rain		rain, raincoat
test3	sunny		(no output)

FLOWCHART



PSEUDOCODE

```
1.  START
2.  DECLARE weather, cloth
3.  Input weather
4.  IF (weather ==rain || weather==storm) Then
5.     cloth=rain coat
6.     OUTPUT weather,cloth
7.  End IF
8.  END
```

❖ EXAMPLE : SELECTION >> IF.. Else

- Create a program that :
  - will display RAIN COAT if user input RAIN or STORM as the weather.
  - will display SHIRT for other input.

PROGRAM CONTROL STRUCTURE: Selection IF.. Else

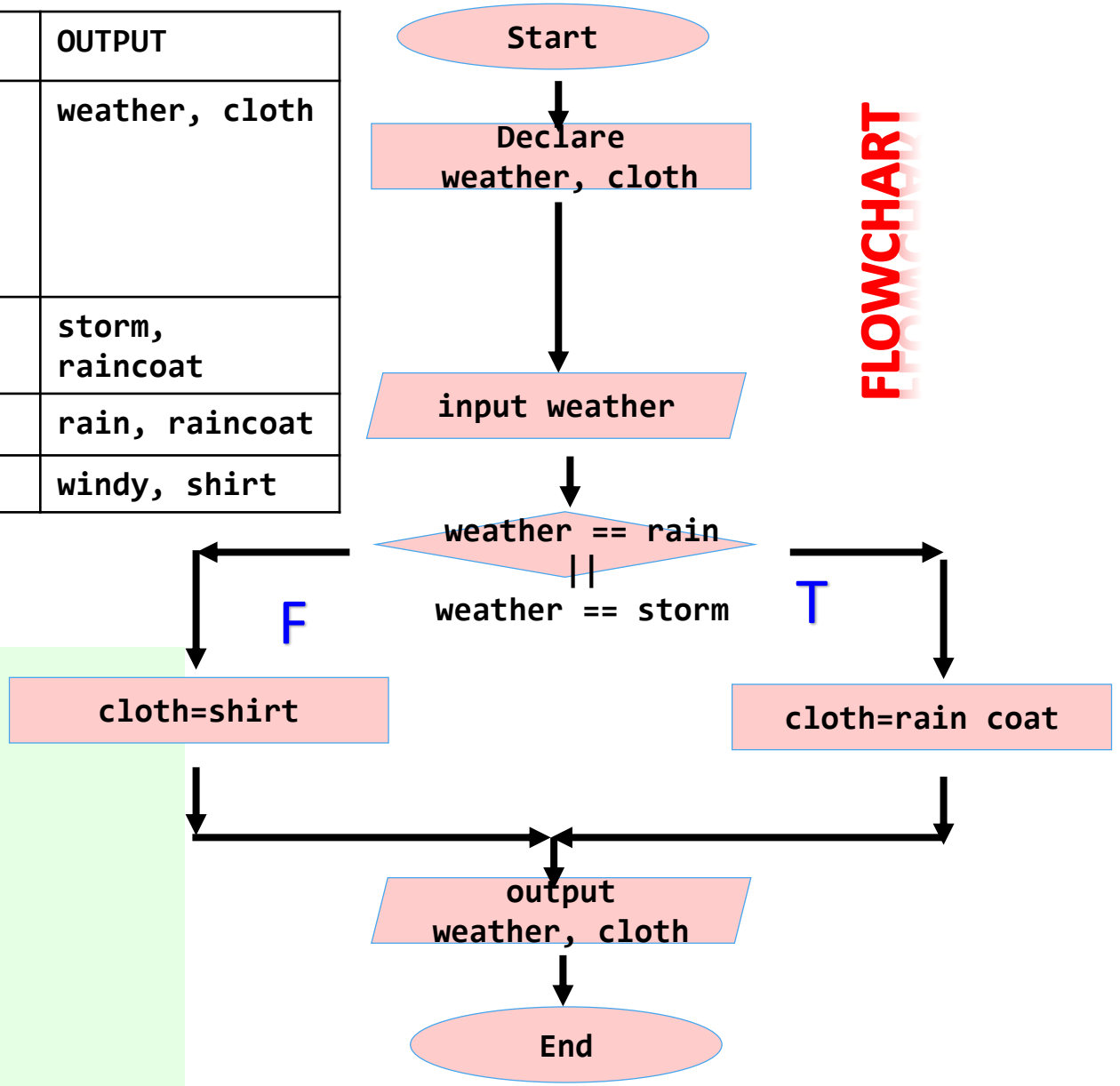
PROB.ANALYSIS

	INPUT	PROCESS	OUTPUT

	weather	if weather == rain or weather == storm
		  assign cloth=raincoat
		else
		  assign cloth=shirt
		end if
			weather, cloth

test1	storm		storm, raincoat
test2	rain		rain, raincoat
test3	windy		windy, shirt

FLOWCHART



PSEUDOCODE

```
1.  START
2.  DECLARE weather, cloth
3.  Input weather
4.  IF (weather ==rain || weather==storm) Then
5.     cloth=rain coat
6.  Else
7.     cloth=shirt
8.  End IF
9.  OUTPUT weather, cloth
10. END
```

❖ EXAMPLE : SELECTION >>Nested IF … Else

- Create a program that :
  - will display RAIN COAT if user input RAIN or STORM as the weather.
  - will display JACKET if user input WINDY as the weather
  - will display SHIRT for other input.

PROB.ANALYSIS

	INPUT	PROCESS	OUTPUT

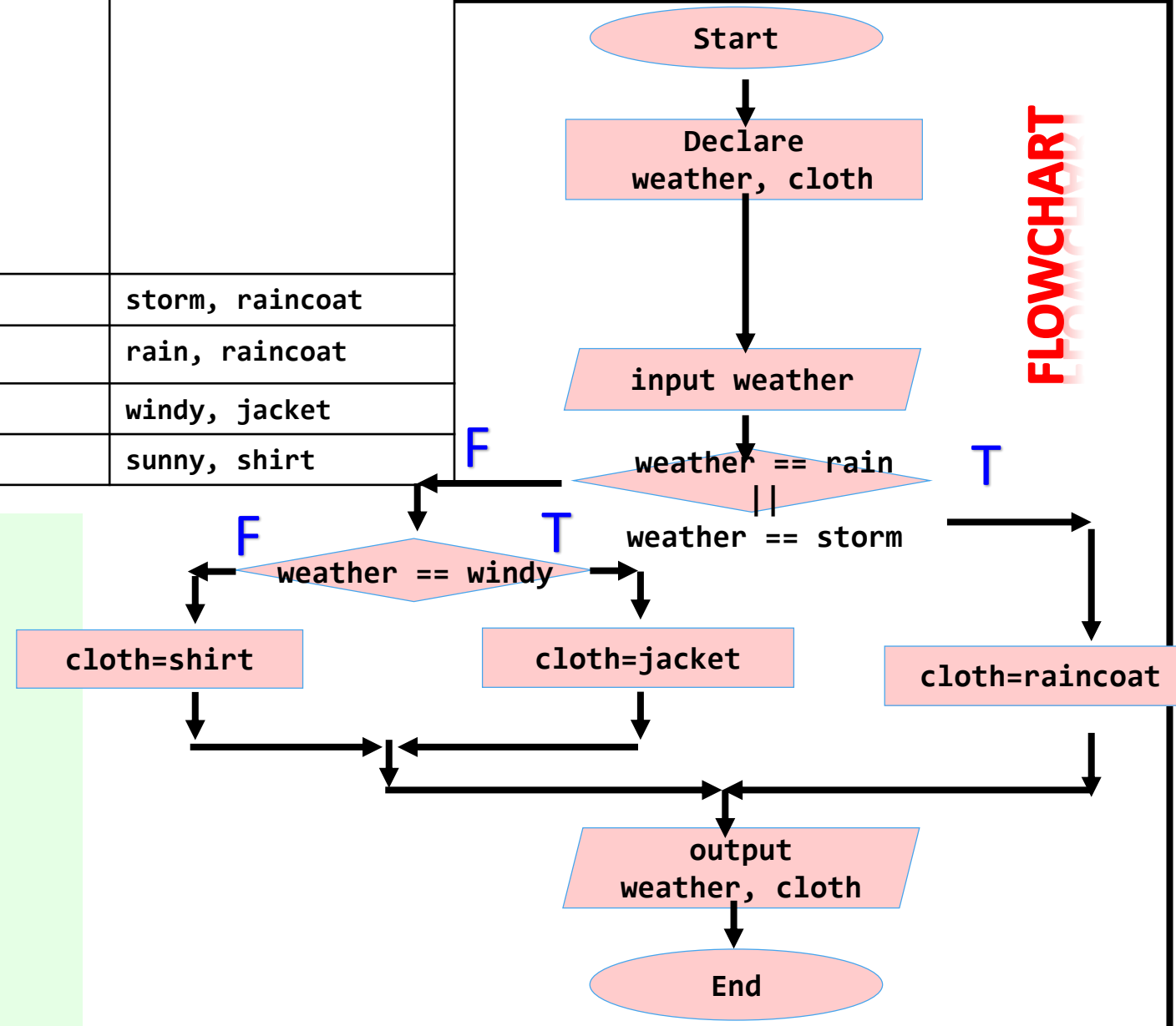
	weather	if weather == rain or weather == storm
		assign cloth=raincoat
		else
		if weather == windy then
		assign cloth=jacket
		else
		assign cloth=shirt
		end if
		end if
			weather, cloth

test1	storm		storm, raincoat
test2	rain		rain, raincoat
test3	windy		windy, jacket
test4	sunny		sunny, shirt

PSEUDOCODE

```
1.  START
2.  DECLARE weather, cloth
3.  Input weather
4.  IF (weather ==rain || weather==storm) Then
5.     cloth=rain coat
6.  Else
7.     If (weather==windy) then
8.        cloth=jacket
9.  Else
10.          cloth=shirt
11. End IF
12. End If
13. OUTPUT weather, cloth
14. END
```

FLOWCHART



❖ EXAMPLE : SELECTION >> If…Else

- A bus company give discount to all their passenger for CNY month to any destination according to this rate:

Age	Discount
12 years and below	50%
13 years above	10%

- This is the example of the bus ticket printed by the system:

MARALINER Sdn.Bhd.

Name: Nurulhuda Mior Khairuddin

Age: 36 Seat: 3A

Fee: RM100.00 After Discount:RM90.00

PROGRAM CONTROL STRUCTURE: Selection IF.. Else

PROB.ANALYSIS

	INPUT	PROCESS	OUTPUT

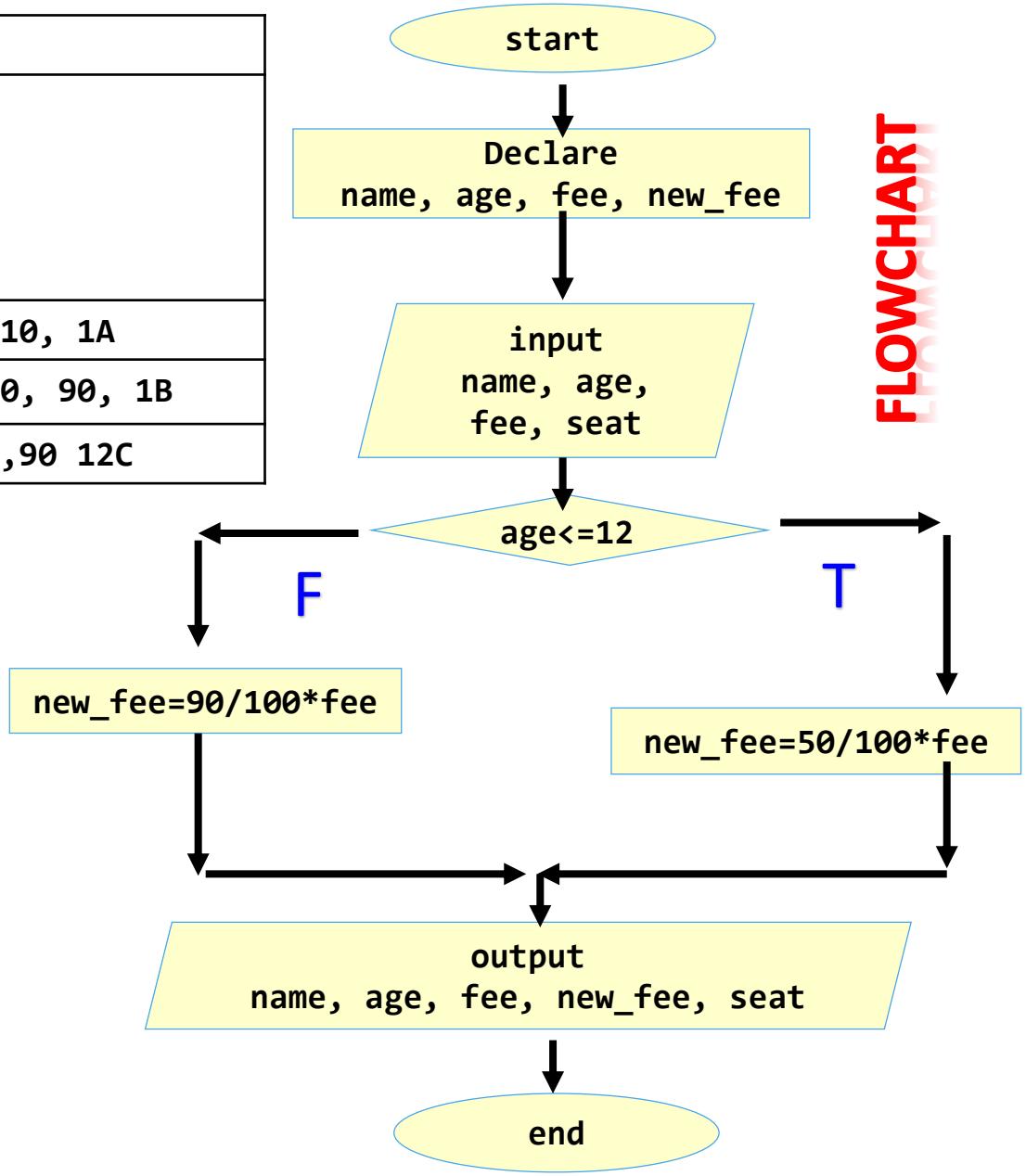
	name
	age
	fee
	seat
		if age<=12
		fee=50/100*fee
		else
		fee=90/100*fee
		end if
			name
			age
			fee
			new_fee
			seat

test1	Ali, 8, 20		Ali, 8, 20, 10, 1A
test2	Ain, 20, 100		Ain, 20, 100, 90, 1B
test3	Abu, 70, 100		Abu, 70, 100,90 12C

PSEUDOCODE

```
1.  START
2.  DECLARE name, age, fee, new_fee, seat
3.  Input name, age, fee, new_fee, seat
4.  IF Age<=12 Then
5.     New_fee=50/100*fee
6.  Else
7.     New_fee=90/100*fee
8.  End If
9.  OUTPUT name, age, fee, new_fee, seat
10. END
```

FLOWCHART



❖ EXAMPLE : SELECTION >> Nested If…Else

- A bus company give discount to all their passenger for CNY month to any destination according to this rate:

Age	Discount
12 years and below	50%
Between 13-59	10%
60 years above	20%

- This is the example of the bus ticket printed by the system:

MARALINER Sdn.Bhd.

Name: Nurulhuda Mior Khairuddin

Age: 36 Seat: 3A

Fee: RM100.00 After Discount:RM90.00

PROB.ANALYSIS

	INPUT	PROCESS	OUTPUT

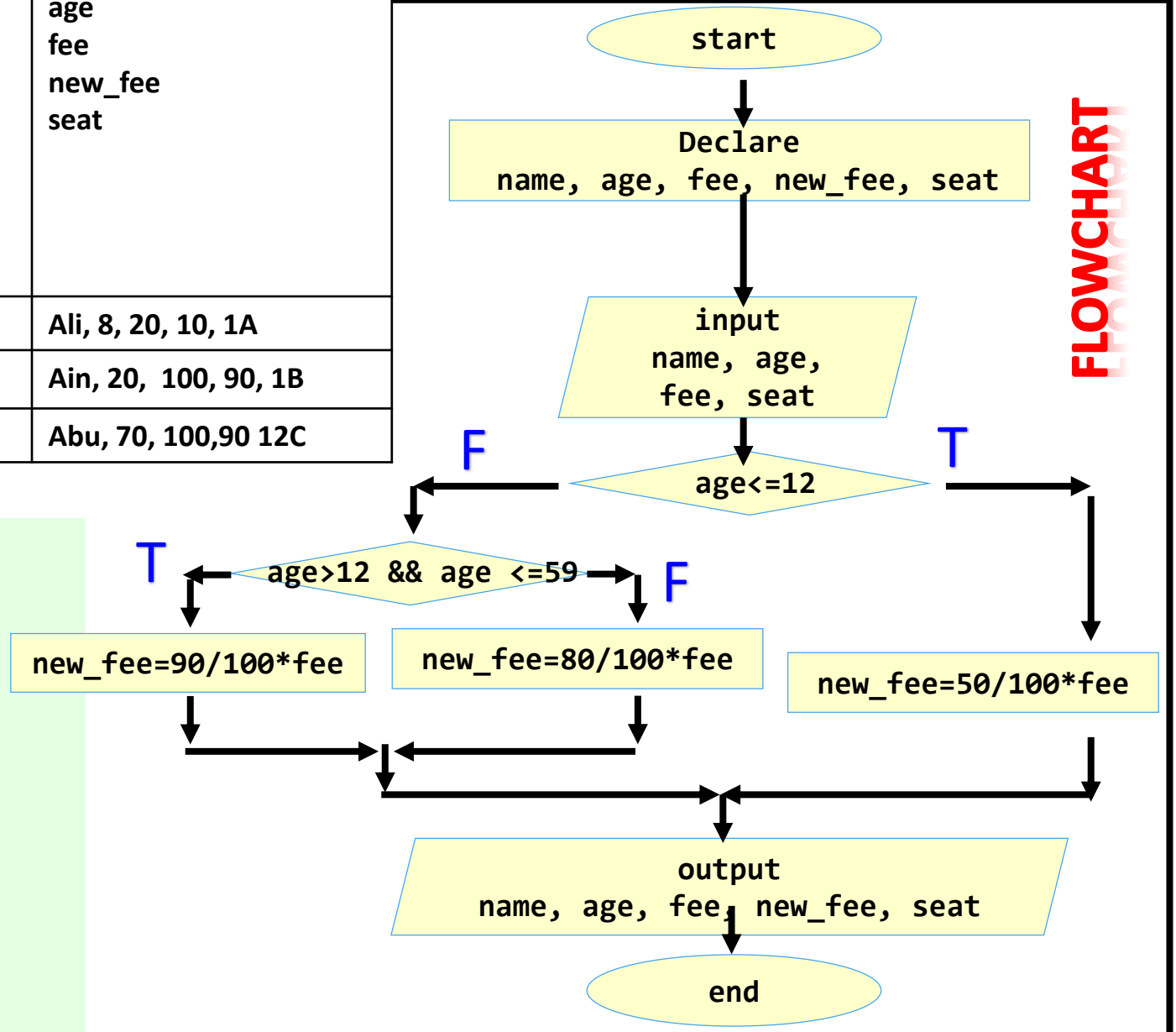
	name
	age
	fee
	seat
		if age<=12
		fee=50/100*fee
		else
		if age>12 && age <=59
		fee=90/100*fee
		else
		fee=80/100*fee
		end if
		end if
			name
			age
			fee
			new_fee
			seat

test 1	Ali, 8, 20		Ali, 8, 20, 10, 1A
test 2	Ain, 20, 100		Ain, 20, 100, 90, 1B
test 3	Abu, 70, 100		Abu, 70, 100,90 12C

PSEUDOCODE

```
1.   START
2.   DECLARE name, age, fee, new_fee, seat
3.   Input name, age, fee, new_fee, seat
4.   IF Age<=12 Then
5.      New_fee=50/100*fee
6.   Else
7.      If Age>12 && age<=59 Then
8.            New_fee=90/100*fee
9.   Else
10.           New_fee=80/100*fee
11.  End IF
12.  End If
13.  OUTPUT name, age, fee, new_fee, seat
14.  END
```

FLOWCHART



❖ EXAMPLE : SELECTION >> Iteration/Looping : Do While

- There are 8 students in a group. They took a test. Grade are given according this:

Score	Grade
50 and above	Pass
49 and below	Fail

- Print out list name of student, their score and grade a group.
- Summarize the number of student (pass and fail) within the group.

PROB.ANALYSIS

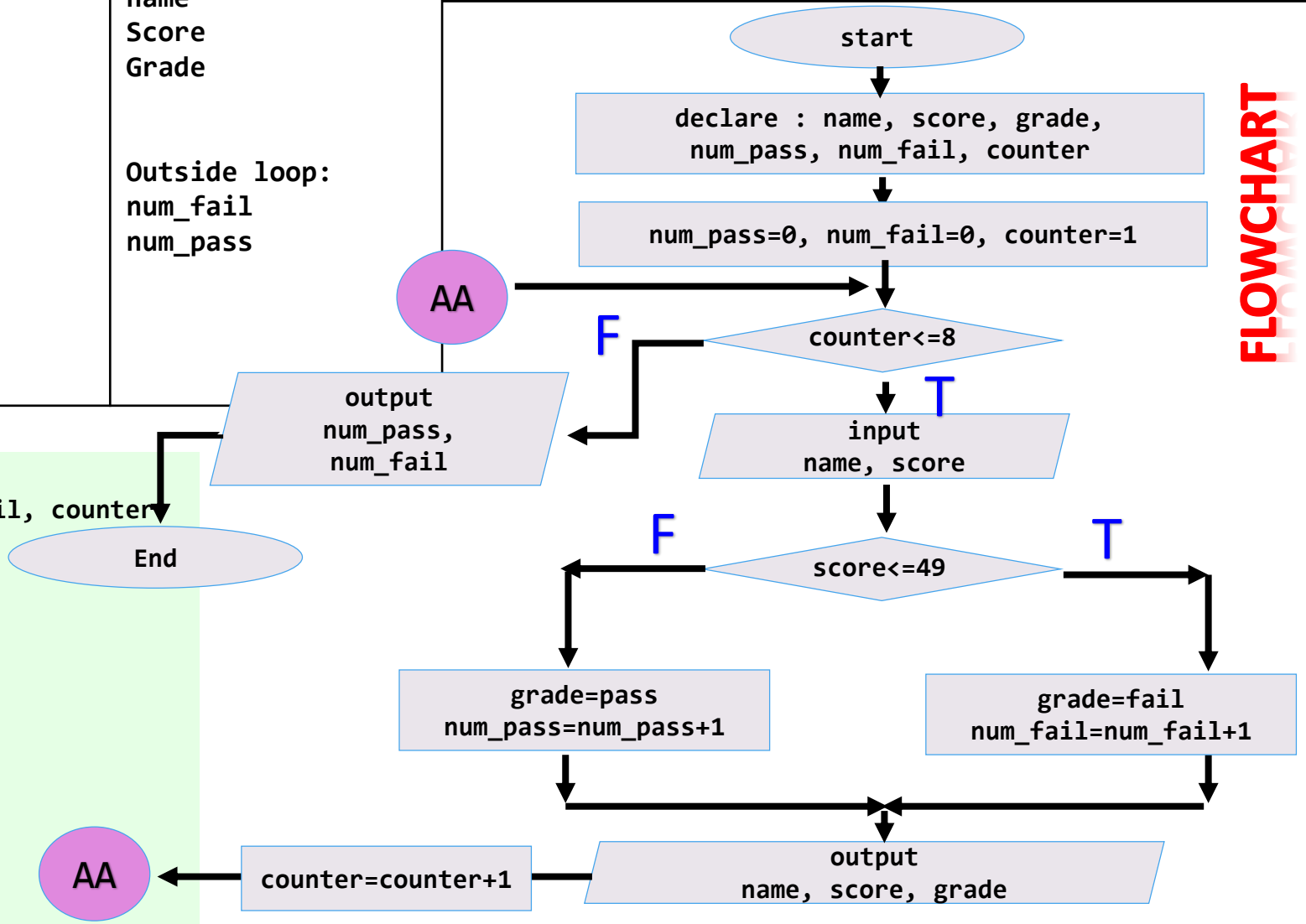
	INPUT	PROCESS	OUTPUT

	name
	score
		Assign num_pass=0, num_fail=0, counter=1
		Do While counter<=8
		Input name, score
		IF score<=50 Then
		grade=fail
		num_fail=num_fail+1
		Else
		grade=pass
		num_pass=num_pass+1
		End If
		OUTPUT name, score, grade
		Counter=counter+1
		End Do
			Within loop:
			name
			Score
			Grade
			
			Outside loop:
			num_fail
			num_pass

PSEUDOCODE

```
1.    START
2.    DECLARE name, score, grade,num_pass, num_fail, counter
3.    Assign num_pass=0, num_fail=0, counter=1
4.    Do While counter<=8
5.    Input name, score
6.    IF score<=50 Then
7.       grade=fail
8.       num_fail=num_fail+1
9.    Else
10.      grade=pass
11.      num_pass=num_pass+1
12.   End If
13.   OUTPUT name, score, grade
14.   Counter=counter+1
15.   End Do
16.   OUTPUT num_fail, num_pass
17.   END
```

FLOWCHART



❖ EXAMPLE : SELECTION >> Iteration/Looping : Do While

- There are n students in a group. They took a test. Grade are given according this:

Score	Grade
50 and above	Pass
49 and below	Fail

- Print out list name of student, their score and grade a group.
- Summarize the number of student (pass and fail) within the group.

PROB.ANALYSIS

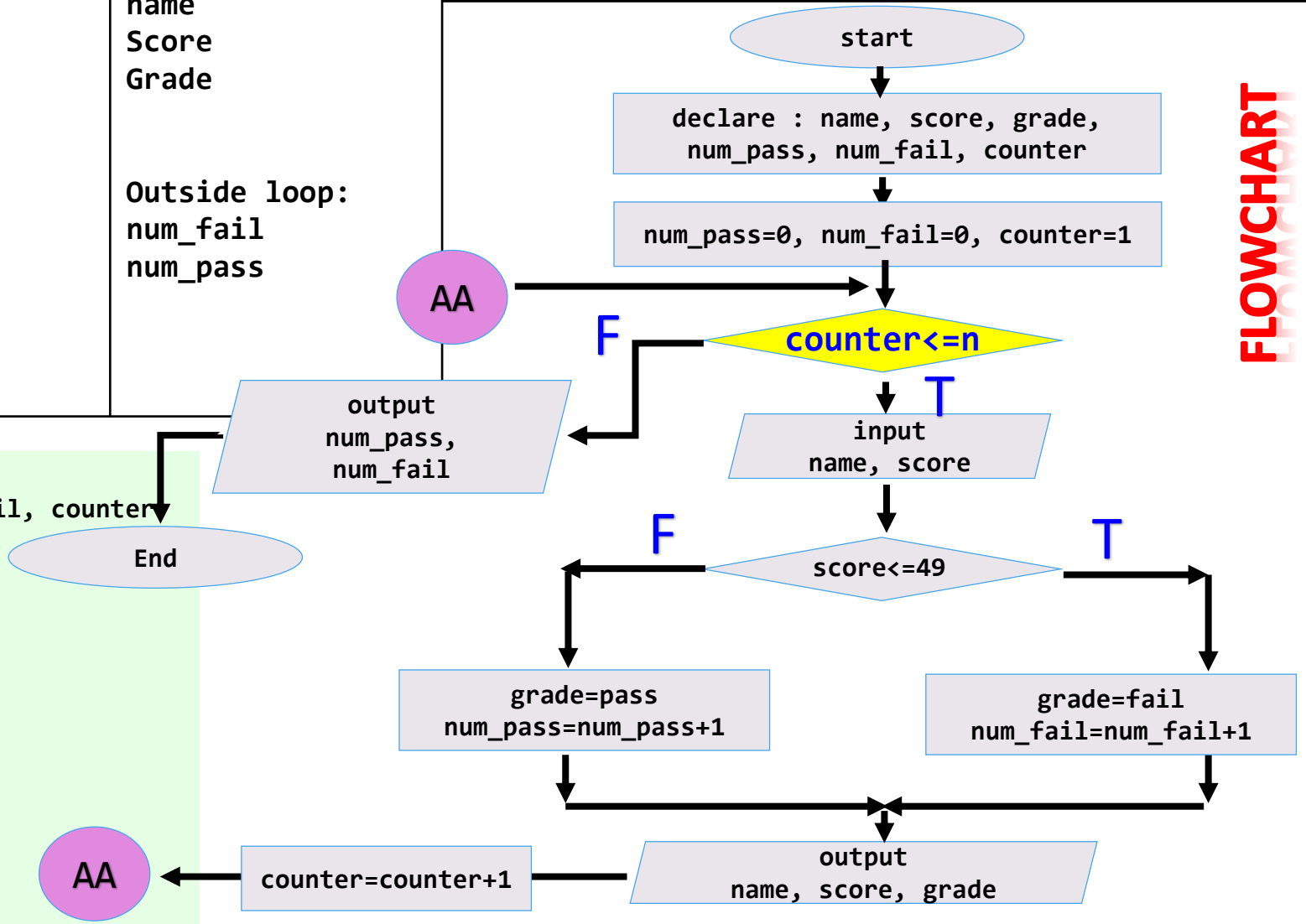
INPUT	PROCESS	OUTPUT

name
score
	Assign num_pass=0, num_fail=0, counter=1
	Do While counter<=n
	Input name, score
	IF score<=50 Then
	grade=fail
	num_fail=num_fail+1
	Else
	grade=pass
	num_pass=num_pass+1
	End If
	OUTPUT name, score, grade
	Counter=counter+1
	End Do
		Within loop:
		name
		Score
		Grade
		
		Outside loop:
		num_fail
		num_pass

PSEUDOCODE

```
1.   START
2.   DECLARE name, score, grade,num_pass, num_fail, counter
3.   Assign num_pass=0, num_fail=0, counter=1
4.   Do While counter<=n
5.   Input name, score
6.   IF score<=50 Then
7.      grade=fail
8.      num_fail=num_fail+1
9.   Else
10.     grade=pass
11.     num_pass=num_pass+1
12.  End If
13.  OUTPUT name, score, grade
14.  Counter=counter+1
15.  End Do
16.  OUTPUT num_fail, num_pass
17.  END
```

FLOWCHART



❖ EXAMPLE : SELECTION >> Iteration/Looping : Do While

- A bus company give discount to all their passenger for CNY month to any destination according to this rate:

Age	Discount
12 years and below	50%
Between 13-59	10%
60 years above	20%

- This is the example of the bus ticket printed by the system:

MARALINER Sdn.Bhd.

Name: Nurulhuda Mior Khairuddin
Age: 36 Seat: 3A
Fee: RM100.00 After Discount:RM90.00

- If the bus could take only 40 Passenger, count the number of Child, Adult and Old Folks for the a trip.

PROB.ANALYSIS

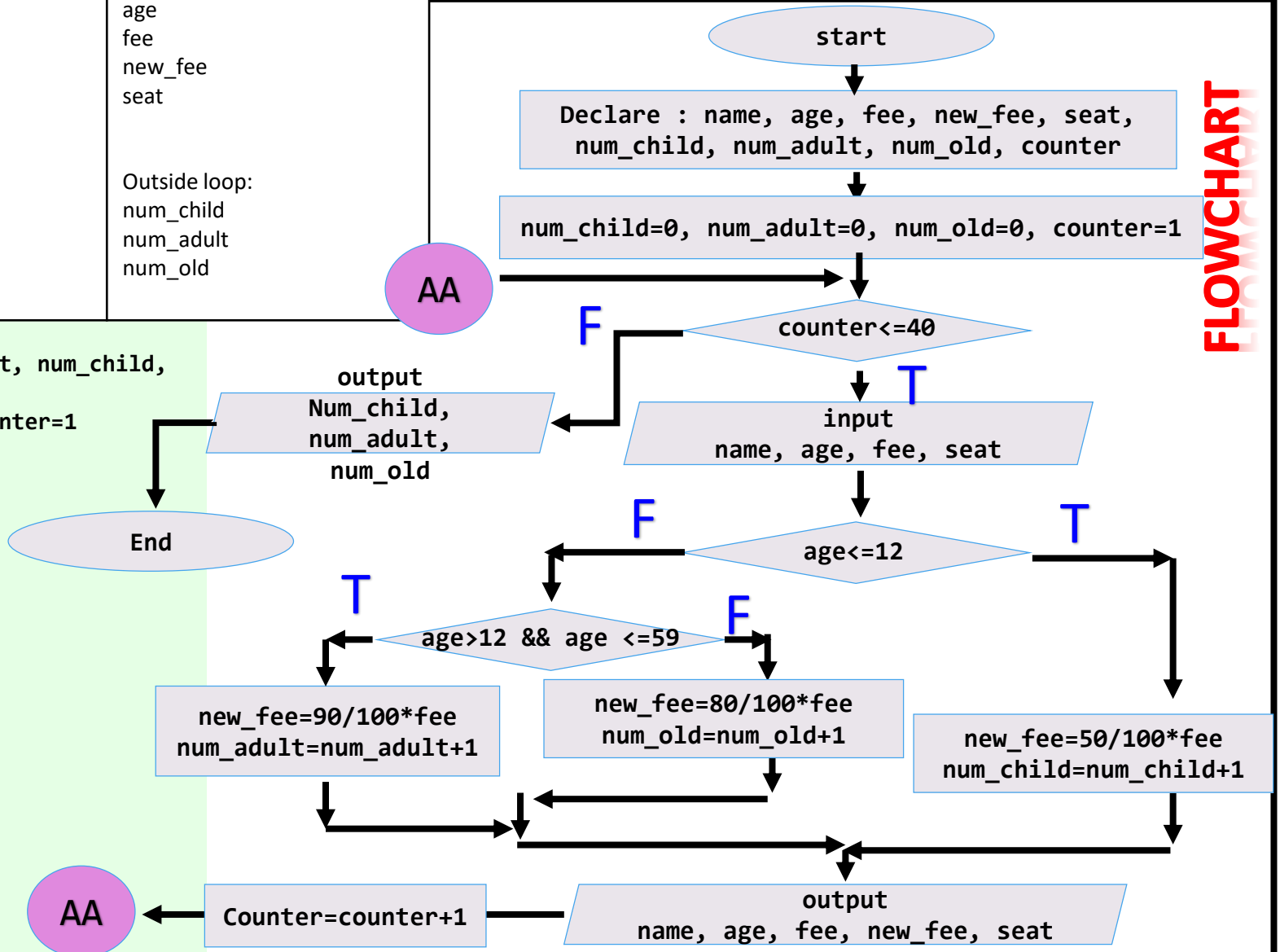
INPUT	PROCESS	OUTPUT

name
age
fee
seat
	Counter=1
	num_adult=0, num_child=0, num_old=0
	Do while counter<=40
	if age<=12
	fee=50/100*fee
	num_child=num_child+1
	else
	if age>12 && age <=59
	fee=90/100*fee
	num_adult=num_adult+1
	else
	fee=80/100*fee
	num_old=num_old+1
	end if (2 times)
	Counter=counter+1
	End Do
		Within loop:
		name
		age
		fee
		new_fee
		seat
		
		Outside loop:
		num_child
		num_adult
		num_old

PSEUDOCODE

```
1.  START
2.  DECLARE name, age, fee, new_fee, seat, num_adult, num_child,
    num_old
3.  Assign num_child=0, num_adult=0, num_old=0, counter=1
4.  Do While counter<=40
5.  Input name, age, fee, new_fee, seat
6.  IF Age<=12 Then
7.     New_fee=50/100*fee
8.     num_child=num_child+1
9.  Else
10.    If Age>12 && age<=59 Then
11.           New_fee=90/100*fee
12.           num_adult=num_adult+1
13. Else
14.           New_fee=80/100*fee
15.           num_old=num_old+1
16. End IF
17. End If
18. OUTPUT name, age, fee, new_fee, seat
19. Counter=counter+1
20. End Do
21. OUTPUT num_child, num_adult, num_old
22. END
```

FLOWCHART



Chap 8: Types of Error >> LOGIC error VS SYNTAX error

Article 1

Every programmer knows that debugging is a time-consuming nightmare, so it makes a good candidate for programmers to learn how to deal with. There are generally two types of errors: **syntax** errors and **logic** errors.

Syntax errors occur when a program does not conform to the grammar of a programming language, and the compiler cannot compile the source file. Logic errors occur when a program does not do what the programmer expects it to do.

Syntax errors are usually easy to fix because the compiler will tell you where the error occurs and you simply fix the syntax error. For example you may miss a semicolon or a curly bracket where it's supposed to be. Simply locate those errors and fix them.

The real pain in the neck are logic errors. For instance you may be writing a software application that solves a puzzle, but when you run it it tells you that the puzzle cannot be solved. After you dig through the program logic you realize you have done something wrong. After you fix the logic and run the program again it solves the puzzle successfully.

Chap 8: Types of Error >> LOGIC error VS SYNTAX error

Article 2

When programmers write code in a high-level language there are two types of errors that they might make: syntax errors and logic errors.

Syntax errors are mistakes such as misspelled keywords, a missing punctuation character, a missing bracket, or a missing closing parenthesis. Nowadays, all famous IDEs such as Eclipse, NetBeans, and Visual Studio (to name a few) detect these errors as you type and underline the erroneous statements with a wavy line. If you try to execute a program that includes syntax errors, you will get error messages on your screen and the program won't be executed. You must correct all the errors and then try to execute the program again.

Logic errors are those errors that prevent your program from doing what you expected it to do. With logic errors you get no warning at all. Your code may compile and run but the result is not the expected one. Logic errors are the most difficult errors to detect. You must revisit your program thoroughly to determine where your error is. For example, consider a program that prompts the user to enter three numbers, and then calculates and displays their average value. The programmer, however, made a typographical error; one of his or her statements divides the sum of the three numbers by 5, and not by 3 as it should. Of course the program is executed as usual, without any error messages, prompting the user to enter three numbers and displaying a result, but obviously not the correct one! It is the programmer who has to find and correct the erroneously written statement, not the computer or the compiler!

ERRORS: Logic VS Syntax

Problem 1:

- *Program to find Area of rectangle.*

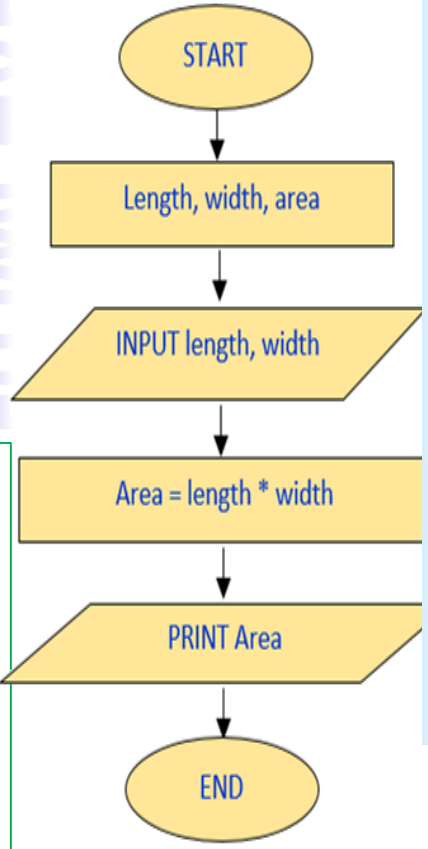
PROB.ANALYSIS

Input	:	length, width
Process	:	Calculate area
		area = length * width
Output	:	area

PSEUDOCODE

1. START
2. Declare length, width, area
3. INPUT length, width
4. Calculate area = length * width
5. PRINT area
6. END

FLOWCHART



C++ CODING

```
/* Python Program to find area of rectangle*/

#include <iostream>
#include <stdlib.h>
using namespace std;
int main()    {
     float length, width, area;

     cout<<"\n Enter your length : ";
     cin>>length;

     cout<<"\n Enter your width : ";
     cin>>width;

     area = length * width;

     cout<<"\n area="<<area;

     system("PAUSE");
     return 0;  }
```

PYHTON CODING

```
# Python Program to find Area Of a rectangle

length = float(input(' Please Enter the length: '))
width = float(input(' Please Enter the width: '))
area = length*width

print(" Area= %.2f" %area)}
```