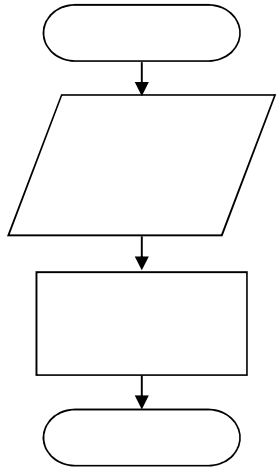
Introduction to Computer Programming

Programming Block

- In the process
- Blocks of programming
  - Identify how the information flow in the system
- Three types of block structure
  - Sequence
  - Decision and selection
  - Repetition

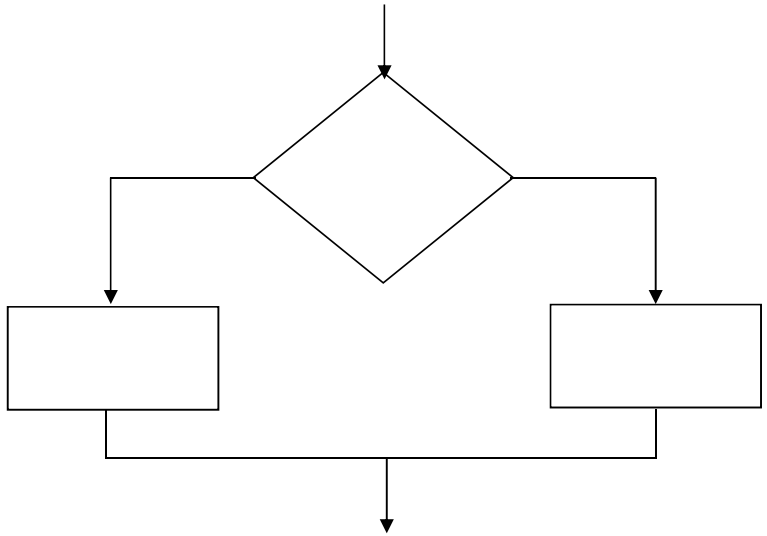
Sequence Structure

- A series of actions are performed in sequence
- Every operation must be executed



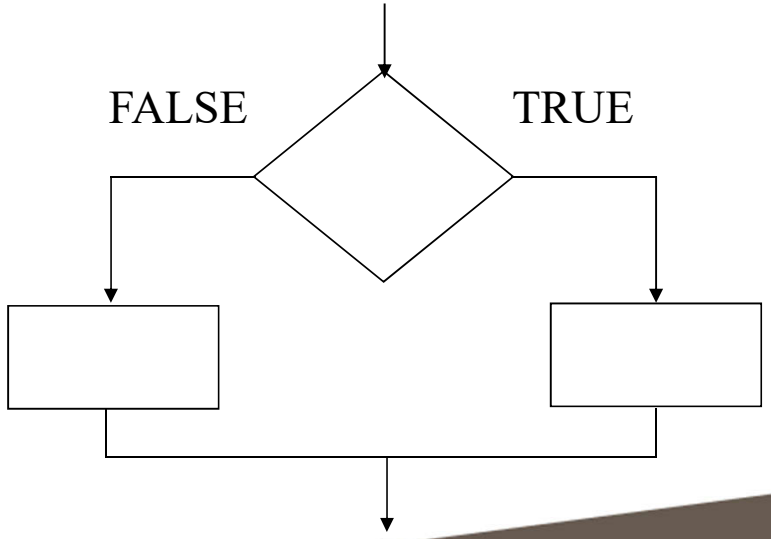
Decision Structure

- One of two possible actions is taken, depending on a condition.



Decision Structure

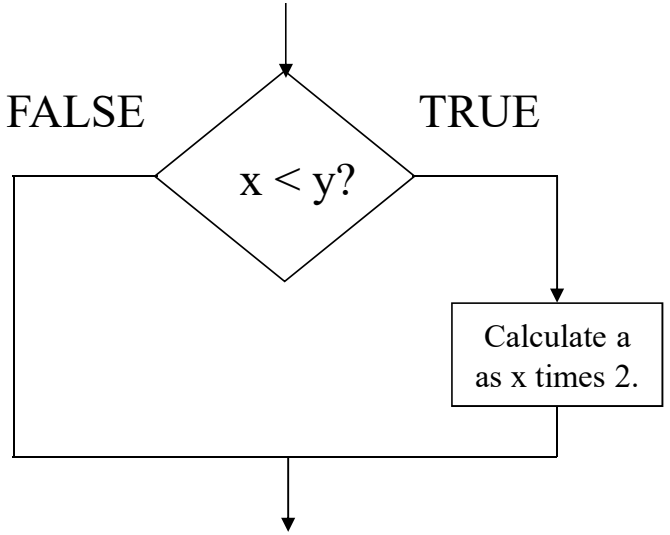
- The diamond, indicates a TRUE/FALSE question
  - If the answer to the question is TRUE, the flow follows one path
  - If the answer is FALSE, the flow follows aFALSEther path



Today

- Discussion on the decision of IF

```
IF x<y
   a = x*2
ENDIF
```

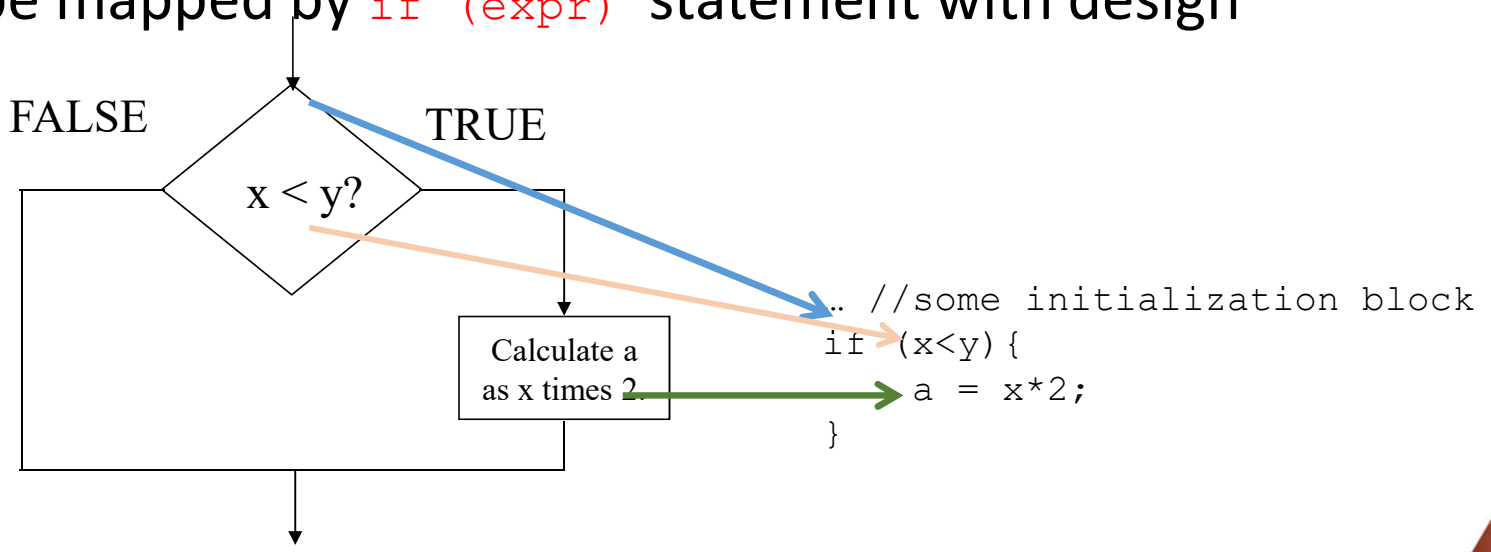


When to make Decision

- The operation will be occurred if some condition is true
- Like when we discuss us
  - We will do something if …
- Example
  - If your GPA is less than 1.50, you will be eliminated from school
  - What is the pseudo code ?

Mapping to Source code

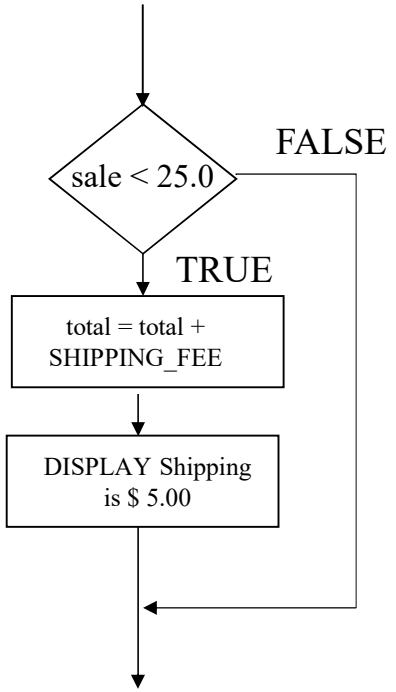
- Pseudo code and Flow chart is used for designing program
- It can be mapped by `if (expr)` statement with design



The if Statement

Example:

```
if (sale < 25.00)
{
   total += SHIPPING_FEE;
   System.out.println("Shipping is $5.00");
}
```

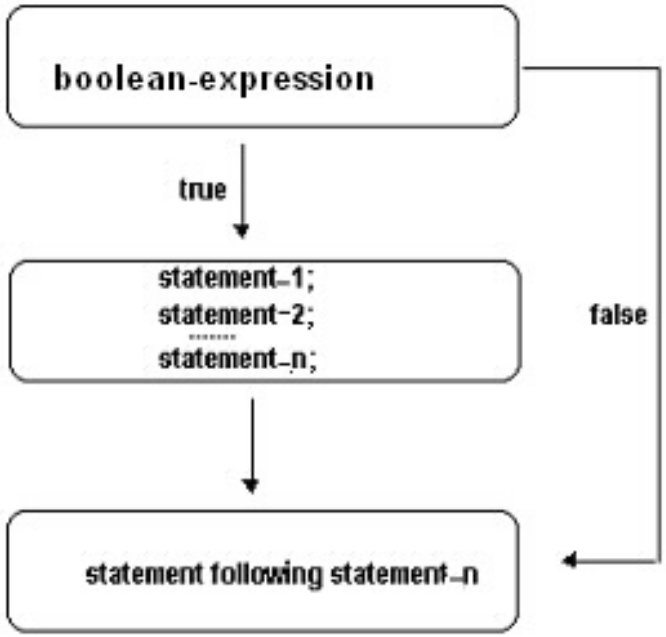


- Execution of this statement proceeds as follows:
  1. The boolean expression *sale < 25.00* is evaluated.
  2. If the boolean expression is true, the two statements enclosed by the curly braces are executed.
  3. If the boolean expression is false, the statements enclosed by the braces are skipped.

The if Statement

- The syntax for an if statement is:

```
if ( boolean-expression)
    {
          statement-1;
          statement-2;
          …
          statement-n;
    }
```



The if Statement

- TermiFALSElogy:
  - An `if` statement is also termed a conditional or selection statement.
  - The phrase `if (boolean-expression)` is called the if clause.
  - The `boolean expression` is also called a *boolean condition* (or simply a *condition*).
  - The `statement-list` enclosed by curly braces is a block or compound statement.
    - Sequence block

The if Statement

- A *block* is a group of statements enclosed by matching curly braces.
- If the statement-list consists of a single statement
  - the braces may be omitted
  - A single statement without the braces is FALSEt considered a block.

The if Statement

- An if statement that does FALSEt contain curly braces:

```
1.  int max = a;     //a is biggest so far
2.  if (b > max)     // is b bigger than the current maximum
3.        max = b;   // if so, set max to b
4.  if (c > max)     // is c bigger than the current maximum?
5.        max = c;   // if so set max to c
6.  System.out.println ("The maximum value is " +max);
```

The if Statement

- Alternatively, the same fragment can be written using curly braces:

```
int max = a;
if (b > max)
{
     max = b;
}
if (c > max)
{
    max = c;
}
System.out.println("The maximum value is "+max);
```

Activity

- Group of 3 students

- Develop a program to read 3 integers and display the result in order (low to high).

The if-else Statement

- The *if-else* statement provides an alternative:
  - if the boolean condition is true one group of statements executes, but if the condition evaluates to false a different group is selected.
-

If-else example

```
1. System.out.print(" 1 to convert from dollars to euros2 from euros to
         dollars: " );
2.  transactionType = input.nextInt();

3.    if (transactionType == 1)  // dollars to euros
4.    {
5.          System.out.print("Number of dollars: ");
6.          dollars = input.nextDouble();
7.          euros = dollars/DOLLARS_PER_EURO;
8.          System.out.println("Number of euros: " + euros);
9.    }
10.   else // otherwise euros to dollars
11.   {
12.         System.out.print("Number of euros: ");
13.         euros = input.nextDouble();
14.         dollars = euros* DOLLARS_PER_EURO;
15.               System.out.println("Number of dollars: " + dollars);
16.    }
```

The if-else Statement

- Lines 12 through 25 constitute a single if-else statement.

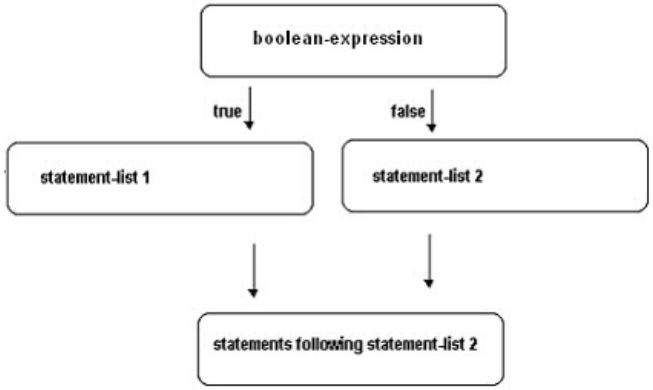
- Line 3 (transactionType == 1) is a boolean condition.
- If this condition is true then the statements on lines 4 through 9 are selected
  - those on line10 through16 are skipped.

- If the boolean condition is false
  - the block consisting of lines 4 through 9 is igFALSEred
  - the block of statements on lines 10 through 16 executes.

The if-else Statement

- The syntax of the if else statement is:

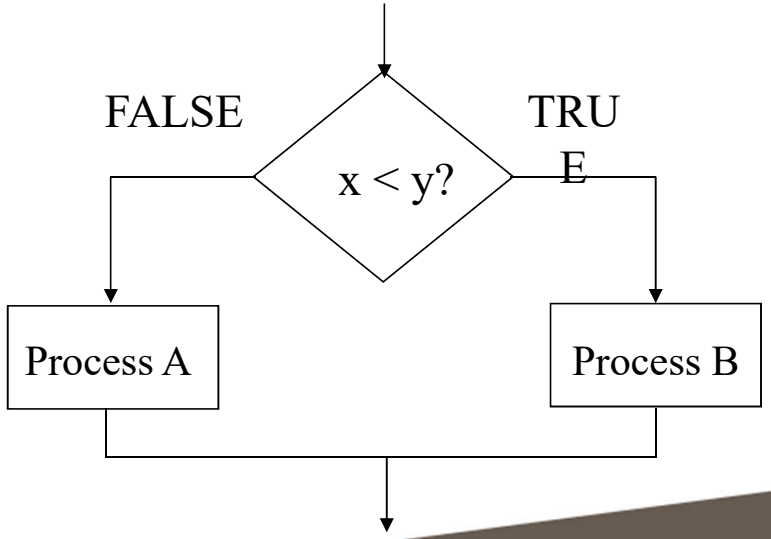
```
if  (boolean-expression)
      statement-list-1
else
      statement-list-2
```



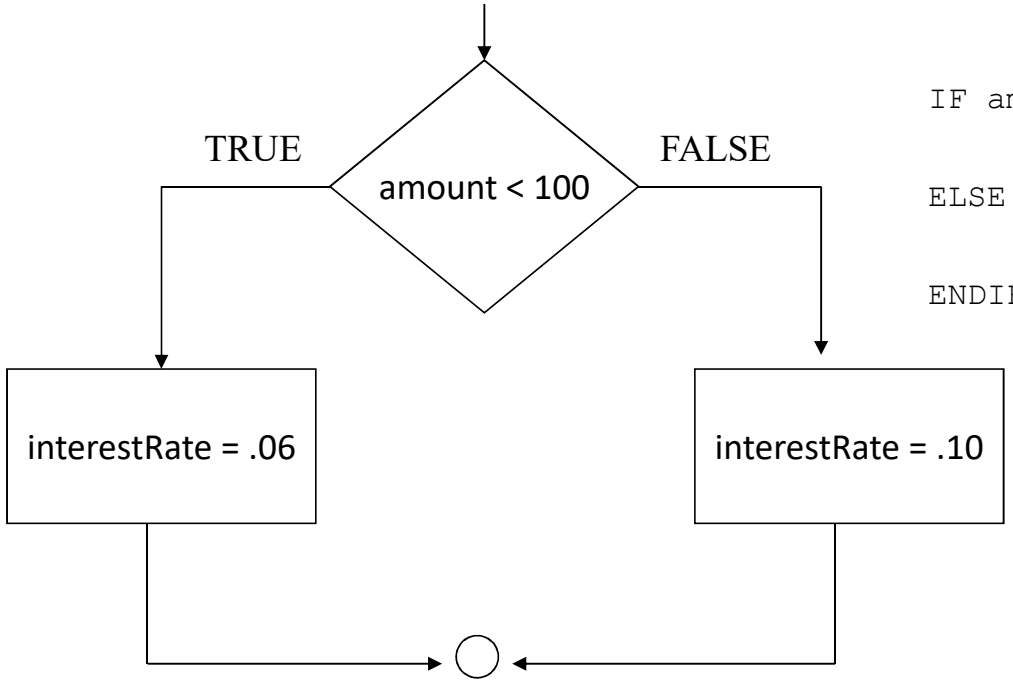
- where statement-list-1 and/or statement-list-2 signify single statements or a block.
- Every time an if-else statement is encountered, one of the two statement-lists always executes.

Flow chart

- In the flowchart segment below, the question “is x < y?” is asked. If the answer is NO, then process A is performed. If the answer is YES, then process B is performed.



Flow Chart and Pseudo code

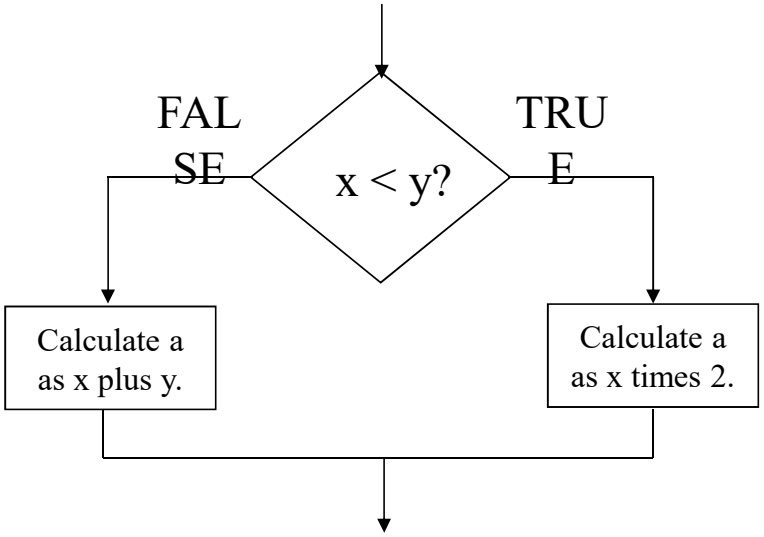



```
IF amount < 100
     interestRate = .06
ELSE
     Interest Rate = .10
ENDIF
```

Pseudocode ➔

Flow chart and Source code

Flowchart



Code

```
if (x < y)
        a = x * 2;
else
        a = x + y;
```

Example

- Write a program to receive a score from user and display “You pass” if the score is larger than 60.0

Example

- Write a program to receive a score from user and display “You pass” if the score is larger than 60.0 and display “You fail” if the score is smaller than 60.0.

Example

- Write a program to receive a province name from user and display “Welcome to Bangkok” if the input is “Bangkok”.

Example

- Write a program to receive a province name from user and display “Welcome to My City” if the input is “Bangkok” or “Chiang Mai”.

What is the difference between “Chiang Mai” and “Chiang mai”?

Example

- The CAMT souvenir shop just opens so they have the promotion. If the students buy stuffs, they will get discount 10 % off. If the faculties buy stuffs, they have to pay 5 % more in order to add to CAMT fund

Example

- Write the flowchart or pseudo code to calculate how much customer have to pay. The program should receive the total price of product customers want to buy and the type of customer. The types of customer is categorize by
  - Students is ‘S’
  - Faculties is ‘F’
  - Other customer is ‘O’

Example

- Write a program to determine the grade using the following criteria

- A : 80.0 – 100.0
- B : 70.0 – 79.99
- C : 60.0 – 69.99
- D : 50.0 – 59.99
- F : <50.0

Example

- Write a program to receive the total income from user and calculate the tax

- Tax 0.05 : total income less than 100,000.00
- Tax 0.10 : the next 100,000.00
- Tax 0.20 : the next 200,000.00
- Tax 0.30 : the next 200,000.00
- Tax 0.37 : The rest