Selection 2

Basic Programming Teaching Team 2022

Objectives

After studying this material, students should be able to:

1. Understand the definition and use of nested selection syntax

2. Understand the basic structure of nested selection syntax

3. Solve problems by creating a Java program that utilizes nested selection syntax

Nested Selection

- Nested selection (NESTED IF) is a type of selection used to make decisions in the form of levels (levels)

- In an IF statement (or IF-ELSE) there can be other IF (or IF-ELSE) statements

Nested Selection

- General Form:

```
if (condition-1){
    if (condition-2){
        statement-1;
        …
        …
        if (condition-n){
            statement-2;
        }
        else {
            statement-3;
        }
    }
    else {
        statement-n;
    }
}
else {
    statement-x;
}
```

Nested Selection

- The condition that will be selected first is the IF condition which is in the outermost position (condition-1).

- If condition-1 is false, then the outer ELSE statement (the corresponding IF pair) will be processed. However, if no ELSE statement (pair of IF) is written, the condition selection will be terminated.

- If it turns out that condition-1 is true, then the next deeper condition (condition-2) will be selected. If condition-2 is false, the ELSE statement (the corresponding IF pair) will be processed. However, if no ELSE statement (pair of IF) is written, the condition selection will be terminated.

Flowchart Nested Selection
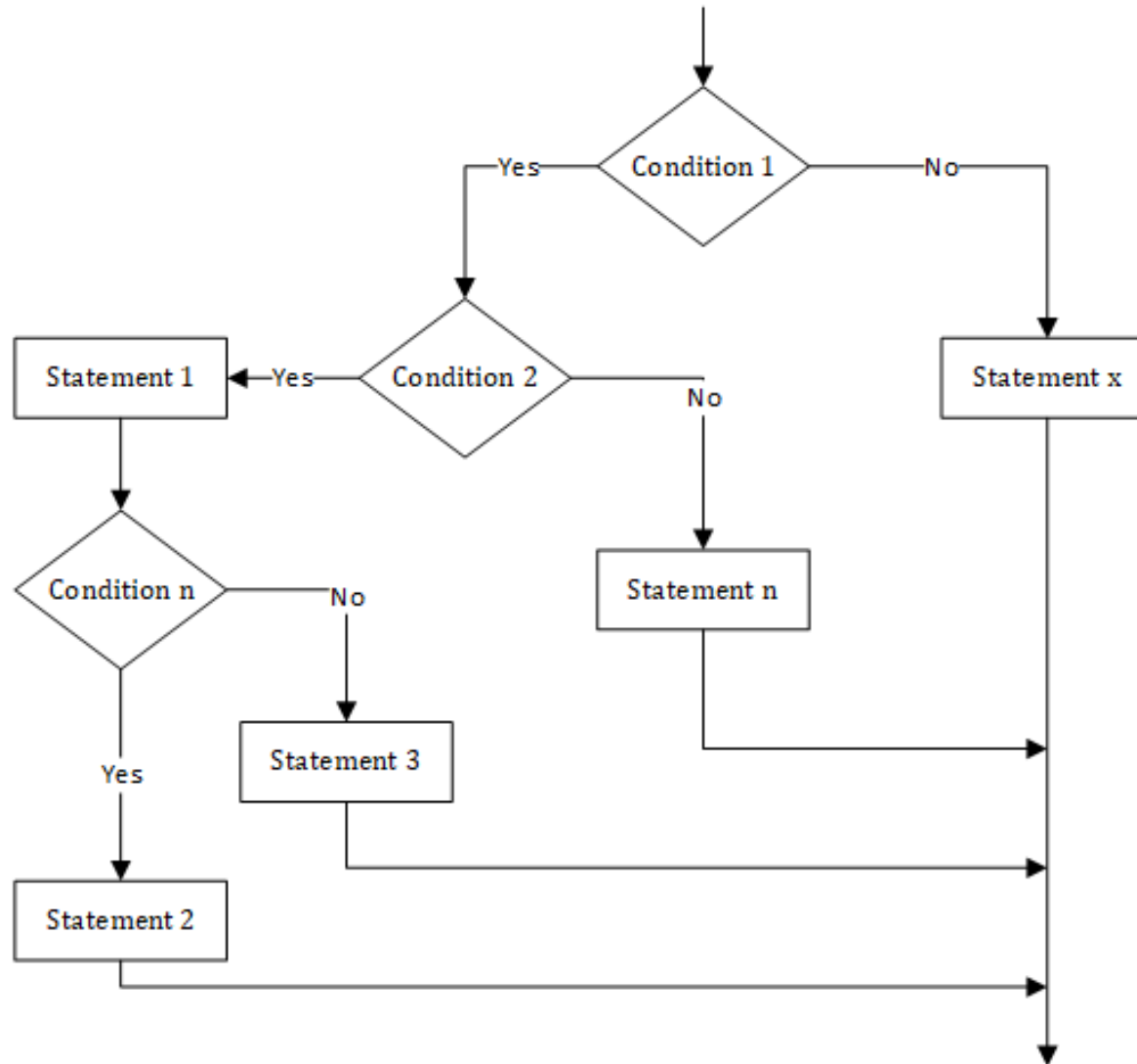
Example

When someone makes a payment at the checkout. The cashier will ask questions:

Does the customer have a membership card?

→ TRUE:

Is the total purchase price more than IDR 500,000?

→ TRUE: Customers get a discount of IDR 50,000
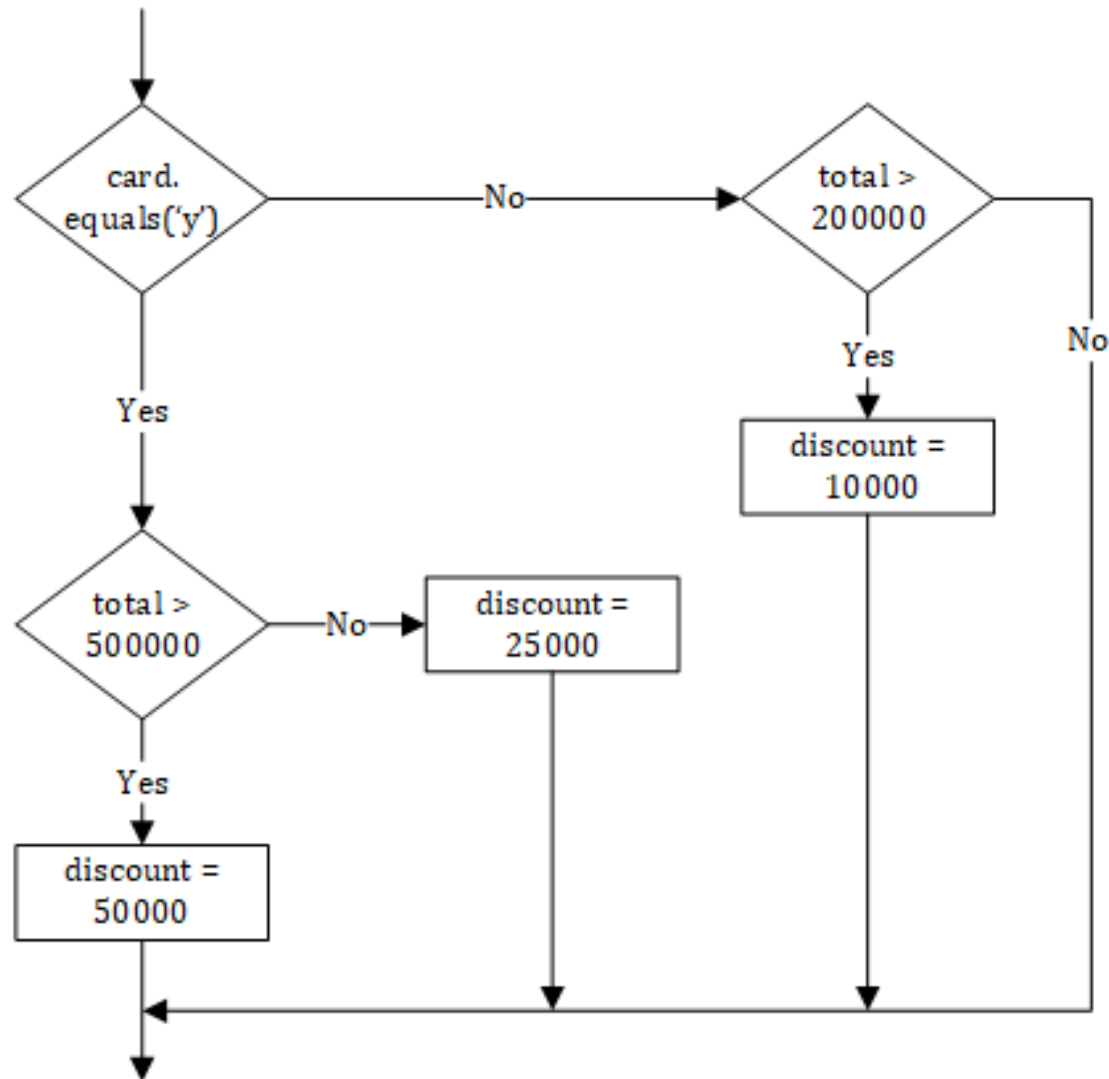
→ FALSE: Customers get a discount of IDR 25,000

→ FALSE:

Is the total purchase price more than IDR 200,000?

→ TRUE: Customers get a discount of IDR 10,000

→ FALSE: Customers do not get a discount

Example of Flowchart

Example of Code

```java
public static void main(String[] args) {
    int total, discount, pay;
    String card;
    Scanner sc = new Scanner(System.in);
    System.out.print("Does the customer have a membership card? ");
    card = sc.next();
    System.out.print("How much the total customer purchases? ");
    total = sc.nextInt();
    if (card.equals("y")) {
        if (total > 500000) {
            discount = 50000;
        } else {
            discount = 25000;
        }
    } else {
        if (total > 200000) {
            discount = 10000;
        } else {
            discount = 0;
        }
    }
    pay = total - discount;
    System.out.println("The total that must be paid by the customer is IDR " + pay);
}
```

```
Does the customer have a membership card? y
How much the total customer purchases? 800000
The total that must be paid by the customer is IDR 750000
```

Logical Expressions

Logical Expressions

- There are 3 types of logical operators used in IF-ELSE statements, namely:
  - && : AND
  - || : OR
  - ! : NOT

- **A logical expression** is an expression that uses one or more logical operators.

- Operators applied to logical expressions will evaluate from **left to right**

Logical Expressions

- When evaluating (e_1 && e_2), if e_1 returns FALSE, then e_2 will not be evaluated. Thus, the value of the entire expression (e_1 && e_2) will be considered false

- However, if e_1 returns TRUE, then e_2 will then evaluate to determine the value of the entire expression

- Example:

```
if (speed == 0 && engineOn == true)
    System.out.println ("Turn off the machine");
```

Logical Expressions

- When evaluating (e_1 || e_2), if e_1 returns TRUE, then e_2 will not be evaluated. Thus, the value of the entire expression (e_1 || e_2) is assumed to be true

- However, if e_1 returns FALSE, then e_2 is evaluated to determine the value of the entire expression
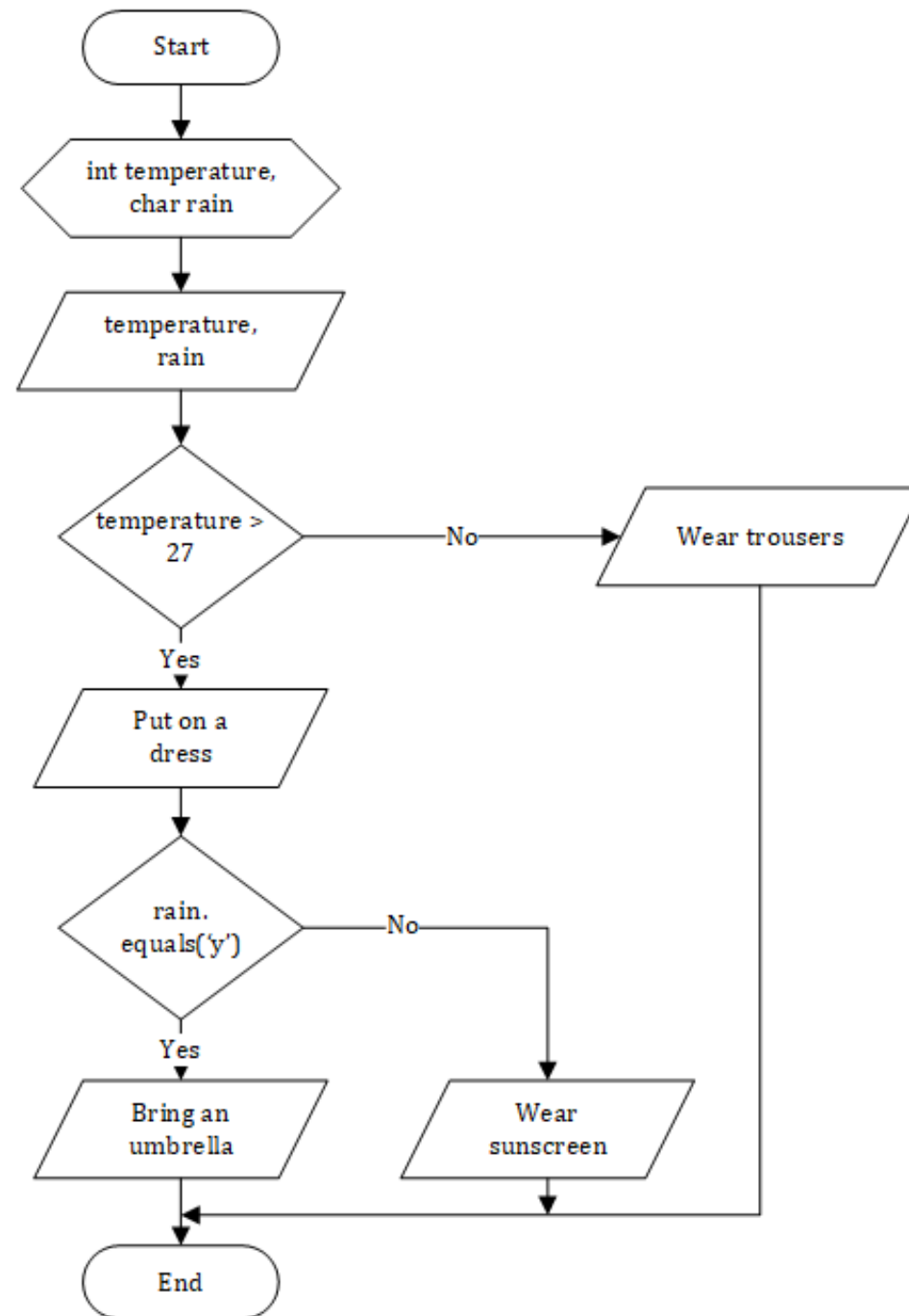
- Example:

```
if (speed == 0 || engineOn == true)
    System.out.println ("Turn off the machine");
```

Case Study

A system is established to determine which clothes and equipment the user should bring according to weather conditions. If the temperature is more than 27°C, the user is advised to wear a dress, then check whether it is raining at this time, if it is raining, the user is advised to bring an umbrella, whereas if it is not raining, the user is advised to wear sunscreen. However, if the temperature is less than or equal to 27°C, the user is advised to wear trousers

Make a flowchart for the system!

Flowchart

```
                    ( Start )
                        |
              / int temperature, \
              \   char rain      /
                        |
              / temperature,  /
              /    rain       /
                        |
                < temperature > >----No----> / Wear trousers /
                <    27       >
                        |
                       Yes
                        |
              / Put on a  /
              /  dress    /
                        |
                < rain.        >----No----> Wear
                < equals('y')  >            sunscreen
                        |
                       Yes
                        |
              / Bring an   /       / Wear      /
              / umbrella   /       / sunscreen /
                        |                |
                    ( End )
```

Assignment

Assignment 1

JNX expedition serves domestic and international shipments with the following details:

- For domestic shipments, if the weight of the goods is less than 5 kg then there is no charge, if the goods weigh 5-10 kg then a fee of IDR 165,000 is charged, and if the weight of the goods is more than 10 kg then a fee of IDR 375,000

- For international shipments, if the weight of the goods is less than 2 kg, there is no charge, if the weight of the goods is more than 2 kg, a fee of IDR 500,000 is charged.

Create a flowchart to determine the shipping costs that must be paid by customers!

Assignment 2

The ATM system has 3 menus, namely Withdrawal, Transfer, and Change PIN

- On the Withdrawal menu, users are asked to select the type of savings "Giro" or "Deposito", then enter the amount of money to be withdrawn

- On the Transfer menu, users are asked to select the destination bank code consisting of BRI, BNI, Mandiri, Bukopin, and BCA, then enter the destination account, and enter the amount of money to be transferred

- On the Change PIN menu, the user is asked to enter the old password and the new password

Make a flowchart for the ATM system!

Assignment 3

Every Saturday, a clothing store gives a discount to its customers according to the type of clothes and the number of clothes purchased

- A 10% discount is given if the clothes purchased are jackets, then an additional 2% discount will be given if more than 2 clothes are purchased

- A discount of 7% is given if the clothes purchased are shirts, then an additional 2% discount will be given if the clothes purchased are more than 3, whereas if the clothes purchased are less than or equal to 3, an additional 1% discount will be given

- Customers will get a 5% discount for clothes other than jackets and shirts if the clothes purchased are more than 3 products

Make a flowchart to determine the total amount to be paid if the input is the type and quantity of clothes (the price of each garment is determined by the system)!