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COSC 211 : Object Oriented Programming I - LAB05

Objectives:

To gain experience with:

- Selection Statement
- Iteration

1. Selection Statement

Three types of selection statements.

if statement.

- Performs an action, if a condition is true; skips it, if false.
- Single-selection statement—selects or ignores a single action (or group of actions).

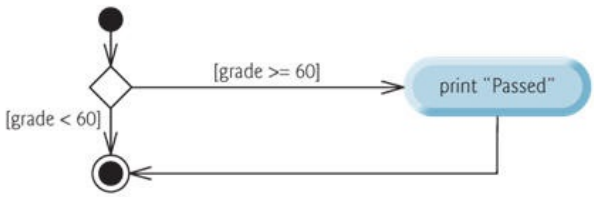
if…else statement:.

- Performs an action if a condition is true and performs a different action if the condition is false.
- Double-selection statement—selects between two different actions (or groups of actions).

switch statement:.

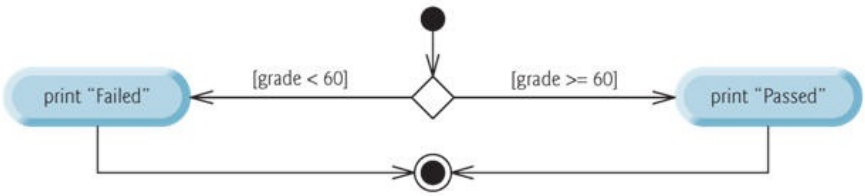
- Performs one of several actions, based on the value of an expression.
- Multiple-selection statement—selects among many different actions (or groups of actions).

if Single-Selection Statement.



Pseudocode:	Java Code:
If student's grade is greater than or equal to 60 *Print "Passed"*	if (studentGrade >= 60) System.out.println("Passed");
If the condition is false, the Print statement is ignored, and the next pseudocode statement in order is performed.	

if Single-Selection Statement.



Pseudocode:	Java Code:
If student's grade is greater than or equal to 60 *Print "Passed"*	

Else
Print "Failed"
	if (grade >= 60)
	
	System.out.println(
	"Passed");
	else
	System.out.println(
	"Failed");

Note that the body of the else is also indented.	

Conditional operator (?:)—shorthand if…else.

Ternary operator (takes three operands)

boolean expression ? the value if the boolean expression is true : the value if the boolean expression evaluates to false

System.out.println(studentGrade >= 60 ? "Passed" : "Failed");

Example 1:

```
import java.util.Scanner;

public class Tester
{
   public static void main(String [] args)
   {
        int score ;
        char grade;

        Scanner input = new Scanner(System.in);
        System.out.println("Enter your score");
        score = input.nextInt();

        if (score >=90)
           grade = 'A';
        else if (score >=80)
           grade = 'B';
        else if (score >=70)
           grade = 'C';
        else if (score >=60)
           grade = 'D';
        else
           grade = 'F';

        System.out.println("Your test score is "+ score
         + ", which is equivalent to the grade " + grade + ".");
   }
}
```

```
import java.util.Scanner;

public class Tester
{
   public static void main(String [] args)
   {
        int score ;
        char grade;

        Scanner input = new Scanner(System.in);
        System.out.println("Enter your score");
        score = input.nextInt();

        if (score >=90)
           grade = 'A';

        if (score >=80)
           grade = 'B';

        if (score >=70)
           grade = 'C';

        if (score >=60)
           grade = 'D';
        else
           grade = 'F';

        System.out.println("Your test score is "+ score
         + ", which is equivalent to the grade " + grade + ".");
   }
}
```

Study, run, compile and run the above codes and observe the output

Click for nested if statements

1. Iteration (Repitation)

Three repetition statements (also called looping statements)Perform statements repeatedly while a loop-continuation condition remains true.
while and *for* statements perform the action(s) in their bodies zero or more times. if the loop-continuation condition is initially false, the body will not execute
The *do…while* statement performs the action(s) in its body one or more times

3. Assignments

1. (a) Write an application that will prompt user the to enter the first term, common difference, and the number of terms of an arithmetic progression (AP). It should compute the nth term of the series and the sum of the first n terms. Your code should ensure that the number of terms, n, is positive:
[Hint: use Tn=a +(n– 1)d, and Sn = (n/2)(a+Tn), wherea is the first term,n is the number of terms,d is the common difference,Tn is thenth term of the series, andSn is the sum of the firstn terms.]

2. A quadratic equation of the form $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ has roots:
(a) Write a program that efficiently determines the values of the roots (*root1* and *root2*) of the given equation. Assume that all the variables have been declared as type *double*. Note that the roots are

real and distinct, real and equal, or complex according to whether the discriminant *(b2 – 4ac)* is positive, zero or negative, respectively. ;

Format the output in the following ways (where *root1* and *root2* are the calculated roots of the equation).

The roots are real and distinct :*root1,root2*
The roots are real and equal:*root1*
The roots are complex

(b) Re-write the example 1 above using *switch* statement

3. Write a program using the followiing pseudocode:

```
(a)

1 Set total to zero
2 set grade counter to one
3
4 While grade counter is less than or equal to zero
5   Prompt the user to enter the next grade
6   Input the next grade
7   Add the grade into the total
8   Add one to the grade counter
9
10 Set the class avaerage to the total divided by ten
11 Print the class avarage

(b)

1 Initialize total to zero
2 Initialize counter to zero
3
4 Prompt the user to enter the first grade
5 Input the first grade (possibly the sentinel)
6
7 While the user has not yet entered the sentinel
8   Add this grade into the running total
9   Add one to the grade counter
10  Prompt user to enter the next grade
11  Input the next grade (Possibly the sentinal)
12
13 If the counter is not equal to zero
14  Set the average to the total divided by the counter
15  Print the average
16 else
17  Print "No grades were entered!"

(c)

1 Initialize passes to zero
2 Initialize failures to zero
3 Initialize student counter to one
4
5 While student counter is less than or equal to 10
6   Prompt the user to enter the exam result
7   Input the next exam result
8
9   If the student passed
10   Add one to passes
11  Else
12   Add one to failures
13
14  Add one to student counter
15
16 Print the number of passes
17 Print the number of failures
18
19 If more than eight students passed
20      Print "Execellent to instructor"
```

4. Home Work

1. The value of an investment of P naira after t years at an interest rate ofr% compounded yearly is given by $P(1 + r/100)^t$.
   Write a program that will ask the user to input *P,t and r*, and will calculate and display the value of the investment.
   This should be done in asentinel-controlled loop so that many such calculations can be performed.
2. The first term of aGP is 1.5, and its common ratio is 2. Write a program that will calculate the sum of ten terms. Do not use a formula.

Very important guidelines:

1. You should submit both printed copy and soft copy in a flash drive bofore the next lab.
2. All your programs files should be saved in a folder HW1 on your diskette.
3. Code your programs according to the Java naming conventions -- check this out on my home page.
4. Indent your work so that content of a class and methods are pushed inside by a tab or at least three spaces.
5. Use comments at the beginning of each program to explain its purpose. Also include your name and ID number as part of the comment.
6. Use comments to explain each variable whose purpose cannot be determined from its name.