UNIVERSITY OF WESTMINSTER

INFORMATICS INSTITUTE OF TECHNOLOGY

# Tutorial 2

## 4COSC010C Software Development II

**Aim:**

- Get familiar with Java data types, variables, and control structures.
- Consolidate learning from lecture week 2.
- Get feedback.
- **Submit tutorial answers (pdf file with source codes) to BB by 21st of February 2025**

## Section 01 : Main Questions

### Q1: Variables and operators.

Write a program in Java that reads 2 numbers (double) and prints the sum of the 2 numbers.
Notes:

- To read an input you will have to import Scanner first: `import java.util.Scanner`
- Use `input.nextDouble()` to read the input from the user (the two numbers)
- Remember that variables have a data type.

### Q2: Age

Write a program in Java that asks the user to input a number. If the number entered is equal or larger than 18, the program should display "Over 18". If the number entered is lower than 18, the program should display "Under 18". If the number entered is lower than 0, the program should display an error message "The age entered is incorrect.". Try different inputs such as: -1, 0, 10, 18, 20.

### Q3: Module Mark Calculation

The final mark of SD2 module is obtained by calculating the average of the in-class test mark (ICT) and the coursework (CW) marks. Both the ICT and CW marks need to be higher or equal than 30 to pass each individual component. To pass the module, the final mark needs to be higher or equal than 40.

Therefore, when the mark of both components is 30 or higher, the final mark can be calculated using the following formula

$$final_{mark} = \frac{ICT\ mark + CW\ mark}{2}$$

Write a program in Java that asks the user to input their ICT and coursework marks and outputs if the student will pass the module and the final mark if the student passed both components.

**Q4: Grade Classification**

**Design a program in Java that given a grade it returns the classification according to the following table:**

| Indicator score | Classification |
|---|---|
| Over 100 | Invalid value |
| 70-100 | 1st Class Honours (1) |
| 60-69 | 2nd Class Honours Upper Division (2:i) |
| 50-59 | 2nd Class Honours Lower Division (2:ii) |
| 40-49 | 3rd Class Honours (3) |
| Under 40 | Invalid value |

**Q5 : Calculator**

Design a Java program that implements a simple calculator that can perform basic arithmetic operations. The calculator should take two numbers and an operator as input (+,-,/,*), perform the calculation and display the result. You must use a switch in your solution to determine the operation.

## Section 02 (Challenging Questions)

**Q6: Exam eligibility**

A student will not be allowed to sit in exam if his/her attendance is less than 75%.
Take following input from user

- Number of classes held
- Number of classes attended.

print percentage of class attended & whether the student is allowed to sit in exam or not.
Modify the above question to allow student to sit if he/she has medical cause. Ask user if he/she has medical cause or not ( 'Y' or 'N' ) and print a message accordingly.

**Q7: Bankging System**

Write a Java program to simulate a simple banking system. The program should prompt the user to enter their account balance, followed by a series of transactions. Each transaction can be a deposit, withdrawal, or a check for fraud.

- A deposit transaction should increase the account balance.
- A withdrawal transaction should decrease the account balance.
- A cheque for fraud should check if the account balance is below a certain threshold (e.g., $100) and print a warning if it is.

Additionally, implement the following rules:

- If the account balance goes below $0 after a withdrawal, print an overdraft warning.
- If the user attempts a withdrawal or deposit without specifying the transaction type, print an error message.
- Allow the user to continue entering transactions until they decide to exit the program.

Use conditional structures to implement these rules and provide appropriate messages for each scenario.

**Q7: Rock, paper Scissors game**

Design a program in Java the simulates the Rock, Paper, Scissors game using only if conditions. The program should take the user's choice (0 == Rock, 1 == Paper or 2 == Scissors) as input and generate a random choice for the computer. Then, it should determine and print the winner based on the following rules:

- Rock crushes Scissors
- Scissors cuts Paper
- Paper covers Rock
- If both the user and the computer choose the same options, then it's a tie.

The program should print the choices made by the user and the computer, as well as the winner or a tie.

***Hint: to generate a random choice for the computer, you can use the following code:***

```
int random_number = new Random().nextInt(3);
```

Read about Java Random Class (R1 , R2, R3)

**Q8: Output Prediction**

1. Two programs are equivalent if given the same input they produce the same output. Which of the following programs are equivalent? Why?

```
// Program A
import java.util.Scanner; class TestPositive {
     public static void main(String [] args) {
          Scanner S = new Scanner(System.in); System.out.print("Enter a value: ");
          int x = S.nextInt();
          if (x > 0) {
                System.out.println("The value is positive:");
          }
          else
          {
              if (x < 0) {
                   System.out.println("The value is negative:");
              }
               else{
                   System.out.println("The value is zero:");
               }
          }
           System.out.println("Good Bye!");
      }
 }
```

```
// Program B
import java.util.Scanner;
class TestPositive {
        public static void main(String [] args) {
            Scanner S = new Scanner(System.in);
            System.out.print("Enter a value: ");
             int x = S.nextInt();
             if (x > 0) {
                 System.out.println("The value is positive:");
             }
             if (x < 0) {
                 System.out.println("The value is negative:");
             }
             else {
                 System.out.println("The value is zero:");
             }
             System.out.println("Good Bye!");
        }
}
```

```
// Program C
import java.util.Scanner;
class TestPositive {
        public static void main(String [] args) {
            Scanner S = new Scanner(System.in);
            System.out.print("Enter a value: ");
            int x = S.nextInt();
            if (x > 0) {
                System.out.println("The value is positive:");
            }
            if (x < 0) {
                System.out.println("The value is negative:");
            }
            if (x ==0) {
                System.out.println("The value is zero:");
            }
            System.out.println("Good Bye!");
        }
}
```

2. Guess the output. Explain the flow of the program.

```
int i = 1; i += ++i + i++ + ++i;
int j = 1; j += ++j +j++ ++j;
int k = 1; k += k++ + k++ + ++k;
System.out.println("i = " + i);
System.out.println("j = " + j);
System.out.println("k = " + k);
```

3. Which of the conditional statements below is  right as per the logic of the print statement?

```
if ((age < 17 || > 85))
{ //don't drive! }
if ((age < 17 ) || (age > 85))
{ //don't drive! }
if ((age < 17 ) && (age > 85))
{ //don't drive! }
```

## Section 03 : HackerRank Challenges

Register in HackerRank (see tutorial notes from week 1) and solve the following exercises:

- Java Stdin and Stdout ll
- Java If-Else
- Java Datatypes
- Java int to String