COMSATS University Islamabad, Islamabad Campus

Department of Computer Science

Course:	**CSC103-PROGRAMMING FUNDAMENTALS**
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MAIN MENU:

```java
import java.util.Random;

import java.util.Scanner;


public class Assignment2 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        while (true) {
            System.out.println("\n====== Main Menu (Assignment-2) ======");
            System.out.println("1 – Question-1");
            System.out.println("2 – Question-2");
            System.out.println("3 – Question-3");
            System.out.println("4 – Question-4");
            System.out.println("5 – Question-5");
            System.out.println("Press option (1-5) to execute the program and Press 0 to Exit");
            System.out.print("Enter your option: ");
            String opt = sc.nextLine().trim();

            switch (opt) {
                case "1":
                    runQuestion1(sc);
                    break;
                case "2":
                    runQuestion2(sc);
                    break;
```

```java
        case "3":

            runQuestion3(sc);

            break;

        case "4":

            runQuestion4(sc);

            break;

        case "5":

            runQuestion5(sc);

            break;

        case "0":

            System.out.println("Exiting program. Goodbye!");

            System.exit(0);

            break;

        default:

            System.out.println("Invalid input. Please enter an option between 0 and 5.");

        }

    }

}
```

```
C:\Windows\System32\cmd.exe - java Assignment2.java
Microsoft Windows [Version 10.0.19045.6396]
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D:\>java Assignment2.java

====== Main Menu (Assignment-2) ======
1 ? Question-1
2 ? Question-2
3 ? Question-3
4 ? Question-4
5 ? Question-5
Press option (1-5) to execute the program and Press 0 to Exit
Enter your option:
```

QUESTION NO.1:

Write a program that prompts the user to enter a Social Security number in the format DDD-DD-DDDD, where D is a digit. Your program should check whether the input is valid. Here are sample runs:

Code:

```
// ========= Question 1 =========
   private static void runQuestion1(Scanner sc) {
      while (true) {
         System.out.println("\n--- Executing Question – 1 -------");
         System.out.print("Enter a SSN (format DDD-DD-DDDD): ");
         String ssn = sc.nextLine().trim();


         if (isValidSSN(ssn))
            System.out.println(ssn + " is a valid social security number.");
         else
            System.out.println(ssn + " is an invalid social security number.");


         if (!repeatOrBack(sc)) return;
      }
   }


   private static boolean isValidSSN(String s) {
      if (s.length() != 11) return false;
      if (s.charAt(3) != '-' || s.charAt(6) != '-') return false;
      for (int i = 0; i < s.length(); i++) {
         if (i == 3 || i == 6) continue;
```

```
        if (!Character.isDigit(s.charAt(i))) return false;

    }

    return true;

  }
```

Output:


```
C:\Windows\System32\cmd.exe - java Assignment2.java
Microsoft Windows [Version 10.0.19045.6396]
(c) Microsoft Corporation. All rights reserved.

D:\>java Assignment2.java

====== Main Menu (Assignment-2) ======
1 ? Question-1
2 ? Question-2
3 ? Question-3
4 ? Question-4
5 ? Question-5
Press option (1-5) to execute the program and Press 0 to Exit
Enter your option: 1

--- Executing Question ? 1 -------
Enter a SSN (format DDD-DD-DDDD): 294 56 5438
294 56 5438 is an invalid social security number.

Press (y) to run again, (b) to go back to main menu, or (0) to exit:
Enter your choice: _
```

QUESTION NO.2:

Write a program that prompts the user to enter two characters and displays the major and status represented in the characters. The first character indicates the major and the second is number character 1, 2, 3, 4, which indicates whether a student is a freshman, sophomore, junior, or senior. Suppose the following characters are used to denote the majors:

M: Mathematics   C: Computer Science   I: Information Technology

Code:

```
// ========= Question 2 =========
    private static void runQuestion2(Scanner sc) {
      while (true) {
        System.out.println("\n--- Executing Question – 2 -------");
        System.out.print("Enter two characters (e.g. M1): ");
        String input = sc.nextLine().trim().toUpperCase();


        if (input.length() != 2) {
          System.out.println("Invalid input.");
        } else {
          char major = input.charAt(0);
          char year = input.charAt(1);


          String majorName = switch (major) {
            case 'M' -> "Mathematics";
            case 'C' -> "Computer Science";
            case 'I' -> "Information Technology";
```

```
        default -> null;

    };


    String status = switch (year) {

        case '1' -> "Freshman";

        case '2' -> "Sophomore";

        case '3' -> "Junior";

        case '4' -> "Senior";

        default -> null;

    };


    if (majorName == null || status == null)

        System.out.println("Invalid input.");

    else

        System.out.println(majorName + " " + status);

    }


    if (!repeatOrBack(sc)) return;

    }

}
```

Output:

```
C:\Windows\System32\cmd.exe - java Assignment2.java

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D:\>java Assignment2.java

====== Main Menu (Assignment-2) ======
1 ? Question-1
2 ? Question-2
3 ? Question-3
4 ? Question-4
5 ? Question-5
Press option (1-5) to execute the program and Press 0 to Exit
Enter your option: 2

--- Executing Question ? 2 -------
Enter two characters (e.g. M1): c4
Computer Science Senior

Press (y) to run again, (b) to go back to main menu, or (0) to exit:
Enter your choice:
```

QUESTION NO.3:

Assume a vehicle plate number consists of three uppercase letters followed by four digits. Write a program to generate a plate number.

Code:

```
// ========= Question 3 =========
   private static void runQuestion3(Scanner sc) {

     while (true) {

       System.out.println("\n--- Executing Question – 3 -------");

       System.out.print("How many plate numbers do you want to generate? ");

       int count = 1;

       try {

         count = Integer.parseInt(sc.nextLine().trim());

         if (count < 1) count = 1;

       } catch (NumberFormatException e) {

         System.out.println("Invalid number. Generating 1 plate by default.");

       }


       for (int i = 0; i < count; i++) {

         System.out.println(generatePlate());

       }


       if (!repeatOrBack(sc)) return;

     }

   }


   private static String generatePlate() {
```

```
Random rnd = new Random();

StringBuilder sb = new StringBuilder();

for (int i = 0; i < 3; i++) sb.append((char) ('A' + rnd.nextInt(26)));

for (int i = 0; i < 4; i++) sb.append(rnd.nextInt(10));

return sb.toString();
}
```

Output:

```
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D:\>java Assignment2.java

====== Main Menu (Assignment-2) ======
1 ? Question-1
2 ? Question-2
3 ? Question-3
4 ? Question-4
5 ? Question-5
Press option (1-5) to execute the program and Press 0 to Exit
Enter your option: 3

--- Executing Question ? 3 -------
How many plate numbers do you want to generate? 6
HXP9389
PPL8990
TDM6827
SUZ2813
NSQ4276
IBD5283

Press (y) to run again, (b) to go back to main menu, or (0) to exit:
Enter your choice: _
```

QUESTION NO.4:

Write a program that prompts the user to enter a decimal integer and displays its corresponding binary value. Don't use Java's Integer.toBinaryString(int) in this program.

Code:

```java
// ========= Question 4 ==========
    private static void runQuestion4(Scanner sc) {
        while (true) {
            System.out.println("\n--- Executing Question – 4 -------");
            System.out.print("Enter a decimal number: ");
            try {
                int num = Integer.parseInt(sc.nextLine().trim());
                System.out.println("Binary value of " + num + " is " + decimalToBinary(num));
            } catch (NumberFormatException e) {
                System.out.println("Invalid input! Please enter an integer.");
            }


            if (!repeatOrBack(sc)) return;
        }
    }


    private static String decimalToBinary(int n) {
        if (n == 0) return "0";
        boolean neg = n < 0;
        n = Math.abs(n);
        StringBuilder sb = new StringBuilder();
```
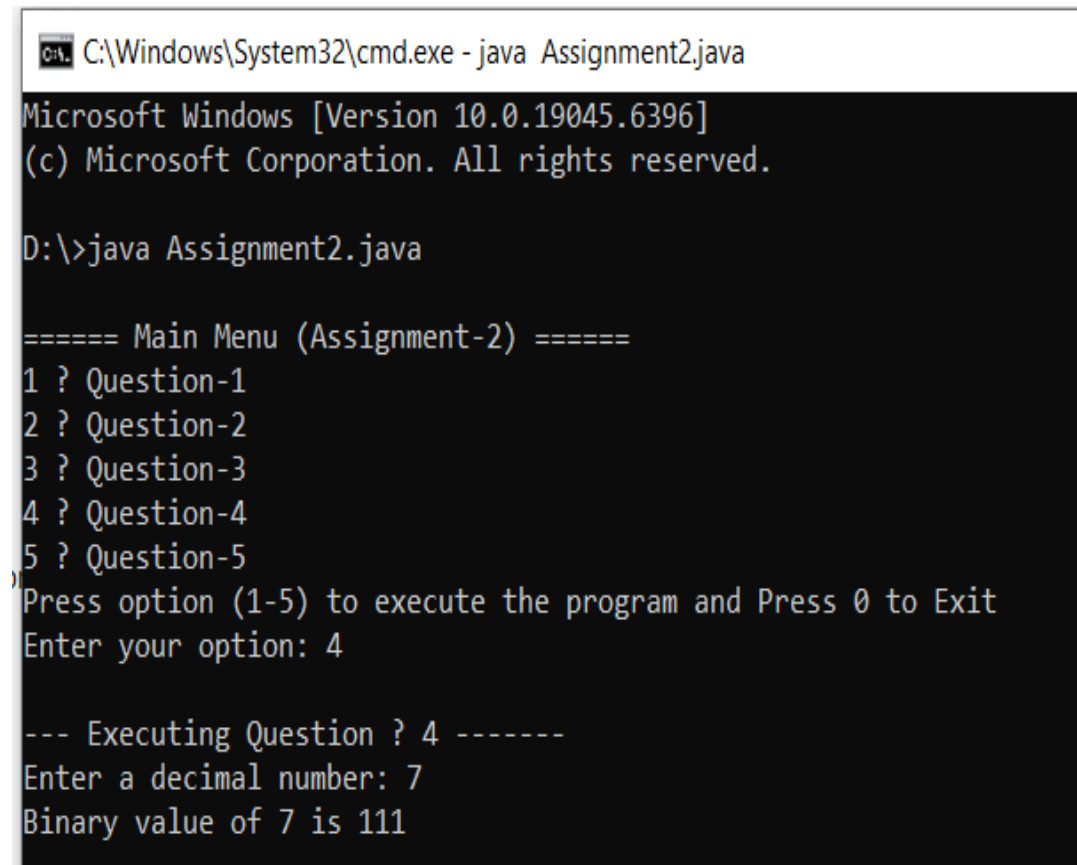
```
while (n > 0) {

   sb.append(n % 2);

   n /= 2;

}

if (neg) sb.append("-");

return sb.reverse().toString();

}
```

Output:

QUESTION NO.5:

The controversial issue of global warming has been widely publicized by the film "An Inconvenient Truth," featuring former Vice President Al Gore. Mr. Gore and a U.N. network of scientists, the Intergovernmental Panel on Climate Change, shared the 2007 Nobel Peace Prize in recognition of "their efforts to build up and disseminate greater knowledge about man-made climate change." Research both sides of the global warming issue online (you might want to search for phrases like "global warming skeptics"). Create a five-question multiple choice quiz on global warming, each question having four possible answers (numbered 1–4). Be objective and try to fairly represent both sides of the issue. Next, write an application that administers the quiz, calculates the number of correct answers (zero through five) and returns a message to the user. If the user correctly answers five questions, print "Excellent"; if four, print "Very good"; if three or fewer, print "Time to brush up on your knowledge of global warming," and include a list of some of the websites where you found your facts

Code:

```
// ========= Question 5 =========
    private static void runQuestion5(Scanner sc) {
        while (true) {
            System.out.println("\n--- Executing Question – 5 -------");
            String[] questions = {
                "1) Which gas is primarily responsible for global warming?",
                "2) What causes greenhouse effect?",
                "3) Which organization reports on climate change?",
                "4) What do some skeptics attribute warming to?",
                "5) Which step helps reduce global warming?"
            };
```

ASSIGNMENT NO # 2

```java
String[][] options = {

    {"1) Oxygen", "2) Nitrogen", "3) Carbon Dioxide", "4) Helium"},

    {"1) Absorbing CO2", "2) Trapping infrared radiation", "3) Blocking sunlight", "4)
Releasing ozone"},

    {"1) WHO", "2) IPCC", "3) IMF", "4) UNESCO"},

    {"1) Solar activity", "2) Forest growth", "3) Population", "4) Oceans"},

    {"1) Planting trees", "2) Burning coal", "3) Using more oil", "4) None"}

};


int[] correct = {3, 2, 2, 1, 1};

int score = 0;


for (int i = 0; i < 5; i++) {

   System.out.println("\n" + questions[i]);

   for (String opt : options[i]) System.out.println(opt);

   System.out.print("Your answer (1-4): ");

   int ans = getChoice(sc, 1, 4);

   if (ans == correct[i]) score++;

}


System.out.println("\nYou got " + score + " out of 5.");

if (score == 5)

   System.out.println("Excellent!");

else if (score == 4)

   System.out.println("Very good!");

else {
```

```java
        System.out.println("Time to brush up on your knowledge of global warming.");

        System.out.println("Visit websites like:");

        System.out.println("https://climate.nasa.gov/");

        System.out.println("https://www.ipcc.ch/");

        System.out.println("https://www.epa.gov/climate-change/");

      }


      if (!repeatOrBack(sc)) return;

    }
  }
```

Output:

ASSIGNMENT NO # 2

C:\Windows\System32\cmd.exe - java Assignment2.java

```
D:\>java Assignment2.java

====== Main Menu (Assignment-2) ======
1 ? Question-1
2 ? Question-2
3 ? Question-3
4 ? Question-4
5 ? Question-5
Press option (1-5) to execute the program and Press 0 to Exit
Enter your option: 5

--- Executing Question ? 5 -------

1) Which gas is primarily responsible for global warming?
1) Oxygen
2) Nitrogen
3) Carbon Dioxide
4) Helium
Your answer (1-4): 3

2) What causes greenhouse effect?
1) Absorbing CO2
2) Trapping infrared radiation
3) Blocking sunlight
4) Releasing ozone
Your answer (1-4): 4

3) Which organization reports on climate change?
1) WHO
2) IPCC
3) IMF
4) UNESCO
Your answer (1-4): 1

4) What do some skeptics attribute warming to?
1) Solar activity
2) Forest growth
3) Population
4) Oceans
Your answer (1-4): 3

5) Which step helps reduce global warming?
1) Planting trees
2) Burning coal
3) Using more oil
4) None
Your answer (1-4): 1

You got 2 out of 5.
```