National University of Computer and Emerging Sciences

CS1002: Programming Fundamental (Fall 2021)

Assignment 3

(Deadline: 14ᵗʰ November, 2021 9:00 PM)

Deadline: Deadline to submit assignment is **14ᵗʰ November, 2021 9:00 PM**. Late submission with 25% deduction will be accepted till **15ᵗʰ November, 2021 9:00 PM**. Late submission with 50% deduction will be accepted till **16ᵗʰ November, 2021 9:00 PM**. Correct and timely submission of assignment is responsibility of every student; hence no relaxation will be given to anyone.

Submission: Please follow the following submission instructions. Failure to submit according to the above format would result in deduction of 10% marks. Submissions on the email will not be accepted.

i.   Create a separate .cpp file containing a separate main function for each question. Name the .cpp file as question number (e.g Q1.cpp, Q2.cpp, etc.).
ii. Combine all your work in one .zip file and name it as SECTION_ROLL-NUM_A3.zip (e.g. A_21i0123_A3.zip). Submit .zip file on Google Classroom within the deadline.

Plagiarism: Plagiarism in the assignment will result in zero marks in the whole assignment category. A code is considered plagiarized if code is not your own work.

Comments: You will lose 10% marks if your code is not properly commented.
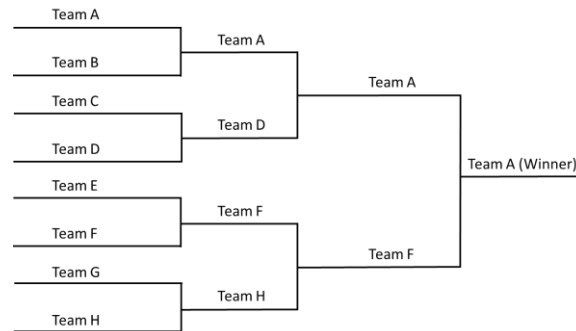
Question 1: In this problem, you are required to build a system that can generate a random winning scenario for the T20 cricket world cup. There are 12 teams in the tournament and every team will play one match each on the knock-out basis in the first round. It means that the losing team of every match leaves the tournament while the winning team continues to play the next match. From the twelve teams, six winning teams will play another knock-out match. From these six teams, three winning teams will play against each other on the round robin basis (i.e. team A plays against team B, team B plays against team C, and team C plays against team A). The top two teams from this round will move to the final match. In case all the teams win one match each at this stage, then there will be a toss to move one team to the final while the other two teams will play against each other and the winner moves to the final. The winner of the final match will be declared the champion of the T20 world cup.
For every match, you can generate a random number to declare the winner of the match. Similarly, you can use a random number to simulate the toss. You are required to use if-else (if-else-if) structure to run the tournament and generate one complete winning scenario randomly. The names of the teams are as below:
1) Afghanistan
2) Australia
3) Bangladesh
4) England
5) India
6) Ireland
7) Pakistan
8) Scotland
9) South Africa

10) Sri Lanka

11) West Indies

12) Zimbabwe

A sample scenario of matches (for eight teams in the tournament) is shown in the following figure:

A sample output is also shown below, you are required to follow the same output format:

Round One:

Match 1: Team A vs. Team B, won by Team A

Match 2: Team C vs. Team D, won by Team D

Match 3: Team E vs. Team F, won by Team E

Match 4: Team G vs. Team H, won by Team H

Match 5: Team I vs. Team J, won by Team J

Match 6: Team K vs. Team L, won by Team K

Round Two:

Match 7: Team A vs. Team D, won by Team A

Match 8: Team E vs. Team H, won by Team E

Match 9: Team J vs. Team K, won by Team K

Round Three (round-robin):

Match 10: Team A vs. Team E, won by Team A

Match 11: Team E vs. Team K, won by Team E

Match 12: Team K vs. Team A, won by Team K

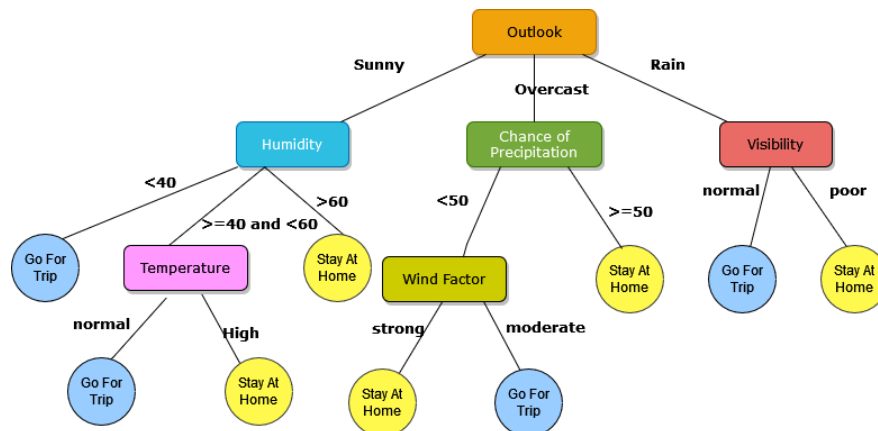*Team A qualified for the final after winning the toss.*

Match 13: Team E vs. Team K, won by Team E

Final Match:

Match 14: Team A vs. Team E, won by Team A

Congratulations to Team A for winning the T20 World Cup 2020.

Question 2: A decision tree is a decision support tool that uses a tree-like model of decisions and their possible consequences. It is widely used in classification and prediction problems. You are required to implement the below decision tree to help you decide whether you should go for a trip or not based on various factors. You also need to take string inputs from the user in this program.

Expected Output:

Run 1:

```
Welcome to Trip Advisor
Enter the outlook
sunny
Enter the humidity
20
You can go to trip


...Program finished with exit code 0
Press ENTER to exit console.
```

Run 2:

```
Welcome to Trip Advisor
Enter the outlook
sunny
Enter the humidity
45
Enter the temperature
high
Stay at home


...Program finished with exit code 0
Press ENTER to exit console.
```

Question 3: FAST-NUCES has expanded its operations to a great extent and it needs an automated helpline system for its One Stop Student Center. In order to develop the system, FAST-NUCES has hired the best programmers from its Islamabad campus. You are required to develop the following scenario for the helpline system using switch-case construct in C++.

FAST-NUCES has five campuses at Islamabad, Lahore, Karachi, Peshawar, and Faisalabad in Pakistan. Your system shall cater for all the campuses and provide the following scenario:

Welcome to FAST-NUCES! Press 1 for Islamabad campus. Press 2 for Lahore campus. Press 3 for Karachi campus. Press 4 for Peshawar campus. Press 5 for Faisalabad campus. Press 0 to talk to an operator.

1) Welcome to Islamabad campus.

    Press 1 for admission related queries.

        Press 1 for admission in school of computing

            Please enter your query: (user shall enter a text message here)

            Your query is registered. We will get back to you soon.

        Press 2 for admission in school of electrical engineering

            Please enter your query: (user shall enter a text message here)

            Your query is registered. We will get back to you soon.

        Press 3 for admission in school of management sciences

            Please enter your query: (user shall enter a text message here)

            Your query is registered. We will get back to you soon.

    Press 2 for academics related queries.

        Press 1 to apply for a degree/transcript generation

            Please enter your query: (user shall enter a text message here)

            Your query is registered. We will get back to you soon.

        Press 2 to freeze your semester

            Please enter your query: (user shall enter a text message here)

            Your query is registered. We will get back to you soon.

        Press 3 to add/drop courses

            Please enter your query: (user shall enter a text message here)

            Your query is registered. We will get back to you soon.

    Press 3 for accounts and fees related queries.

        Press 1 for queries related to fee challan generation

            Please enter your query: (user shall enter a text message here)

            Your query is registered. We will get back to you soon.

        Press 2 to apply for financial aid

            Please enter your query: (user shall enter a text message here)

            Your query is registered. We will get back to you soon.

        Press 3 apply for a scholarship

            Please enter your query: (user shall enter a text message here)

            Your query is registered. We will get back to you soon.

    Press 4 for information technology related queries.

        Press 1 to apply for an email id generation

            Please enter your query: (user shall enter a text message here)

            Your query is registered. We will get back to you soon.

        Press 0 to talk to an IT expert

            Please wait.

Press 5 for sports related queries.
    Press 1 to get a sports venue booked
        Please enter your query: (user shall enter a text message here)
        Your query is registered. We will get back to you soon.
    Press 0 to talk to a representative
        Please wait
If you know your desired extension, please dial it directly.

2) Welcome to Lahore campus.
    Press 1 for admission related queries.
        Press 1 for admission in school of computing
            Please enter your query: (user shall enter a text message here)
            Your query is registered. We will get back to you soon.
        Press 2 for admission in school of electrical engineering
            Please enter your query: (user shall enter a text message here)
            Your query is registered. We will get back to you soon.
        Press 3 for admission in school of management sciences
            Please enter your query: (user shall enter a text message here)
            Your query is registered. We will get back to you soon.
        Press 4 for admission in school of civil engineering
            Please enter your query: (user shall enter a text message here)
            Your query is registered. We will get back to you soon.
        Press 5 for admission in school of science and humanities
            Please enter your query: (user shall enter a text message here)
            Your query is registered. We will get back to you soon.

    (Use the same menu as Islamabad campus for the rest of the services)

3) Welcome to Karachi campus.
    Press 1 for admission related queries.
        Press 1 for admission in school of computing
            Please enter your query: (user shall enter a text message here)
            Your query is registered. We will get back to you soon.
        Press 2 for admission in school of electrical engineering
            Please enter your query: (user shall enter a text message here)
            Your query is registered. We will get back to you soon.
        Press 3 for admission in school of management sciences
            Please enter your query: (user shall enter a text message here)
            Your query is registered. We will get back to you soon.

    (Use the same menu as Islamabad campus for the rest of the services)

4) Welcome to Peshawar campus.
    Press 1 for admission related queries.
        Press 1 for admission in school of computing
            Please enter your query: (user shall enter a text message here)

Your query is registered. We will get back to you soon.
Press 2 for admission in school of electrical engineering
Please enter your query: (user shall enter a text message here)
Your query is registered. We will get back to you soon.

(Use the same menu as Islamabad campus for the rest of the services, except for the sports services)

5) Welcome to Faisalabad campus.
Press 1 for admission related queries.
Press 1 for admission in school of computing
Please enter your query: (user shall enter a text message here)
Your query is registered. We will get back to you soon.
Press 2 for admission in school of electrical engineering
Please enter your query: (user shall enter a text message here)
Your query is registered. We will get back to you soon.
Press 3 for admission in school of management sciences
Please enter your query: (user shall enter a text message here)
Your query is registered. We will get back to you soon.
Press 4 for admission in school of civil engineering
Please enter your query: (user shall enter a text message here)
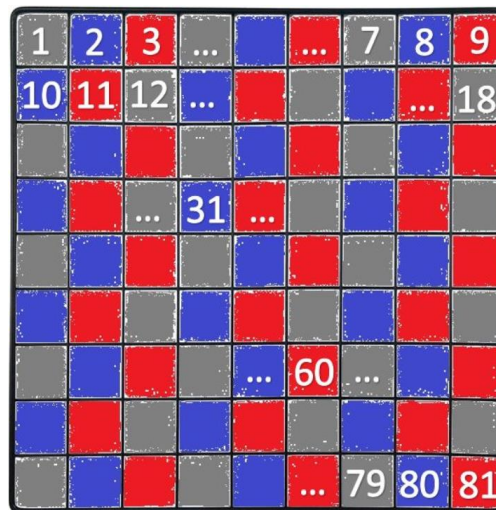*Your query is registered. We will get back to you soon.*
Press 5 for admission in school of science and humanities
Please enter your query: (user shall enter a text message here)
Your query is registered. We will get back to you soon.

(Use the same menu as Islamabad campus for the rest of the services)

0) Please wait to talk to the operator.

Question 4: Write a C++ program to find roots of a quadratic equation using Ternary conditional operator. (5 marks)

Question 5: You are given a 9*9 grid as shown in the figure below. You can determine the color of each square from the grid. The number of each square is also shown below. Write a C++ program for this below given grid. The user is given two options to select from. (7.5+7.5 marks)

Part A: When the user selects 1st option, the user will enter number of square in this grid (any number from 1-81). Your program will determine the color of the square.

Part B: When the user enters 2nd option, the user will enter two numbers from this grid. Your program will determine if the two squares entered in this 9*9 grid have same color or not.

Question 6: IFone, a cellular company, offers the following three postpaid data packages to its customers. (5+5 marks)

- Package A: For Rs. 100 per month, 1 GB data is provided. Additional data can be purchased for Rs. 20 per 100 MB.
- Package B: For Rs. 200 per month, 2.5 GB data is provided. Additional data can be purchased for Rs. 10 per 100 MB.
- Package C: For Rs. 1000 per month, unlimited access is provided.

Part A: Write a program that calculates a customer's monthly bill. It should ask how many GBs the customer has used in the month and which package the customer has subscribed for. It should then display the total amount due.

Part-B: Modify the program in Part A so that it also displays how much money Package A customers would save if they purchased packages B or C, and how much money Package B customers would save if they purchased Package A or C. If there are no savings for a particular package, your program shall print an appropriate message.

Question 7: Using switch-case statements only, write a C++ program that displays the following menu for the food items available to take orders from the customer: (10 marks)

- Burgers
- Pizzas
- Sandwiches

When the user selects one of the options, a further submenu is displayed according to the chosen option. The online food shop offers Crispy Chicken Burger (600 Rs.), Beef Burger (650 Rs.), and Fish Burger (700 Rs.) in the Burger category; Chicken tikka, Chicken Fajita and Four Seasons in the Pizza category; whereas Club (300 Rs.), Chicken (325 Rs.), and Vegetables (315 Rs.) in the Sandwiches category. Prices of each food item is also displayed to the user in the selected sub menu. The user will select the food item and quantity of the item. In case of the Pizza items, the user can also select the size of pizzas (i.e. Small (850 Rs.),

Medium (1200 Rs.), and Large (1600 Rs.)). The program outputs the total charges according to the chosen options.

Question 8: Write a C++ program which accepts amount in rupees as input (integer) within Range from Rs. 100 to Rs. 100000 and then asks the user for particular currency note preference and display the total number of currency notes of Rs. 500, 100, 50, 20, 10, 5, and 1. The user can be given a maximum of 200 notes of his preferred choice. (5 marks)

For example: when a user enters a number, Rs. 57477 and enters 50 notes as his preferred choice, the results would be like this.

Currency Note : Number
500   : 94
100   : 4
50   : 200
20   : 3
10   : 1
5   : 1
1   : 2

Best of luck!