Programming Fundamentals

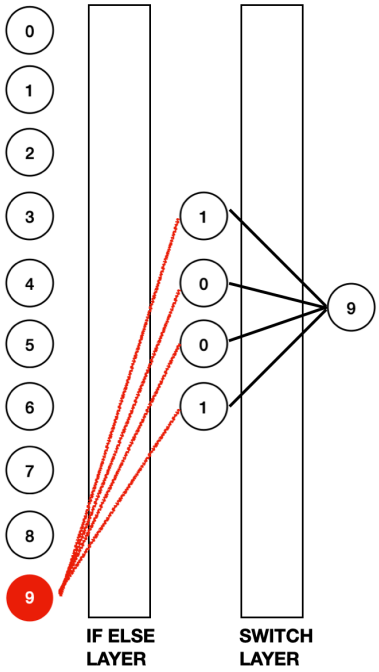
Assignment # 3

Due Date: 25-Oct-2022

You are required to submit a zip following the naming convention i.e i22xxxx_Assignment_3_DS/AI_X. Each and every question should have naming 122xxxx_q1.cpp. You have to submit only .cpp in a zip. Failing to do so will cause you to lose 30% of your marks.
Plagiarism is strongly discouraged you will be marked 0 in this assignment and also a 50% reduction in a previous assignment.
Commenting, the proper naming convention has marks so do follow the naming convention, proper indentation, and comment on your code.

Question 1: Marks: 20

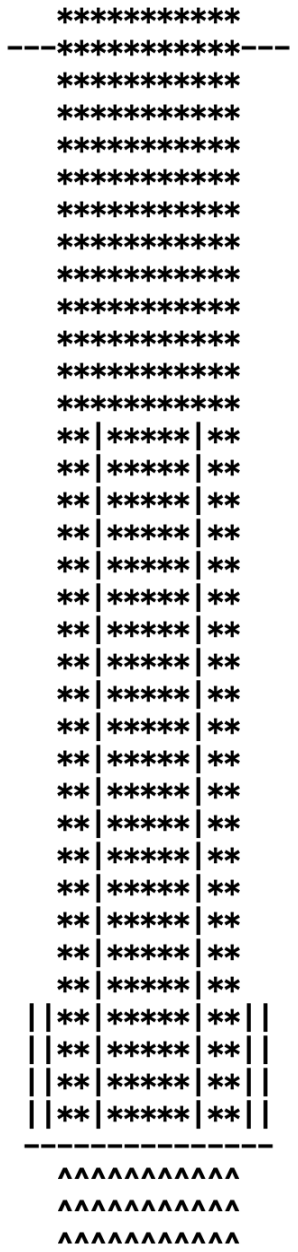
You will design the architecture below



Each Circle represents a variable that will be flagged as true or false. You have to ask the user to flag which variable as true and others will be marked as false. Then you have to convert the variable index 0 - 9 into its binary and mark the layer2 variables with the binary number layer2 will have 4 Circles meaning four variables. The Above example shows that 9 is marked so the binary of 9 is 1001 so level2 variables 1 and 4 are marked as 1 and variables 2 and 3 will be marked as 0. Then you have to use the switches to implement which variables in Layer2 are True and False to mark layer3's only variable with the value of index variable turned on.

Question 2: Marks: 20

You have to implement the following pattern you have to use for the loop, if else for this you cannot hardcode. You will also ask the users for scale factor to actually scale the pattern you will take values from 1 to 2. 1 is the same pattern and 1.5 is 50% larger and wider pattern and 2 meaning double the pattern size. Make sure you implement all the checks in your code. Your code must be generic.



Question 3: Marks: 20

You have to develop a restaurant menu of your own choice you have to add at least 20 items to the menu. The user can at most only order 6 items in the menu. You have to ask the user for his name and contact number. Then you have to ask for items he wants to purchase. Then you have to ask whether he wants more items. You also have to ask about the quantity of each item they buy. At the very end, you have to provide the bill for all the items they have bought and the total cost of them as well as add GST of 12% on the total.

Bill will look like this:

```
_____________________________________
|Name                 Qty          Total |
|.......              .....        ..... |
|.......              .....        ..... |
|.......              .....        ..... |
|.......              .....        ..... |
|.......              .....        ..... |
|.......              .....        ..... |
|                                        |
|              Total Qty                 .....|
|         Total Amount                   .....|
|                  GST                   .....|
|                Total                   .....|
_____________________________________
```

Question 4: Marks: 10

You have to write a c++ code to convert decimal to hexadecimal and octal.
You are only allowed to use ternary operators no if and else or switches.
Decimal = 20
Hexadecimal = 14
Octal = 24

Question 5: Marks: 10

You have to write a c++ code to take a string and find all possible subwords in a sentence either in reverse or normal way also you have to tell the number of words, number of special characters, and number of characters in the sentence.
Sentence = This is a good assignment everyone can do this good assignment siht.
Subword = This
Number of time sub word found = 3
Number of words = 12
Number of Characters = 68
Number of special characters = 1

Question 6: Marks: 10

You have to write code to make a pattern as below and you have to take input from the user for the maximum number to be in the pattern and the number of diamonds.

Number of Diamonds = 2
Largest number = 5

```
    11          11
   2112        2112
  321123      321123
 43211234    43211234
5432112345  5432112345
 43211234    43211234
  321123      321123
   2112        2112
    11          11
```

Question 7: Marks: 25

In this, you will implement encryption of a sentence/word of x length and encrypt it by using the following algorithm. (Length of sentence/word must be not greater than 6). You must take the input from the user and take the input until a correct 6 or fewer characters are entered.
Let x be the length of a sentence that you have to take from a user. After taking the sentence you have to encrypt the sentence. You will encrypt the sentence with each character's ASCII and store it in a datatype other than a string or a char. Each ASCII will be separated by your roll number iteratively. For Example:
Let's say the Roll no of the Student is 1765 Roll no will be in String.

S U P E R _

Will be encrypted as:

83 1 85 7 80 6 69 5 82 1 95

Question 8: Marks: 25

Now you have to implement decryption of the upper algorithm and separate the roll number separators and the ASCII. Finally, you have to convert the ASCII back into the word or sentence and store it in a string. You must take the Encrypted key from the user and it must not be a string or a char. You must show the word or sentence and the roll number separators. For Example:

83 1 85 7 80 6 69 5 82 1 95

Will be decrypted as:

S U P E R _

And you will also show the roll number which is

1765

Goodluck 😃