NUST-SMME-

CS-114 Fundamentals of Programming Lab Report #03

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BE-ME15 Section: - A

Lab Manual #03 Nested if-else and switch-case

(Note that all my tasks are under one function described in task 1. Moreover, all tasks are carried out at the same time and the output is displayed at the end of each task.)

Task: -1

Q. Write a program in C++ to print the total number of populations in Punjab, Sindh, KPK and Balochistan using a switch case

[*] home task lab manual 3.cpp

```cpp
#include<iostream>
#include<math.h> //I included math.h header to use absolute value function in task 3
using namespace std;
int main()
{
    cout<<"TASK 1: -"<<endl;
    int num;
    cout<<"Please choose the province:-"<<endl;
    cout<<"1. Balochistan"<<endl;
    cout<<"2. Punjab"<<endl;
    cout<<"3. Sindh"<<endl;
    cout<<"4. KPK"<<endl;
    cin>>num; //the user inputs any integer from 1 to 4.
    //The switch makes it so that for each input entered, a different output gets carried out
    //each case shows the population of the province corresponding to it in the options
    switch(num){
    case 1:
    cout<<"Balochistan's population is: - 20.1million  "<<endl; //when 1 is entered
    break;
    case 2:
    cout<<"Punjab's population is : - 127.4million "<<endl; //when 2 is entered
    break;
    //break is necessary in switch case functions since it stops the code from running from that point if the case is true
    case 3:
    cout<<"Sindh's population is: - 54.8million "<<endl;  //when 3 is entered
    break;
    case 4:
    cout<<"KPK's population is: - 39.37million "<<endl;   //when 4 is entered
    break;
    default: //any other input entered apart from the above given cases will be declared as invalid since none of the options given above come under it
    cout<<"Invalid input entered."<<endl;
}
    //end of task 1
```

I declared any variable ”num” and set up a switch case for that variable as shown. I gave 4 options labeled 1, 2, 3 and 4 respectively to the user to choose one of the 4 provinces. For each respective number chosen, the population of the corresponding province shows up as output. I restricted the inputs to 1, 2, 3 and 4 as these are the only options given for the provinces. Any value entered apart from these will give” Invalid input entered” as output.

Task: -2

Q. Write a C++ program to check whether an alphabet is a vowel or a consonant using a switch case

```
    cout<<"TASK 2: -"<<endl;
    char alpha;
    cout<<"Please enter your alphabet: -"<<endl;
    cin>>alpha;
    switch(alpha){
        //to check for lower case vowels, the following cases are stated:-
        case 'a': case 'e': case 'i': case'o': case'u':
        cout<<"Your alphabet is a lower case vowel"<<endl;
        break;
        //to check for upper case vowels, the following cases are stated:-
        case 'A': case 'E': case 'I': case 'O': case 'U':
        cout<<"Your alphabet is an upper case vowel"<<endl;
        break;
        //to check for upper case consonants, the following cases are stated:-
        case 'B': case 'C': case 'D': case 'F': case 'G': case 'H': case 'J': case 'K': case 'L': case 'M': case 'N': case 'P': case 'Q': case'R': case 'S': case 'T': case'V': case'W': case 'X': case 'Y' : case 'Z'
        cout<<"Your alphabet is an upper case consonant"<<endl;
        break;
        //to check for lower case consonants, the following cases are stated:-
        case 'b': case 'c': case 'd': case 'f': case 'g': case 'h': case 'j': case 'k': case 'l': case 'm': case 'n': case 'p': case 'q': case'r': case 's': case 't': case'v': case'w': case 'x': case 'y' : case 'z'
        cout<<"Your alphabet is a lower case consonant"<<endl;
        break;
        default: //in case of any character entered other than an alphabet, the following output will be displayed. Hence the user is only restricted to using alphabets
        cout<<"INVALID CHARACTER ENTERED";
        //end of task 2


    }
```

I declared alpha as any character. Then, I used a switch on char, set different cases for upper- and lower-case vowels and consonants. Under default I entered the result in case the user enters any character other than an alphabet. The above cases only have alphabets. This way the user enters any alphabet, and the output will appear accordingly.

Task: -3

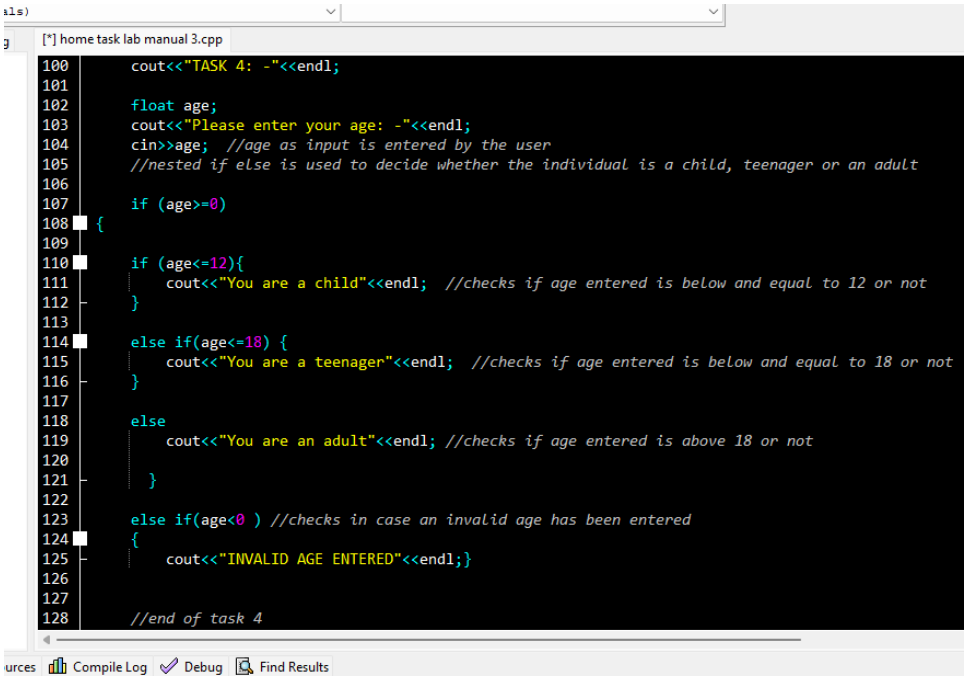
Q. Write a C++ program to check whether a number is positive, negative, or 0 using a switch case.

```
    cout<<"."<<endl;
    cout<<"TASK 3: -"<<endl;
    int x, y;
    cout<<"Enter any number"<<endl;
    cin>>x; //input any number negative, positive or equal to 0

    switch(x)  //setting up a switch for the value of x as we have to show whether input number is negative, positive or 0
    {
    case 0:  //in case it's equal to 0, the switch right away gives the output, wihtout going towards the next step
        cout<<"Your number is equal to zero"<<endl;
        break; //break lines are necessary in between different cases
    default:
        y = x/abs(x);
        //the absolute value function is used by including math.h header
        //another y is introduced as first declared under int
        //the formula showing the value of y is a proof to decide whether x is a positive or negative.
        //the absolute value of x will be positive in both cases, but the sign of the numerator will change on the basis of the sign of x
        //henceforth the x in the numerator and the denominator will divide and give us 1 along with the sign of the x in the numerator
        switch(y){

            case -1:
                cout<<"Your number is negative"<<endl; //checks if number is negative
            break;

            case 1:
                cout<<"Your number is positive"<<endl; //checks if number is positive
            break;

            default:
                cout<<"INVALID NUMBER ENTERED"<<endl;

    }
    }

    //end of task 3
```

In this task, the user will give an input value of x, the number in question. I then wrote a switch case statement in x. The 1st case is for x = 0, giving the output “the number is = 0”. To distinguish between positive and negative values, under “default” I introduced a new variable y, where y = x/abs(x). In order to carry out the absolute value function I had to include the <math.h> library in my header. The variable ‘y’ can only have two possible definite values, 1 and –1. Giving x any negative value will give us y = -1 and giving x any positive value will give us y=1. This way by using switch on ‘y’ with the cases ‘1’ and ‘-1’ we can distinguish between negative and positive inputs.

Task 4: -

Q. Write a C++ program to find out whether a person is an adult, teenager or child using nested if-else.

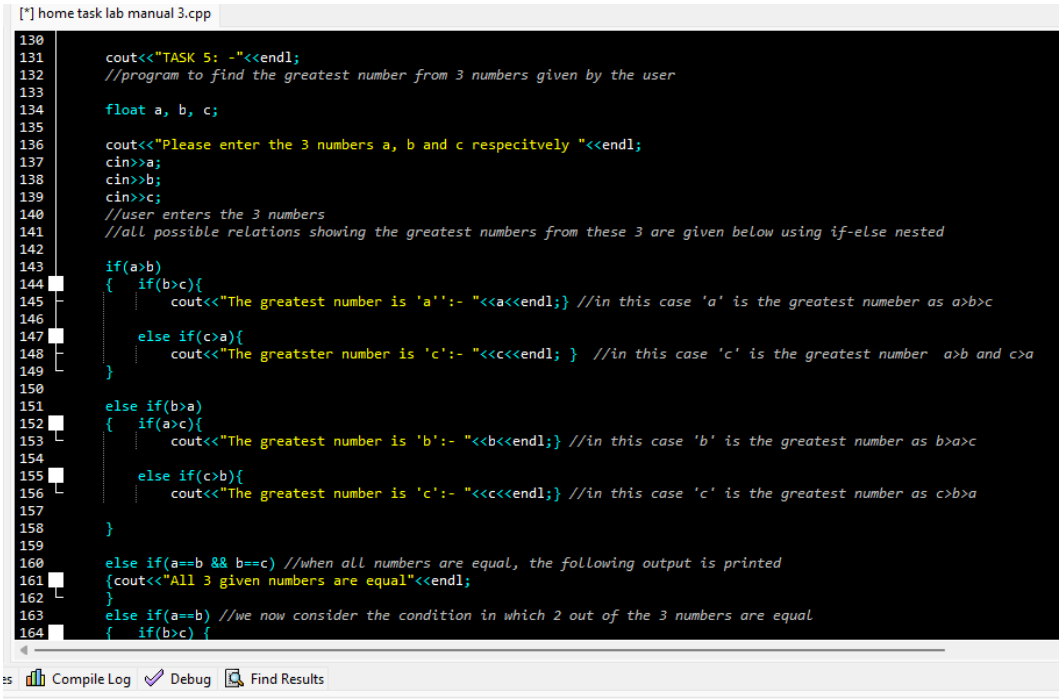



```
100     cout<<"TASK 4: -"<<endl;
101
102     float age;
103     cout<<"Please enter your age: -"<<endl;
104     cin>>age;  //age as input is entered by the user
105     //nested if else is used to decide whether the individual is a child, teenager or an adult
106
107     if (age>=0)
108 {
109
110     if (age<=12){
111         cout<<"You are a child"<<endl;  //checks if age entered is below and equal to 12 or not
112     }
113
114     else if(age<=18) {
115         cout<<"You are a teenager"<<endl;  //checks if age entered is below and equal to 18 or not
116     }
117
118     else
119         cout<<"You are an adult"<<endl; //checks if age entered is above 18 or not
120
121       }
122
123     else if(age<0 ) //checks in case an invalid age has been entered
124     {
125         cout<<"INVALID AGE ENTERED"<<endl;}
126
127
128     //end of task 4
```

I first used if-else statement on the user’s age (input). If age is greater than equal to 0 then the input goes to the nested if-else statement inside the first if, this nested statement further distinguishes whether the person’s age is less than or equal to 12 (child), less than or equal to 18 (teenager) or none of the two (adult). Moreover, in addition to the first if statement outside, an else if shows if age is less than 0 then output is “Invalid”.

Task 5: -

Q. Write a C++ program that takes three numbers from the user and finds the greatest number out of the three number using nested if else statements




```
130
131       cout<<"TASK 5: -"<<endl;
132       //program to find the greatest number from 3 numbers given by the user
133
134       float a, b, c;
135
136       cout<<"Please enter the 3 numbers a, b and c respecitvely "<<endl;
137       cin>>a;
138       cin>>b;
139       cin>>c;
140       //user enters the 3 numbers
141       //all possible relations showing the greatest numbers from these 3 are given below using if-else nested
142
143       if(a>b)
144       {   if(b>c){
145           cout<<"The greatest number is 'a'':- "<<a<<endl;} //in this case 'a' is the greatest numeber as a>b>c
146
147           else if(c>a){
148           cout<<"The greatster number is 'c':- "<<c<<endl; }  //in this case 'c' is the greatest number  a>b and c>a
149       }
150
151       else if(b>a)
152       {   if(a>c){
153           cout<<"The greatest number is 'b':- "<<b<<endl;} //in this case 'b' is the greatest number as b>a>c
154
155           else if(c>b){
156           cout<<"The greatest number is 'c':- "<<c<<endl;} //in this case 'c' is the greatest number as c>b>a
157
158       }
159
160       else if(a==b && b==c) //when all numbers are equal, the following output is printed
161       {cout<<"All 3 given numbers are equal"<<endl;
162       }
163       else if(a==b) //we now consider the condition in which 2 out of the 3 numbers are equal
164       {   if(b>c) {
```

```
161       {cout<<"All 3 given numbers are equal"<<endl;
162       }
163       else if(a==b) //we now consider the condition in which 2 out of the 3 numbers are equal
164       {   if(b>c) {
165               cout<<"Both a and b are the greatest numbers since "<<(a=b)<<endl;}
166               //in this case both numbers that are equal are considered the greatest since it is greater than the 3rd number
167
168           else if(c>b){
169               cout<<"The greatest number is 'c':- "<<c<<endl; }  //in this case 'c' is the greatest number since c>b=a
170       }
171       else if(a==c) //similar to the previous step, we now show the case when 2 other numbers are equal
172
173       {   if(c>b) {
174           cout<<"Both a and c are the greatest numbers since "<<(a=c)<<endl;} //both equal numbers are the greatest
175           else if(b>c){
176           cout<<"The greatest number is 'b':- "<<b<<endl; } //the third unequal number is greater than the other two
177       }
178
179       else if(b==c) //the third condition where any 2 numbers in a group of 3 numbers can be equal
180
181       {   if(b>a) {
182           cout<<"Both b and c are the greatest numbers since "<<(b=c)<<endl;}
183           else if(a>b){
184           cout<<"The greatest number is 'a':- "<<a<<endl; }
185       }
186
187        //end of task 5
```

In this task, I represented all possibilities in finding the greatest number among 3 numbers. The possibilities included if one number is greater than the other 2, if all 3 numbers are equal, if two numbers are equal and also greater than the 3rd and if one number is greater than two equal numbers. All these possibilities and their outcomes are stated using nested if else statements.

Task 6: -

Q. Write a C++ program to check whether the alphabet entered by the user is a vowel or a consonant using nested if-else.

```
186       //end of task 5
187
188       cout<<"TASK 6:- "<<endl;
189       char ch;
190
191        cout << "Enter an alphabet: ";
192        cin >> ch;
193     //checking if given input is a letter
194        if ((ch >= 'a' && ch <= 'z') || (ch >= 'A' && ch <= 'Z')) {
195
196     // Check if the input is a lowercase vowel
197           if (ch == 'a' || ch == 'e' || ch == 'i' || ch == 'o' || ch == 'u')
198            {cout << ch << " is a lowercase vowel." << endl;}
199
200     // Check if the input is an uppercase vowel
201           else if (ch == 'A' || ch == 'E' || ch == 'I' || ch == 'O' || ch == 'U')
202            {cout << ch << " is an uppercase vowel." << endl;}
203
204     // Check if the input is an uppercase  consonant
205           else if (ch >= 'b' && ch <='z')
206            {cout<< ch <<" is a lowercase consonant."<<endl;}
207
208           else
209            {cout<< ch<<" is an uppercase consonant."<<endl;}
210
211         }
212     // If it's not a letter
213        else
214        {cout << "Invalid input. Please enter an alphabet." << endl;
215         }
216
217     return 0;
218
219   }
```

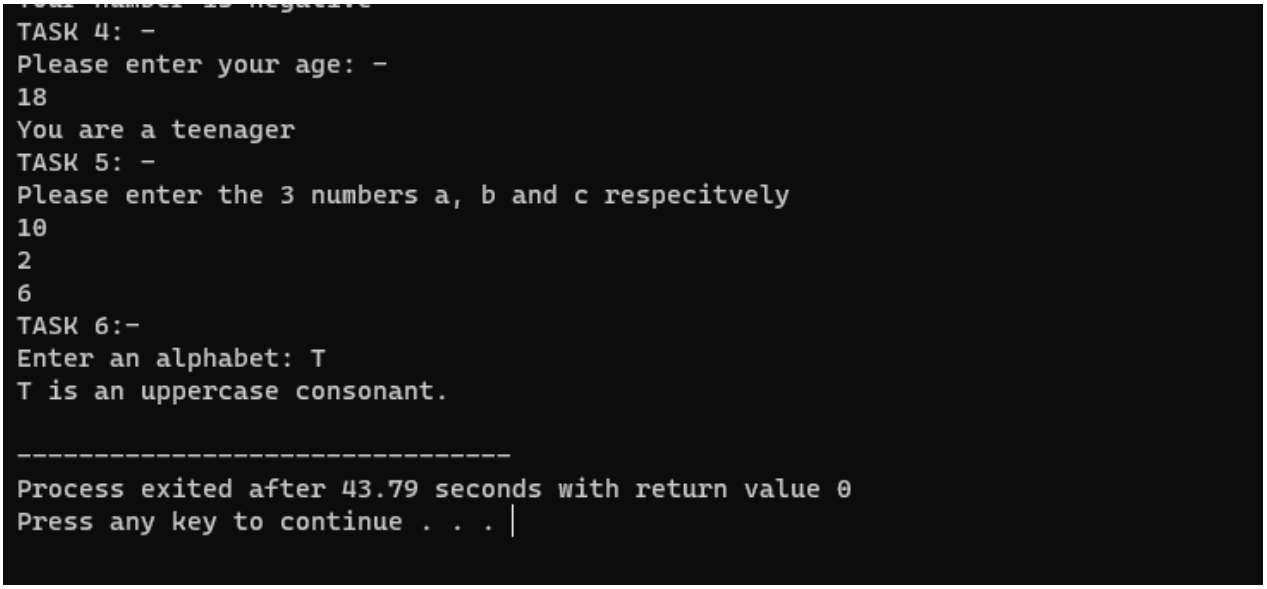
In this task, an if else statement is first used to decide whether, the character entered by the user is an alphabet or not. Under else the output “Invalid input” is entered. Then, an if-else statement is nested into the 1st if used to distinguish between lowercase and uppercase vowels and consonants.

OUTPUT: -

Task 1 to 3: -


C:\Users\tahse\Desktop\hom
TASK 1: -
Please choose the province:-
1. Balochistan
2. Punjab
3. Sindh
4. KPK
4
KPK's population is: - 39.37million
TASK 2: -
Please enter your alphabet: -
t
Your alphabet is a lower case consonant
.
TASK 3: -
Enter any number
-190
Your number is negative

Task 4 to 6: -


TASK 4: -
Please enter your age: -
18
You are a teenager
TASK 5: -
Please enter the 3 numbers a, b and c respecitvely
10
2
6
TASK 6:-
Enter an alphabet: T
T is an uppercase consonant.

Process exited after 43.79 seconds with return value 0
Press any key to continue . . .