

Programming Fundamentals

Lab Report

Lab03



Group Members Name & Reg #:	<u>Muhammad Haris Irfan</u> (FA18-BCE-090)
Class	Programming Fundamentals CSC103 (BCE-2B)
Instructor's Name	Dilshad Sabir

In Lab Tasks

Question no: 1

Write a C program that solves a simple user-entered mathematical expression. It should take input from the user (two floating type values and operations like *, /, + and -), calculate the result and show it on screen.

Solution:

In this Program, I used Switch and Case Operators, I made a separate Case for each of multiplication, addition, subtraction and division.

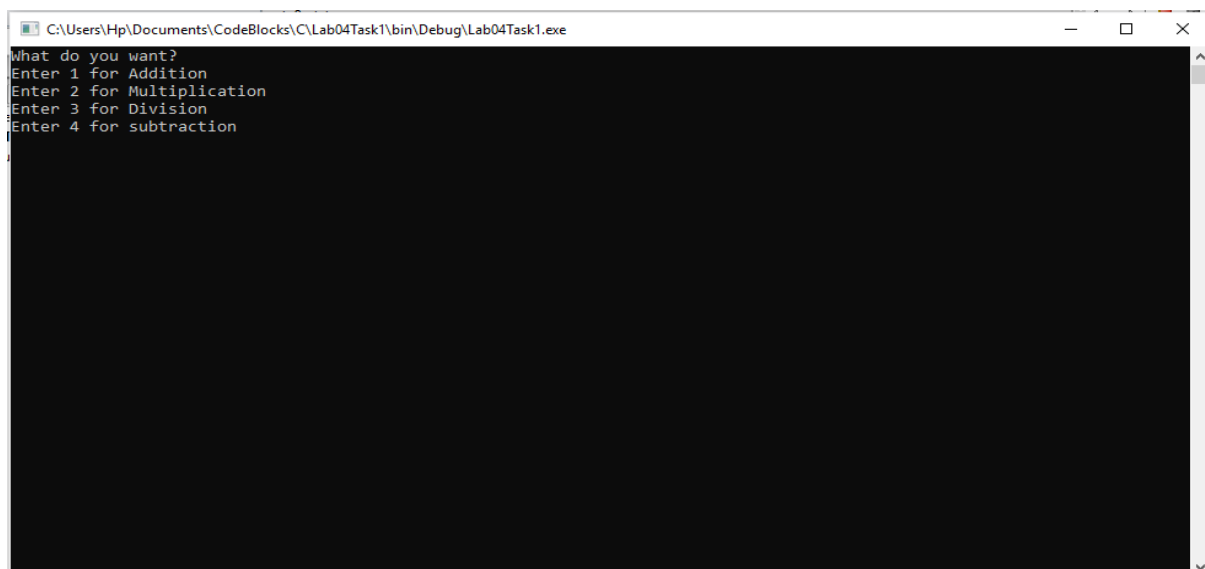
Code and results attached below

```
1  #include <stdio.h>
2  #include <stdlib.h>
3
4  int main()
5  {
6      int op;
7      float num1,num2,total;
8      printf("What do you want?\n");
9      printf("Enter 1 for Addition\n");
10     printf("Enter 2 for Multiplication\n");
11     printf("Enter 3 for Division\n");
12     printf("Enter 4 for subtraction\n");
13     scanf("%d",&op);
14     switch(op)
15     {
16     case 1:
17     {
18         printf("Enter the First Digit?");
19         scanf("%f",&num1);
20         printf("Enter the Second Digit?");
21         scanf("%f",&num2);
22         total= num1 + num2;
23         printf("The Value of %f plus %f is : %f ",num1,num2,total);
24         break;
25     }
26
27     case 2:
```

```
25     }
26
27     case 2:
28     {
29         printf("Enter the First Digit?");
30         scanf("%f",&num1);
31         printf("Enter the Second Digit?");
32         scanf("%f",&num2);
33         total= num1 * num2;
34         printf("The Value of %f Multiplied with %f is : %f ",num1,num2,total);
35         break;
36     }
37
38     case 3:
39     {
40         printf("Enter the First Digit?");
41         scanf("%f",&num1);
42         printf("Enter the Second Digit?");
43         scanf("%f",&num2);
44         total= num1 / num2;
45         printf("The Value of %f divided by %f is : %f ",num1,num2,total);
46         break;
47     }
48
49     case 4:
50     {
51         printf("Enter the First Digit?");
```

```
46         break;
47     }
48
49     case 4:
50     {
51         printf("Enter the First Digit?");
52         scanf("%f",&num1);
53         printf("Enter the Second Digit?");
54         scanf("%f",&num2);
55         total= num1 - num2;
56         printf("The Value of %f Minus %f is : %f ",num1,num2,total);
57         break;
58     }
59
60     default:
61     {
62         printf("Select the above options only!!");
63     }
64 }
65
66
67
68
69
70
71     return 0;
72 }
```

Now below is the Menu:



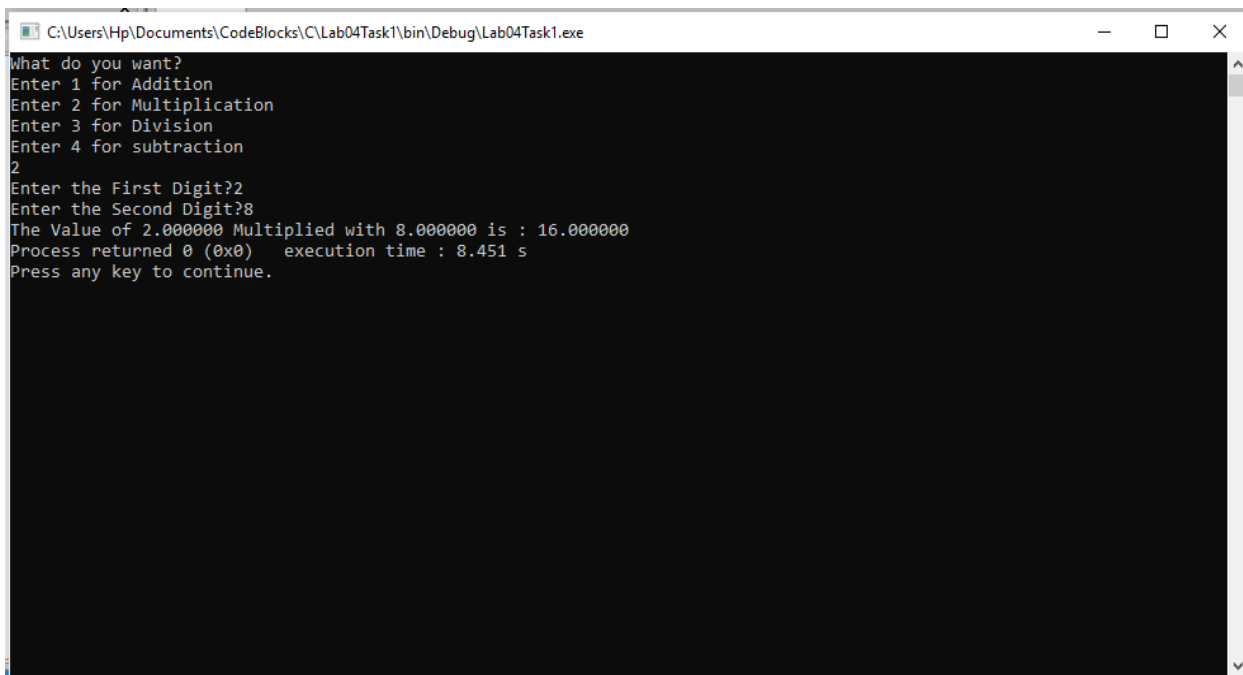
The screenshot shows a Windows command prompt window titled "C:\Users\Hp\Documents\CodeBlocks\C\Lab04Task1\bin\Debug\Lab04Task1.exe". The window displays the following text:

```
What do you want?
Enter 1 for Addition
Enter 2 for Multiplication
Enter 3 for Division
Enter 4 for subtraction
```

Now I have Tested all 4 for different values, there result is attached below,



```
C:\Users\Hp\Documents\CodeBlocks\C\Lab04Task1\bin\Debug\Lab04Task1.exe
What do you want?
Enter 1 for Addition
Enter 2 for Multiplication
Enter 3 for Division
Enter 4 for subtraction
1
Enter the First Digit?8
Enter the Second Digit?8
The Value of 8.000000 plus 8.000000 is : 16.000000
Process returned 0 (0x0)   execution time : 5.162 s
Press any key to continue.
```



```
C:\Users\Hp\Documents\CodeBlocks\C\Lab04Task1\bin\Debug\Lab04Task1.exe
What do you want?
Enter 1 for Addition
Enter 2 for Multiplication
Enter 3 for Division
Enter 4 for subtraction
2
Enter the First Digit?2
Enter the Second Digit?8
The Value of 2.000000 Multiplied with 8.000000 is : 16.000000
Process returned 0 (0x0)   execution time : 8.451 s
Press any key to continue.
```

```
C:\Users\Hp\Documents\CodeBlocks\C\Lab04Task1\bin\Debug\Lab04Task1.exe
What do you want?
Enter 1 for Addition
Enter 2 for Multiplication
Enter 3 for Division
Enter 4 for subtraction
3
Enter the First Digit?6
Enter the Second Digit?3
The Value of 6.000000 divided by 3.000000 is : 2.000000
Process returned 0 (0x0)   execution time : 5.393 s
Press any key to continue.

C:\Users\Hp\Documents\CodeBlocks\C\Lab04Task1\bin\Debug\Lab04Task1.exe
What do you want?
Enter 1 for Addition
Enter 2 for Multiplication
Enter 3 for Division
Enter 4 for subtraction
4
Enter the First Digit?8
Enter the Second Digit?4
The Value of 8.000000 Minus 4.000000 is : 4.000000
Process returned 0 (0x0)   execution time : 5.750 s
Press any key to continue.
```

Hence, these results further verify the that our program works for all values and is correct.

=====

Question no: 2(a)

Following program prints a menu. It then takes input from user and displays the entered choice. Type-in the C program given below into a new project, compile and run to see how it works..

```
#include <stdio.h>
#include <stdlib.h>

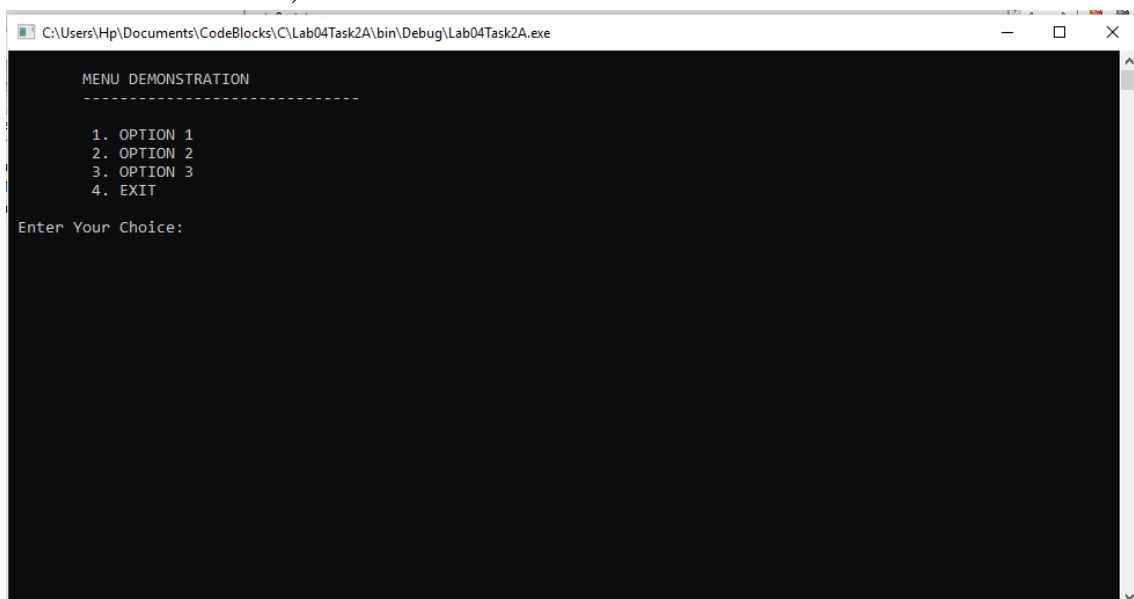
int main()
{
    int choice=0; while(choice!=4)
    {
        printf("\n\tMENU DEMONSTRATION");

        printf("\n\t-----");
        printf("\n\t 1. OPTION 1" ); printf("\n\t 2. OPTION 2" );
        printf("\n\t 3. OPTION 3" ); printf("\n\t 4. EXIT");
        printf("\n\tEnter Your Choice: ");
        scanf("%d",&choice); switch(choice)
        1: case
        break; case 2: printf("\n\tYOU SELECTED OPTION %d",choice);
        break; case 3: printf("\n\tYOU SELECTED OPTION %d",choice);
        break; case 4: printf("\n\tYOU SELECTED OPTION %d",choice);
        default: printf("\n\tINVALID SELECTION...Please try again");
    }
    getchar();
}
```

Solution

I compiled and ran the following program in codeblocks, its result is attached below,

This is the menu,



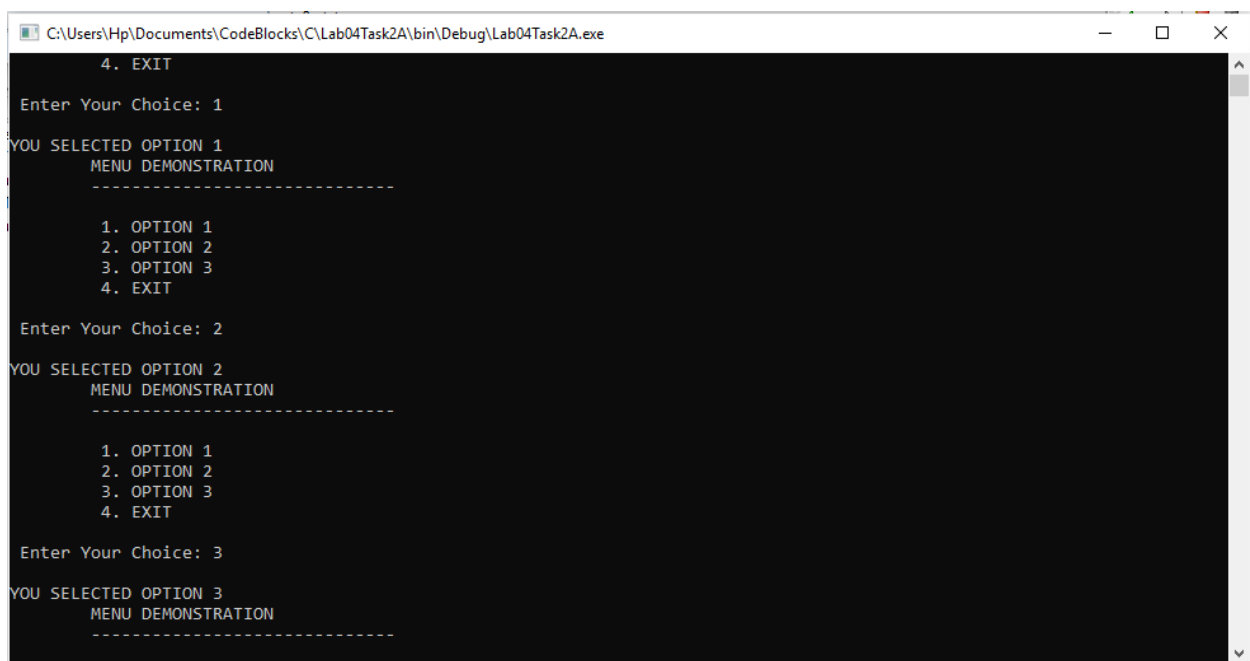
```
C:\Users\Hp\Documents\CodeBlocks\C\Lab04Task2A\bin\Debug\Lab04Task2A.exe

MENU DEMONSTRATION
-----

1. OPTION 1
2. OPTION 2
3. OPTION 3
4. EXIT

Enter Your Choice:
```

It tells us which option we selected when we enter an option, for eg:



```
C:\Users\Hp\Documents\CodeBlocks\C\Lab04Task2A\bin\Debug\Lab04Task2A.exe

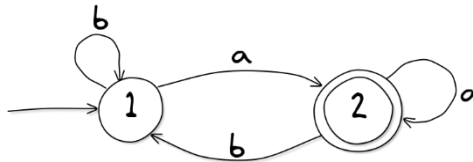
4. EXIT
Enter Your Choice: 1
YOU SELECTED OPTION 1
MENU DEMONSTRATION
-----
1. OPTION 1
2. OPTION 2
3. OPTION 3
4. EXIT
Enter Your Choice: 2
YOU SELECTED OPTION 2
MENU DEMONSTRATION
-----
1. OPTION 1
2. OPTION 2
3. OPTION 3
4. EXIT
Enter Your Choice: 3
YOU SELECTED OPTION 3
MENU DEMONSTRATION
-----
```

Hence, this verifies our program.

=====

Question no: 2(b)

Modify the above program to implement following state machine. Here 'a' and 'b' are user input characters. The program should print out appropriate messages to the console when a user enters a character.



Solution

In this program I used switch and case statements as well as the goto statement, initially we are in state one, if the user inputs 'a', state is changed to 2, if 'b' is entered the state is not changed, similarly when in state 2, if the user enters 'b' then state is changed and if 'a' is entered the state remains same.

The code and results are attached below,

```
1  #include <stdio.h>
2  #include <stdlib.h>
3
4  int main()
5  {
6
7      char op='a';
8      switch(op)
9      {
10         char opl;
11         case 'a':
12         {
13             cl:
14             printf("You are in state 1\n\n");
15             printf("You have two choices to select either a or b?\n");
16             opl= getch(opl);
17             if(opl=='a' || opl=='A')
18             {
19                 system("CLS");
20                 goto c2;
21             }
22
23             else if ( opl=='B' || opl=='b')
24             {
25                 system("CLS");
26
27                 goto cl;
28             }
29         }
30
31         else
32         {
33
34             printf("the option is not given");
35         }
36         break;
37     }
38
39     case 'b':
40     {
41         c2:
42
43         printf("you are in state 2\n\n");
44         printf("You have two choices to select either a or b\n");
45
46         opl=getch(opl);
47
48         if(opl=='b' || opl=='B')
49         {
50             system("CLS");
51             goto cl;
52         }
53
54         else if (opl=='a' || opl=='A')
55         {
56             system("CLS");
57
58             goto c2;
59         }
60     }
```



```

49
50     if(opl=='b' || opl=='B')
51     {
52         system("CLS");
53         goto c1;
54     }
55
56     else if (opl=='a' || opl=='A')
57     {
58         system("CLS");
59         goto c2;
60     }
61
62     }
63
64     else
65     {
66         system("CLS");
67         printf("the Given option is not mentioned");
68     }
69
70     break;
71 }
72
73
74
75
76     return 0;
77 }
78

```

Now, initially we are in state 1,



A screenshot of a terminal window titled "C:\Users\Hp\Documents\CodeBlocks\C\Lab04Task2B\bin\Debug\Lab04Task2B.exe". The terminal displays the following text:

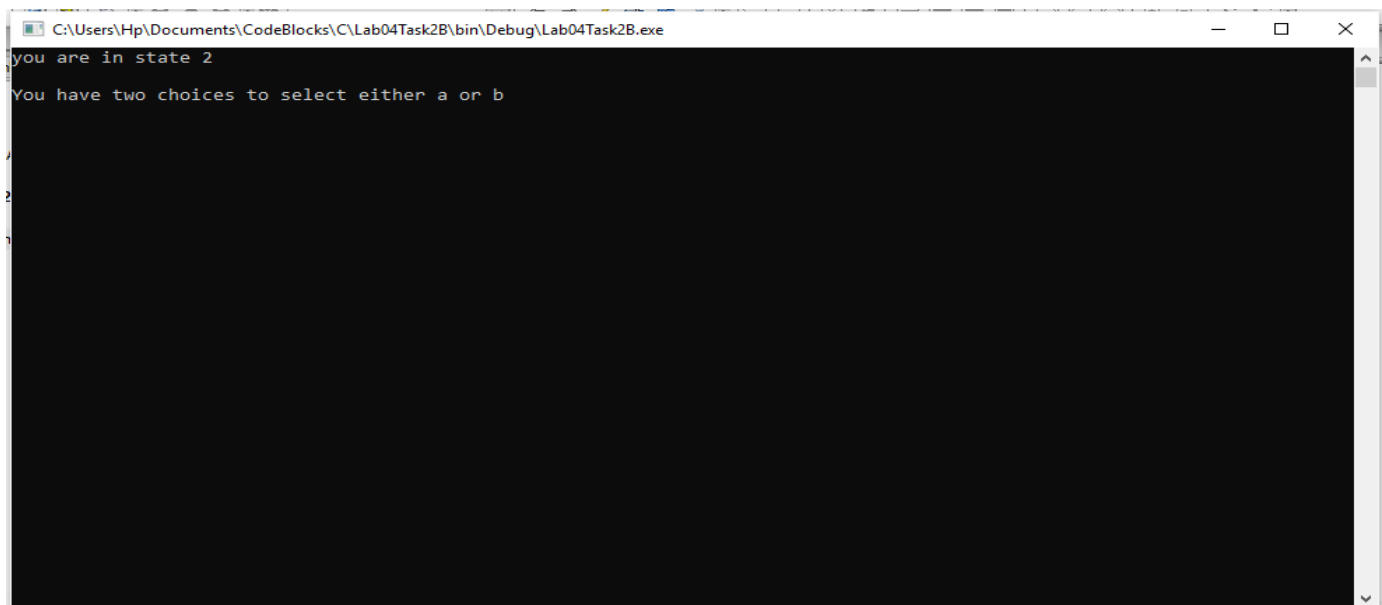
```

You are in state 1
You have two choices to select either a or b?

```

The terminal is currently empty, waiting for user input.

When b is pressed the state changes to 2.



A screenshot of a terminal window titled "C:\Users\Hp\Documents\CodeBlocks\C\Lab04Task2B\bin\Debug\Lab04Task2B.exe". The terminal displays the following text:

```

you are in state 2
You have two choices to select either a or b

```

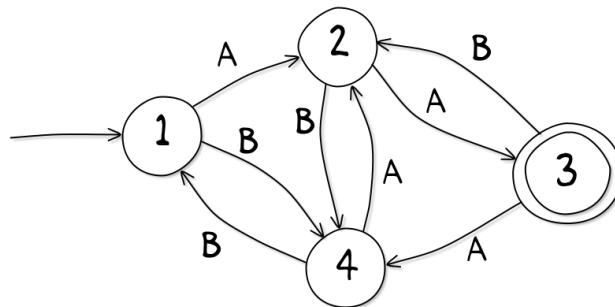
The terminal is currently empty, waiting for user input.

and this is also valid vice versa, the above results show that our program is valid and correct.

POST LAB

Question:

Write a C program to implement the following state machine.



Solution:

I am attaching my code below for this program, its code is similar to the above program, I used case and goto statements in this program.

The code and result is attached below,

```

1  #include <stdio.h>
2  #include <stdlib.h>
3
4  int main()
5  {
6
7      int op=1;
8      switch(op)
9      {
10         char opl;
11         case 1:
12         {
13             c1:
14             printf("You are in state 1\n\n");
15             printf("You have two choices to select either a or b?\n");
16             opl= getch(opl);
17             if(opl=='a' || opl=='A')
18             {
19                 system("CLS");
20                 goto c2;
21             }
22
23             else if ( opl=='B' || opl=='b')
24             {
25                 system("CLS");
26                 goto c4;
27             }
28
29             else
30             {
31                 printf("the option is not given");
32             }
33
34             break;
35         }
36     }
37     case 2:

```

```

37     case 2:
38     {
39         c2:
40         printf("You are in state 2\n\n");
41         printf("You have two choices to select either a or b?\n");
42         opl= getch(opl);
43         if(opl=='a' || opl=='A')
44         {
45             system("CLS");
46             goto c3;
47         }
48
49         else if ( opl=='B' || opl=='b')
50         {
51             system("CLS");
52             goto c4;
53         }
54
55         else
56         {
57             printf("the option is not given");
58         }
59
60         break;
61     }
62
63     case 3:
64     {
65         c3:
66         printf("You are in state 2\n\n");

```

```

70     case 3:
71     {
72         c3:
73         printf("You are in state 3\n\n");
74         printf("You have two choices to select either a or b?\n");
75         opl= getch(opl);
76         if(opl=='a' || opl=='A')
77         {
78             system("CLS");
79             goto c4;
80         }
81
82         else if ( opl=='B' || opl=='b')
83         {
84             system("CLS");
85             goto c2;
86         }
87
88         else
89         {
90             printf("the option is not given");
91         }
92
93         break;
94     }
95
96     case 4:
97     {
98         c4:
99         printf("You are in state 4\n\n");
100        printf("You have two choices to select either a or b?\n");
101        opl= getch(opl);
102        if(opl=='a' || opl=='A')

```

```

101 case 4:
102 {
103     c4:
104     printf("You are in state 4\n\n");
105     printf("You have two choices to select either a or b?\n");
106     opl= getch(opl);
107     if(opl=='a' || opl=='A')
108     {
109         system("CLS");
110         goto c2;
111     }
112     else if ( opl=='B' || opl=='b')
113     {
114         system("CLS");
115         goto c1;
116     }
117     else
118     {
119         printf("the option is not given");
120     }
121     break;
122 }
123
124 default:
125 {
126     printf("wrong option selected");
127 }
128 }
129 }
130 }
131 }
132 }
133 }
134 }
135 }
136 }
137 }
138 }

```

When we press a in state 1, it goes to state b

when I press b in state 2 it goes to state 4

Hence, The working shows that our code works for all states and is correct.

THE END