Compiler Design(18CSC304J)

Experiment 3

RE to NFA

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Aim: To study and perform regular expression to NFA conversion

Language: C

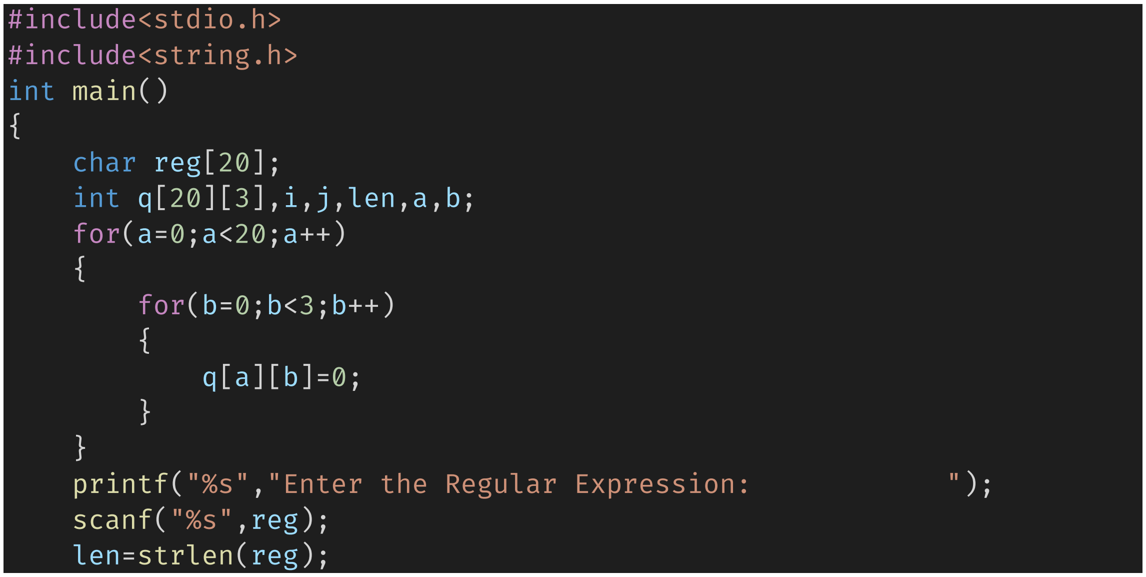
Procedure:

1. Create a file or select the file for performing the operations on.
2. For this, created a c file called master.c
3. Write the code in the c file
4. Run the code and perform the operations required.
5. Note the output and document it.

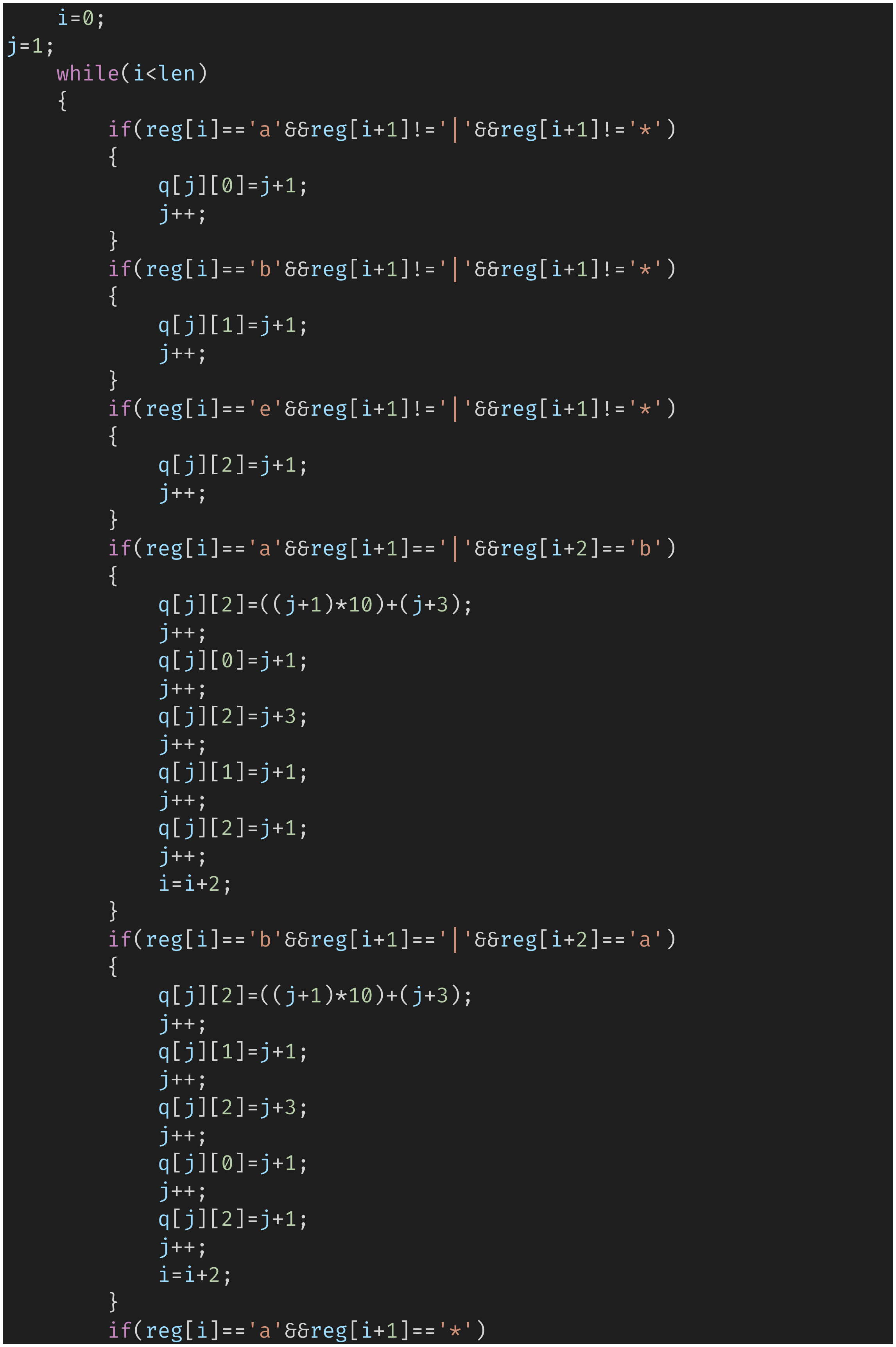
Process:

- Open the c file using open command in execute mode
- Input the regular expression
- Loop on the regular expression till its length
- Generate transition function
- Print the transition function .

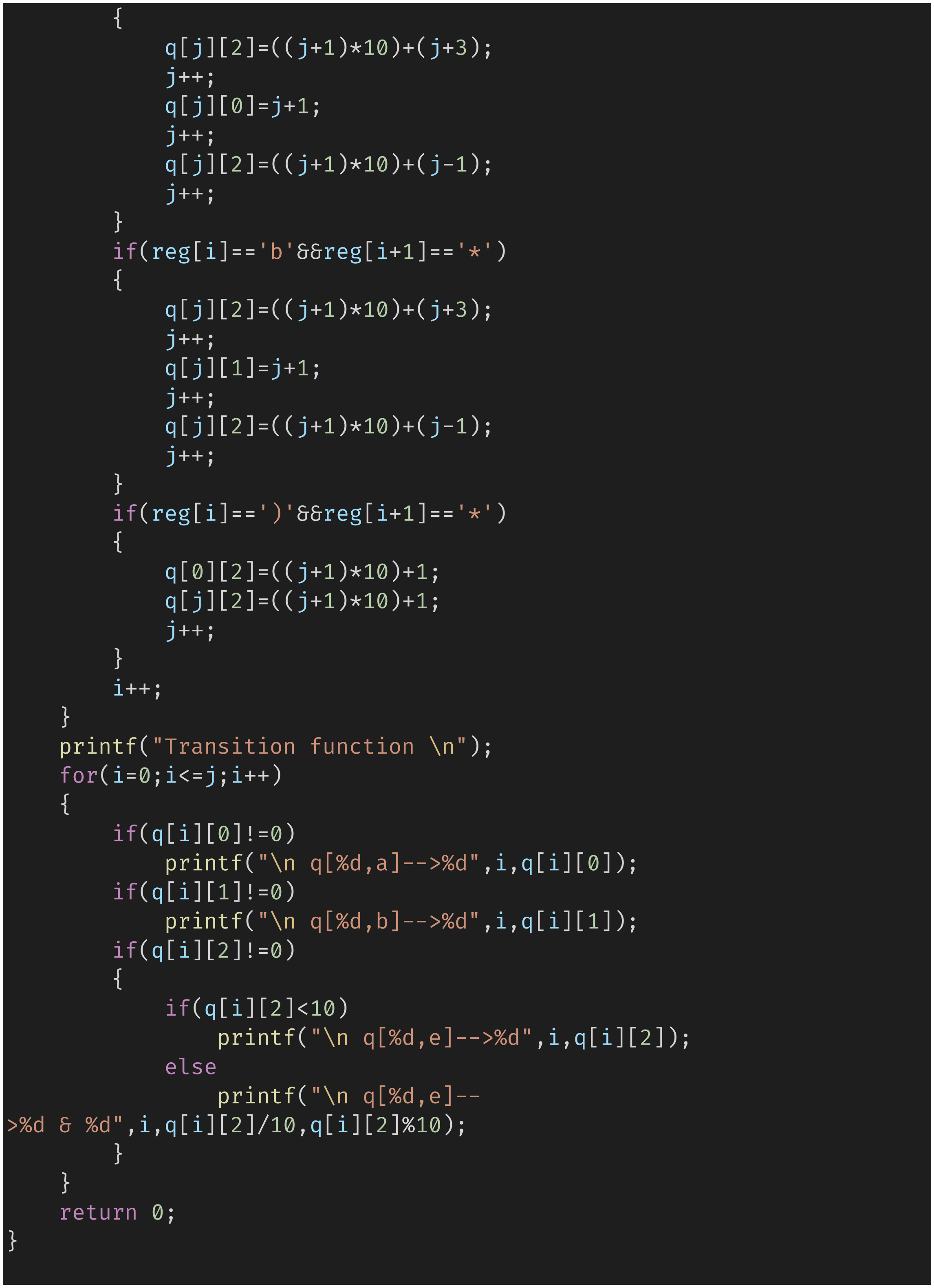
Code Snippet:



```
#include<stdio.h>
#include<string.h>
int main()
{
    char reg[20];
    int q[20][3],i,j,len,a,b;
    for(a=0;a<20;a++)
    {
        for(b=0;b<3;b++)
        {
            q[a][b]=0;
        }
    }
    printf("%s","Enter the Regular Expression:            ");
    scanf("%s",reg);
    len=strlen(reg);
```

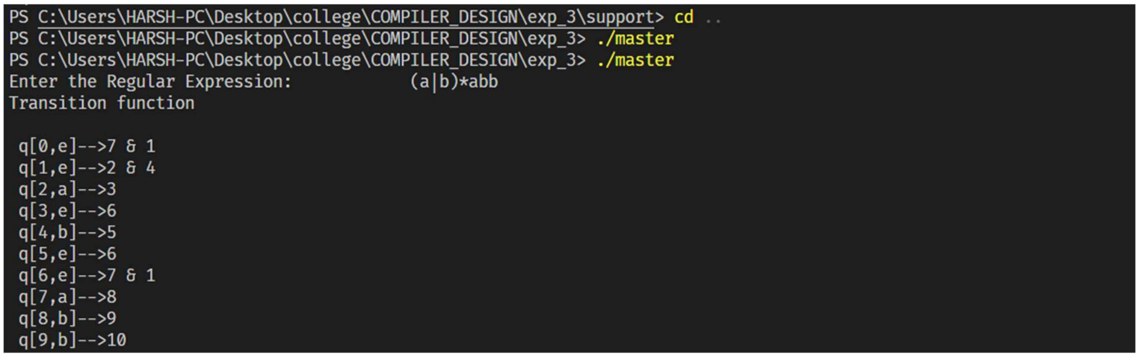


```
    i=0;
j=1;
    while(i<len)
    {
        if(reg[i]=='a'&&reg[i+1]!='|'&&reg[i+1]!='*')
        {
            q[j][0]=j+1;
            j++;
        }
        if(reg[i]=='b'&&reg[i+1]!='|'&&reg[i+1]!='*')
        {
            q[j][1]=j+1;
            j++;
        }
        if(reg[i]=='e'&&reg[i+1]!='|'&&reg[i+1]!='*')
        {
            q[j][2]=j+1;
            j++;
        }
        if(reg[i]=='a'&&reg[i+1]=='|'&&reg[i+2]=='b')
        {
            q[j][2]=((j+1)*10)+(j+3);
            j++;
            q[j][0]=j+1;
            j++;
            q[j][2]=j+3;
            j++;
            q[j][1]=j+1;
            j++;
            q[j][2]=j+1;
            j++;
            i=i+2;
        }
        if(reg[i]=='b'&&reg[i+1]=='|'&&reg[i+2]=='a')
        {
            q[j][2]=((j+1)*10)+(j+3);
            j++;
            q[j][1]=j+1;
            j++;
            q[j][2]=j+3;
            j++;
            q[j][0]=j+1;
            j++;
            q[j][2]=j+1;
            j++;
            i=i+2;
        }
        if(reg[i]=='a'&&reg[i+1]=='*')
```



```
        {
            q[j][2]=((j+1)*10)+(j+3);
            j++;
            q[j][0]=j+1;
            j++;
            q[j][2]=((j+1)*10)+(j-1);
            j++;
        }
        if(reg[i]=='b'&&reg[i+1]=='*')
        {
            q[j][2]=((j+1)*10)+(j+3);
            j++;
            q[j][1]=j+1;
            j++;
            q[j][2]=((j+1)*10)+(j-1);
            j++;
        }
        if(reg[i]==')'&&reg[i+1]=='*')
        {
            q[0][2]=((j+1)*10)+1;
            q[j][2]=((j+1)*10)+1;
            j++;
        }
        i++;
    }
    printf("Transition function \n");
    for(i=0;i<=j;i++)
    {
        if(q[i][0]!=0)
            printf("\n q[%d,a]-->%d",i,q[i][0]);
        if(q[i][1]!=0)
            printf("\n q[%d,b]-->%d",i,q[i][1]);
        if(q[i][2]!=0)
        {
            if(q[i][2]<10)
                printf("\n q[%d,e]-->%d",i,q[i][2]);
            else
                printf("\n q[%d,e]--
>%d & %d",i,q[i][2]/10,q[i][2]%10);
        }
    }
    return 0;
}
```

Output Screenshots:



```
PS C:\Users\HARSH-PC\Desktop\college\COMPILER_DESIGN\exp_3\support> cd ..
PS C:\Users\HARSH-PC\Desktop\college\COMPILER_DESIGN\exp_3> ./master
PS C:\Users\HARSH-PC\Desktop\college\COMPILER_DESIGN\exp_3> ./master
Enter the Regular Expression:            (a|b)*abb
Transition function

 q[0,e]-->7 & 1
 q[1,e]-->2 & 4
 q[2,a]-->3
 q[3,e]-->6
 q[4,b]-->5
 q[5,e]-->6
 q[6,e]-->7 & 1
 q[7,a]-->8
 q[8,b]-->9
 q[9,b]-->10
```

Result:

The code was successfully implemented in C and output was recorded. Hence, RE to NFA was successfully executed.