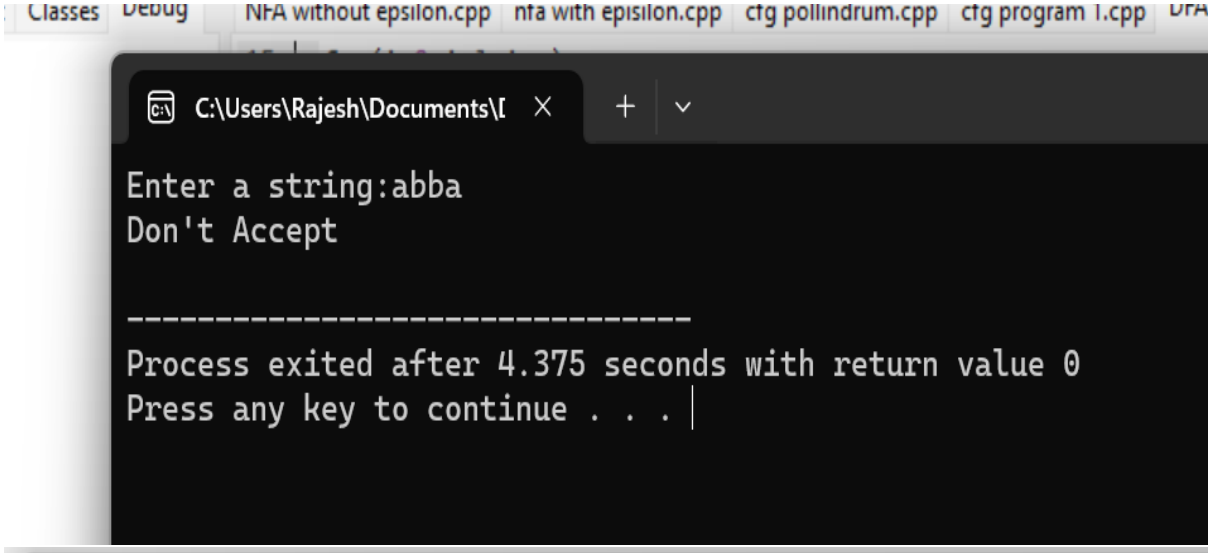
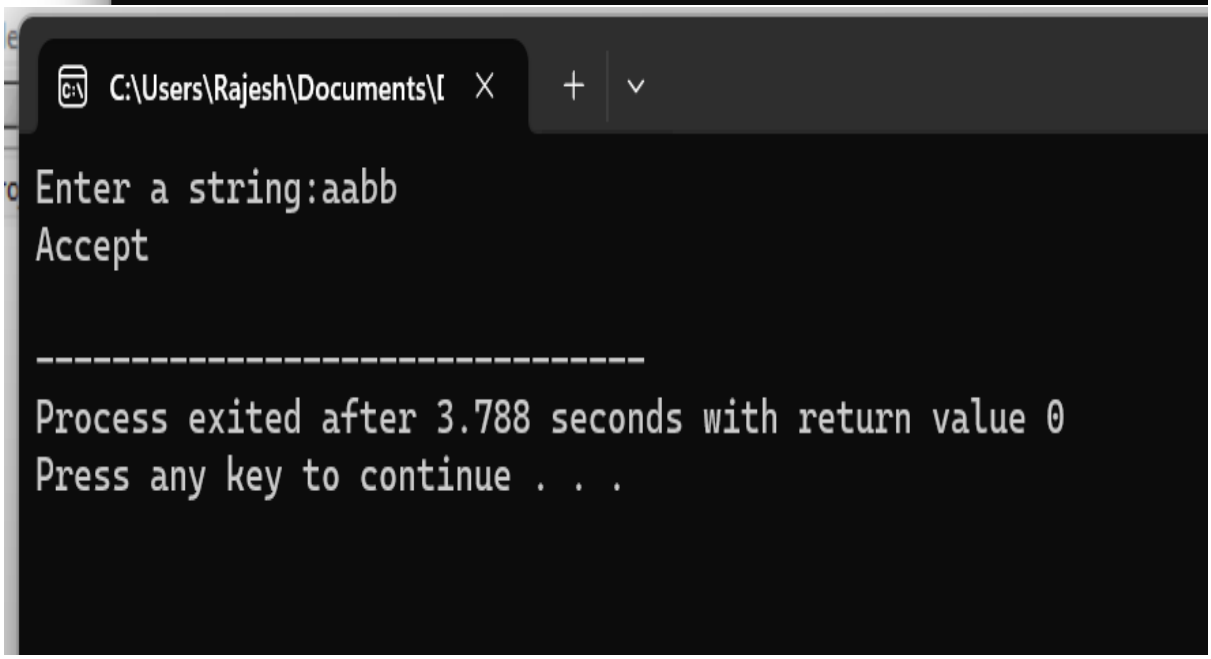
1).**write a c program for construct DFA**

```
#include<stdio.h>
#include<string.h>
#define max 20
int main()
{
int trans_table[4][2]={{1,3},{1,2},{1,2},{3,3}};
int final_state=2,i;
int present_state=0;
int next_state=0;
int invalid=0;
char input_string[max];
printf("Enter a string:");
scanf("%s",input_string);
int l=strlen(input_string);
for(i=0;i<l;i++)
{
if(input_string[i]=='a')
next_state=trans_table[present_state][0];
else if(input_string[i]=='b')
next_state=trans_table[present_state][1];
else
invalid=l;
present_state=next_state;
}
if(invalid==l)
{
printf("Invalid input");
}
else if(present_state==final_state)
printf("Accept\n");
```

```
else
printf("Don't Accept\n");
}
```

Output:





2).**write a c program for construct the NFA without epsilon**

```
#include<stdio.h>
#include<string.h>
int main()
{
 int i,j,k,l,m,next_state[20],n,mat[10][10][10],flag,p;
 int num_states,final_state[5],num_symbols,num_final;
 int present_state[20],prev_trans,new_trans;
 char ch,input[20];
 int symbol[5],inp,inp1;
 printf("How many states in the NFA : ");
 scanf("%d",&num_states);
 printf("How many symbols in the input alphabet : ");
 scanf("%d",&num_symbols);
 for(i=0;i<num_symbols;i++)
{
  printf("Enter the input symbol %d : ",i+1);
  scanf("%d",&symbol[i]);
}
  printf("How many final states : ");
  scanf("%d",&num_final);
for(i=0;i<num_final;i++)
{
  printf("Enter the final state %d : ",i+1);
  scanf("%d",&final_state[i]);
}
//Initialize all entries with -1 in Transition table
for(i=0;i<10;i++)
{
   for(j=0;j<10;j++)
  {
```

```
   for(k=0;k<10;k++)
   {
     mat[i][j][k]=-1;
    }
  }
}
//Get input from the user and fill the 3D transition table
  for(i=0;i<num_states;i++)
{
    for(j=0;j<num_symbols;j++)
{
  printf("How many transitions from state %d for the input %d :",i,symbol[j]);
   scanf("%d",&n);
    for(k=0;k<n;k++)
    {
  printf("Enter the transition %d from state %d for the input%d : ",k+1,i,symbol[j]);
  scanf("%d",&mat[i][j][k]);
    }
  }
}
printf("The transitions are stored as shown below\n");
 for(i=0;i<10;i++)
  {
    for(j=0;j<10;j++)
  {
    for(k=0;k<10;k++)
    {
 if(mat[i][j][k]!=-1)
 printf("mat[%d][%d][%d] = %d\n",i,j,k,mat[i][j][k]);
    }
  }
```

```
}
  while(1)
{
  printf("Enter the input string : ");
  scanf("%s",input);
  present_state[0]=0;
prev_trans=1;
l=strlen(input);
for(i=0;i<l;i++)
{
 if(input[i]=='0')
 inp1=0;
 else if(input[i]=='1')
 inp1=1;
 else
 {
  printf("Invalid input\n");
  int  exit(0);
 }
 for(m=0;m<num_symbols;m++)
{
if(inp1==symbol[m])
{
inp=m;
break;
}
}
new_trans=0;
for(j=0;j<prev_trans;j++)
{
k=0;
```

```
p=present_state[j];
while(mat[p][inp][k]!=-1)
{
next_state[new_trans++]=mat[p][inp][k];
k++;
}
}
for(j=0;j<new_trans;j++)
{
present_state[j]=next_state[j];
}
prev_trans=new_trans;
}
flag=0;
for(i=0;i<prev_trans;i++)
{
for(j=0;j<num_final;j++)
{
if(present_state[i]==final_state[j])
{
flag=1;
break;
}
}
}
if(flag==1)
printf("Acepted\n");
else
printf("Not accepted\n");
printf("Try with another input\n");
}}
```

Output:

```
How many symbols in the input alphabet : 2
Enter the input symbol 1 : 0
Enter the input symbol 2 : 1
How many final states : 1
Enter the final state 1 : 2
How many transitions from state 0 for the input 0 :1
Enter the transition 1 from state 0 for the input0 : 1
How many transitions from state 0 for the input 1 :1
Enter the transition 1 from state 0 for the input1 : 3
How many transitions from state 1 for the input 0 :2
Enter the transition 1 from state 1 for the input0 : 1
Enter the transition 2 from state 1 for the input0 : 2
How many transitions from state 1 for the input 1 :1
Enter the transition 1 from state 1 for the input1 : 1
How many transitions from state 2 for the input 0 :0
How many transitions from state 2 for the input 1 :0
How many transitions from state 3 for the input 0 :1
Enter the transition 1 from state 3 for the input0 : 3
How many transitions from state 3 for the input 1 :2
Enter the transition 1 from state 3 for the input1 : 2
Enter the transition 2 from state 3 for the input1 : 3
The transitions are stored as shown below
mat[0][0][0] = 1
mat[0][1][0] = 3
mat[1][0][0] = 1
mat[1][0][1] = 2
mat[1][1][0] = 1
mat[3][0][0] = 3
mat[3][1][0] = 2
mat[3][1][1] = 3
Enter the input string : 0111010
Acepted
```

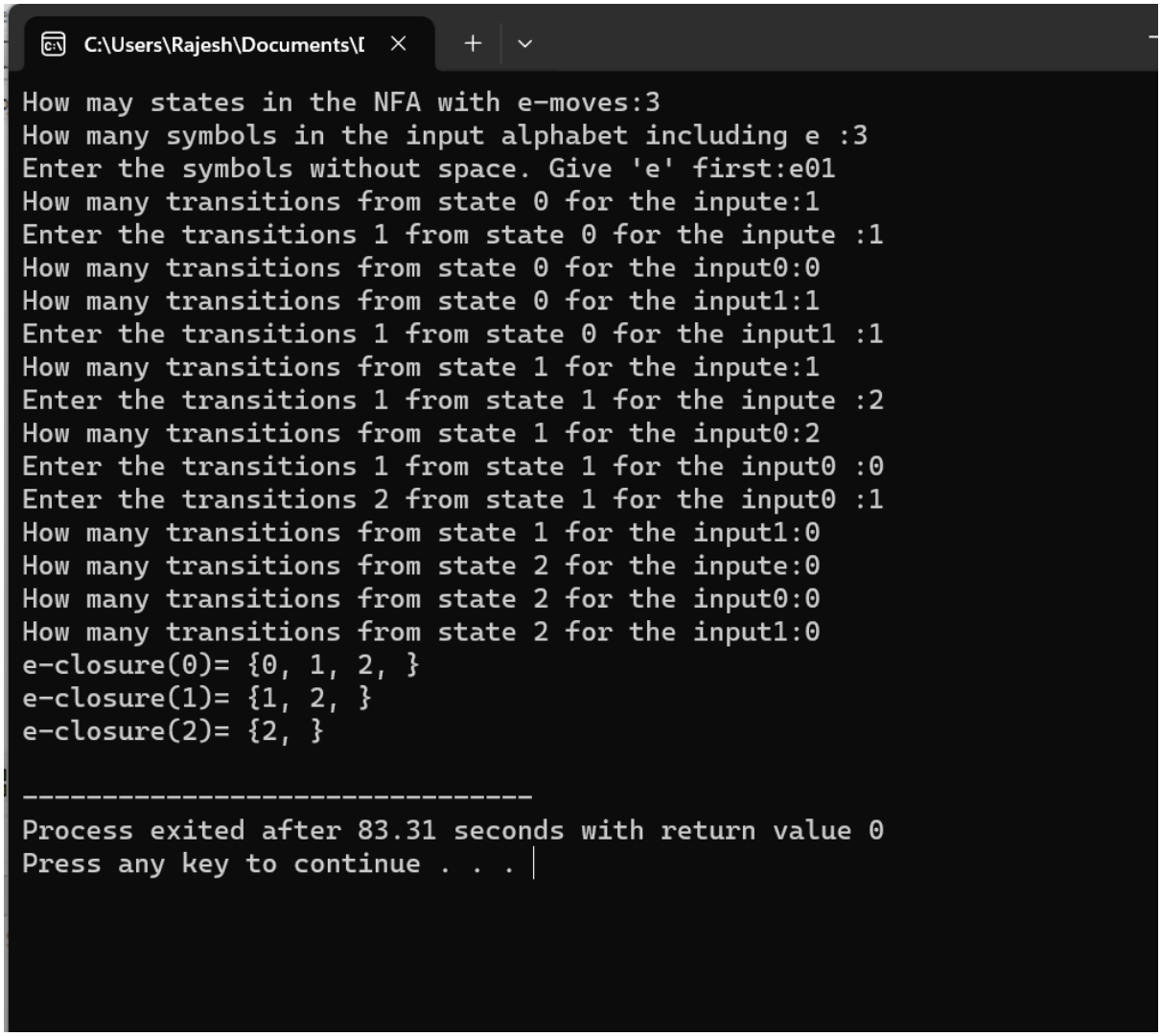
3).wtrite a C program to construct the NFA with epsilon

```
#include<stdio.h>
#include<string.h>
int trans_table[10][5][3];
char symbol[5],a;
int e_closure[10][10],ptr,state;
void find_e_closure(int x);
int main()
{
int i,j,k,n,num_states,num_symbols;
for(i=0;i<10;i++)
{
for(j=0;j<5;j++)
{
for(k=0;k<3;k++)
{
trans_table[i][j][k]=-1;
}
}
}
printf("How may states in the NFA with e-moves:");
scanf("%d",&num_states);
printf("How many symbols in the input alphabet including e :");
scanf("%d",&num_symbols);
printf("Enter the symbols without space. Give 'e' first:");
scanf("%s",symbol);
for(i=0;i<num_states;i++)
{
for(j=0;j<num_symbols;j++)
{
printf("How many transitions from state %d for the input%c:",i,symbol[j]);
```

```
scanf("%d",&n);
for(k=0;k<n;k++)
{
printf("Enter the transitions %d from state %d for the input%c :", k+1,i,symbol[j]);
scanf("%d",&trans_table[i][j][k]);
}
}
}
for(i=0;i<10;i++)
{
for(j=0;j<10;j++)
{
e_closure[i][j]=-1;
}
}
for(i=0;i<num_states;i++)
e_closure[i][0]=i;
for(i=0;i<num_states;i++)
{
if(trans_table[i][0][0]==-1)
continue;
else
{
state=i;
ptr=1;
find_e_closure(i);
}
}
for(i=0;i<num_states;i++)
{
printf("e-closure(%d)= {",i);
```

```
for(j=0;j<num_states;j++)
{
if(e_closure[i][j]!=-1)
{
printf("%d, ",e_closure[i][j]);
}
}
printf("}\n");
}
}
void find_e_closure(int x)
{
int i,j,y[10],num_trans;
i=0;
while(trans_table[x][0][i]!=-1)
{
y[i]=trans_table[x][0][i];
i=i+1;
}
num_trans=i;
for(j=0;j<num_trans;j++)
{
e_closure[state][ptr]=y[j];
ptr++;
find_e_closure(y[j]);
}
}
```

Output:



4).**write a c program check whether a string pollindrum belong to grammer**

```
#include<stdio.h>
#include<string.h>
int main()
{
        char s[100];
        int n,i,a,b,flag,flag1=1;
        printf("enter the string");
        scanf("%s",s);
```

```
flag=1;
n=strlen(s);
for(int i=0;i<n;i++)
{
        if(s[i]!='0'&& s[i]!='1')
        {
                flag=0;
        }
}
if(flag!=1)
{
        printf("string is not valid");
}
if(flag==1)
{
        flag1=1;
        a=0;
        b=n-1;
        while(a!=(n/2))
        {
                if(s[a]!=s[b])
                {
                        flag1=0;
                }
                a++;
                b--;
        }
        if(flag1==1)
        {
                printf("string is pollindrum\n");
                printf("string is accept");
```

```
            }
            else
            {
                printf("string is not pollindrum");
                printf("string is not valid");
            }
        }
}
```

Output: