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## Experiment-3 CONVERSION OF NFA TO DFA

Aim:

To write a program for converting NFA to DFA.

Procedure:

1. Start
2. Get the input from the user
3. Set the only state in SDFA to “unmarked”.
4. While SDFA contains an unmarked state do:
    a. Let T be that unmarked state
    b. for each a in % do S = e-Closure(MoveNFA(T,a))
    c. if S is not in SDFA already then, add S to SDFA (as an “unmarked”)
    d. Set MoveDFA(T,a) to S.
5. For each S in SDFA if any s & S is a final state in the NFA then, mark S a final state in the DFA.
6. Print the result.

Code:

```
#include <vector>
#include <iostream>
using namespace std;
int main()
{
   vector<vector<int>> nfa( 5 , vector<int> (3));
```

```
    vector<vector<int>> dfa( 10 , vector<int> (3));
    for(int i=1;i<5;i++){
        for(int j=1;j<=2;j++){
            int h;
            if (j == 1){
                cout << "nfa [" << i << ", a]: ";
            }
            else{
                cout << "nfa [" << i << ", b]: ";
            }
            cin>>h;
            nfa[i][j]=h;
        }
    }
    int dstate[10];
    int i=1,n,j,k,flag=0,m,q,r;
    dstate[i++]=1;
    n=i;

    dfa[1][1]=nfa[1][1];
    dfa[1][2]=nfa[1][2];
    cout<<"\n"<<"dfa["<<dstate[1]<<", a]: {"<<dfa[1][1]/10<<",
"<<dfa[1][1]%10<<"}";
    cout<<"\n"<<"dfa["<<dstate[1]<<", b]: "<<dfa[1][2];

 for(j=1;j<n;j++)
    {
        if(dfa[1][1]!=dstate[j])
          flag++;
    }
```

```
if(flag==n-1)
{
   dstate[i++]=dfa[1][1];
   n++;
}
flag=0;
for(j=1;j<n;j++)
{
    if(dfa[1][2]!=dstate[j])
       flag++;
}
if(flag==n-1)
{
    dstate[i++]=dfa[1][2];
    n++;
}
k=2;
while(dstate[k]!=0)
{
   m=dstate[k];
   if(m>10)
   {
      q=m/10;
      r=m%10;
   }
   if(nfa[r][1]!=0)
       dfa[k][1]=nfa[q][1]*10+nfa[r][1];
   else
      dfa[k][1]=nfa[q][1];
   if(nfa[r][2]!=0)
```

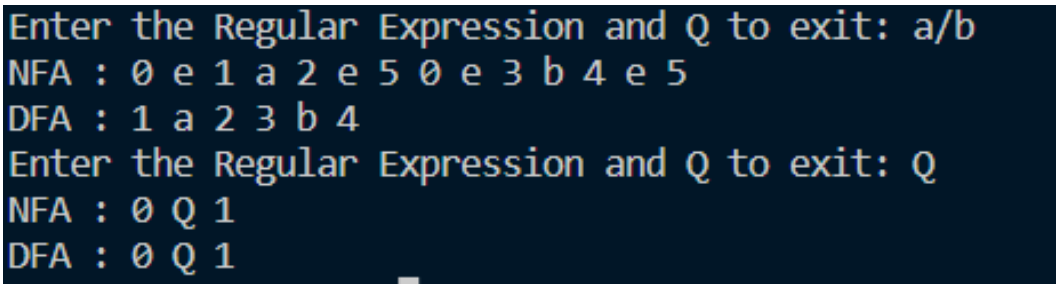
```
            dfa[k][2]=nfa[q][2]*10+nfa[r][2];
        else
            dfa[k][2]=nfa[q][2];


        if (dstate[k] > 10){
            if (dfa[k][1] > 10){
                cout<<"\n"<<"dfa[{"<<dstate[k]/10 << ", " << dstate[k]%10 <<"}, a]:
{"<<dfa[k][1]/10 << ", " << dfa[k][1]%10 << "}";
            }
            else{
                cout<<"\n"<<"dfa[{"<<dstate[k]/10 << ", " << dstate[k]%10 <<"}, a]:
"<<dfa[k][1];
            }
        }
        else{
            if (dfa[k][1] > 10){
                cout<<"\n"<<"dfa["<<dstate[k] << ", a]: {"<<dfa[k][1]/10 << ", " <<
dfa[k][1]%10 << "}";
            }
            else{
                cout<<"\n"<<"dfa["<<dstate[k] << ", a]: "<<dfa[k][1];
            }
        }
        if (dstate[k] > 10){
            if (dfa[k][2] > 10){
                cout<<"\n"<<"dfa[{"<<dstate[k]/10 << ", " << dstate[k]%10 <<"}, b]:
{"<<dfa[k][2]/10 << ", " << dfa[k][2]%10 << "}";
            }
            else{
                cout<<"\n"<<"dfa[{"<<dstate[k]/10 << ", " << dstate[k]%10 <<"}, b]:
"<<dfa[k][2];
            }
```

```
        }
        else{
            if (dfa[k][1] > 10){
                cout<<"\n"<<"dfa["<<dstate[k] << ", b]: {"<<dfa[k][2]/10 << ", " <<
dfa[k][2]%10 << "}";
            }
            else{
                cout<<"\n"<<"dfa["<<dstate[k] << ", b]: "<<dfa[k][2];
            }
        }
       flag=0;
        for(j=1;j<n;j++)
        {
         if(dfa[k][1]!=dstate[j])
          flag++;
        }
      if(flag==n-1)
     {
        dstate[i++]=dfa[k][1];
        n++;
     }
    flag=0;
    for(j=1;j<n;j++)
    {
         if(dfa[k][2]!=dstate[j])
            flag++;
    }
    if(flag==n-1)
    {
         dstate[i++]=dfa[k][2];
```

```
        n++;
    }
    k++;
    }
    return 0;
}
```

Output:




Result:

The given NFA was converted to a DFA successfully.