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**COURSE NAME**

**Theory of Automata & Formal Language**

**Assignment No: 01**

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**Question 1:**

**String end and start with same letter**

**Code/Solution:**

#include <bits/stdc++.h>

using namespace std;

// States of DFA

void q1(string, int);

void q2(string, int);

void q3(string, int);

void q4(string, int);

// Function for the state Q1

void q1(string s, int i)

{

// Condition to check end of string

if (i == s.length()) {

cout << "Yes \n";

return;

}

// State transitions

// 'a' takes to q1, and

// 'b' takes to q2

if (s[i] == 'a')

q1(s, i + 1);

else

q2(s, i + 1);

}

// Function for the state Q2

void q2(string s, int i)

{

// Condition to check end of string

if (i == s.length()) {

cout << "No \n";

return;

}

// State transitions

// 'a' takes to q1, and

// 'b' takes to q2

if (s[i] == 'a')

q1(s, i + 1);

else

q2(s, i + 1);

}

// Function for the state Q3

void q3(string s, int i)

{

// Condition to check end of string

if (i == s.length()) {

cout << "Yes \n";

return;

}

// State transitions

// 'a' takes to q4, and

// 'b' takes to q3

if (s[i] == 'a')

q4(s, i + 1);

else

q3(s, i + 1);

}

// Function for the state Q4

void q4(string s, int i)

{

// Condition to check end of string

if (i == s.length()) {

cout << "No \n";

return;

}

// State transitions

// 'a' takes to q4, and

// 'b' takes to q3

if (s[i] == 'a')

q4(s, i + 1);

else

q3(s, i + 1);

}

// Function for the state Q0

void q0(string s, int i)

{

// Condition to check end of string

if (i == s.length()) {

cout << "No \n";

return;

}

// State transitions

// 'a' takes to q1, and

// 'b' takes to q3

if (s[i] == 'a')

q1(s, i + 1);

else

q3(s, i + 1);

}

// Driver Code

int main()

{

string s = "abbaabb";

// Since q0 is the starting state

// Send the string to q0

q0(s, 0);

**Question 2:**

**Even number of string**

**Code/Solution:**

#include<stdio.h>

#include<string.h>

void main()

{

char s[100];

int st[10][3]={0}, n, t=1, i, j, is, fs, cs, k;

printf(“there are two symbols in our DFA: a and b\n”);

printf(“Lets DESIGN DFA FOR ACCEPTING EVEN NO. OF ‘a’ AND EVEN NO. OF ‘b’\n”);

printf(“Enter no. of states:”);

scanf(“%d”,&n);

for(i=0; i<n; i++) st[i+1][0]=i+1;

printf(“TRANSITIONS FOR EACH STATE:\n”);

while(t!=n+1)

{ printf(“enter transitions states over a & b for %d : “,t);

scanf(“%d%d”, &st[t][1], &st[t][2]);

t++;

}

t=1;

printf(“transition table is: \n”);

printf(” state\ta\tb\n”);

for(i=1; i<=n; i++,t++)

printf(” %d\t%d\t%d\n”,st[t][0],st[t][1],st[t][2]);

printf(“enter initial state and final state: “); scanf(“%d%d”,&is, &fs); cs=is;

printf(“\nInput character string consisting only a and b: “);

scanf(“%s”,s); k=strlen(s); s[k]=’\0′;

printf(“\nstring is: %s \n”,s);

i=0;

while(s[i]!=’\0′ && s[i]==’a’ || s[i]==’b’)

{

for(j=i+1; s[j]!=’\0′; j++) printf(“%c”,s[j]); printf(“!”);

if(s[i]==’a’) { cs=st[cs][1]; printf(” —> %d\n “,cs); }

else if(s[i]==’b’){cs=st[cs][2]; printf(” —> %d\n “,cs); }

i++;

}

if(cs==fs) printf(“\* string is ACCEPTED by the DFA!! \* 🙂 “);

else printf(“\* string is NOT ACCEPTED by the DFA!! \* 🙂 “);

}