SRM UNIVERSITY AP
Andhra Pradesh

Department of Computer Science and Engineering

Compiler Design Lab (CS 306)

Week 1: Implementation of Language recognizer

Week 1 Programs

1. Implementation of Language recognizer for set of all strings over input alphabet ∑={a,b} containing even number of a's and even number of b's.
2. Implementation of Language recognizer for set of all strings ending with two symbols of same type.

Instructions:

- Explanation and code of a language recognizer for first program are given below. YouTube link of this week's explanation is https://youtu.be/qww2eRMK4f8
- You are required to design a language recognizer for second program.
- Upload both these programs into your Github accounts under the folder **Week1-Lab-exercise**

Program 1:

Implement a language recogniser which accepts set of all strings over the alphabet ∑={a,b} containing an even number of a's and an even number of b's.

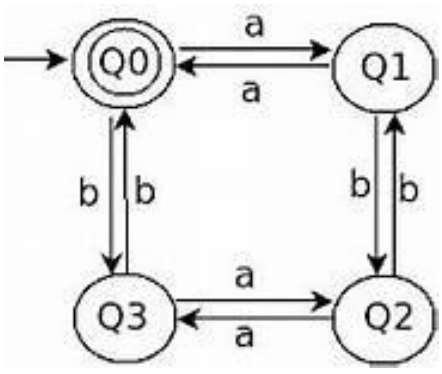
Description:

The acceptable strings of the language are ε(Null string), aa, bb, abba, babbab etc.

Deterministic Finite Automata for the given language is given below:

DFA M=(Q,∑,δ,Q_0,F) Where
Q=Set of all states ={Q_0,Q_1,Q_2,Q_3}
∑=Input Alphabet={a,b},
Start state is Q_0
F=Set of all final States={ Q_0}

And the transitions are defined in the transition diagram



Algorithm: Language recognizer

Input:

input //input string

Output:

Algorithm prints a message

"String accepted": If the input is acceptable by the language,
"String not accepted" otherwise,
"Invalid token": If the input string contains symbols other than input alphabet.

Method:

```
state=0   //initial state
i=0
while((current=input[i++])!='\0'){
    switch(state)
       case 0: if(current=='a')          state=1;
                 else if(current=='b')    state=2;
                      else
                           Print "Invalid token" ; exit;
       case 1: if(current=='a')          state=0;
                else if(current=='b')     state=3;
                     else
                           Print "Invalid token" ; exit;
       case 2: if(current=='a')          state=3;
                 else if(current=='b')    state=0;
                      else
                           Print "Invalid token" ; exit;
       case 3: if(current=='a')          state=2;
                 else if(current=='b')         state=1;
                      else
                           Print "Invalid token" ; exit;
    end switch
end while
//Print output
if(state==0)
    Print "String accepted"
else
    Print "String not accepted"
```

Test cases:

Input	Expected Output
aabb	String accepted
abab	String accepted
aaabb	String not accepted
aaa	String not accepted
abcd	Invalid token

C Code

```
#include<stdio.h>
void main(){
   int state=0,i=0;
   char current,input[20];
   printf("Enter input string \t :");
   scanf("%s",input);
   while((current=input[i++])!='\0'){
      switch(state)
      {
         case 0: if(current=='a')
                    state=1;
                 else if(current=='b')
                    state=2;
                 else
                 {
                    printf("Invalid token");
                    exit(0);
                 }
                 break;
         case 1: if(current=='a')
                    state=0;
                 else if(current=='b')
                    state=3;
                 else
                 {
                    printf("Invalid token");
                    exit(0);
                 }
                 break;
         case 2: if(current=='a')
                    state=3;
                 else if(current=='b')
                    state=0;
                 else
                 {
                    printf("Invalid token");
                    exit(0);
                 }
                 break;
         case 3: if(current=='a')
                    state=2;
                 else if(current=='b')
                    state=1;
                 else
                 {
                    printf("Invalid token");
```

```
                exit(0);
            }
            break;
        }
    }
    if(state==0)
        printf("\n\nString accepted\n\n");
    else
        printf("\n\nString not accepted\n\n");
}
```

Test cases:

Input 1	Output
Input 2	Output
Input 3	Output
Input 4	Output