

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 $\Sigma = \{a, b\}$ 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 $\Sigma = \{a, b\}$ containing an even number of a's and an even number of b's.

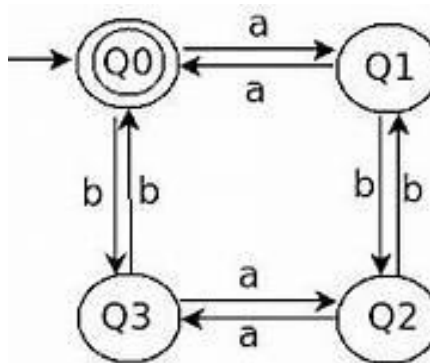
Description:

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 $M = (Q, \Sigma, \delta, Q_0, F)$ Where
 $Q = \text{Set of all states} = \{Q_0, Q_1, Q_2, Q_3\}$
 $\Sigma = \text{Input Alphabet} = \{a, b\}$,
Start state is Q_0
 $F = \text{Set of all final States} = \{Q_0\}$

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
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