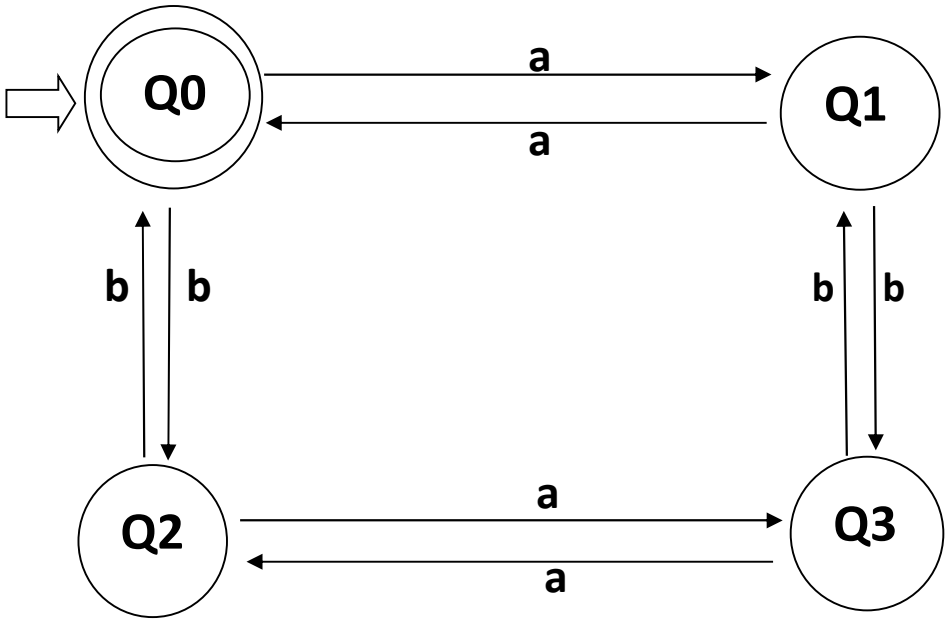
Program-1

Implement a language recognizer 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 few strings of language are ε (Null string), aa, bb, abab, bbaa, etc.

The Deterministic Finite Automata (DFA) for the given language is: -



A DFA is a five tuple. Let N be the name of DFA,

N= (Q,∑,δ,Q0,F) where,

Q=Set of all states ={Q0,Q1,Q2,Q3},

∑=Input Alphabet={a,b},

Start state is Q0

F=Set of all final States={ Q0} and

δ= Transition Function is as follows:

States	a	b

Q0	Q1	Q2
Q1	Q0	Q3
Q2	Q3	Q0
Q3	Q2	Q1

Algorithm

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”
```

Code for the given language in C

```
#include<stdio.h>
#include<stdlib.h>
int main()
{
   int state=0,i=0;
   char current,input[20];
   printf("Enter input string:");
   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("String accepted");
else
printf("String not accepted");
```

```
    return 0;
}
```

Sample Inputs and their Outputs

Sample Inputs	Outputs
aa	String accepted
bb	String accepted
aaaaa	String not accepted
aabddbc	Invalid token
aaabbbb	String not accepted

Conclusion

The above language recognizer has been implemented that recognizes the set of all strings over the alphabets ∑={a,b} containing an even number of a's and an even number of b's.

Program-2

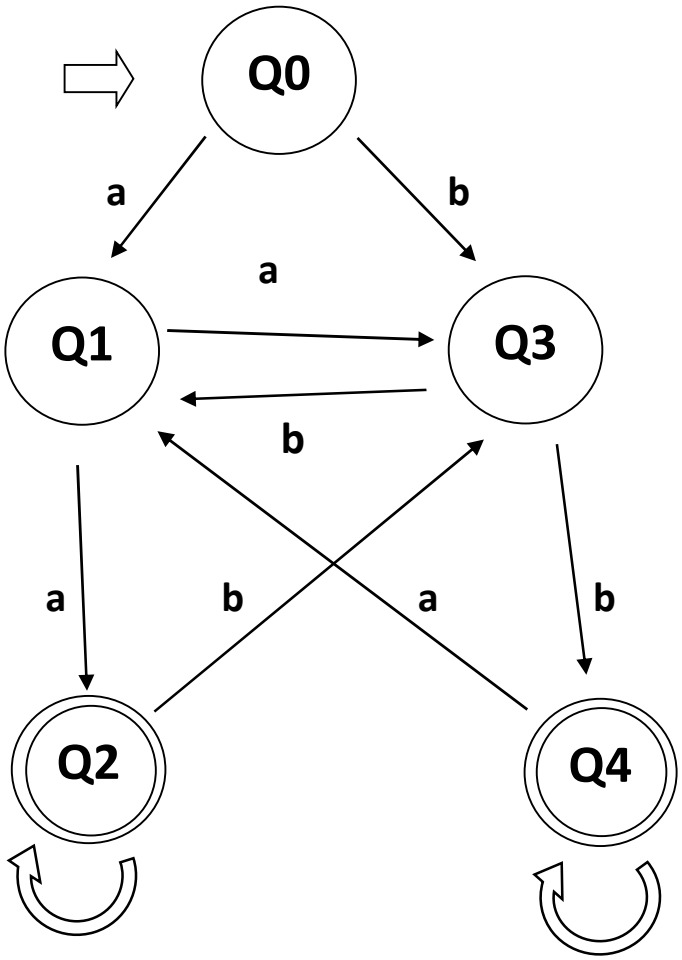
Implementation of Language recognizer for set of all strings ending with two symbols of same type.

Description

Let the alphabet be ∑={a,b}

The few strings of the language are aaa, bbb, ababaabb, baaaa, abbbaa,baabbbabb etc.

The Deterministic Finite Automata (DFA) for the given language is:



A DFA is a five tuple. Let M be the name of DFA,

M= (Q,∑,δ,Q0,F) where,

Q=Set of all states ={Q0,Q1,Q2,Q3,Q4},

∑=Input Alphabet={a,b},

Start state is Q0

F=Set of all final States={Q2,Q4} and

δ= Transition Function is as follows:

States	a	B
Q0	Q1	Q3
Q1	Q2	Q3
Q2	Q2	Q3
Q3	Q1	Q4
Q4	Q1	Q4

Algorithm

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=3;
              else
                  Print "Invalid string
      input"; exit;
      case 1: if(current=='a') state=2;
              else if(current=='b')
                  state=3;
               else
                  Print "Invalid string
      input"; exit; case 2: if(current=='a')
      state=2;
              else if(current=='b')
                   state=3;
              else
                  Print "Invalid string
      input"; exit; case 3: if(current=='a')
      state=1;
              else if(current=='b') state=4;
              else
                 Print "Invalid string input"; exit;
     case 4: if(current=='a') state=1;
              else if(current=='b') state=4;
              else
                  Print "Invalid string input"; exit;
  end
```

```
switch
  end while
}
//Print
output
if(state=
=2       ||
state==4
)
      Print ”String is accepted”
else
      Print ”String is not accepted”
```

Code for the given language in C

```
#include<stdio.h>
#include<stdlib.h>
int main()
{
char input[100],current;
printf("Enter the input string:");
scanf("%s",input);
int i=0,state=0;
while((current=input[i++])!='\0')
{
   switch(state)
   {
      case 0:
      if(current=='a')
      state=1;
      else if(current=='b')
      state=3;
      else
      {
         printf("Invalid string input");
         exit(1);
      }
      break;
      case 1:
      if(current=='a')
      state=2;
      else if(current=='b')
      state=3;
      else
      {
```

```
            printf("Invalid string input");
            exit(1);
        }
        break;
        case 2:
        if(current=='a')
        state=2;
        else if(current=='b')
        state=3;
        else
        {
            printf("Invalid string input");
            exit(1);
        }
        break;
        case 3:
        if(current=='a')
        state=1;
        else if(current=='b')
        state=4;
        else
        {
            printf("Invalid string input");
            exit(1);
        }
        break;
        case 4:
        if(current=='a')
        state=1;
        else if(current=='b')
        state=4;
        else
        {
            printf("Invalid string input");
            exit(1);
        }
        break;
    }
}
if(state==2 || state==4)
printf("String is accepted");
else
printf("String is not accepted");
return 0;
}
```

Sample Inputs and their Outputs

Sample Inputs	Outputs
bbb	String is accepted
aaa	String is accepted
abbbaaab	String is not accepted
aacbbdd	Invalid string input
bababa	String is not accepted

Conclusion

The above language recognizer has been implemented that recognizes the set of all strings over the alphabets ∑={a,b} ending with two symbols of same type.