

# Compiler Design

## Practical-1: Implementation of Finite Automata and String Validation

- Design a deterministic finite automaton (DFA) for accepting the language.
- Regular expression for language L is,

$$L = (aa)^* (b)^+$$

➤ There are 3 steps involve which results in acceptance of string:

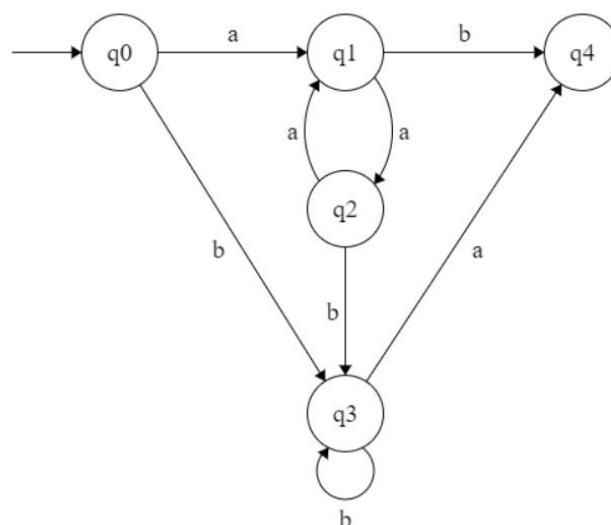
Step-1) Construct FA for  $(aa)^*$  means having even number of a's.

Step-2) Construct FA for  $(b)^+$  means having any number of b's greater than one.

Step-3) Concatenate the two FA and make single DFA.

Any other combination result is the rejection of the input string.

### DFA Transition Diagram



**CODE:**

```
def start(c):  
    if (c == 'a'):  
        dfa = 1  
    elif (c == 'b'):  
        dfa = 3  
    else:  
        dfa = -1  
    return dfa
```

```
def s1(c):  
    if (c == 'a'):  
        dfa = 2  
    elif (c == 'b'):  
        dfa = 4  
    else:  
        dfa = -1  
    return dfa
```

```
def s2(c):  
    if (c == 'b'):  
        dfa = 3  
    elif (c == 'a'):  
        dfa = 1  
    else:  
        dfa = -1  
    return dfa
```

```
def s3(c):  
    if (c == 'b'):  
        dfa = 3  
    elif (c == 'a'):  
        dfa = 4  
    else:  
        dfa = -1  
    return dfa  
  
def s4(c):  
    dfa = -1  
    return dfa  
  
def isAccepted(String):  
    l = len(String)  
  
    dfa = 0  
    for i in range(l):  
        if (dfa == 0):  
            dfa = start(String[i])  
  
        elif (dfa == 1):  
            dfa = s1(String[i])  
  
        elif (dfa == 2) :  
            dfa = s2(String[i])  
  
        elif (dfa == 3) :  
            dfa = s3(String[i])
```

```
elif (dfa == 4) :  
    dfa = s4(String[i])  
else:  
    return 0  
if(dfa == 3) :  
    return 1  
else:  
    return 0
```

```
String = input("Input String: ")  
#String = "aaaaaabbabb"  
if (isAccepted(String)) :  
    print("ACCEPTED")  
else:  
    print("NOT ACCEPTED")
```

Output:

```
>>> %Run dfa.py  
Input String:aaaaaabbabb  
ACCEPTED  
>>> %Run dfa.py  
Input String: aaaaaabbabb  
ACCEPTED  
>>>  
>>> %Run dfa.py  
Input String: aaaaaabbabb  
ACCEPTED  
>>> %Run dfa.py  
Input String: aaab  
NOT ACCEPTED  
>>> %Run dfa.py  
Input String: aabbbb  
ACCEPTED  
>>> %Run dfa.py  
Input String: aaaaaabbabb  
ACCEPTED  
>>> %Run dfa.py  
Input String: aab  
ACCEPTED  
>>>
```