

Drawing Finite State Automata using Graphviz

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1 The Language

Consider the language of all strings of a 's and b 's that start with a and end with the string baa . The corresponding regular expression is: $a(a|b)^*baa$.

2 The Deterministic Finite State Automaton

The DFA accepting the above mentioned language is shown in Figure 1 and the Transition table for the same is shown in Figure 2. The code for the DFA in the DOT graph representation language is as follows:

```
digraph finite_state_machine {
    rankdir=LR;
    size="8,5"

    node [shape = point ]; qi
    node [shape = doublecircle]; q4

    node [shape = circle];
    qi -> q0 [ label = "start" ];

    q0 -> q1 [ label = "a" ];
    q0 -> qf [ label = "b" ]

    qf -> qf [ label = "a,b" ]

    q1 -> q1 [ label = "a" ];
    q1 -> q2 [ label = "b" ];

    q2 -> q3 [ label = "a" ];
    q2 -> q2 [ label = "b" ];

    q3 -> q4 [ label = "a" ];
    q3 -> q2 [ label = "b" ];
```

```

q4 -> q1 [ label = "a" ];
q4 -> q2 [ label = "b" ];
}

```

To output the graph as a .png file, the following command was used:
`dot -Tpng -Gdpi=300 fsm.gv -o fsm.png`

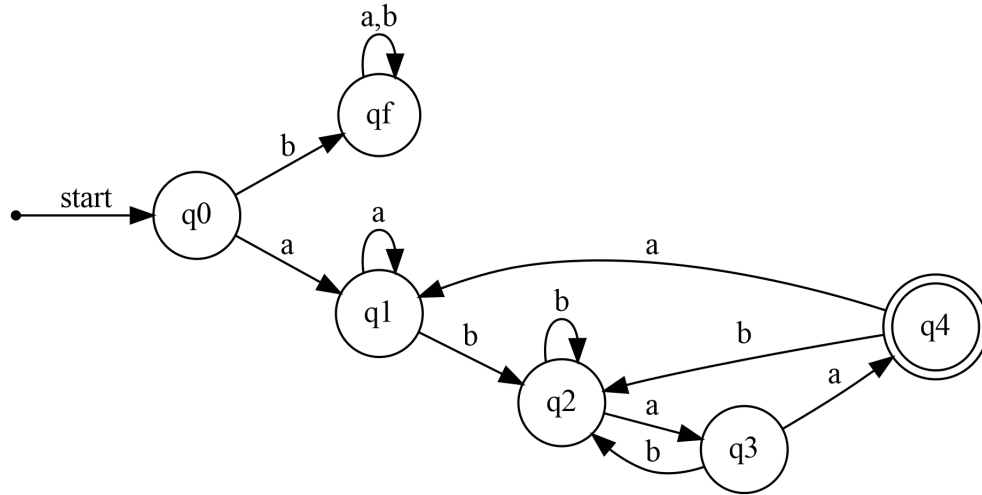


Figure 1: DFA accepting $a(a|b)^*baa$

The \rightarrow before state q_0 denotes that it is the start state, and the $*$ before state q_4 denotes that it is the accept state. The state q_f is a reject state since the string starts with a b instead of an a if we have reached this state.

STATE	a	b
$\rightarrow q_0$	q_1	q_f
q_1	q_1	q_2
q_2	q_3	q_2
q_3	q_4	q_2
$*q_4$	q_1	q_2
q_f	q_f	q_f

Figure 2: Transition table for the DFA of Figure 1