DFAtex (dfatex) Package Documentation

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Contents

1 Introduction

The package will allow to draw DFAs in Latex with ease. The library uses the Tikz library to provide commands to create states and transitions. The following sections will show you some basic syntax and examples for all of the commands.

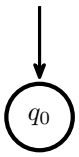
2 DFA environment

The diagram you draw must be wrapped inside the `dfa` environment defined. This creates the Tikz picture environment and sets up the style for the states and transitions.

3 State Commands

3.1 Start State

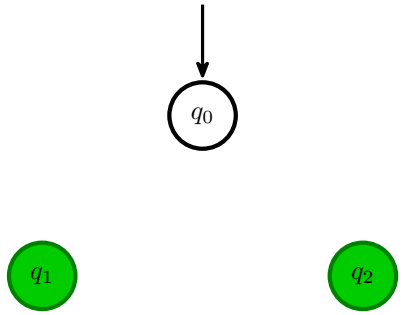
The command for the start state is `\start{label}{position of starting arrow}{text}`. The following is an example of a start state:



This was created using the code `\start{q0}{above}{`q_0`}`.

3.2 Accept State

The command for the accept state is `\accept{label}{relative position of state}{text}`. The following is an example of an accept state:

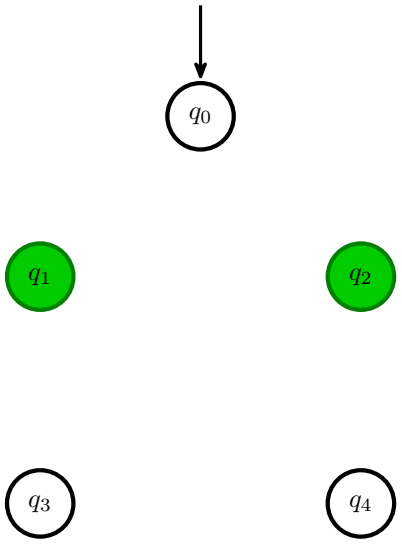


This was created using the code `\accept{q1}{below left=of q0}{`q_1`}` and

\accept{q2}{below right=of q0}{q_2}. Note that the accept states are green to indicate that they are accept states.

3.3 State

The command for creating a regular state is \state{label}{relative position of state}{text}. The following is an example of a regular state:

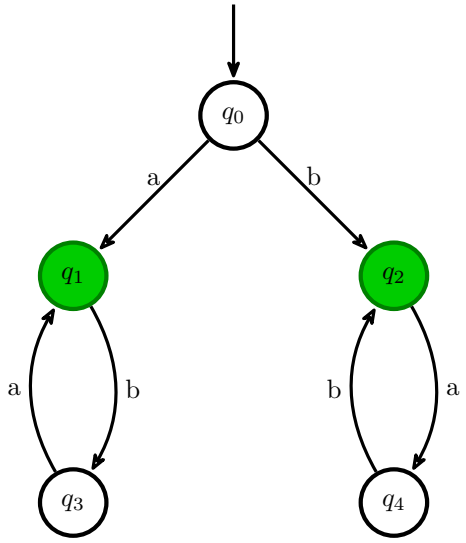


This was created using the code \state{q3}{below=of q1}{q_3} and \state{q4}{below=of q2}{q_4}.

4 Transition Commands

4.1 Transitions between nodes

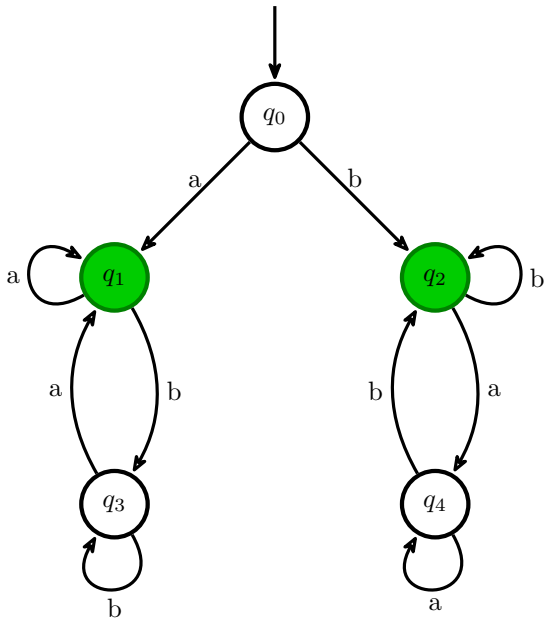
The command to create a transition between two nodes is `\trans{label of starting node}{bend direction}{position of label}{label}{label of ending node}`. The following is an example of a transition between two nodes:



This was created using the code `\trans{q0}{}{above}{a}{q1}`, `\trans{q0}{}{above}{b}{q2}`. The bend direction is optional and can be left blank. The bend direction can be `bend left`, `bend right`, `bend up`, or `bend down`. The position of the label is optional and can be left blank. The position of the label can be `above`, `below`, `left`, or `right`.

4.2 Loops

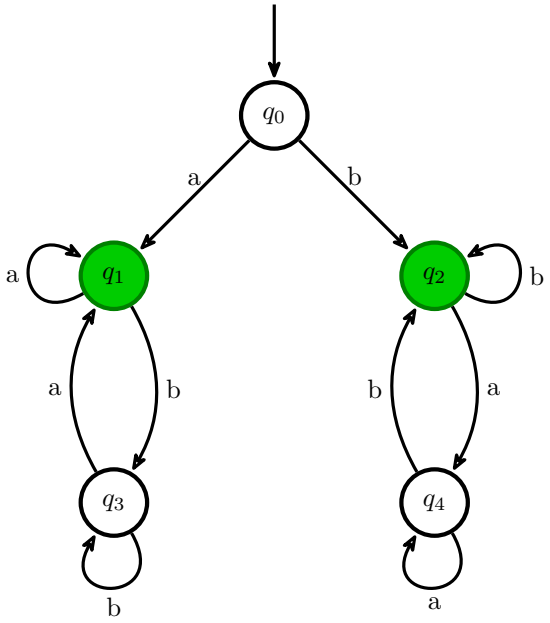
The command to create a loop is \ltrans{label of node}{position of loop}{position of label}{label}. The following is an example of a loop:



This was created using the code \ltrans{q1}{left}{left}{a} and \ltrans{q2}{right}{right}{b} (and a couple more for the loops over q_3 and q_4). The position of the loop can be `above`, `below`, `left`, or `right`. The position of the label is optional and can be left blank. The position of the label can be `above`, `below`, `left`, or `right`.

5 Formal Definitions

The command to create and output the formal definition of the DFA is `\makefdef{language of DFA}`. The following is an example of a formal definition produced from a DFA:



Formal Definition
Q: { q_0,q_1,q_2,q_3,q_4 }
Σ: $\{0, 1\}$
δ: $\delta(q0, \{a\}) = q1$, $\delta(q0, \{b\}) = q2$, $\delta(q1, \{a\}) = q1$, $\delta(q2, \{b\}) = q2$, $\delta(q1, \{b\}) = q3$, $\delta(q3, \{a\}) = q1$, $\delta(q2, \{a\}) = q4$, $\delta(q4, \{b\}) = q2$, $\delta(q3, \{b\}) = q3$, $\delta(q4, \{a\}) = q4$,
q_0: q_0
F: { q_1,q_2 }

This was created by using the code `\makefdef{$\{0,1}$}`. The language of the DFA must be enclosed in dollar signs (`$`) to be properly formatted. The command is placed outside of the `dfa` environment.

6 Example Code

The full code for the example developed in the earlier sections is:

```
\begin{figure}
    \centering
    \begin{dfa}
        \start{q0}{above}{$q_0$}
        \accept{q1}{below left=of q0}{$q_1$}
        \accept{q2}{below right=of q0}{$q_2$}
        \state{q3}{below=of q1}{$q_3$}
        \state{q4}{below=of q2}{$q_4$}
        \trans{q0}{}{above}{a}{q1}
        \trans{q0}{}{above}{b}{q2}
        \ltrans{q1}{left}{left}{a}
        \ltrans{q2}{right}{right}{b}
        \trans{q1}{bend left}{right}{b}{q3}
        \trans{q3}{bend left}{left}{a}{q1}
        \trans{q2}{bend left}{right}{a}{q4}
        \trans{q4}{bend left}{left}{b}{q2}
        \ltrans{q3}{below}{below}{b}
        \ltrans{q4}{below}{below}{a}
    \end{dfa}
    \makefdef{$\{0,1\}$}
\end{figure}
```