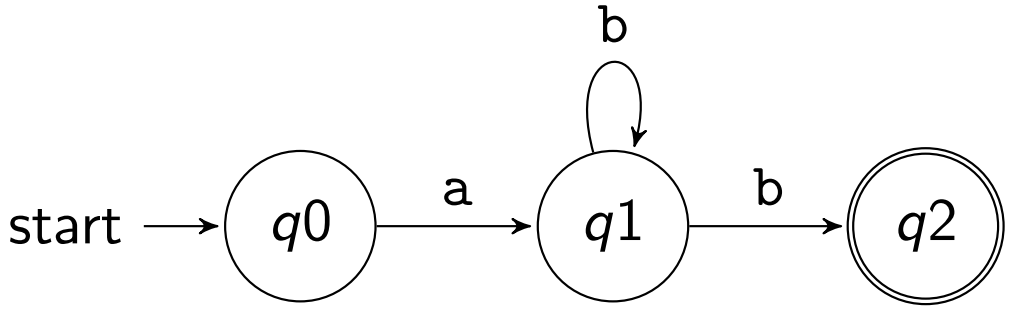
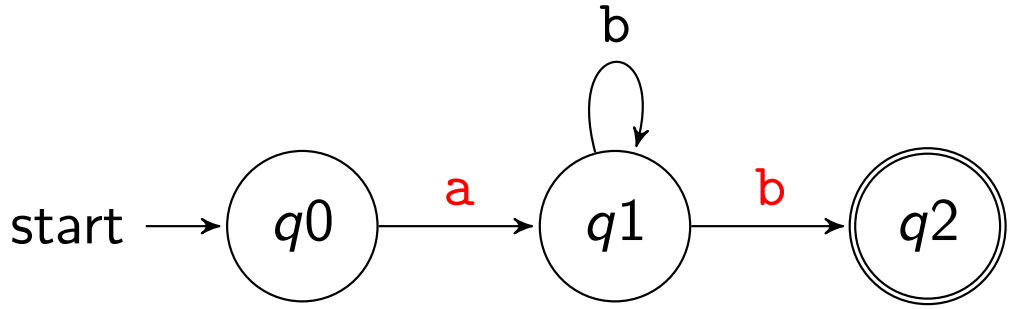
Finite automata



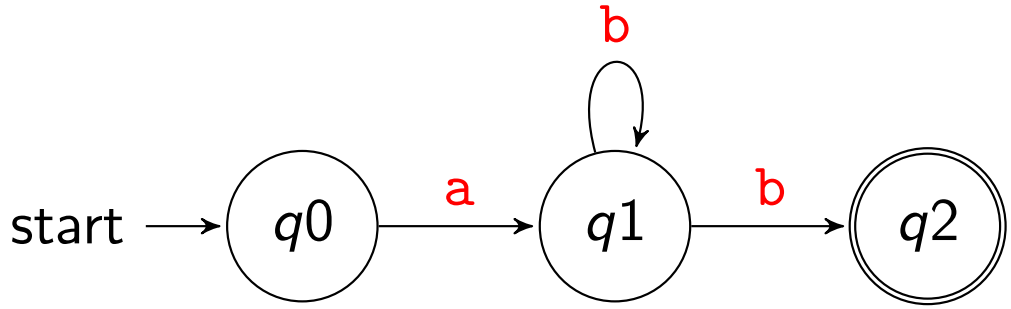
Finite automata



accepting runs $q0 \xrightarrow{\texttt{a}} q1 \xrightarrow{\texttt{b}} q2 \in F$

ab

Finite automata

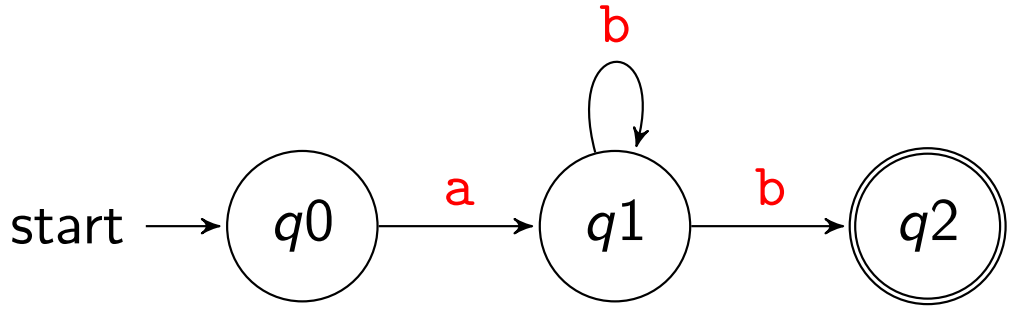


accepting runs $q0 \xrightarrow{\texttt{a}} q1 \xrightarrow{\texttt{b}} q2 \in F$

$q0 \xrightarrow{\texttt{a}} q1 \xrightarrow{\texttt{b}} q1 \xrightarrow{\texttt{b}} q2 \in F$

ab, abb

Finite automata



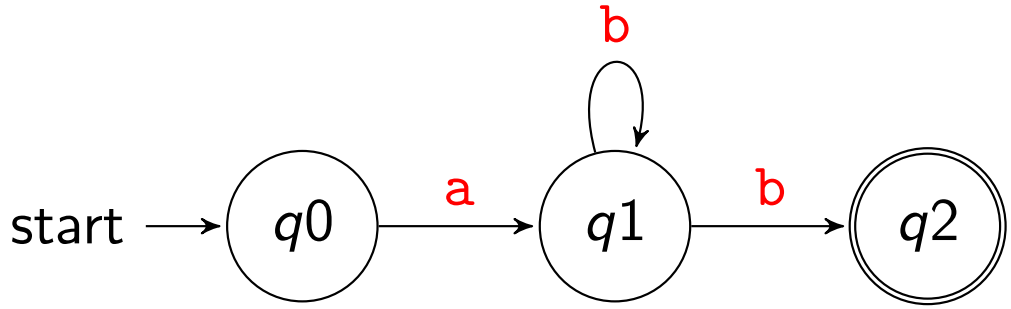
accepting runs $q0 \xrightarrow{\texttt{a}} q1 \xrightarrow{\texttt{b}} q2 \in F$

$q0 \xrightarrow{\texttt{a}} q1 \xrightarrow{\texttt{b}} q1 \xrightarrow{\texttt{b}} q2 \in F$

$\vdots$

regular expression $\texttt{ab}^*\texttt{b}$ denoting the regular language $\{\texttt{ab}, \texttt{abb}, \ldots\}$

Finite automata and regular grammars: example



accepting runs $q0 \xrightarrow{\texttt{a}} q1 \xrightarrow{\texttt{b}} q2 \in F$

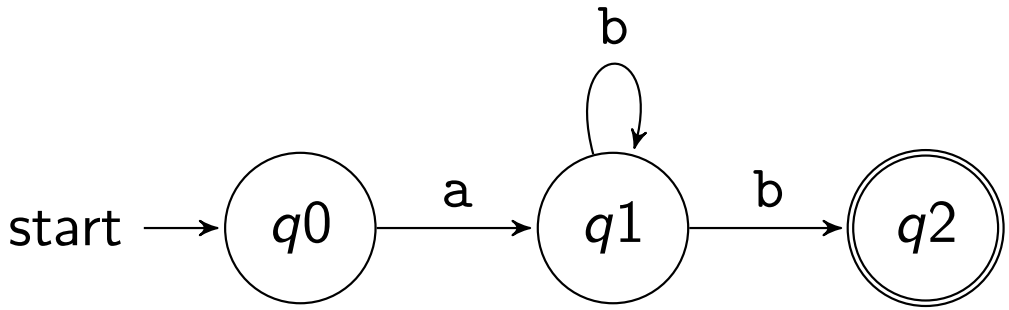
$q0 \xrightarrow{\texttt{a}} q1 \xrightarrow{\texttt{b}} q1 \xrightarrow{\texttt{b}} q2 \in F$

$\vdots$

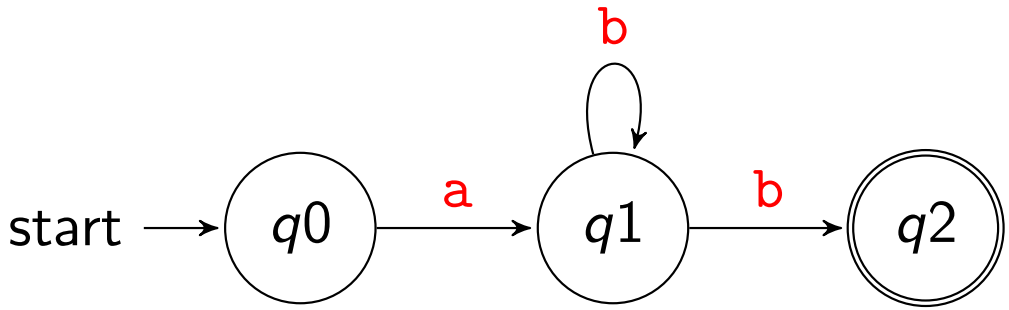
regular expression $\texttt{ab}^*\texttt{b}$ denoting the regular language $\{\texttt{ab}, \texttt{abb}, \ldots\}$

```
q0 --> [a], q1.      % tran(q0,a,q1).
q1 --> [b], q1.      % tran(q1,b,q1).
q1 --> [b], q2.      % tran(q1,b,q2).
q2 --> [].           % final(q2).
```

Strings accepted by a finite automaton

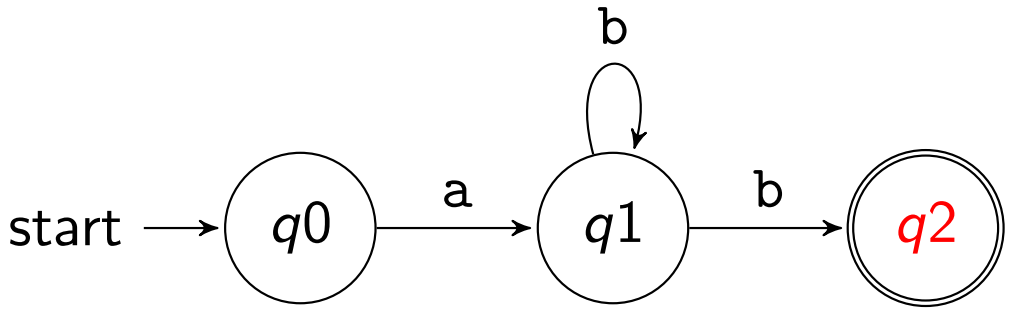


Strings accepted by a finite automaton



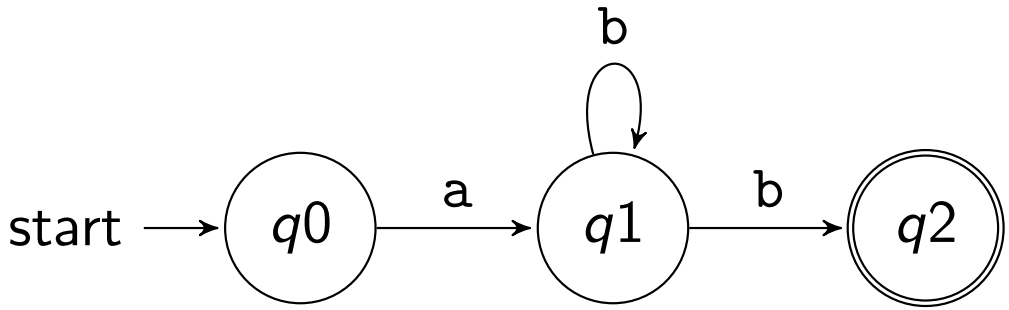

```
tran(q0,a,q1).
     tran(q1,b,q1).
          tran(q1,b,q2).
```

Strings accepted by a finite automaton




```
tran(q0,a,q1).
     tran(q1,b,q1).
          tran(q1,b,q2).
               final(q2).
```

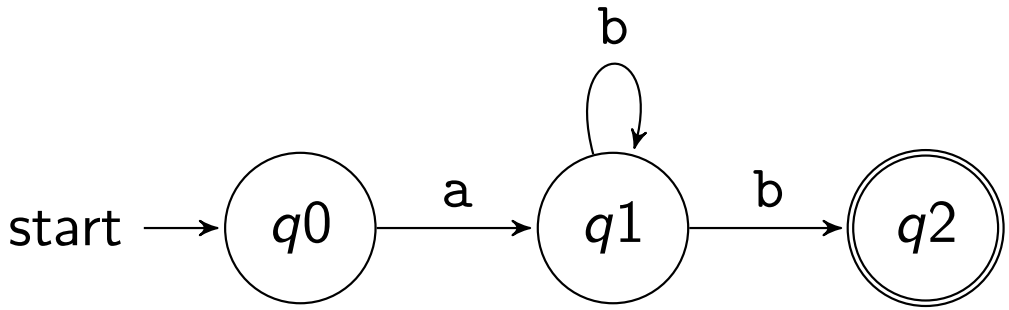
Strings accepted by a finite automaton




```
tran(q0,a,q1).
     tran(q1,b,q1).
          tran(q1,b,q2).
               final(q2).

accept(String) :- steps(q0,String,Q), final(Q).
```

Strings accepted by a finite automaton

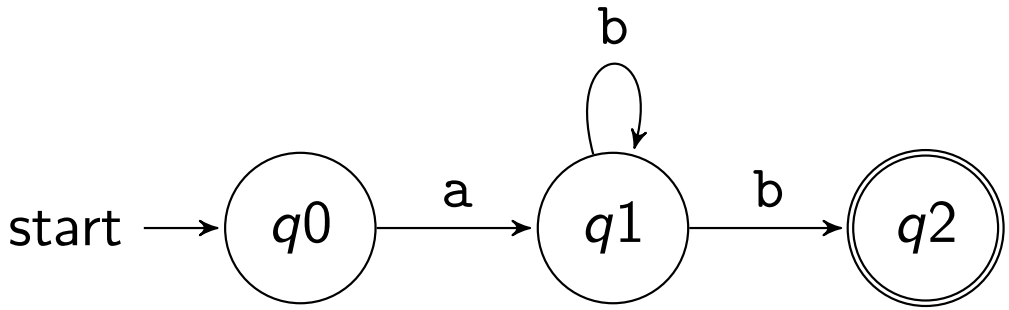



```
tran(q0,a,q1).
     tran(q1,b,q1).
          tran(q1,b,q2).
               final(q2).
```

```
accept(String) :- steps(q0,String,Q), final(Q).
```

```
steps(Q,[H|T],N) :- tran(Q,H,Qn), steps(Qn,T,N).
```

Strings accepted by a finite automaton




```
tran(q0,a,q1).
     tran(q1,b,q1).
          tran(q1,b,q2).
               final(q2).
```

```
accept(String) :- steps(q0,String,Q), final(Q).

steps(Q,[],Q).

steps(Q,[H|T],N) :- tran(Q,H,Qn), steps(Qn,T,N).
```