Lecture 2 - Strings and DFAs

Strings

An *Alphabet* is any finite set. We call the elements of the alphabet *symbols* or letters or bits or digits...

Examples

$\Sigma 1 = \{0, 1\}$
$\Sigma 2 = \{a, b, c, \ldots, z\}$
$\Gamma = \{0, 1, x, y, z\}$
$\Delta = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$

A *string* over and alphabet is a finite sequence of symbols from that alphabet.

The *length* of a string w, denoted by $|w|$, equals the number of symbols in w.

ε is the empty string.

Σ^* is the set of all strings over the alphabet Σ.

w^R is the *reverse* of w.

A *substring* of w is sequence of consecutive symbols in w.

xy, the *concatenation* of strings x and y is the symbols of x followed by the symbols of y.

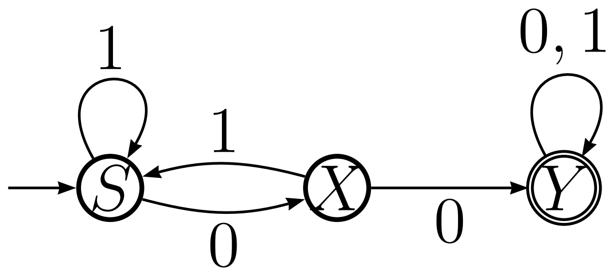
A *language* over alphabet Σ is any subset of Σ^*.

Deterministic Finite Automata A *finite automaton* is 5-tuple $(Q, \Sigma, \delta, q_0, F)$, where

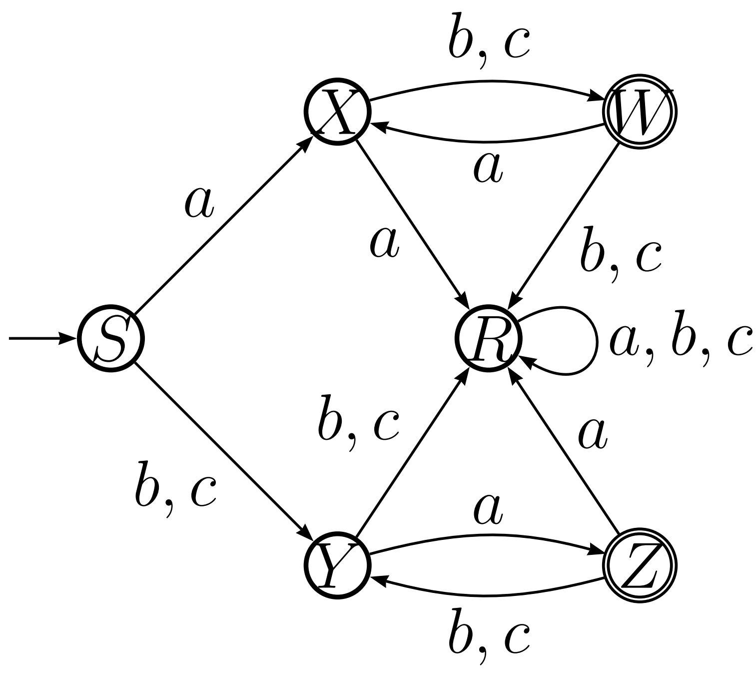
1. Q is a finite set called the ***states***.
2. Σ is a finite set called the ***alphabet***.
3. $\delta : Q \times \Sigma \to Q$ is the ***transition function***.
4. q_0 is the ***start state***.
5. $F \subseteq Q$ is the ***set of accept states***.

Examples

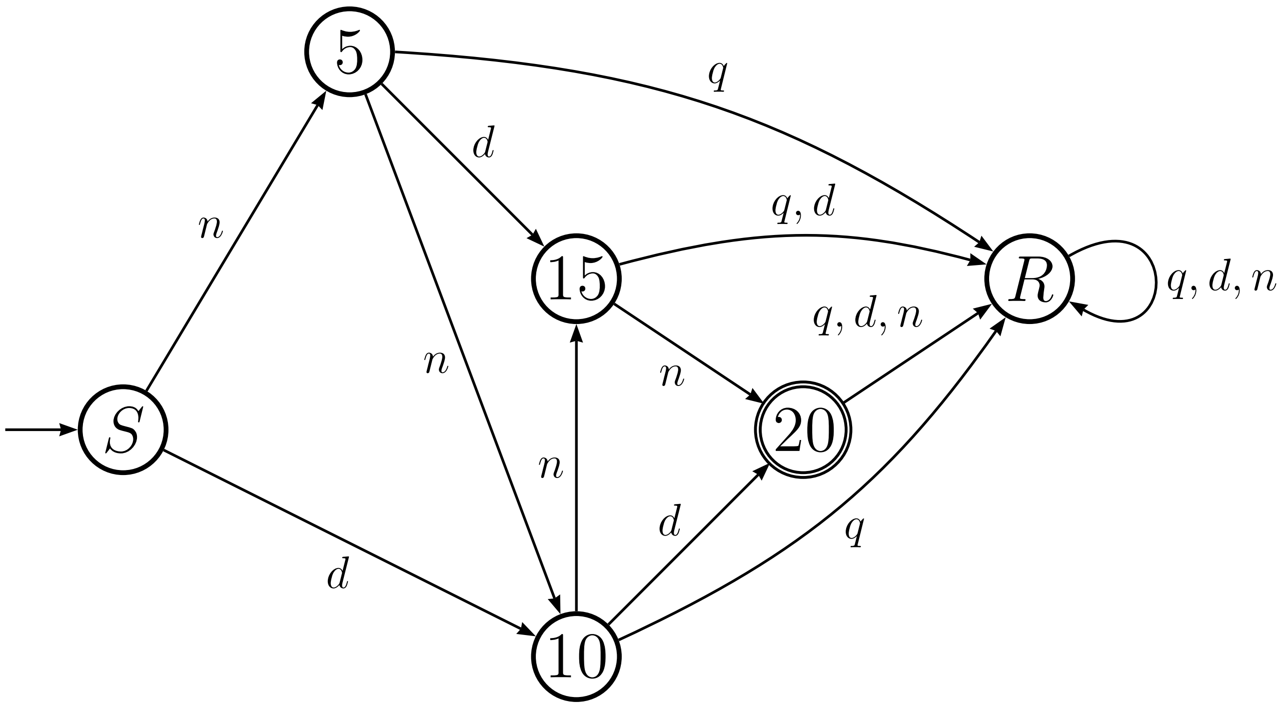
M1 Alphabet $= \{0, 1\}$



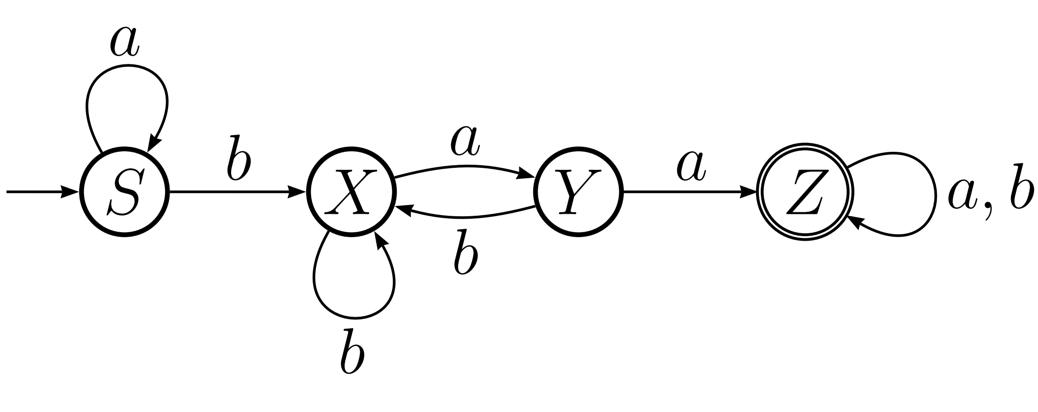
M2 Alphabet $= \{a, b, c\}$



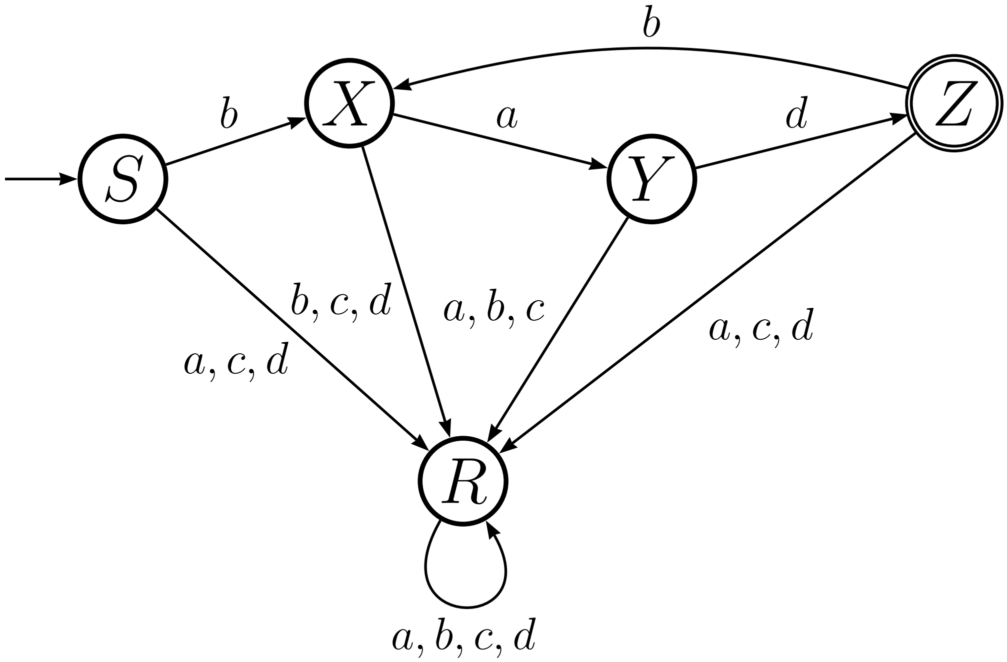
M3 Alphabet $= \{q, d, n\}$



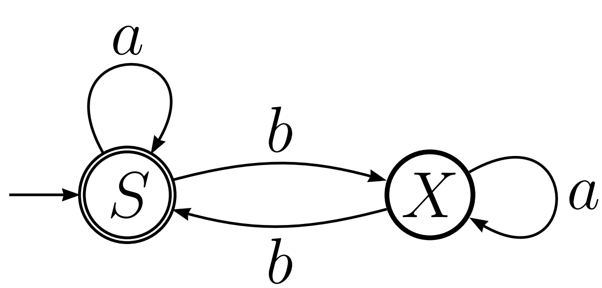
M4 Alphabet $= \{a, b\}$



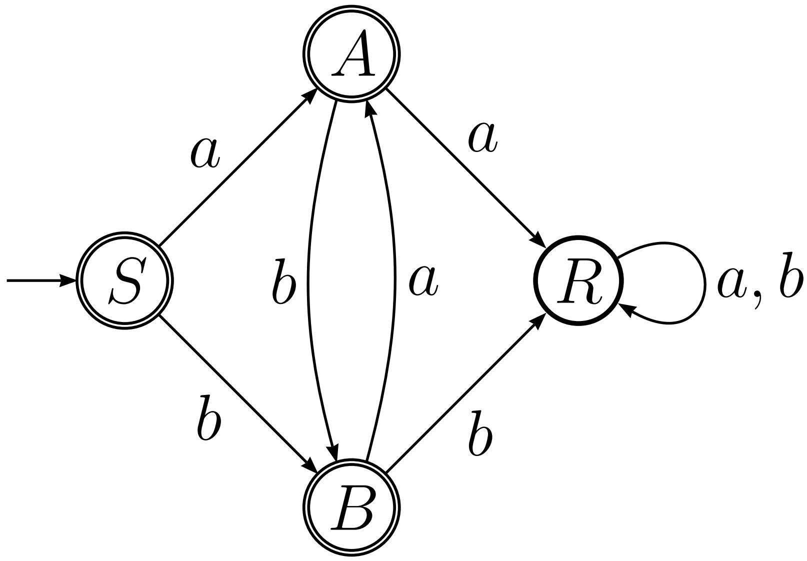
M5 Alphabet $= \{a, b, c, d\}$



M6 Alphabet $= \{a, b\}$



M7 Alphabet $= \{a, b\}$



M8 Alphabet $= \{a, b\}$