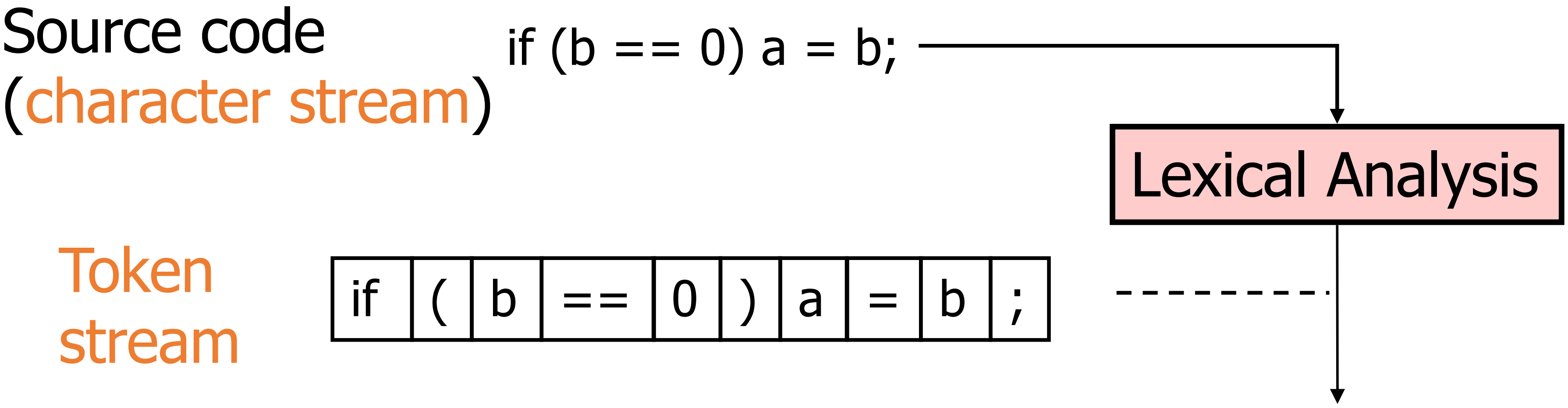


Source code

(character stream)

if (b == 0) a = b;

Lexical Analysis

Token stream

if	(	b	==	0	)	a	=	b	;

Identifiers:	`x   y11   elsen   _i00`
Integers:	`2   1000   -500   5L`
Floating point:	`2.0   .02   1.   1e5   0.e-10`
Strings:	`"x"   "She said, \"Hey!\""`
Comments:	`/** don’t change this **/`
Keywords:	`if   else   while   break`
Symbols:	`+   *   {   }   ++   <   <<   [   ]  >=`

Regular Expressions

A language is a set of words: { moo, cow }, { a,b,c,d,... }

Regular expressions describe languages

`abab`   `a|b`   `(a|b)*`   `[1-9][0-9]*`   `[a-z][a-z0-9]*`

Definition

a	ordinary character stands for itself
ε	the empty string
R|S	either R or S (alternation), where R,S are REs
RS	R followed by S (concatenation)
R*	R repeated 0 or more times

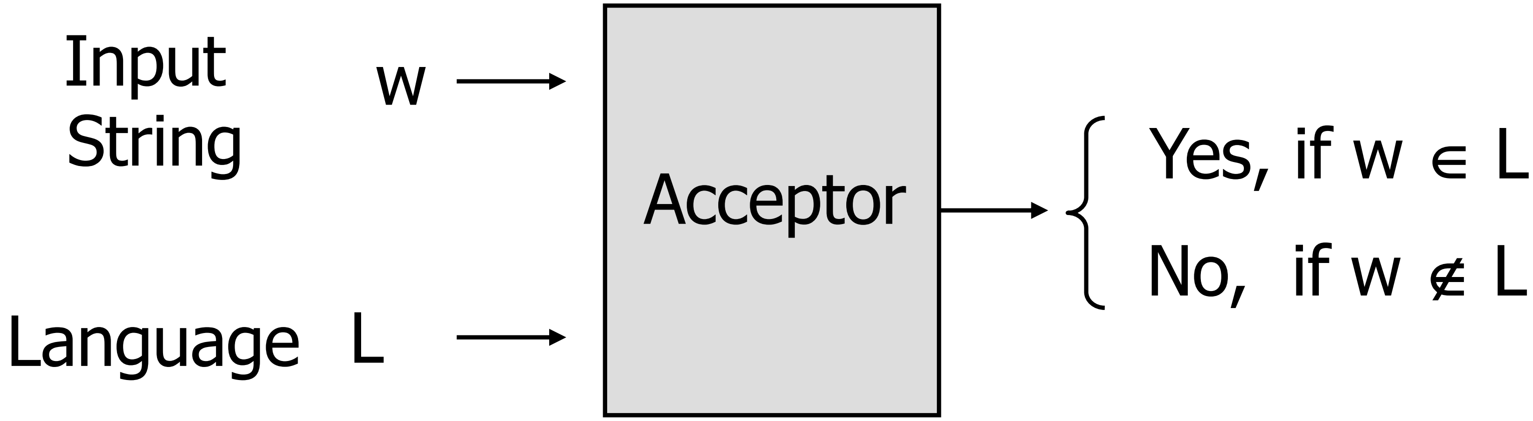
L(R) = the language defined by regular expression R

- L(`a(moo|cow)`) = { amoo, acow }
- L(`[1-9][0-9]*`) = { 1,2,3,4,5,6,7,8,9,10,11,12,13,....}

Acceptors:

(a.k.a. recognizers)

Abstract machines that determine if an input string belongs to a language, answering Yes/No.

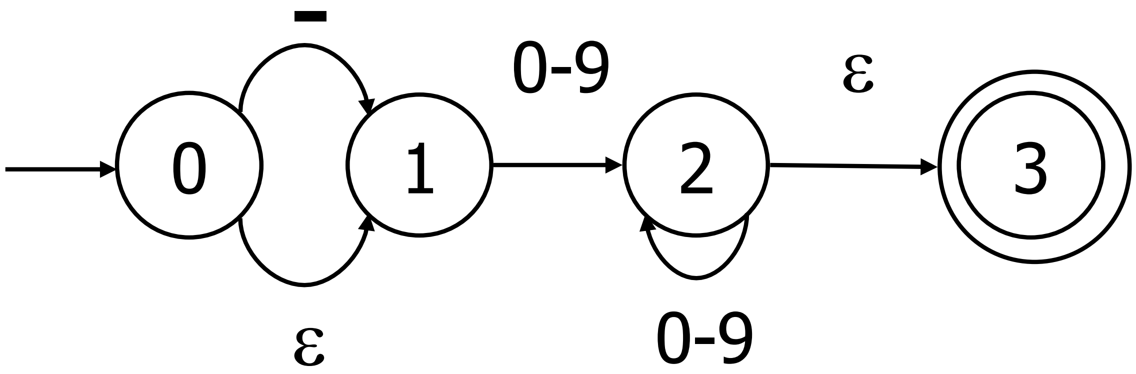


Finite Automata:
acceptors for languages described by regular expressions

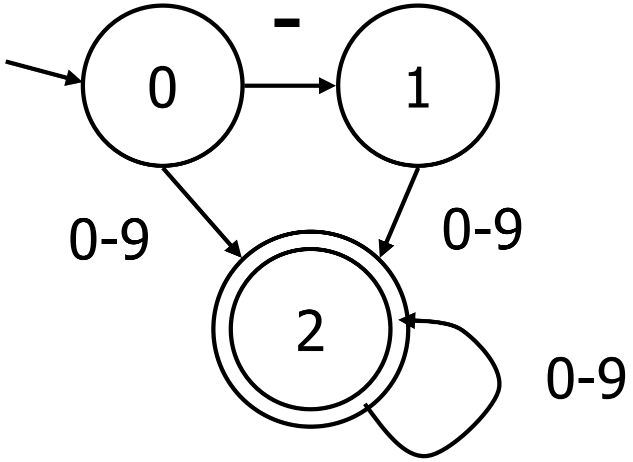
Finite Automata

Regular Expression: (-|ε)[0-9][0-9]*

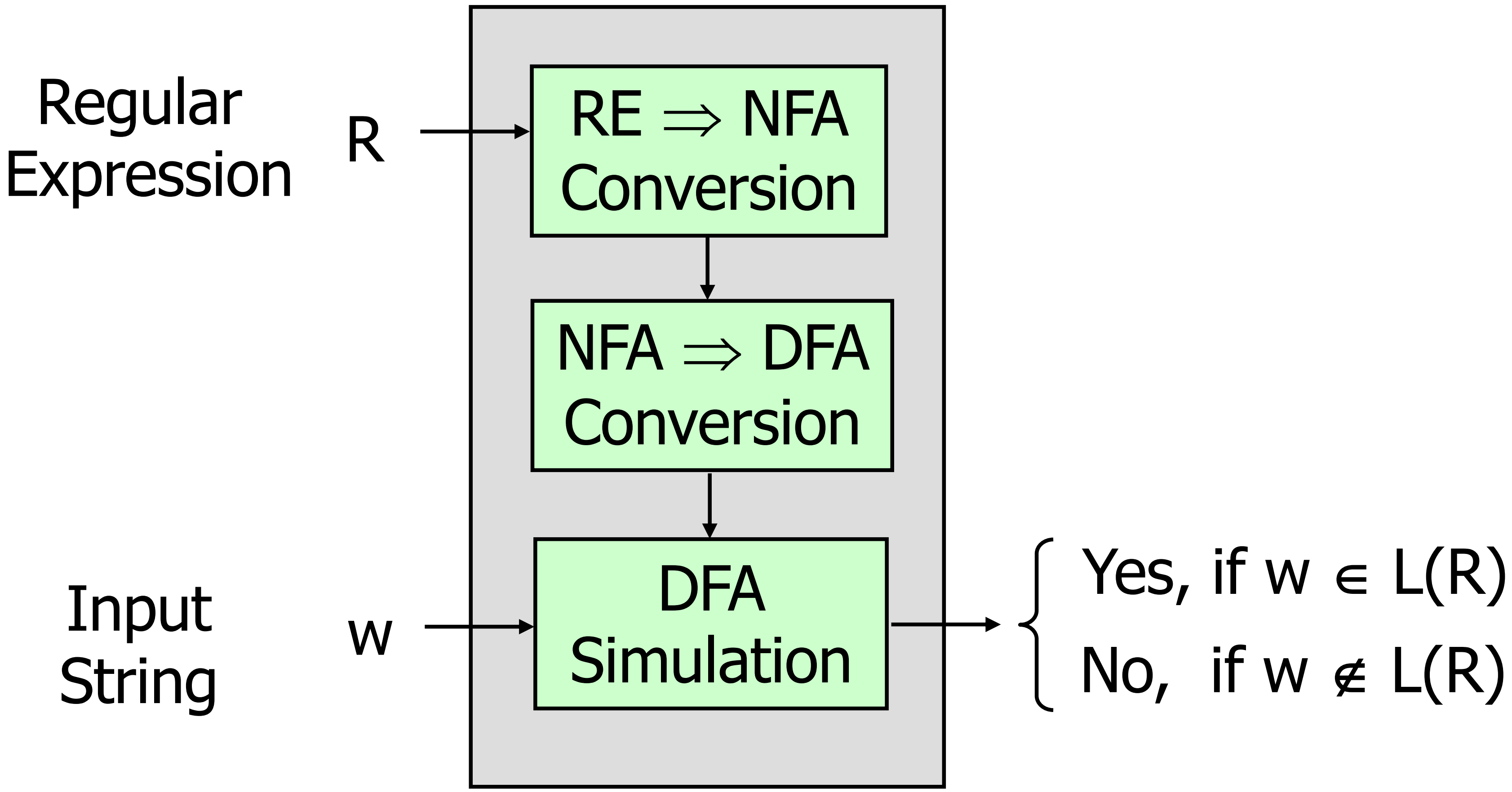
Non-deterministic Finite Automata:



Deterministic Finite Automata:



Building an acceptor for a regular expression:


Regular Expression
R
RE ⇒ NFA Conversion
NFA ⇒ DFA Conversion
DFA Simulation
Input String
w
Yes, if w ∈ L(R)
No, if w ∉ L(R)