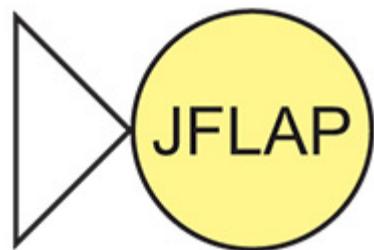
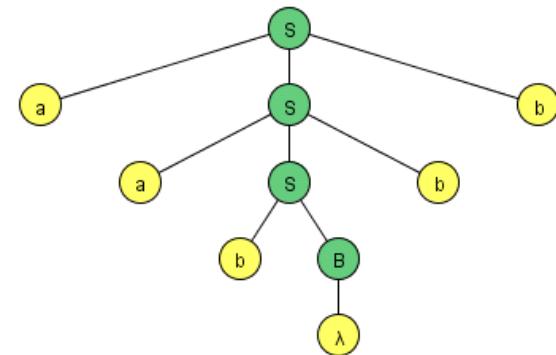


Changes to JFLAP to Increase Its Use in Courses



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Darmstadt, Germany
June 29, 2011



NSF Grants CCLI-0442513 and TUES-1044191

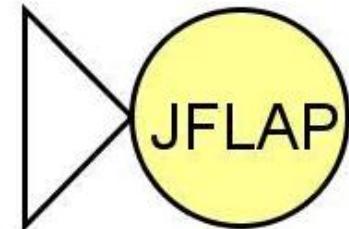
Co-Authors



Henry Qin



Jonathan Su



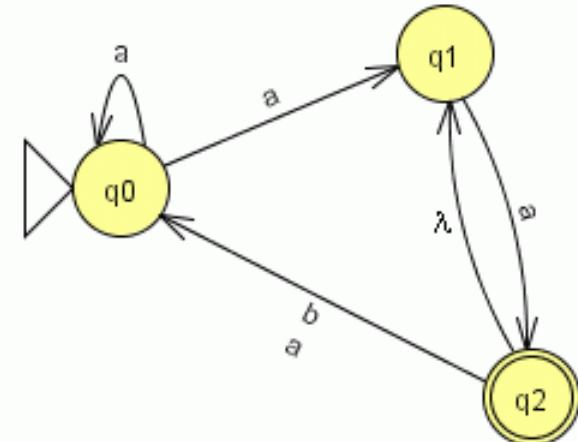
Overview of JFLAP

- Java Formal Languages and Automata Package
- Instructional tool to learn concepts of Formal Languages and Automata Theory
- Topics:
 - Regular Languages
 - Context-Free Languages
 - Recursively Enumerable Languages
 - Lsystems
- **With JFLAP your creations come to life!**

JFLAP – Regular Languages

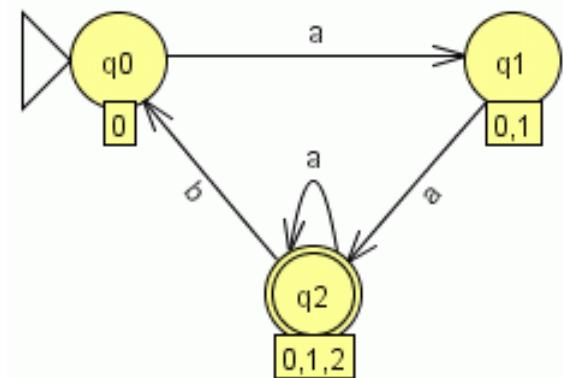
- Create

- DFA and NFA
- Moore and Mealy
- regular grammar
- regular expression



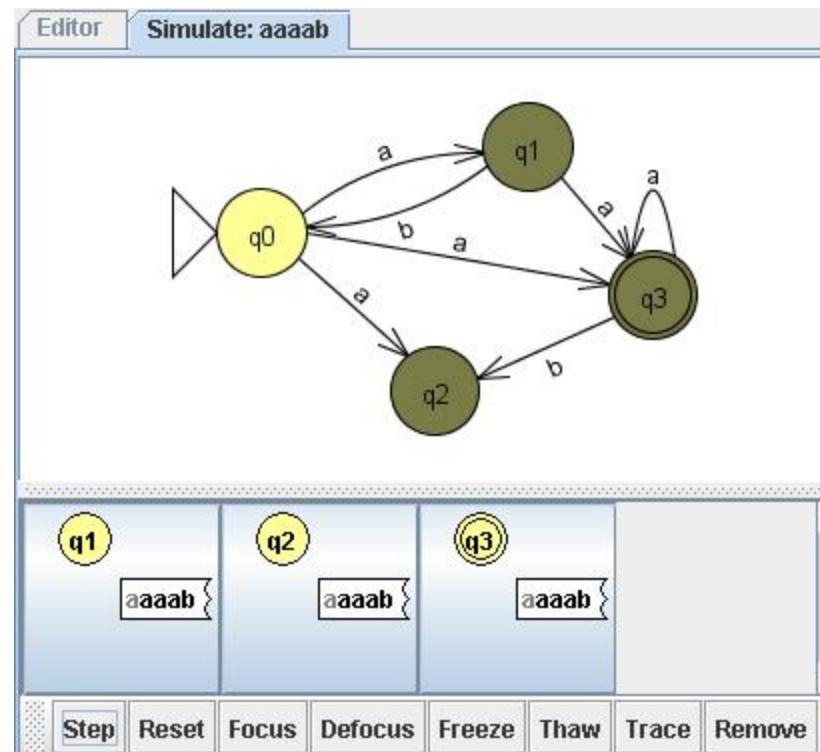
- Conversions

- NFA to DFA to minimal DFA
- NFA \longleftrightarrow regular expression
- NFA \longleftrightarrow regular grammar



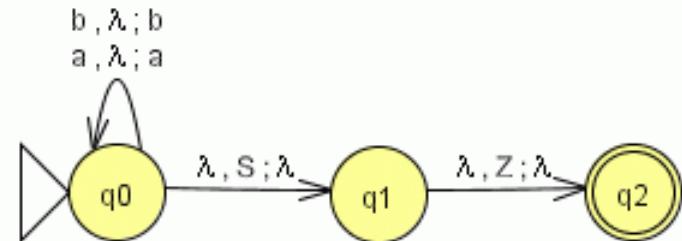
JFLAP – Regular languages (more)

- Simulate DFA and NFA
 - Step with Closure or Step by State
 - Fast Run
 - Multiple Run
- Combine two DFA
- Compare Equivalence
- Brute Force Parser
- Pumping Lemma

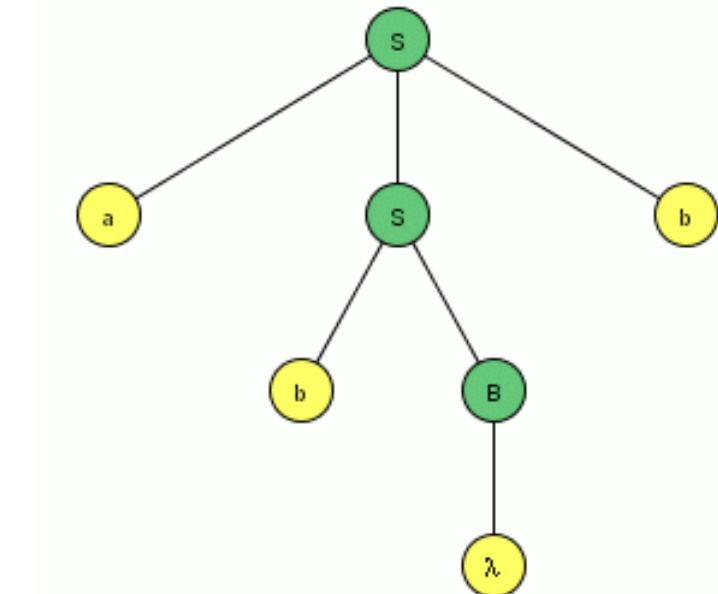


JFLAP – Context-free Languages

- Create
 - Nondeterministic PDA
 - Context-free grammar
 - Pumping Lemma

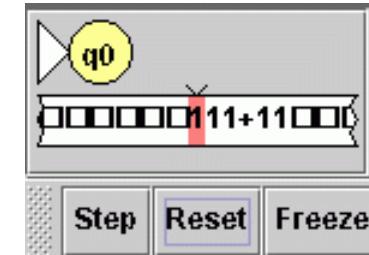


- Transform
 - PDA \rightarrow CFG
 - CFG \rightarrow PDA (LL & SLR parser)
 - CFG \rightarrow CNF
 - CFG \rightarrow Parse table (LL and SLR)
 - CFG \rightarrow Brute Force Parser

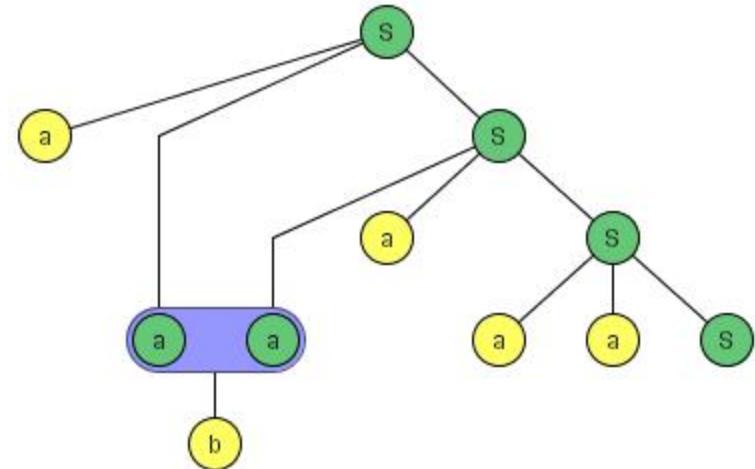


JFLAP – Recursively Enumerable Languages

- Create
 - Turing Machine (1-Tape)
 - Turing Machine (multi-tape)
 - Building Blocks
 - Unrestricted grammar



- Parsing
 - Unrestricted grammar with brute force parser



JFLAP - L-Systems

JFLAP : (tree.jff)

File Input Help

Editor

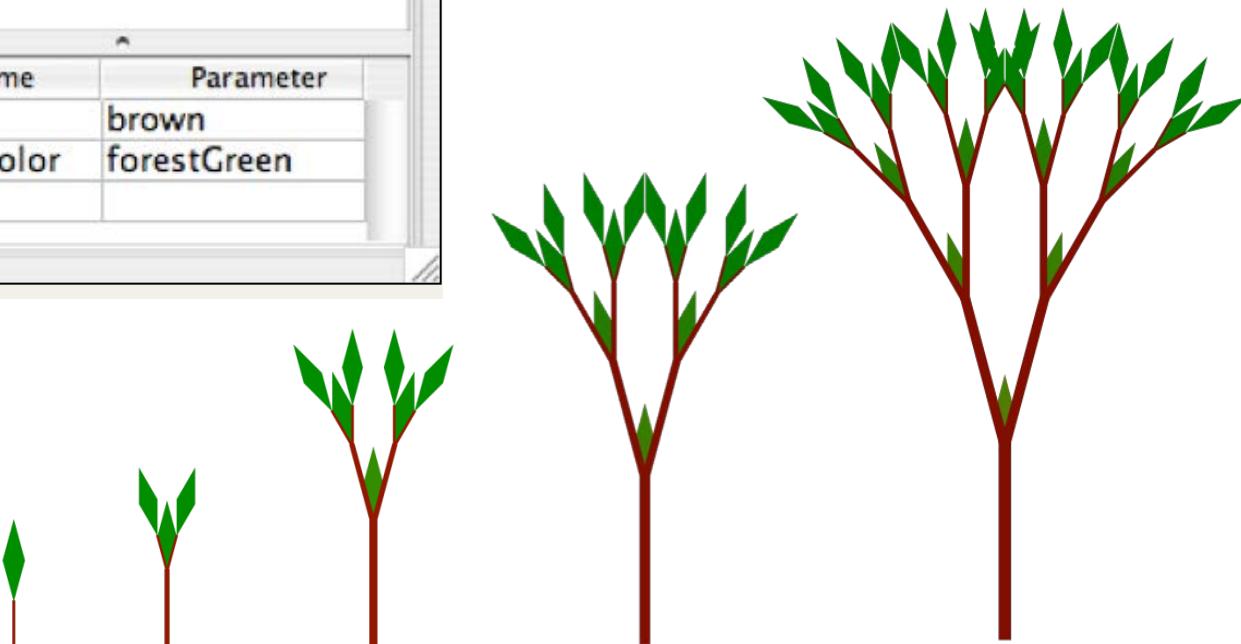
Axiom: $R \sim \# \# B$

B	$\rightarrow [~ \# \# T L - B + + B]$
L	$\rightarrow [\{ - g + + g \% -- g \}]$
R	$\rightarrow ! @ @ R$
T	$\rightarrow T g$

Name Parameter

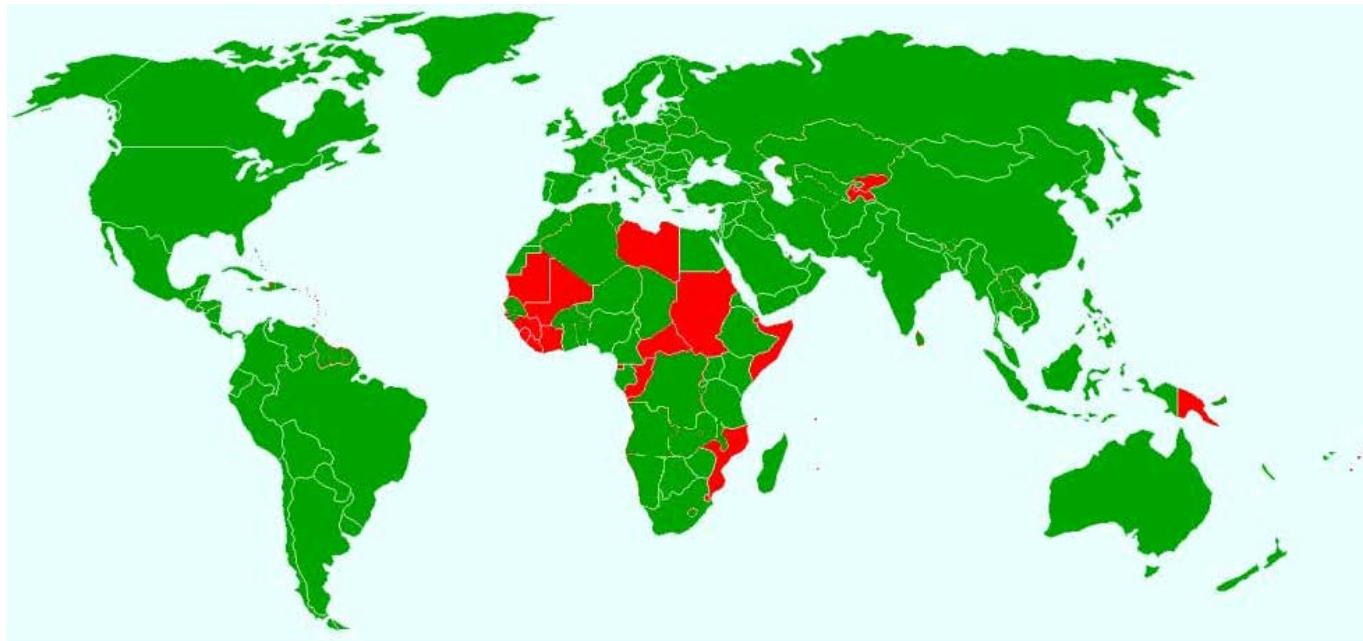
color	brown
polygonColor	forestGreen

- This L-System renders as a tree that grows larger with each successive derivation step.



JFLAP's Use Around the World

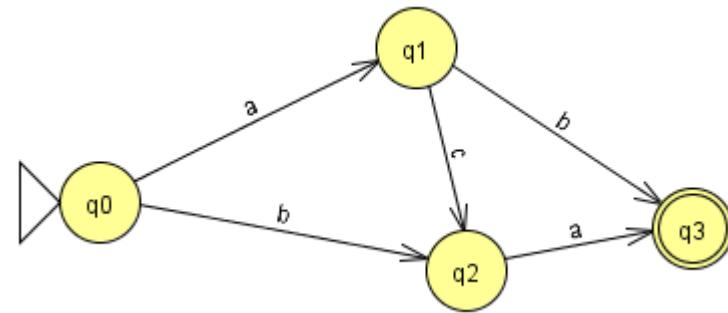
- JFLAP web page has over 300,000 hits since 1996
- Google Search
 - JFLAP appears on over 9830 web pages
 - Note: search only public web pages
- JFLAP been downloaded in over 160 countries



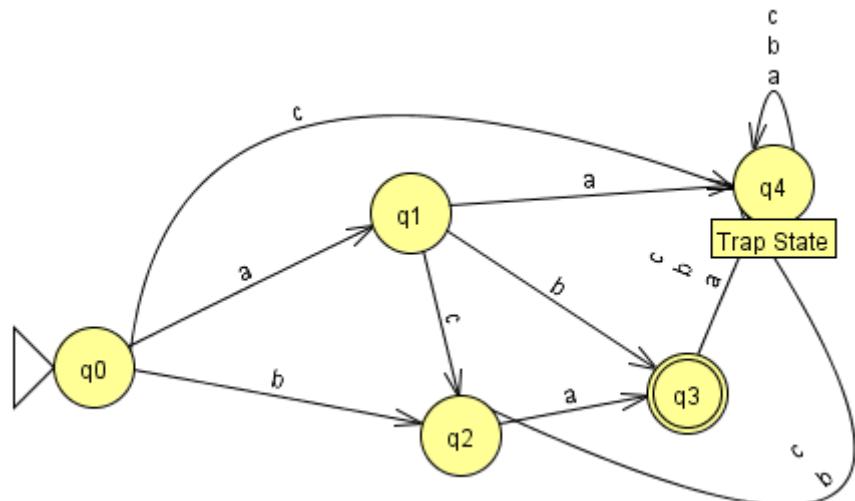
JFLAP Demos

DFA new features

- Here is a simple DFA



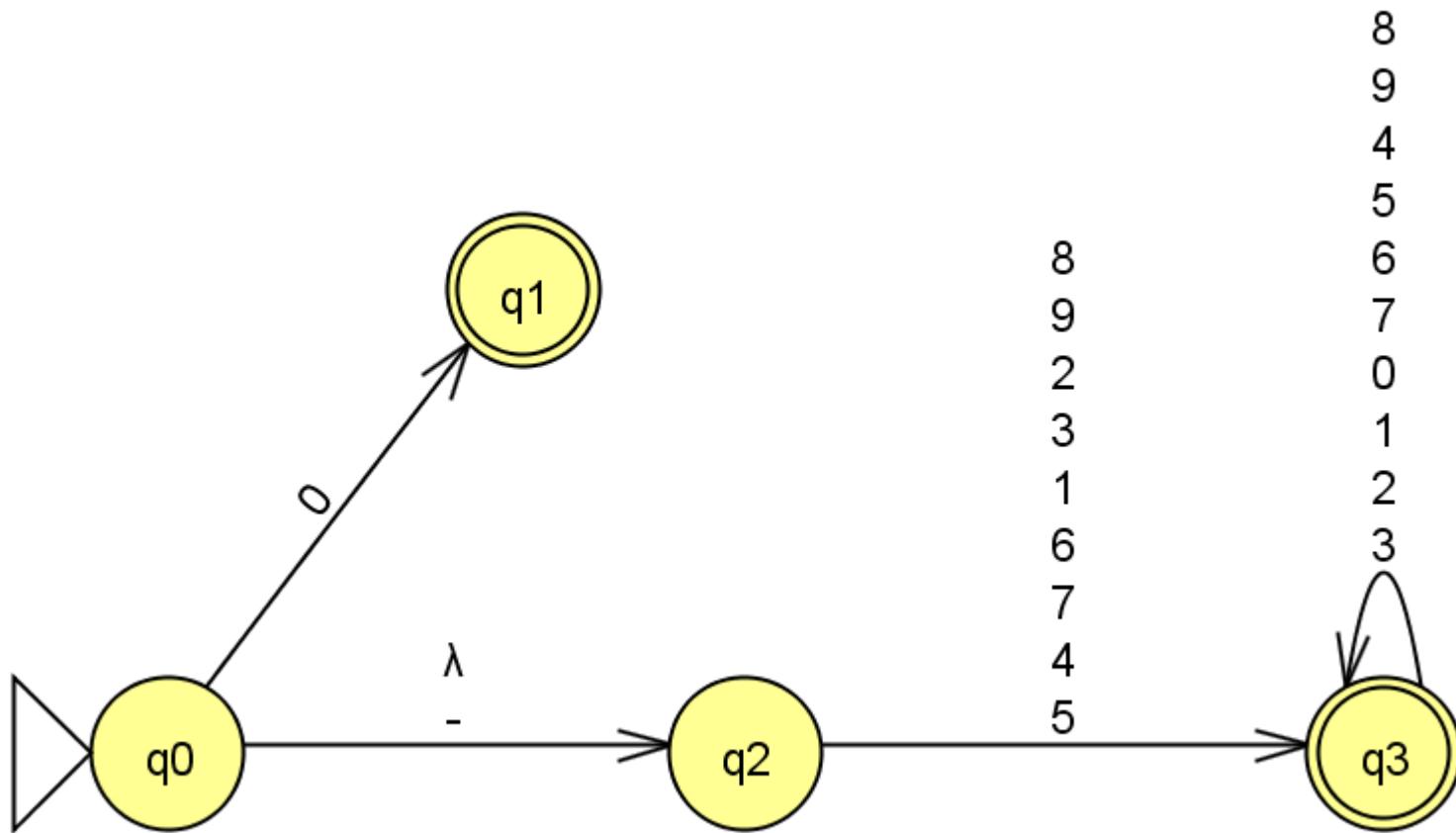
- New features:
 - Added trap state
 - Curved two of the transitions



Example: Build an NFA for valid integers

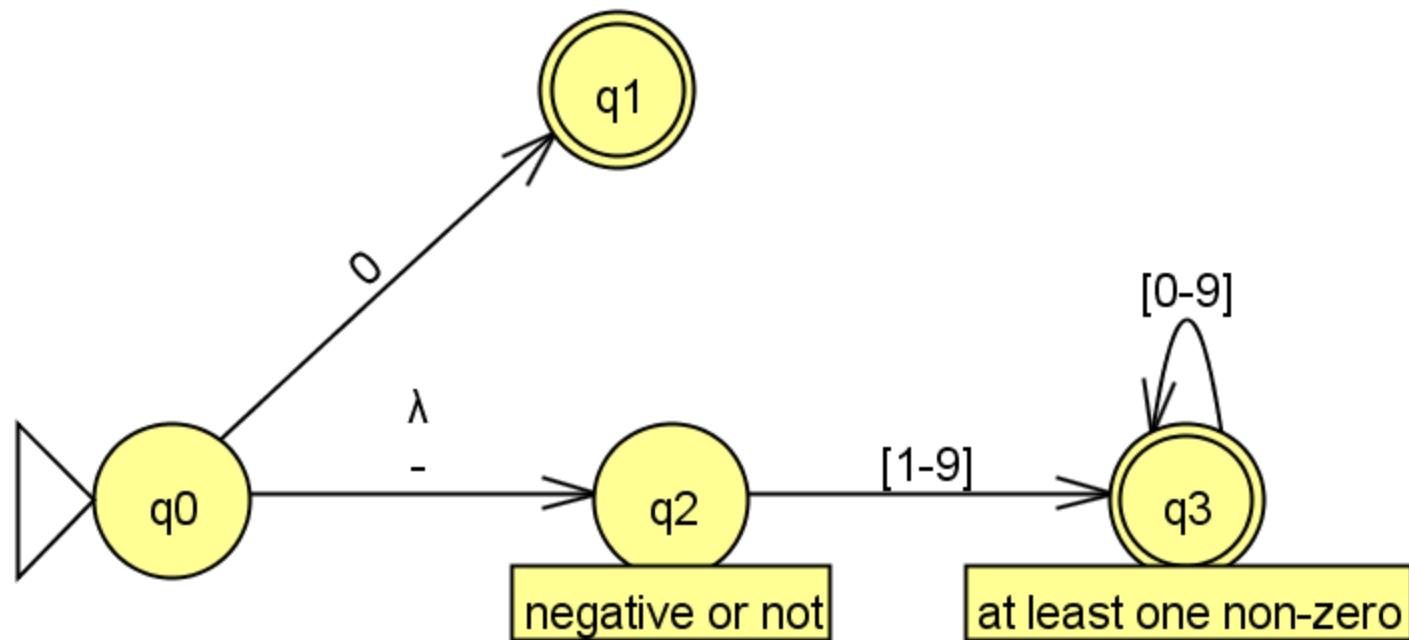
- Example:
 - Valid integers {-3, 8, 0, 456, 13, 500, ...}
 - Not valid: {006, 3-6, 4.5, ...}

Example: NFA for all valid integers



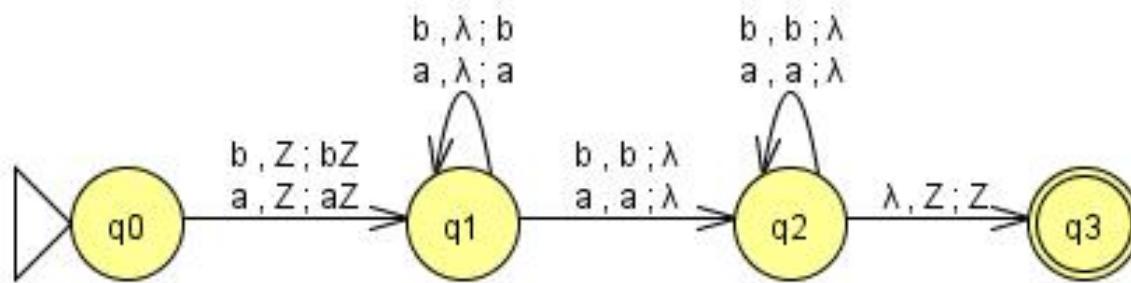
NFA annotated and shortcut

- New feature: [1-9] on labels



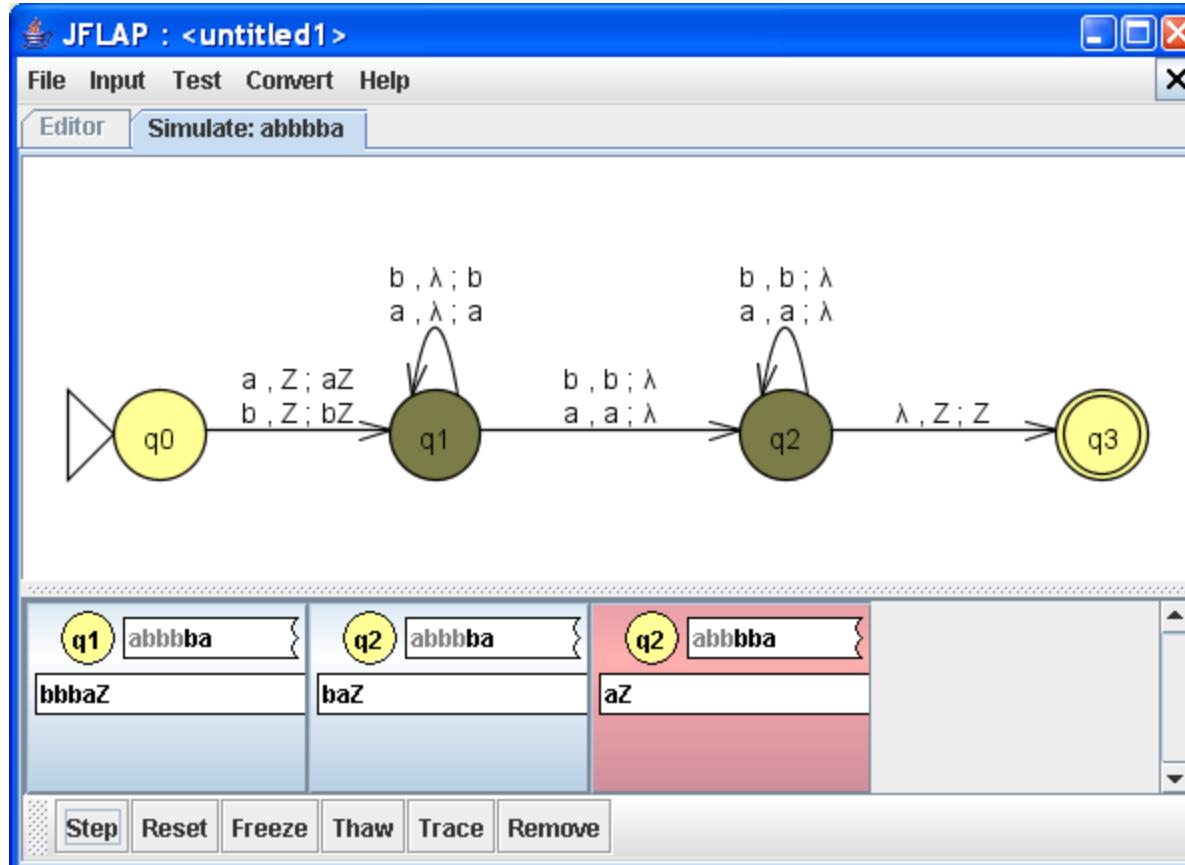
Example : NPDA

- NPDA for palindromes of even length
- New feature: asks for multi-char or single char for labels



Example (cont)

- Run input strings on the NPDA
 - Shows the nondeterminism

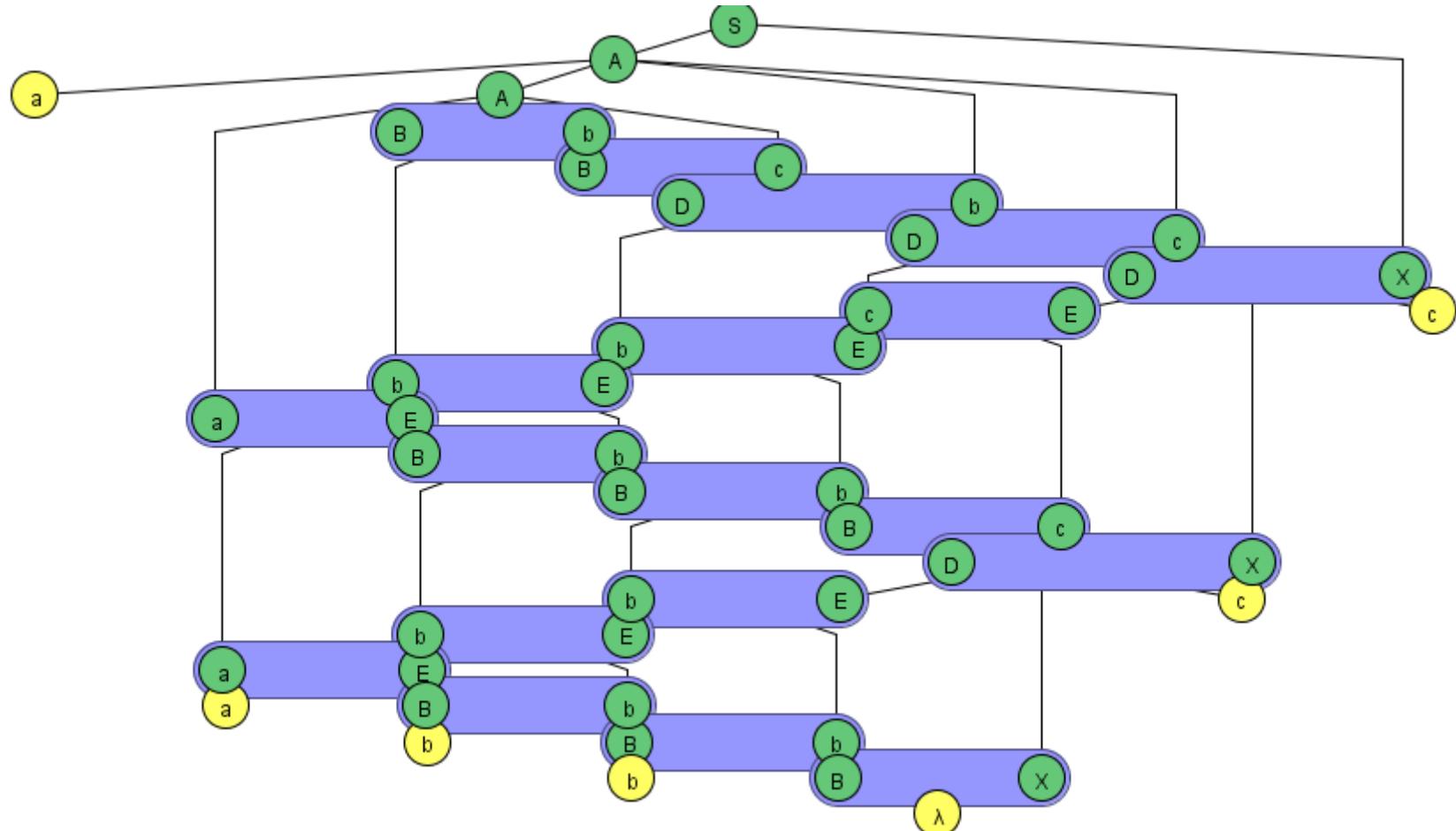


Example

Unrestricted Grammar - $a^n b^n c^n$

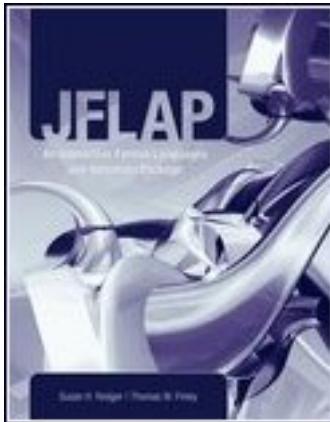
S	$\rightarrow AX$
A	$\rightarrow aAbc$
A	$\rightarrow aBbc$
Bb	$\rightarrow bB$
Bc	$\rightarrow D$
Dc	$\rightarrow cD$
Db	$\rightarrow bD$
DX	$\rightarrow EXc$
BX	$\rightarrow \lambda$
cE	$\rightarrow Ec$
bE	$\rightarrow Eb$
aE	$\rightarrow aB$

Trace aabbcc

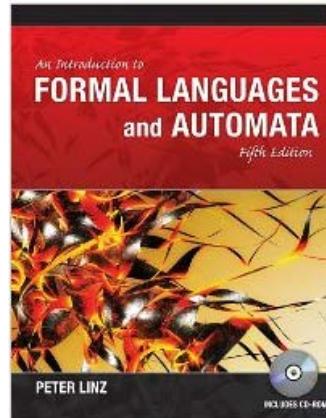


JFLAP Materials

JFLAP book
Use with automata
theory textbook



JFLAP works well
with Linz book



CD supplement with
JFLAP exercises to
go with this book

JFLAP is FREE

www.jflap.org

The screenshot shows the JFLAP website at www.jflap.org. The header features the JFLAP logo (a yellow circle with a black triangle) and the text "JFLAP Version 6.4 RELEASED July 13, 2008". The left sidebar contains a navigation menu with links like HOME, What is JFLAP, JFLAP Tutorial, Instructor Use, World Usage to June 2008, JFLAP book, books using JFLAP, Sample Bits, JFLAP wiki, and NEW JFLAP items. The main content area discusses JFLAP software, its usage, and news, including a note about a December 2008 CD release.

JFLAP online tutorial

The screenshot shows the JFLAP online tutorial at www.jflap.org/tutorial/. The header features the JFLAP logo and the text "JFLAP 6.4 Tutorial". The left sidebar contains a navigation menu with links for various automata types: Finite Automata, Mealy Machine, Moore Machine, Pushdown Automata, Turing Machine, Grammar, L-System, Regular Expressions, Regular Pumping Lemma, and Context-Free. The main content area is titled "Introduction" and provides basic information about the tutorial, including how to expand or collapse index menus and where to send bug reports. It also includes a note about downloading all files and a link to the JFLAP website.

Questions?

