A Hands-on Approach to Formal Languages and Automata with JFLAP

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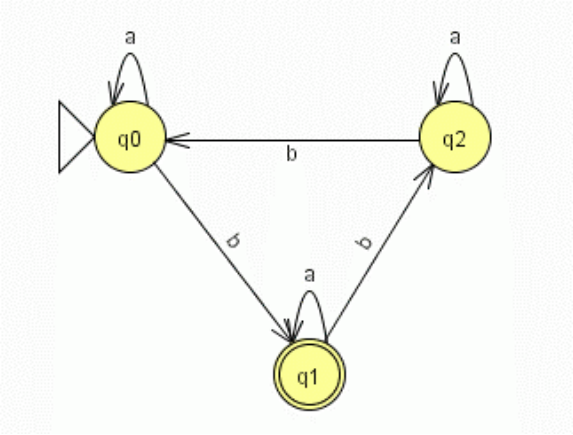

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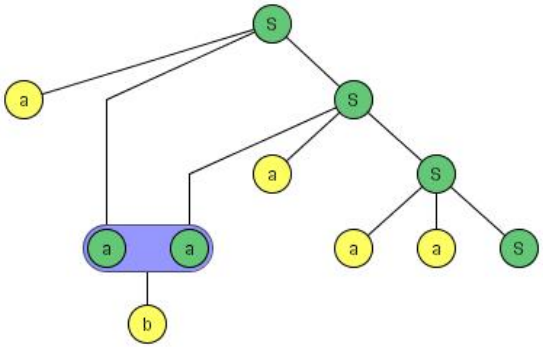


Who We Are…….
Susan Rodger

- Duke University
  - Associate Professor of the Practice
  - Teaching automata theory for 16 years
  - Developing JFLAP for 15 years!
- Co-author of “JFLAP: An Interactive Formal Languages and Automata Package”, Jones and Bartlett, 2006.

Who We Are ……
Thomas Finley

- Cornell University
  - Graduate Student and Research Assistant
- One of the developers of JFLAP 4.0
- Duke University
  - BS Computer Science/Mathematics 2002
- Co-author of “JFLAP: An Interactive Formal Languages and Automata Package”, Jones And Bartlett, 2006.

Who We Are ……..
Peter Linz

- University of California, Davis
  - Professor Emeritus
  - Teaching automata theory a long time…
- Written five textbooks including
  - An Introduction to Formal Languages and Automata Theory, 4th Ed, Jones and Bartlett, 2006

Outline – What we will do!

- Overview of JFLAP
- Getting Started with JFLAP – Regular Languages
- JFLAP and Context-free Languages
- JFLAP and Turing Machines
- JFLAP and Parsing
- Integrating JFLAP into a course
- JFLAP and L-systems
- History of JFLAP and Wrap-up

- Exercises with JFLAP throughout

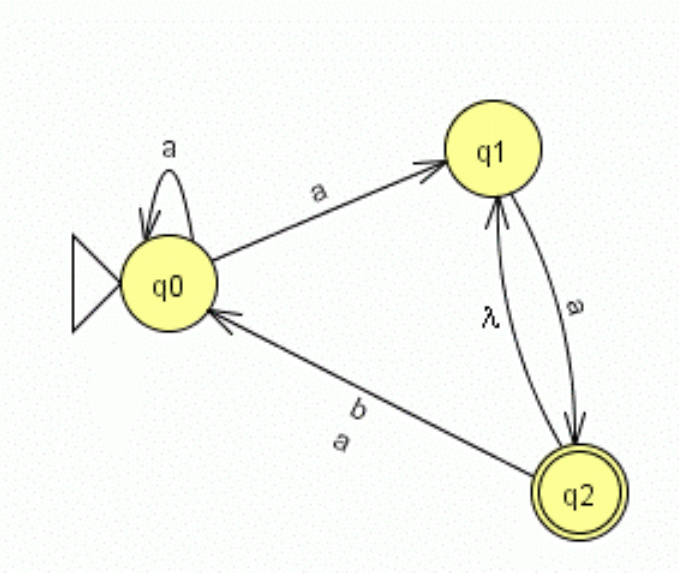
Why should people use JFLAP?

Overview of JFLAP

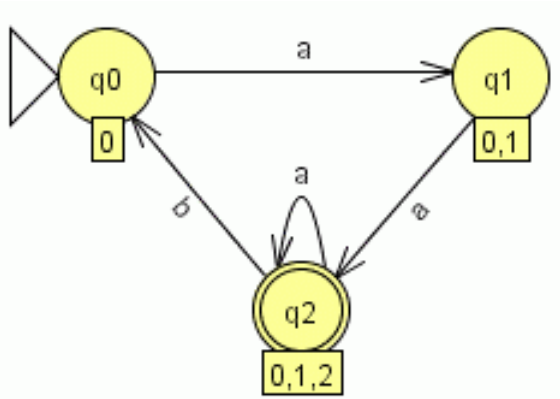
- **J**ava **F**ormal **L**anguages and **A**utomata **P**ackage
- Instructional tool to learn concepts of Formal Languages and Automata Theory
- Topics:
  - Regular Languages
  - Context-Free Languages
  - Recursively Enumerable Languages
  - Lsystems

JFLAP – Regular Languages

- Create
  - DFA and NFA
  - regular grammar
  - regular expression

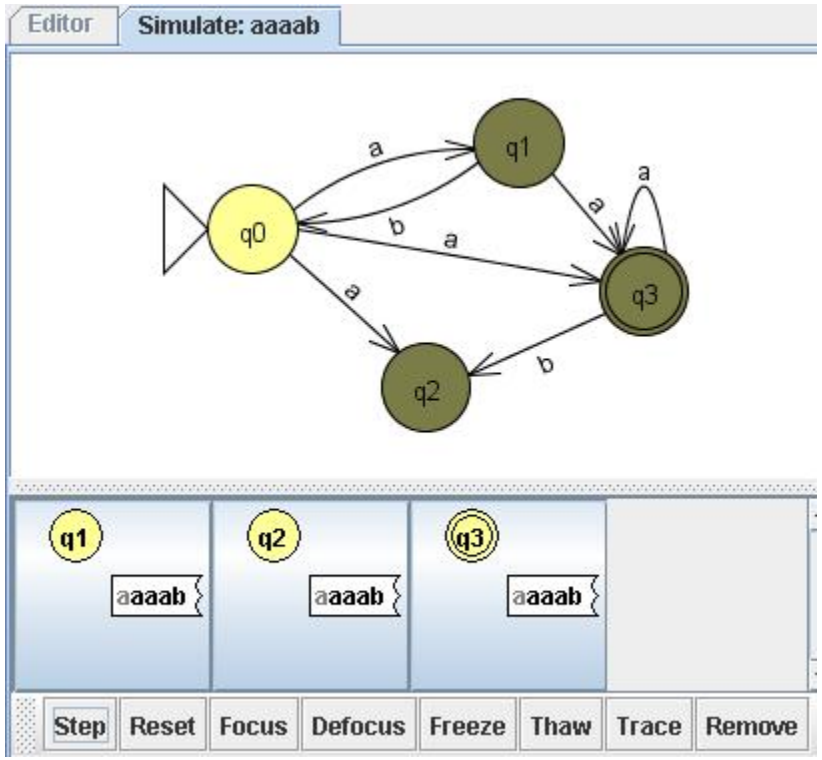


- Conversions
  - NFA to DFA to minimal DFA
  - NFA ←→ regular expression
  - NFA ←→ regular grammar



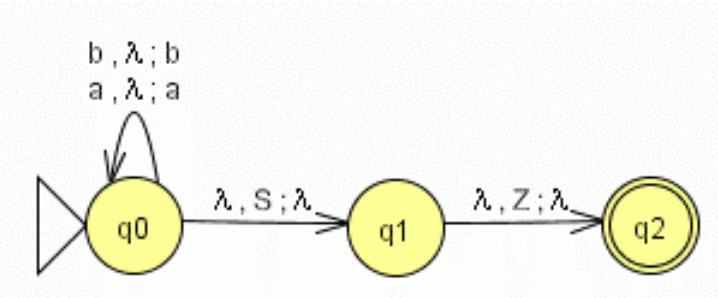
JFLAP – Regular languages (more)

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

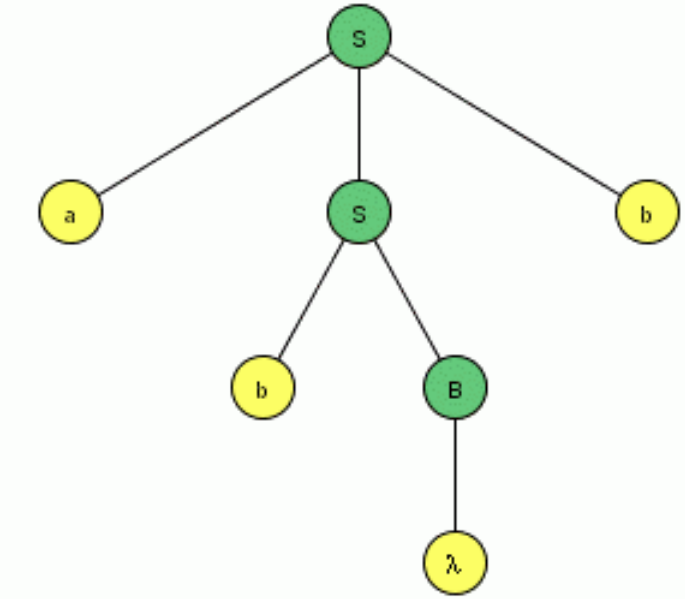


JFLAP – Context-free Languages

- Create
  - Nondeterministic PDA
  - Context-free grammar

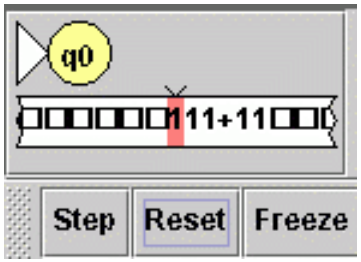


- Transform
  - PDA → CFG
  - CFG → PDA (LL & SLR parser)
  - CFG → CNF
  - CFG → Parse table (LL and SLR)
  - CFG → Brute Force Parser

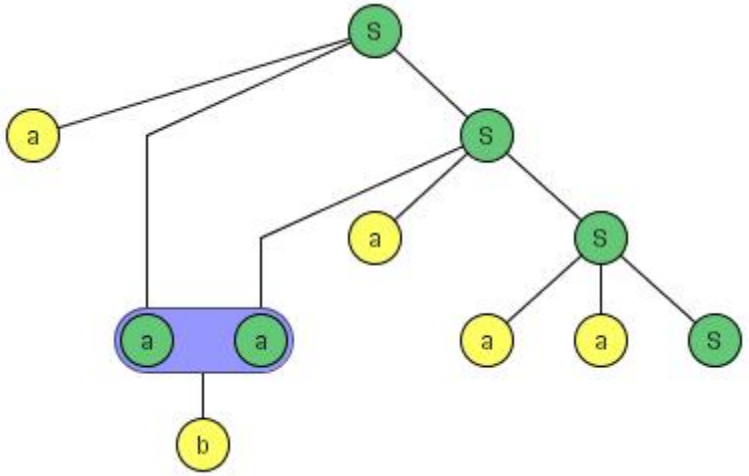


JFLAP – Recursively Enumerable Languages

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

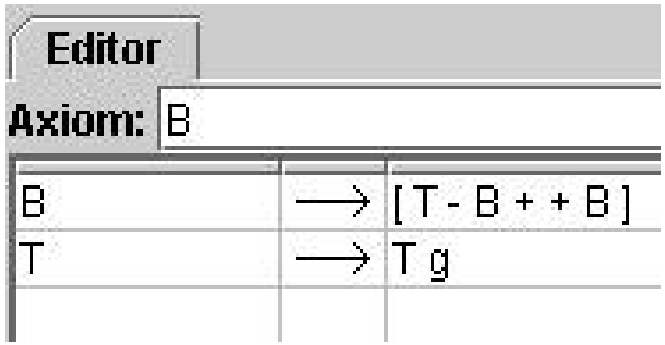


- Parsing
  - Unrestricted grammar with brute force parser



JFLAP - Lsystems

- Create an L-system



- Render the L-system