

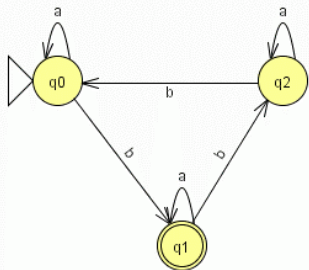
A Hands-on Approach to FLA with JFLAP

JFLAP in the Classroom

Susan Rodger, Duke University

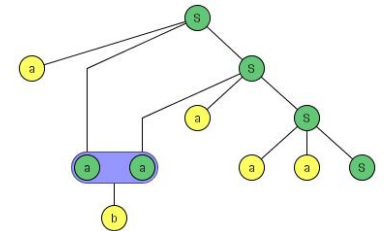
Thomas Finley, Cornell University

Peter Linz, University of California, Davis



SIGCSE 2006

March 4, 2006



JFLAP in CPS 140 at Duke

- Lecture
 - Demo how to use JFLAP
 - Solve a problem using JFLAP with the class
 - Give them time to think about it first
 - Either from scratch, or give them an attempt that needs to be fixed
 - Teach conversions using an example
 - Run examples, some with exponential time

www.cs.duke.edu/courses/spring05/cps140

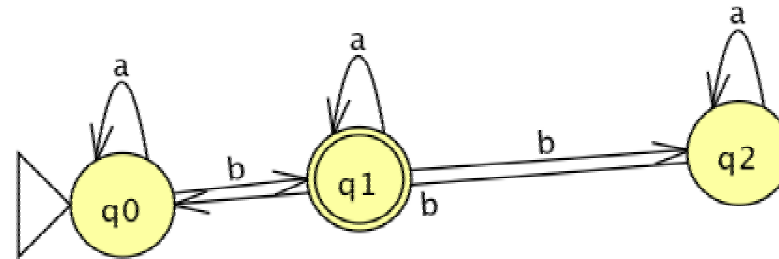
JFLAP in CPS 140 Homework

- Spring 2005 - 10 of 11 hwks used JFLAP
- Use JFLAP to check your answer
- Turn in a JFLAP file
- Grading – use multiple run window
 - Type in data once, it stays around

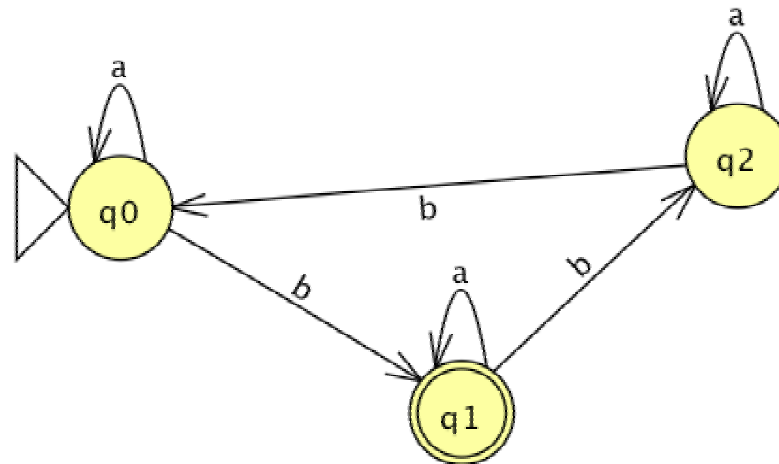
Use of JFLAP by Instructor

Showing how to layout items

Poor:

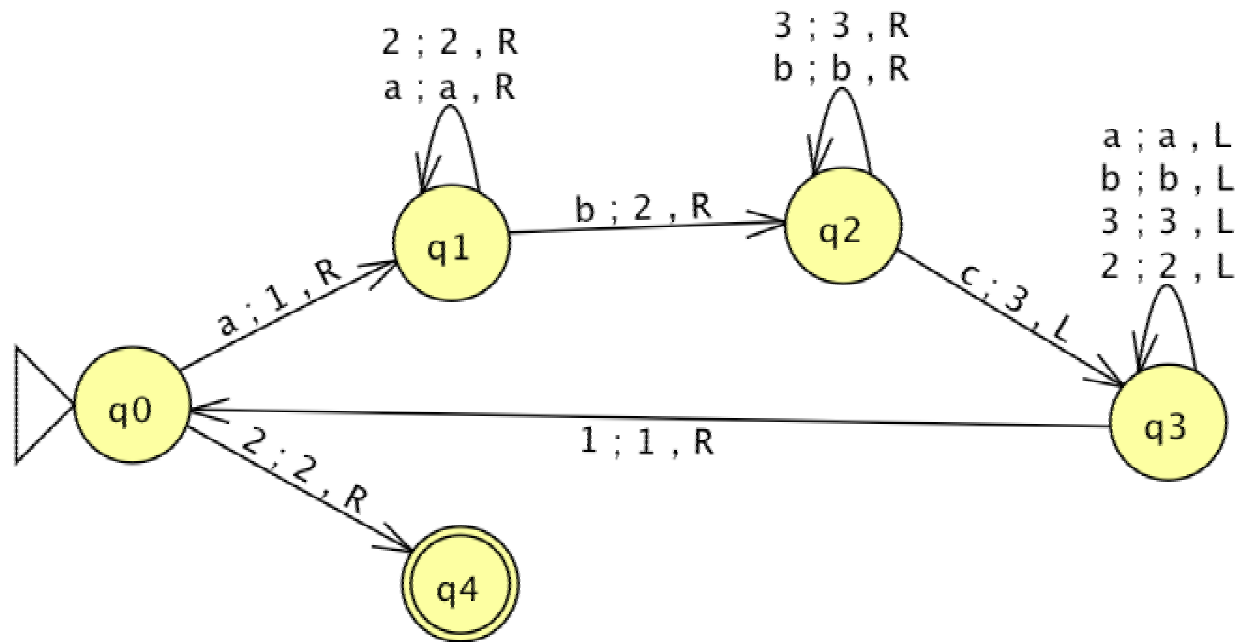


Better:



Use of JFLAP by Instructor

Is this correct for $a^n b^n c^n$?



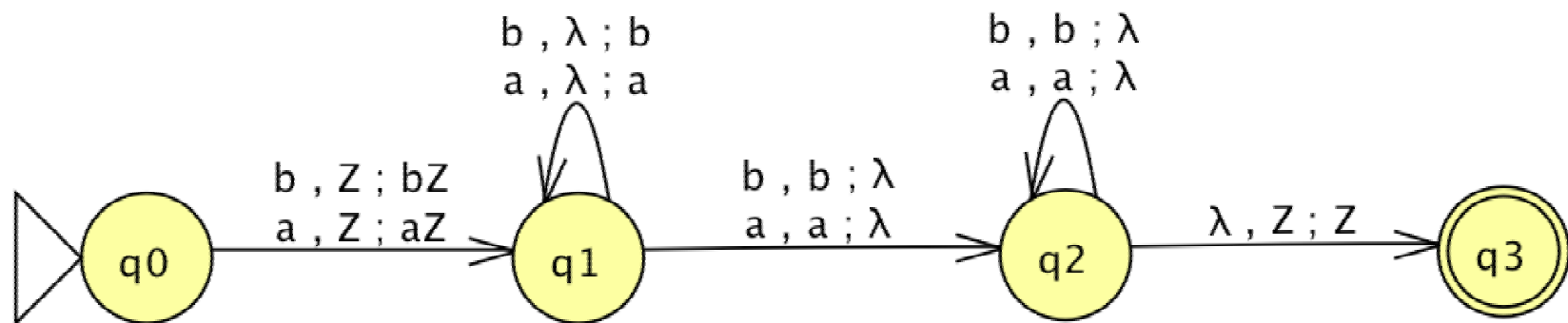
How do we fix it?

Use of JFLAP by Instructor

Experimenting with Difficult Concepts

Nondeterminism: ww^R

- Students attempt at desk -
difficult: want to find the “middle”
- Instructor solves with class using JFLAP



Use of JFLAP by Instructor

Testing Student Programs

The screenshot shows the JFLAP software interface for a Turing Machine (TM) named `(anbncn.jff)`. The interface includes a menu bar (`File Input Test Convert Help`), a toolbar (`Editor Multiple Inputs`), and a main workspace divided into a diagram area and a table area.

Turing Machine Diagram:

- States: `q0` (start state), `q1`, `q2`, and `q3` (final state).
- Transitions:
 - `q0` to `q0`: `a ; a, R | □ ; a, R`
 - `q0` to `q1`: `b ; b, S | □ ; □, L`
 - `q1` to `q1`: `b ; b, R | a ; b, L`
 - `q1` to `q2`: `c ; c, S | □ ; □, R`
 - `q2` to `q2`: `c ; c, R | b ; c, R`
 - `q2` to `q3`: `□ ; □, R | □ ; □, R`

Test Results Table:

Input 1	Input 2	Result
aabbcc		Accept
aaabbbccc		Accept
bc		Reject
aabbc		Reject
aabcc		Reject
abbcc		Reject
abc		Accept
aabbccc		Reject

Buttons at the bottom: `Run Inputs`, `Clear`, `Enter Lambda`.

Use of JFLAP by Instructor

Relate to other CS Concepts

Running Time

- Consider $a^n b^n c^n$
 - one-tape TM $O(n^2)$
 - two-tape TM $O(n)$

Other Uses of JFLAP by Instructor

- Demonstrate Nondeterminism
- Demonstrate the running of a CFG to a PDA using LR method

Which lookahead do you choose?

- Demonstrate a transformation from one form to another

Example: PDA to CFG

- And many other uses...

JFLAP Student Use

- Recreate and experiment with instructor's examples
- Use with Homework
- A study aid - create additional examples
 - explore concepts in depth
 - weaker students get more feedback

JFLAP in Lab?

- One semester I used a lab
- Now instead have consulting hours
 - Students (mostly juniors/seniors) rarely come
- Why?
 - Downloading JFLAP is easy
 - JFLAP answers their questions

Other fun ways to interact in class

- Have students build an edible DFA with cookies

