LING/C SC/PSYC 438/538

Lecture 20

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Internships and Career Services Presentation

- Next Tuesday, a departure from our usual topics:
  - Guest lecture by Dr. Shawn E. Nordell
  - Associate Director of Graduate Career Services, U of A.
  - *Resources for jobs, resumes and internships*
  - *Q&A*

Today's Topics

- Regex (mathematical) & FSA are equivalent.
- Example:
  - a machine is (*perhaps*) easier to build than a regex.
- The state bypass method:
  - converting a FSA into a regex algorithmically
- Homework 11

FSA and regex

- Textbook Exercise: find a regex for

  4. the set of all strings from the alphabet a, b such that each a is immediately preceded by and immediately followed by a b;

  Examples (* *denotes string not in the language*):
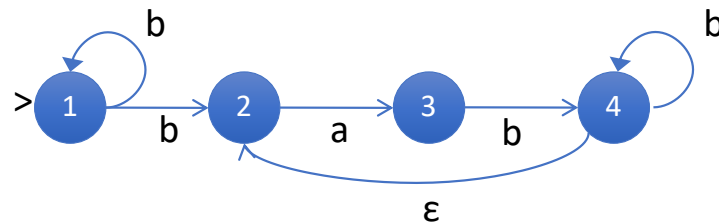   *ab *ba
      bab
      λ (empty string)
      bb
      *baba
      babab

FSA and regex

- Draw a FSA and convert it to a regex:

b*   b   (ab+)+

= b+(ab+)*| ε

Regex from FSA

- $ perl –le 'for (@ARGV) {if (/^(b+(ab+)*|)$/) {print "$_ accept"} else {print "$_ reject"}}' '' ab ba bab bb baba babab
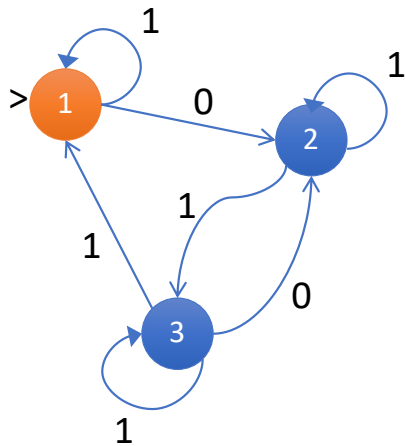
1.   accept
2. ab reject
3. ba reject
4. bab accept
5. bb accept
6. baba reject
7. babab accept

Regex from FSA

- Any regex can be re-drawn as a FSA.
- Formally, we can also convert any FSA to a regex
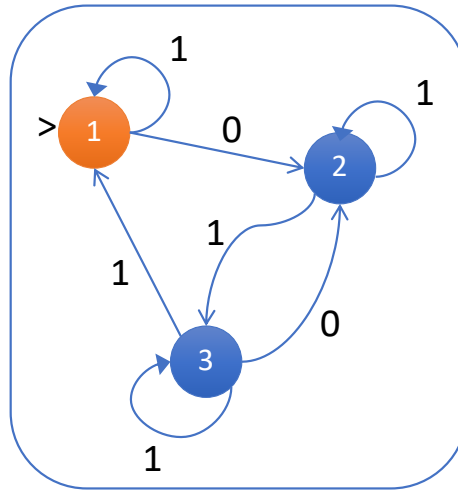 - *But there isn't necessarily just one solution*
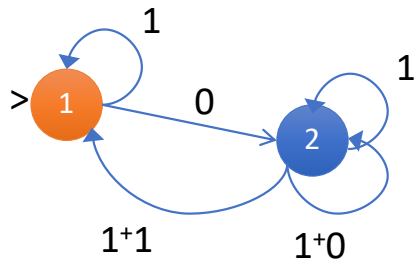
Regex from FSA

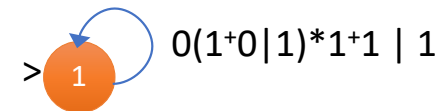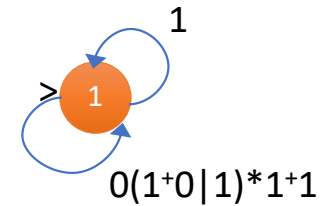- Example:
  - Give a regex for the NDFSA:

- State by-pass method:
  1. Delete one state at a time
  2. Calculate the possible paths passing through the deleted state
  3. Add the regex calculated at each stage as an arc
  - e.g.
    - eliminate state 3
    - then 2...

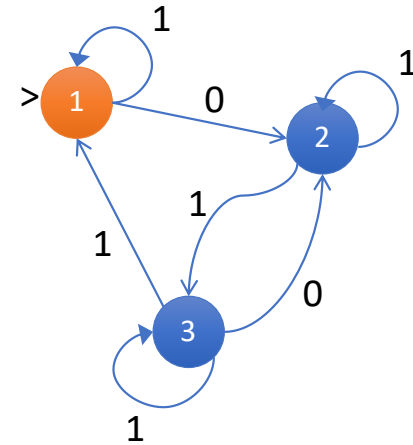# Regex from FSA

- eliminate state 3

- eliminate state 2

$0(1^+0|1)*1^+1$

$0(1^+0|1)*1^+1 \mid 1$

Answer: $(0(1^+0|1)*1^+1 \mid 1)*$

[Powerpoint animation]
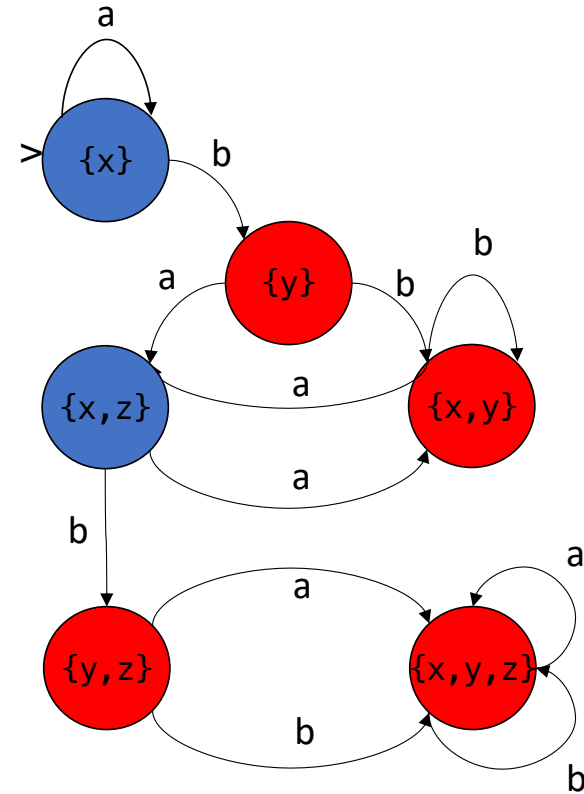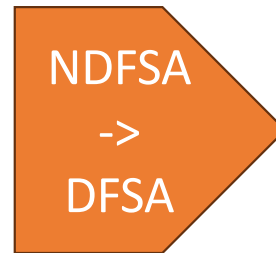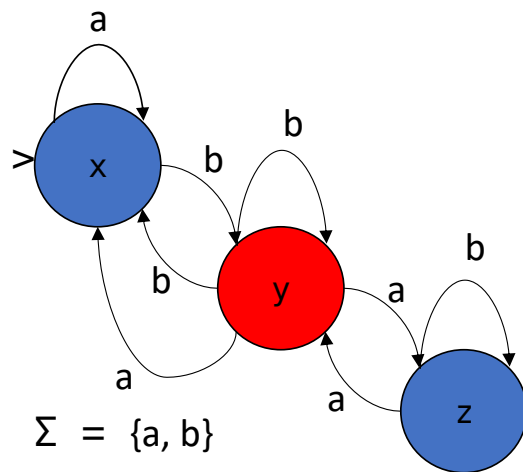
Another way: Regex from FSA

The example from two slides ago …

- BUT:
  - let's do it in a different order, so:
  - step 1: eliminate state 2
  - step 2: eliminate state 3

Homework 11

- Let's start with Homework 10
- Recall Q4: let L be the language accepted by either:

Homework 11

- Question 1:
  - L_R = {w^R | $w \in L$}, w a string of L, w^R the reverse of w.
  - Example: abaa $\in$ L, aaba $\in$ L^R
  - Give a FSA for L_R
  - Recall: basic idea swap final/beginning states
  - Check your answer!
  - *By software or* legible *hand-drawn diagrams accepted*

Homework 11

- Question 2:
  - convert $L_R = \{w^R \mid w \in L\}$ to a DFSA
  - use the construction described in class
  - make sure you label your states with sets
  - How many states does the DFSA have?
  - How many end states?
  - Check your answer!
  - *By software or* legible *hand-drawn diagrams accepted*

Homework 11

- Question 3:
  - consider $L_{RR} = \{w^R \mid w \in L_R\}$, L_R being the language in Question 2.
  - construct the machine for L_{RR} from the machine of L_R in Question 2.
  - use the method of Question 1
  - Check your answer!
  - *By software or legible hand-drawn diagrams accepted*
  - Compare the machine you obtain here with the original machine for L.
  - What is the difference?

Homework 11

- Question 4:
  - convert $L_{RR} = \{w^R \mid w \in L_R\}$ to a DFSA
  - use the construction described in class
  - make sure you label your states with sets (of sets)
  - Check your answer!
  - *By software or legible hand-drawn diagrams accepted*
  - Compare the machine you obtain here with the (answer) machine obtained for L in Homework 10.
  - What do you notice/what is the difference?

Homework 11

- Email: to sandiway@arizona.edu
- Subject: 438/538 Homework 11 *YOUR NAME*
- Due date (*special circumstances due to guest lecture*):
  - next Tuesday night!
  - will be reviewed next Thursday
- One PDF file please
  - paste your machine (drawings) into the file