

CMSC 330: Organization of Programming Languages

Practice Problem 1 Solutions

Problem 1

- a) $0(0|1)^*0$
 - All strings beginning and ending in 0
- b) $((\epsilon|0)1^*)^*$
 - All strings
- c) $(0|1)^*0(0|1)(0|1)$
 - All strings with 0 as third digit from right

Problem 2 – Regular Expressions

For all strings of 0's and 1's

- a) Begin in 1
 - $1(0|1)^*$
- b) End in 1
 - $(0|1)^*1$
- c) Contains 00
 - $(0|1)^*00(0|1)^*$
- d) Does not contain 00
 - $(01|1)^*(\epsilon|0)$

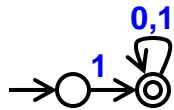
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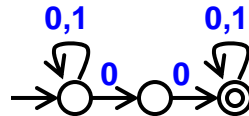
Problem 2 – NFA

For all strings of 0's and 1's

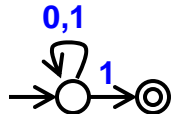
- a) Begin in 1



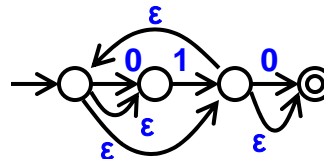
- c) Contains 00



- b) End in 1



- d) Does not contain 00



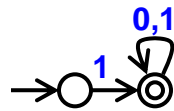
Based on regular expression ⁴

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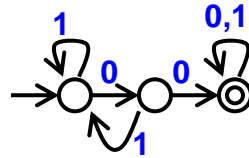
Problem 2 – DFA

For all strings of 0's and 1's

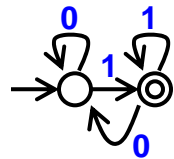
a) Begin in 1



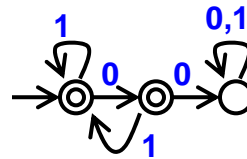
c) Contains 00



b) End in 1



d) Does not contain 00



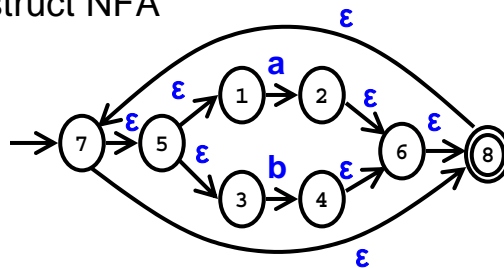
Swap final / non-final states!

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Problem 3 – $(a | b)^*$

a) Construct NFA



b) Parse ababbab

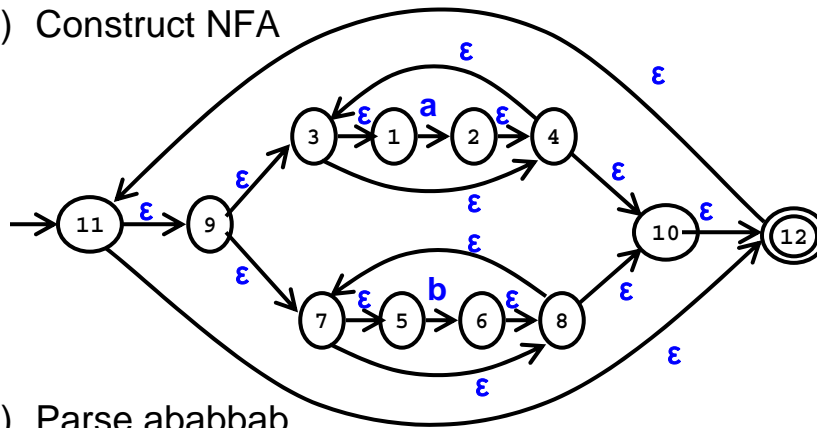
7,5,1,2,6,8,7,5,3,4,6,8,7,5,1,2,6,8,7,5,3,4,6,8,7,5,3,4,6,
8,7,5,1,2,6,8,7,5,3,4,6,8 accept

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Problem 3 – $(a^* | b^*)^*$

a) Construct NFA



b) Parse ababbab

11,9,3,1,2,4,10,12,11,9,7,5,6,8,10,12,11,9,3,1,2,4,10,12...