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) \((\varepsilon|0)1^*)^*\)
   - 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
   – \((0|1)^*(\varepsilon|0)\)

Problem 2 – NFA

For all strings of 0’s and 1’s

a) Begin in 1

\[\text{Diagram for Begin in 1}\]

b) End in 1

\[\text{Diagram for End in 1}\]

c) Contains 00

\[\text{Diagram for Contains 00}\]

d) Does not contain 00

\[\text{Diagram for Does not contain 00}\]

Based on regular expression
Problem 2 – DFA

For all strings of 0’s and 1’s

a) Begin in 1

b) End in 1

c) Contains 00

d) Does not contain 00

Swap final / non-final states!

Problem 3 – (a | b )*

a) Construct NFA

b) Parse ababbab

7,5,1,2,6,8,7,5,3,4,6,8,7,5,1,2,6,8,7,5,3,4,6,8,7,5,3,4,6,8,7,5,3,4,6,8,7,5,3,4,6,8,7,5,3,4,6,8 accept
Problem 3 – \((a^* \mid b^*)^*\)

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...