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21.04.2016

BLG311E – FORMAL LANGUAGES AND AUTOMATA

2016 SPRING

QUIZ 4

Design a push-down automaton to recognize the strings produced by $L = (a^n b^+ c^n)^+$, $n > 0$. Draw the NFA corresponding to the PDA's control logic or write down the state-transition relation function δ .

Duration: 20 mins

Solution:

$$M = (S, \Sigma, \Gamma, \delta, s_0, F)$$

$$S = \{q_0, q_1, q_2, q_3, f\}, \Sigma = \{a, b, c\}, \Gamma = \{a, c\}, s_0 = q_0, F = f$$

$$\delta = \{ \underbrace{[(q_0, a, \Lambda), (q_1, ac)]}_{a}, \quad \rightarrow \text{push } c \text{ to be able to check if the stack is empty}$$

$$\underbrace{[(q_1, a, \Lambda), (q_1, a)]}_{a^{n-1}}, \underbrace{[(q_1, b, \Lambda), (q_2, \Lambda)]}_{b},$$

$$\underbrace{[(q_2, b, \Lambda), (q_2, \Lambda)]}_{b^*}, \underbrace{[(q_2, c, a), (q_3, \Lambda)]}_{c},$$

$$\underbrace{[(q_3, c, a), (q_3, \Lambda)]}_{c^{n-1}}, \underbrace{[(q_3, a, c), (q_1, ac)]}_{(a^n b^+ c^n)^+}, \underbrace{[(q_3, \Lambda, c), (f, \Lambda)]}_{\text{accept the word}} \}$$

