

Introduction to Language Theory and Compilation Solutions

Session 2: Regular expressions

Ex. 1. RE are:

1. $(0+1)^*00$
2. $(0+1)^*1(0+1)(0+1)$
3. $(1+01+0011)^*(0+\varepsilon)$
4. $0^*(1+00(0^*))^*0^*$
5. $(0+1)^*00+0$

Ex. 2. RE are:

- a) By applying the rule: $(R+SU^*T)^*SU^*$, RE is: $((1+(01))+(00)(0+(10))^*(11))^*(00)(0+(10))^*$

Transition	$(Q_a, Q_x) : A$	$(Q_x, Q_b) : B$	$(Q_x, Q_x) : X$
(Q_1, Q_1)	$(Q_1, Q_2) : 0$	$(Q_2, Q_1) : 1$	$(Q_2, Q_2) : \emptyset$
(Q_1, Q_3)	$(Q_1, Q_2) : 0$	$(Q_2, Q_3) : 0$	$(Q_2, Q_2) : \emptyset$
(Q_3, Q_3)	$(Q_3, Q_2) : 1$	$(Q_2, Q_3) : 0$	$(Q_2, Q_2) : \emptyset$
(Q_3, Q_1)	$(Q_3, Q_2) : 1$	$(Q_2, Q_1) : 1$	$(Q_2, Q_2) : \emptyset$

Table (a): Absorbing transitions

Absorbing transitions	$(Q, Q') : E$	AX^*B	Result
$(Q_1, Q_1) : R$	1	01	$1+(01)$
$(Q_1, Q_3) : S$	\emptyset	00	00
$(Q_3, Q_3) : U$	0	10	$0+(10)$
$(Q_3, Q_1) : T$	\emptyset	11	11

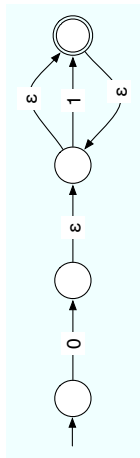
Table (b): Applying the rule: $E+(AX^*B)$

- b) By applying the rule: $(R+SU^*T)^*SU^*$, RE is: $((00)+(1+(01))(01)^*(1+(00)))^*(1+(01))(01)^*$

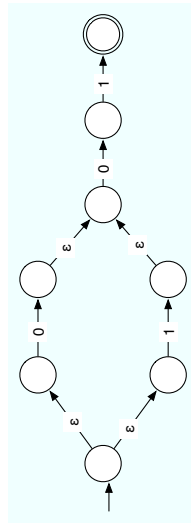
Absorbing transitions	$(Q, Q') : E$	AX^*B	Result
$(Q_1, Q_1) : R$	\emptyset	00	00
$(Q_1, Q_3) : S$	1	01	$1+(01)$
$(Q_3, Q_3) : U$	\emptyset	01	01
$(Q_3, Q_1) : T$	1	00	$1+(00)$

Table (c): Absorbing transitions

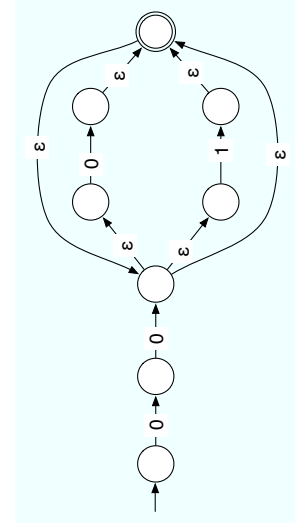
Ex. 3.



1) 01*



2) (0+1)01



3) 00(0+1)*

Ex. 4.

1. $(\cdot | \backslash n)\{5\}$
2. $\backslash \backslash * \backslash **$
3. $\hat{\#} \cdot * \$$
4. $[0-9]^+ (\backslash \cdot [0-9]^+)^? (E[+-]^? [0-9]^+)^?$
5. $^ [A-Z] [A-Za-z]^* (\backslash [A-Za-z]^+)^* \cdot \$$
6. $abcde[A-Za-z_]\{3\} (=? \cdot ext)$