18.10.25

Compilerbau Blatt 1

A1.1

Der folgende Ausdruck wird beschrieben:

0 bis n oft

a a a b a

A1.2 (1)

(a-z+A-Z) (a-z+A-Z+0-9+_)* (a-z+A-Z+0-9)

1 2 3

Beispiel Bezeichner:

1 2 3 — Vtest_1

1 2 3 — pNumber

A1.2 (2) (DFA)

$A = (Q, \Sigma, \delta, q_0, F)$

$\Sigma = \{a\text{-}z, A\text{-}Z, 0\text{-}9, \_\}$

$Q = \{q_0, q_1, q_2\}$

$F = \{q_2\}$ = Endzustände

$\delta(q_0, A\text{-}Z a\text{-}z) = q_1$

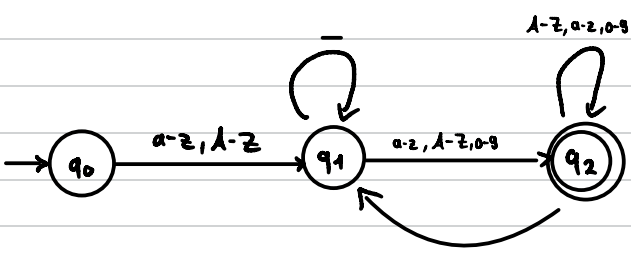
$\delta(q_1, \_) = q_1$

$\delta(q_1, A\text{-}Z a\text{-}z 0\text{-}9) = q_2$

$\delta(q_2, \_) = q_1$

$\delta(q_2, A\text{-}Z a\text{-}z 0\text{-}9) = q_2$

$q_0 \in Q$ = Startzustand



Beispiel Bezeichner:

- V_1 $q_0 \to V \to q_1 \to \_ \to q_1 \to 1 \to q_2$
- Pp $q_0 \to P \to q_1 \to p \to q_2$

A 1.2 (3) (Reguläre Grammatik)

$G = (N, T, P, S)$

S: Startsymbol

P: Produktionsregeln

N: Menge der Nichtterminalen / Variablen

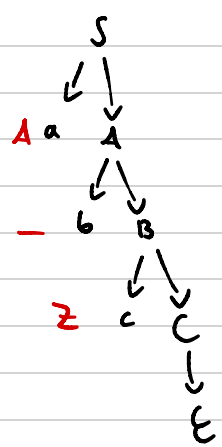
T: Menge der Terminale / Terminalsymbole

$S \to aA$ $\quad a = \{a\text{-}z, A\text{-}Z\}$

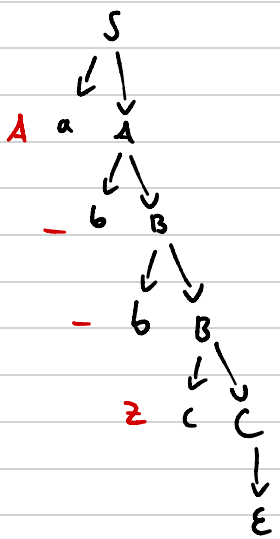
$A \to bB \mid cC$ $\quad b = \{a\text{-}z + A\text{-}Z + 0\text{-}9 + \_\}$

$B \to cC \mid bB$ $\quad c = \{a\text{-}z + A\text{-}Z + 0\text{-}9\}$

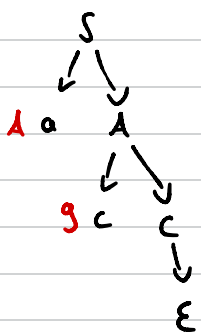
$C \to \varepsilon$



Bezeichner 1: A_Z



Bezeichner 2: A__Z



Bezeichner 3: A9

A 1.3(1)

Python Float Schreibweisen:
- 1.0, 20.5 (Standardschreibweise)
- -1.0, +1.0

Weitere Möglichkeiten:
- 1_0000.0, 2_0., +3_0., ----+9_2.2
- .4, 5., +4., -4., +.5, -.5
- 1e3, 1e+3, 1e-3, 09.3e3, 1e-003
- -3.15E-2, 3E2, 2.3E+5

A 1.3 (2)

e6 + ← gelt beides oft

Regulärer Ausdruck Python:

$(-++)^*(\,.(0\text{-}9)^+ + (0\text{-}9)^+.(0\text{-}9)^* + (0\text{-}9)^+e(++-+\epsilon)(0\text{-}9)^+ + (0\text{-}9)^+E(++-+\epsilon)(0\text{-}9)^+ + (0\text{-}9)^+.(0\text{-}9)^+e(++-+\epsilon)(0\text{-}9)^+ + (0\text{-}9)^+.(0\text{-}9)^+E(++-+\epsilon)(0\text{-}9)^+ + (0\text{-}9)^+\_(0\text{-}9)^+.(0\text{-}9)^+\_(0\text{-}9)^+ + .(0\text{-}9)^+\_(0\text{-}9)^+ + (0\text{-}9)^+\_(0\text{-}9)^+.)$

vor e und E immer eine Zahl

max. 1 Vorzeichen gefolgt von Zahl

Beispiel Bezeichner die matchen:

+3. + → $(-++)^*$ → 3. → $(0\text{-}9)^+$.

10e6 kein Vorzeichen → $(-++)^*$ → 10e6 → $(0\text{-}9)^+e(++-+\epsilon)(0\text{-}9)^+$

DFA:

$A = (Q, \Sigma, \delta, q_0, F)$

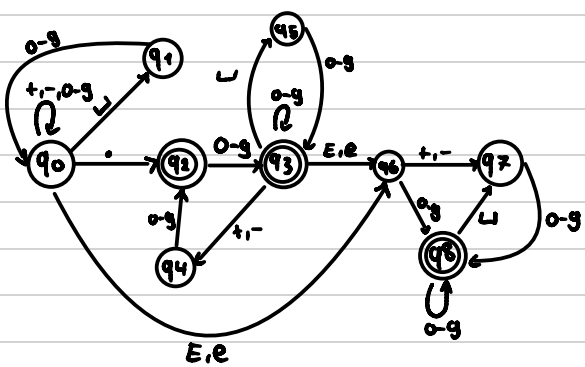
$\Sigma = \{0\text{-}9, \_, e, ., +, -, E\}$

$Q = \{q_0, q_1, q_2, q_3, q_4, q_5, q_6, q_7, q_8\}$

$F = \{q_2, q_3, q_8\}$ = Endzustände

$q_0 \in Q$ = Startzustand

␣ = Unterstrich



$\delta(q_0, +-0\text{-}9) = q_0$ $\quad \delta(q_3, \_) = q_5$

$\delta(q_0, \_) = q_1$ $\quad \delta(q_5, 0\text{-}9) = q_3$

$\delta(q_0, Ee) = q_6$ $\quad \delta(q_6, +-) = q_7$

$\delta(q_1, 0\text{-}9) = q_0$ $\quad \delta(q_6, 0\text{-}9) = q_8$

$\delta(q_0, .) = q_2$ $\quad \delta(q_7, 0\text{-}9) = q_8$

$\delta(q_2, 0\text{-}9) = q_3$ $\quad \delta(q_8, 0\text{-}9) = q_8$

$\delta(q_3, 0\text{-}9) = q_3$ $\quad \delta(q_8, \_) = q_7$

$\delta(q_3, Ee) = q_6$ $\quad \delta(q_4, 0\text{-}9) = q_2$

Beispiel Bezeichner:

9.00000 $q_0 \to 9 \to q_0 \to . \to q_2 \to 0 \to q_3 \to 0 \to q_3 \to 0 \to q_3$ usw.

-4.2e-2 $q_0 \to - \to q_0 \to 4 \to q_0 \to . \to q_2 \to 2 \to q_3 \to e \to q_6 \to - \to q_7 \to 2 \to q_8$

Reguläre Grammatik:

$S \to aS \mid \_A \mid .B \mid dF$

$A \to cS$

$B \to cC \mid \varepsilon$

$C \to \_E \mid cC \mid bD \mid dF \mid \varepsilon$

$E \to cC$

$F \to cH \mid bG$

$G \to cH$

$H \to \_G \mid cH \mid \varepsilon$

$a = \{+, -, 0\text{-}9\}$

$\_ = \_$

$. = .$

$b = \{+, -\}$

$c = \{0\text{-}9\}$

$d = \{e, E\}$

$G = (N, T, P, S)$

S: Startsymbol

P: Produktionsregeln

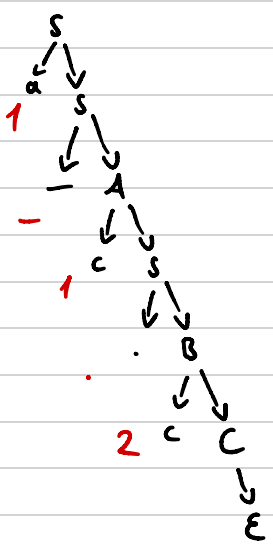
N: Menge der Nichtterminalen / Variablen

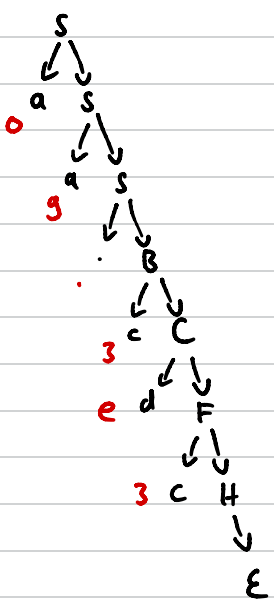
T: Menge der Terminale / Terminalsymbole

Beispiel Bezeichner:

09.3e3

1_1.2





A1.5 DFA

Zweitletzte Zeichen ist derselbe wie das zweite.

$A = (Q, \Sigma, \delta, q_0, F)$

$\Sigma = \{1,2,3\}$

$Q = \{q_0, q_1, q_2, q_3, q_4, q_5, q_6, q_7, q_8, q_9, q_{10}, q_{11}, q_{12}, q_{13}\}$

$F = \{q_2, q_3, q_4, q_5, q_6, q_7\}$ = Endzustände

$q_0 \in Q$ = Startzustand

$\delta(q_0, 1\text{-}3) = q_1$

$\delta(q_1, 1) = q_4$

$\delta(q_1, 2) = q_3$

$\delta(q_1, 3) = q_2$

$\delta(q_4, 1) = q_4$

$\delta(q_3, 2) = q_3$

$\delta(q_2, 3) = q_2$

$\delta(q_4, 2\text{-}3) = q_7$

$\delta(q_3, 1\text{-}3) = q_6$

$\delta(q_2, 1\text{-}2) = q_5$

$\delta(q_7, 1) = q_{12}$

$\delta(q_7, 2\text{-}3) = q_{13}$

$\delta(q_6, 1,3) = q_{11}$

$\delta(q_6, 2) = q_{10}$

$\delta(q_5, 1\text{-}2) = q_9$

$\delta(q_5, 3) = q_8$

$\delta(q_{13}, 2\text{-}3) = q_{13}$

$\delta(q_{13}, 1) = q_{12}$

$\delta(q_{12}, 1\text{-}3) = q_7$

$\delta(q_{11}, 1,3) = q_{11}$

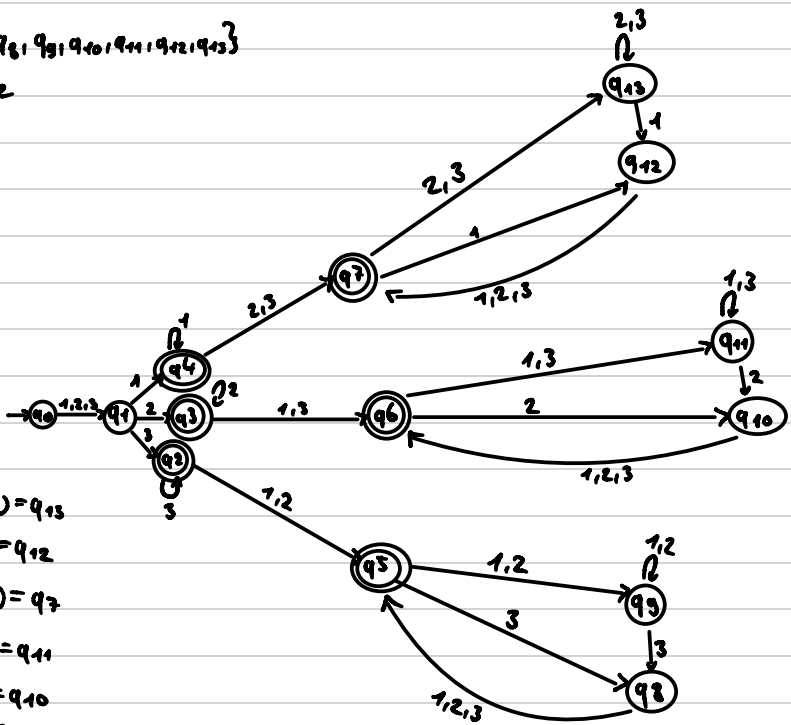
$\delta(q_{11}, 2) = q_{10}$

$\delta(q_{10}, 1\text{-}3) = q_6$

$\delta(q_9, 1\text{-}2) = q_9$

$\delta(q_9, 3) = q_8$

$\delta(q_8, 1\text{-}3) = q_5$

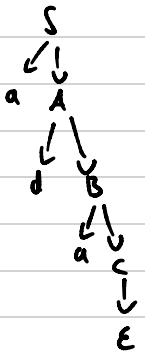


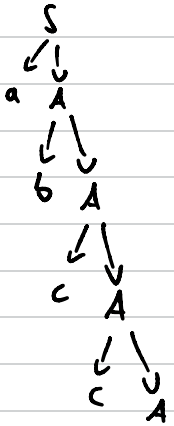
Beispiel Bezeichnen:

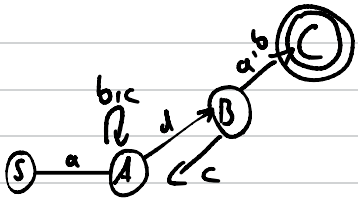
1231323 $q_0 \to 1 \to q_1 \to 2 \to q_3 \to 3 \to q_6 \to 1 \to q_{11} \to 3 \to q_{11} \to 2 \to q_{10} \to 3 \to q_6$

21221 $q_0 \to 2 \to q_1 \to 1 \to q_4 \to 2 \to q_7 \to 2 \to q_{12} \to 1 \to q_7$

A16







$a(b+c)^*(dc+d)^+(b+c)^*(a+b+da)$