5. Shift Reduce Parser 2

Monday, March 1, 2021 8:28 AM

Augmented Grammar

$E' \to E$
$E \to E+T$
$E \to T$
$T \to T*F$
$T \to F$
$F \to id \mid (E)$

I_0 closure $(E' \to E)$

$E' \to .E$
$E \to .E+T$
$E \to .T$
$T \to .T*F$
$T \to .F$
$F \to .id$
$F \to .(E)$

I_1 closure (I_0, E)

$E' \to E.$
$E \to E.+T$

I_2 closure (I_0, T)

$E \to T.$
$T \to T.*F$

I_3 closure (I_0, F)

$T \to F.$

I_4 closure (I_0, id)

$F \to id.$

I_5 closure $(I_0, '(')$

$F \to (.E)$
$E \to .E+T$
$E \to .T$
$T \to .T*F$
$T \to .F$
$F \to .id$
$F \to .(E)$

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goto $(I_0, E) \to I_1$

$E' \to E.$
$E \to E.+T$

goto $(I_0, T) \to I_2$

$E \to T.$
$T \to T.*F$

goto $(I_0, id) \to I_5$

$F \to id.$

goto $(I_0, F) \to I_3$

$T \to F.$

goto $(I_0, '(') \to I_4$

$F \to (.E)$
$E \to .E+T$
$E \to .T$
$T \to .T*F$
$T \to .F$
$F \to .(E)$
$F \to .id$

* till you cannot move to a new item set

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goto $(I_1, +) \to I_6$

$E \to E+.T$
$T \to .T*F$
$T \to .F$
$F \to .(E)$
$F \to .id$

goto $(I_2, *) \to I_7$

$T \to T*.F$
$F \to .(E)$
$F \to .id$

goto $(I_4, E) \to I_8$

$F \to (E.)$
$E \to E.+T$

goto (I_4, T)

$E \to T.$
$T \to T.*F$
$\}\ I_2$

$F \to (E.)$
$E \to E.+T$

goto (I_4, id)
$F \to id.$ } I_5

goto (I_5, T)
$E \to E*T.$
$T \to T.*F$

goto (I_6, F)
$T \to F.$ } I_3

goto (I_6, id) } I_5
$F \to id.$

goto $(I_7, F) \to I_{10}$
$T = T*F.$

goto (I_8, T)
$\hookrightarrow I_6$

goto $(I_9, *)$
$\hookrightarrow I_7$

$T \to T.*F$ } I_2

goto (I_4, F)
$T \to F.$ } I_3

goto $(I_4, '(')$
$F \to (.E)$
$E \to$
$T \to$
$F \to$
} I_4

goto $(I_6, '(')$
$F \to (.E)$
$E \to$
$T \to$
$F \to$
} I_4

goto $(I_8, ')')$
$\hookrightarrow I_4$

goto (I_7, id)
$\hookrightarrow I_5$

goto $(I_8, ')') \to I_{11}$
$F \to (E).$

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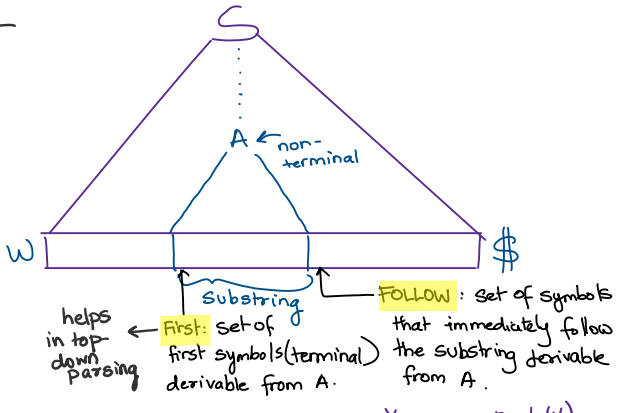
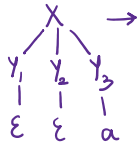
*DFA of goto function → DFA

Parse Table

(1) FIRST & FOLLOWS



(1) First(x) = {x}
$X \to Y_1 Y_2 \ldots Y_n$



→ First(X) = a

Example:
(1) $S \to Az$, $A \to a$ — First(A) = {a}, First(S) = {a}
(2) $S \to Az$, $A \to \varepsilon$ — First(A) = {ε}, First(S) = {z}

① First(x) = {x}

$X \to Y_1 Y_2 \ldots Y_n$

② First(x) → First(Y_1) except ε (empty string) ∪
First(Y_2) except ε ∪
⋮
First(Y_n) except ε

③ $X \to \varepsilon$; First(x) = {ε}

④ $A \to \varepsilon$ First(S) = {ε}