

Lecture #10

Syntax Analysis - IV

Follow Sets

- Definition:
 - $\text{Follow}(X) = \{ t \mid S \rightarrow^* \alpha X t \beta \}$
 - ‘t’ is said to follow of ‘X’ if we can obtain a sentential form where the terminal ‘t’ comes immediately after ‘X’
 - *Follow set for a given symbol never concerns what the symbol can generate, but depends on where that symbol can appear in the derivations.*
- If $(X \rightarrow AB)$ then
 - $\text{First}(B)$ is in $\text{Follow}(A)$ and
 - $\text{Follow}(X)$ is in $\text{Follow}(B)$
 - If $(B \rightarrow^* \epsilon)$ then
 - $\text{Follow}(X)$ is in $\text{Follow}(A)$

Follow Sets

- To build FOLLOW(X)
 1. Add \$ to FOLLOW(S) [If S is the start symbol]
 2. If $(A \rightarrow \alpha B \beta)$, then
Add everything in FIRST(β) except ϵ to FOLLOW(B)
 3. If $((A \rightarrow \alpha B \beta \text{ and } \beta \rightarrow^* \epsilon) \text{ or } (A \rightarrow \alpha B))$
Add everything in FOLLOW(A) to FOLLOW(B)
- *ϵ never appears in Follow sets, so Follow sets are just sets of terminals*
- Find the follow sets in the grammar:

$E \rightarrow T X$	$X \rightarrow + E \mid \epsilon$
$T \rightarrow (E) \mid \text{int } Y$	$Y \rightarrow * T \mid \epsilon$

Parsing Table Construction

- for each production $A \rightarrow \alpha$ {
 - for each terminal 't' in $\text{FIRST}(\alpha)$
 - $M[A, t] = \alpha$;
 - if ϵ is in $\text{FIRST}(\alpha)$, then
 - for each terminal 'b' (including '\$') in $\text{Follow}(A)$
 - $M[A, b] = \alpha$;}

- Construct a parsing table for the grammar:

$E \rightarrow T X$ $X \rightarrow + E \mid \epsilon$

$T \rightarrow (E) \mid \text{int } Y$ $Y \rightarrow * T \mid \epsilon$