Lecture 17

Note that productions output are tracing out a *lefmost derivation*. The grammar symbols on the stack make up *left-sentential forms.*

LL(1) Table Construction

Top-down parsing expands a parse tree from the start symbol to the leaves. It always expand the leftmost non-terminal. Consider the state

$$S \Rightarrow^{*} b A g$$

with b the next token and we are trying to match $b\,b\,g$. There are two possibilities

1. b belongs to an expansion of A.
   Any $A \Rightarrow a$ can be used if b can start a string derived from a. In this case we say that $b \in FIRST(a)$

2. b does not belong to an expansion of A. Expansion of A is empty, i.e., $A \Rightarrow e$ and b belongs an expansion of g, e.g., bw. which means that b can appear after A in a derivation of the form $S \Rightarrow^{*} bAbw$. **W**e say that $b \in FOLLOW(A)$.

Any $A \Rightarrow a$ can be used if a expands to e. We say that $e \in FIRST(A)$ in this case.

Definition

$$FIRST(X) = \{ b \mid X \Rightarrow^{*} ba \} \cup \{ \varepsilon \mid X \Rightarrow^{*} \varepsilon \}$$