Left Factoring

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- If two alternatives of a production begin with the same string , then the grammar is not LL(1)
  - Example: S → 0S1 | 01 is not LL(1)

- In left factoring it is not clear which two alternative productions to use to expand a non-terminal S

- General method:
  $A \rightarrow \alpha\beta_1 \mid \alpha\beta_2$

  The equivalent non left-factored grammar is
  $A \rightarrow \alpha A'$,
  $A' \rightarrow \beta_1 \mid \beta_2$

Eliminating Left Factoring Example

- Example 1

S → iEtS | iEtSeS | a
E → b

The equivalent non left factored grammar is

S → iEtSS′ | a
S′→ eS | ε
E → b

- Example 2

S → bSSaaS / bSSaSb / bSb / a

- Eliminate the common prefix **bS**

S → bSS' / a

S' → SaaS / SaSb / b

Again, this is a grammar with common prefixes.

- Eliminate the common prefix **Sa** from the second grammar

S → bSS' / a

S' → SaA / b

A → aS / Sb