

Clite Grammar (from Tucker and Noonan, 2007)

$$\begin{aligned}
\text{Program} &\rightarrow \text{int main} () \{ \text{Declarations Statement} \} \\
\text{Declarations} &\rightarrow \{ \text{Declaration} \} \\
\text{Declaration} &\rightarrow \text{Type Identifier} [[\text{Integer}]] \{ , \text{Identifier} [[\text{Integer}]] \} \\
\text{Type} &\rightarrow \text{int} \mid \text{bool} \mid \text{float} \mid \text{char} \\
\text{Statements} &\rightarrow \{ \text{Statement} \} \\
\text{Statement} &\rightarrow ; \mid \text{Block} \mid \text{Assignment} \mid \text{IfStatement} \mid \text{WhileStatement} \\
\text{Block} &\rightarrow \{ \text{Statements} \} \\
\text{Assignment} &\rightarrow \text{Identifier} [[\text{Expression}]] = \text{Expression}; \\
\text{IfStatement} &\rightarrow \text{if} (\text{Expression}) \text{Statement} [\text{else Statement}] \\
\text{WhileStatement} &\rightarrow \text{while} (\text{Expression}) \text{Statement} \\
\\
\text{Expression} &\rightarrow \text{Conjunction} \{ \mid \mid \text{Conjunction} \} \\
\text{Conjunction} &\rightarrow \text{Equality} \{ \&\& \text{Equality} \} \\
\text{Equality} &\rightarrow \text{Relation} [\text{EquOp Relation}] \\
\text{EquOp} &\rightarrow == \mid != \\
\text{Relation} &\rightarrow \text{Addition} [\text{RelOp Addition}] \\
\text{RelOp} &\rightarrow < \mid < = \mid > \mid > = \\
\text{Addition} &\rightarrow \text{Term} \{ \text{AddOp Term} \} \\
\text{AddOp} &\rightarrow + \mid - \\
\text{Term} &\rightarrow \text{Factor} \{ \text{MulOp Factor} \} \\
\text{MulOp} &\rightarrow * \mid / \mid \% \\
\text{Factor} &\rightarrow [\text{UnaryOp}] \text{Primary} \\
\text{UnaryOp} &\rightarrow - \mid ! \\
\text{Primary} &\rightarrow \text{Identifier} [[\text{Expression}]] \mid \text{Literal} \mid \\
&\quad (\text{Expression}) \mid \text{Type} (\text{Expression}) \\
\\
\text{Identifier} &\rightarrow \text{Letter} \{ \text{Letter} \mid \text{Digit} \} \\
\text{Letter} &\rightarrow \text{a-zA-Z} \\
\text{Digit} &\rightarrow \text{0-9} \\
\text{Literal} &\rightarrow \text{Integer} \mid \text{Boolean} \mid \text{Float} \mid \text{Char} \\
\text{Integer} &\rightarrow \text{Digit} \{ \text{Digit} \} \\
\text{Boolean} &\rightarrow \text{true} \mid \text{false} \\
\text{Float} &\rightarrow \text{Integer} . \text{Integer} \\
\text{Char} &\rightarrow ' \text{ASCIIChar} '
\end{aligned}
\tag{1}$$

There are two additional items required to completely specify the grammar of the language. First, the if/else ambiguity is resolved by attaching the else to the nearest prior if statement. Second, the set ASCIIChar is the set of printable ASCII characters less than 128.