COMP3131/9102: Programming Languages and Compilers

Week 8 Tutorial Questions

Attribute Grammars

1. Consider the following number grammar, where numbers may be octal (indicated by the suffix **o**) or decimal (indicated by the suffix **d**):

$$
\begin{array}{rcl}
\textit{based-num} & \rightarrow & \textit{num base-char} \\
\textit{base-char} & \rightarrow & \mathbf{o} \\
\textit{base-char} & \rightarrow & \mathbf{d} \\
\textit{num} & \rightarrow & \textit{num digit} \\
\textit{num} & \rightarrow & \textit{digit} \\
\textit{digit} & \rightarrow & \mathbf{0} \mid \mathbf{1} \mid \ldots \mid \mathbf{9}
\end{array}
$$

   (a) Give an attribute grammar to determine the value of a number.
   (Hint: Associate a synthesised attribute *val* with *based-num*, *num* and *digit* and an inherited attribute with *base-char*, *num* and *digit*.)

   (b) Draw a decorated parse tree for **123o**.

   (c) Justify whether your attribute grammar is L-attributed or not.

   (d) Can the attributes be computed during parsing in a recursive-descent parser?

   (e) Give some pseudo-code for computing the attributes in a single pass over the parse tree for a number.