Compiler Construction/Fall 2014/Homework 3

Eva Rose
evarose@cs.nyu.edu

Kristoffer Rose
krisrose@cs.nyu.edu

Assigned Thursday 9/18/2014, due Thursday 9/25/2014 at 8am

Reading Assignments

- For lecture on 9/18/2014: Dragon book 2.4 + 4.1-4.4 (50 pages); HACS handout 3 (the H3 link on the course schedule)
- For lecture on 9/25/2014: Dragon book 2.3, 5.1-5.3 (30p); HACS handout 4 (the H4 link on the course schedule)

Homework Assignments

The following assignments should be submitted[1] for a maximum of 15 points.

1 Grammars

Question 1.1 (Dangling else grammar, 5 points)**.** Consider the "dangling else" grammar (also Figure 4.10 in the dragon book):

$$\begin{aligned} stmt &\rightarrow matchedstmt \mid openstmt \\ matchedstmt &\rightarrow \textbf{if}\ expr\ \textbf{then}\ matchedstmt\ \textbf{else}\ matchedstmt \mid \textbf{other} \\ openstmt &\rightarrow \textbf{if}\ expr\ \textbf{then}\ stmt \mid \textbf{if}\ expr\ \textbf{then}\ matchedstmt\ \textbf{else}\ openstmt \end{aligned}$$

(This is a useful version of the grammar for nested **if** statements because it is non-ambiguous even with fewer **else** than **then** parts.)

Explain why the following statement does not parse with this grammar (assume that e is a valid $expr$)**.**

if e **then other if** e **then other else if** e **then other**

Question 1.2 (Left recursion elimination, 5 points)**.** Consider the following grammar:

$$\mathit{lVal} \rightarrow \textbf{id} \mid \mathit{lVal}\ \textbf{(}\ \mathit{lVal}\ \textbf{)} \mid \mathit{lVal}\ \textbf{.}\ \textbf{id}$$

Show the grammar converted to right recursion?

[1] To submit homeworks, log into `home.nyu.edu`, go to Academic → NYU Classes → Compiler Construction → Assignments, and upload your file with answers there. Don't forget to click "submit" before the deadline, just "upload" is not enough.

Question 1.3 (FIRST and FOLLOW, 5 points)**.** Consider the grammar for student grade trails:

$$
\begin{aligned}
\textit{trail} &\rightarrow \textit{grade} \mid \textit{grade}\ \textbf{,}\ \textit{grade} \\
\textit{grade} &\rightarrow \textbf{letter}\ \textit{sign} \\
\textit{sign} &\rightarrow \texttt{+} \mid \texttt{-} \mid \epsilon \\
\textbf{letter} &\rightarrow \texttt{[A-CF]}
\end{aligned}
$$

Compute the FIRST and FOLLOW sets of this grammar.