Compiler Construction CSCI-GA.2130-001 Fall 2011 hw1

Assigned We 9/7/2011, due Fr 9/16/2011 at 1pm.

Reading Assignments

• For lecture on 9/7/2011: Dragon-book 1.1-1.2 (12 pages)
• For lecture on 9/14/2011: Dragon-book 2.1-2.5 (35 pages)

Homework Assignments

1. Language Processors (6 = 3 + 3 points)
   1a. (3 points) Some compilers use C as the target language, instead of assembly or machine code. What advantages does targeting C bring?
   1b. (3 points) On the other hand, what advantages does it bring to compile all the way to assembly or machine code, instead of using C as the target language?

2. Compiler Phases (18 = 3 + 3 + 3 + 3 + 3 + 3 points)
   This question is based on Figure 1.7 on Page 7 of the Dragon-book. Your task is to show the output of each of the compiler phases, but for a different source code statement. The source code statement is price = (sticker - coupon) * tax. We assume that variable coupon has type int, and all the other variables have type float.

   2a. (3 points) What sequence of tokens does the lexical analyzer output?
   2b. (3 points) What abstract syntax tree does the syntax analyzer output?
   2c. (3 points) What is the abstract syntax tree after the semantic analyzer modifies it?
   2d. (3 points) What sequence of three-address instructions does the IR generator output?
   2e. (3 points) What sequence of three-address instructions does the optimizer output? For this question, you can assume that coupon is the constant integer 2.
   2f. (3 points) What sequence of machine instructions does the code generator output? Again, assume that coupon is the constant integer 2. You can improvise your own pseudo-assembler syntax for this question, as long as the overall idea is clear.