Alexandria University
Faculty of Engineering
Computer and Systems Engineering Dept.
Third Year

CS321: Programming Languages and Compilers
Spring 2016
Assignment 1 – Phase 3
Due: Saturday, May 14, 2016

Phase 3: Java Byte Code Generation

Java Bytecode Generation

Objective

This phase of the assignment aims to practice techniques of constructing semantics rules to generate intermediate code.

Description:

Generated bytecode must follow Standard bytecode instructions defined in Java Virtual Machine Specification

http://java.sun.com/docs/books/jvms/second_edition/html/VMSpecTOC.doc.html
http://en.wikipedia.org/wiki/Java_bytecode

Proposed grammars are required to cover the following features:

- Primitive types (**int**, **float**) with operations on them **(+, - , *, /)**
- Boolean Expressions (Bonus marks)
- Arithmetic Expressions
- Assignment statements
- **If-else** statements
- **for** loops (Bonus marks)
- **while** loops

Requirements:

1- Write the semantics rules of the context free grammar described in the problem statement of phase 2.
Use tools like bison http://www.gnu.org/software/bison/ to convert a context-free grammar and semantics rules into a parse tree.

2- The semantics rules are used to output a bytecode that follows the standard java bytecode instructions.

3- Generated bytecode can be tested using any of the tools
Java Bytecode Assembler : http://tinf2.vub.ac.be/~dvermeir/courses/compilers/javaa/
Jasmin: http://jasmin.sourceforge.net/
Both are tools that generate .class files to be run by JVM.

Bonus

Use your own parser generator, implemented in phase 2, instead of Bison.

Useful Links:

http://dinosaur.compilertools.net/bison/bison_6.html
http://alumni.cs.ucr.edu/~lgao/teaching/bison.html

Notes

1- Each group consists of 4 students.
2- Each group must submit the following to the online submission system "http://alexcs.noip.me/CSBox" under Dropbox -> CSBox -> Third -> Compilers -> deliverable03:

1- Your executables and source code
2- A project report: make sure that your report contains at least the following:
   a. A description of used data structures if any.
   b. All algorithms and techniques used
   c. Comments about used tools
   d. Explanation of functions
   e. Any assumptions made and their justification.

Grading Policies

- Delivering a copy will be awfully penalized for both parties, so delivering nothing is so much better than delivering a copy.