CS424: Project Description

April 18, 2018

This course requires the students to do a term project. The projects will be done individually. The project requires you to build a basic compiler front-end. This means that your compiler should be able to read an input source file, perform lexical analysis, parsing, semantic analysis and finally generate code in some machine-independent intermediate form (such as three address code). The compiler should be built using Flex and Bison.

The source language for the compiler is a restricted subset of the C programming language. In addition to the basic features (loops, conditionals etc.) we have already seen in class, it should have

1. Scopes
2. Data types including strings
3. Arrays
4. Type checking.
5. Support for functions.
6. A record or structure type such as the C `struct`.

The language should be expressive enough that you can write a simple program such as bubble sort.

Lexical Analyzer

As a first step in building the compiler you are to write a lexical analyzer for your proposed language using Flex.

Figure out all the tokens your programming language allows and write them out in a Lex file. Submit the Lex file alongwith three example source files. The example source files should contain examples of programs in your intended language. Make sure that the examples cover all features of your language. One of the programs should be an implementation of bubble sort in your proposed language with a separate function for the sorting routine.

Parser

Step two of the project will be to create a parser using either top-down or bottom-up methods. Bottom-up parsers can be built using Bison. You should also have a working handling of data types and scopes.

Final Submission

In the final step you will need to add three address code translation to your parser. As shown in class a common way of doing this is to create a syntax tree and to traverse the tree to generate code. Type checking and other features listed above should be complete.

Due Date

The Flex file and the example programs are due next Monday (April 23). The parser is due next Friday (April 27). Your completed working compiler will be due in the final week of classes.