

CSE 341: Compilers and Interpreters

Project Submission

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1 High level description

The project consists of a compiler (“*mcc*”) that compiles a subset of the C language into SPARC Assembly language.

The compiler consist of three distinct phases:

1. lexical analysis
2. parsing
3. code generation

Type checking and symbol management are done throughout the three stages.

2 The source code

2.1 Management

The source code is managed by *RCS* and compiled using the *make* utility. The source code is divided up somewhat along the lines of the major functions described in section 1:

- `globals.h` – structures, global variables, and function prototypes
- `mcc.l` – flex lexer
- `mcc.y` – bison parser
- `symbol.c` – symbol table management
- `tree.c` – syntax tree management, type checking
- `register.c` – code generation, register allocation

2.2 Compiling

Using the make utility, the code compiles into an executable called `mcc`.

```
$ make
bison -v -d mcc.y
gcc -g symbol.c -c
gcc -g tree.c -c
/usr/local/bin/flex mcc.l
gcc -g lex.yy.c -c
gcc -g mcc.tab.c -c
gcc -g register.c -c
gcc -g -o mcc symbol.o lex.yy.o mcc.tab.o tree.o register.o -lfl -ly
```

3 What works; what doesn't work

The primary weakness of *mcc* is inefficient code generation. Registers are flushed and loaded to and from the stack often; global registers are not used at all; local registers are not used often enough.

Also, global variables were not implemented correctly and dropped. I have also noticed that integer \rightarrow float raising does not occur in some instances; however, it does occur correctly in all the sample programs. I was unable to isolate the source of the problem.

4 Submission

There are three “useful” programs which demonstrate commonly known non-trivial algorithms, and one “useless” program which demonstrates various control structures and expressions.

With each program is the *mcc* source, assembly output from *mcc*, and compile/ runtime shell logs.

1. `fquick` – quick sort
2. `ssort` – shell sort
3. `factorial` – factorial

4. sample – “useless”

Also attached is the full source listing.

5 Acknowledgements

I’d like to thank my roommates for putting up with me talking to myself while wearing a bicycle helmet while doing this project.