CS335A
Compilers Project

C-C++-MIPS Compiler

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FEATURES

IMPLEMENTED

- Native data types
- Variables and Expression
- Conditionals and loops
- i/o functions (stdin/stdout)
- Arrays
- Function and recursion
- User-defined struct and passing and return
- unary minus
- global and local

NOT IMPLEMENTED

- multi level pointers
- library functions
- file i/o
- float

Every feature is implemented up to 3AC generation

AST

- Minimal representation of leaf nodes which can be flattened out to recover the information in the initial C file
- Implementation of all unary (+, -, !, ~, &, *, ++, --), binary, and assignment operators (=, +=, &=, <<=, etc.) alongwith its type (int, float, char, etc.)
- Typecasting handled at all levels (implicit as well as while assignment or function parameter passing etc.)
- No loss of information even for very long string constant in the user program

3AC

- Function beginning and ending handled by defining labels
- Return statements can be empty, variable, assignment, array elements, or struct/struct members
- Direct assignment (a=1) and variable assignment (a=b) handled separately to allow optimizations if possible
- Specialized error messages to easily track any type errors or function definition/declaration issues

Target Instructions

- Defined functions to scan and print integers
- All relops implemented in target language
- Struct assignment, passing, and return supported

Optimizations

- Used 17 registers (t0-t9, s2-s8) to handle all the operations
- No jumps over jumps in the final generated 3AC
- Nextuse for efficient register allocation
- Constant unfolding attempted

References

- http://www.quut.com/c/ANSI-C-grammar-l.html
- http://www.quut.com/c/ANSI-C-grammar-y-2011.html
- http://logos.cs.uic.edu/366/notes/mips%20quick%20tutorial.htm
- http://reliant.colab.duke.edu/c2mips/
- http://xahlee.info/parser/dragon_book_table_of_contents.html