

CS335: Milestone 5

Group 14

Members:

| Name | Roll No. | Email | Contribution |
|-------------------|----------|---------------------|--------------|
| Supreeth Baliga | 180801 | supbal@iitk.ac.in | 20% |
| Chinmay Goyal | 180206 | chinmayg@iitk.ac.in | 20% |
| Aaryan Srivastava | 180007 | aaryans@iitk.ac.in | 20% |
| Nikhil Agarwal | 180475 | nikhilag@iitk.ac.in | 20% |
| Sanchit Agrawal | 180664 | sanagrwl@iitk.ac.in | 20% |

Source Language (S): *C*

Implementation Language (I): *Python3*

Target Language (T): *X86 Assembly - 32 bit: AT&T Syntax*

Repo Link: <https://github.com/SupreethBaliga/Compilers/>

Directory Structure:

```
TOP
├── src/
│   ├── helpers/
│   │   └── libstring.a (Archive file for string functions)
│   ├── lexerClass.py (Lexical analyser of the compiler)
│   ├── parserClass.py (Creates the AST, does semantic analysis and emits TAC)
│   ├── SymbolTable.py (Handles all functionality related to symbol table)
│   ├── TypeTable.py (Handles all functionality related to type table)
│   ├── TAC.py (Handles all functionality related to three address code)
│   └── codeGen.py (Converts the TAC to Assembly code)
├── tests/
│   └── (Contains all tests for respective milestones)
├── PDFs
│   └── (Contains the corresponding PDF files for milestones)
├── requirements.txt
├── install.sh (Script file to setup dependencies)
├── lex.sh (Script file to run just the lexer)
├── c-- (This is the main script file with which you run the compiler)
├── README.md
└── .gitignore
```

Instructions to run:

- Install all the python modules and set up virtual environment by executing `$./install.sh`
- Activate the virtual environment by running: `$ source venvcompiler/bin/activate`
- To use the compiler execute `$ bash c--` and provide the test file(s) as command line arguments

Main Features supported by our compiler:

- Handles data types like char and int (bool can be treated similar to a char)
- Supports usage of derived data types arrays (multidimensional), structs and pointers
- Handles type checking and precedence of operators
- Support for short circuit evaluation
- Handles nested if-else, iterators, loops and conditionals
- Supports any number of parameters passed to the function and handles recursion
- Scales well to size of the expressions
- Supports usage of basic functions like printf, scanf, malloc, sizeof and free

Basic Features NOT supported by our compiler:

- Function declarations are not allowed. Only function definitions are allowed
- Array initializations are not allowed (Workarounds exist for char arrays)
- Only static integers are supported and they should be initialised with a non-negative integer. Global variables cannot be initialised while declaring.
- Pointer arithmetic is not supported (Workarounds exist)
- File I/O is not handled

Advanced Features supported by our compiler:

- Mixing of declarations and statements, unlike ANSI C
- Support for multiscoping and multi-level pointers
- Support for static integer variables and global variables
- Handles floating point integers and all it's operations
- Avoids generating redundant labels by the use of backpatching
- Dynamic memory allocation/management
- The stack pointer is set in an inline manner according to the current scope (This reduces number of instructions)
- Added support for using functions from the math library and string functions

Output of '\$ git show final':

```
commit 51cd4610c549bd93ff54524a77e58da350778714 (HEAD -> main, tag: final, origin/main, origin/HEAD)
Author: Supreeth Baliga <supreethbaliga@gmail.com>
Date: Tue May 11 20:43:51 2021 +0530
```

PPT added

```
diff --git a/PDFs/CS335-Group14.pdf b/PDFs/CS335-Group14.pdf
new file mode 100644
index 0000000..32db776
Binary files /dev/null and b/PDFs/CS335-Group14.pdf differ
diff --git a/tests/Milestone5/test9.c b/tests/Milestone5/test9.c
index 7bba976..15068fe 100644
--- a/tests/Milestone5/test9.c
+++ b/tests/Milestone5/test9.c
@@ -19,7 +19,7 @@ void odd(int k) {
 }

int main() {
-   printf("TC for Odd Even Recursion:\n")
+   printf("TC for Odd Even Recursion:\n", 0);
   int k;
   scanf("%d", &k);
   if (k%2) odd(k);
```