

# Programming Assignment 4

Set up your VirtualBox VM if you need to; please see the page [Getting started with the VM.PDF](#) for instructions. If you have already done the previous assignments you can use the same VM.

Next, download the [PA4.PDF](#). In addition to the assignment requirements, It has information about how to get the starter code up and running.

**Please note that this assignment is about as complex as the previous assignment, i.e. significantly more difficult than the first two.**

## IMPORTANT NOTES:

- The assignment numbers are offset by 1. **Even though this is assignment 4, the directory that you will get the starter code from is named "PA5" for the C++ version and "PA5J" for the Java version.**
- **If you are using Java, once you run the make command that checks out the starter code, you will need to make a change before the code will compile.** A few changes need to be made in the files `ASTParser.java` and `ClassTable.java` (which you should not otherwise modify); in particular, every instance of the class name `"formalc"` needs to be replaced by `"formal"`, every instance of `"class_c"` needs to be replaced by `"class_"`, and every instance of `"programc"` needs to be replaced by `"program"`. Running the following command in the assignment directory will make these changes automatically:

```
perl -p -i.bak -e  
"s/formalc/formal/g;s/class_c/class_/g;s/programc/program/g" ASTParser.java ClassTable.java
```

Here are some more useful resources:

- [The Cool Reference Manual.PDF](#)
- [A Tour of the Cool Support Code.PDF](#) In particular, look at section 6 "Abstract Syntax Trees", section 7 "The Runtime System", and section 8 "The Garbage Collector".
- Some additional [Other Project Resources.PDF](#) including miscellaneous documentation.

As with the first three assignments, the examples are in the directory `/usr/class/cs143/examples`. Please copy these into your project directory if you wish to use them.

The correct version of `spim` is at `/usr/class/cs143/bin/spim`.

Once your code generator works, you should be able to compile the examples using your code generator and run them. As an example, the following should work (some output omitted):

```
$ make cgen
...
$ cp /usr/class/cs143/examples/hello_world.cl .
$ ./mycoolc hello_world.cl
$ /usr/class/cs143/bin/spim hello_world.s
SPIM Version 6.5 of January 4, 2003
Copyright 1990-2003 by James R. Larus (larus@cs.wisc.edu).
All Rights Reserved.
See the file README for a full copyright notice.
Loaded: /usr/class/cs143/lib/trap.handler
Hello, World.
COOL program successfully executed
Stats -- #instructions : 154
#reads : 27 #writes 22 #branches 28 #other 77
```

## How to Submit

1. Download the grading script from [here](http://spark-university.s3.amazonaws.com/stanford-compilers/scripts/pa4-grading.pl) and put it in the directory in which you are doing the assignment (where the `cgen.cc` or `Cgen.java` file is). The easiest way to do so is to go to your assignment directory, and run in the VM:

```
wget
http://spark-university.s3.amazonaws.com/stanford-compilers/scripts/pa4-grading.pl
```

or

```
wget
https://lagunita.stanford.edu/assets/courseware/v1/4842ecf0218c19f520fb27e695a797e4/c4x/Engineering/Compilers/asset/pa4-grading.pl
```

This will save the script (`pa4-grading.pl`) in your assignment directory.

2. Run the script by typing

```
perl pa4-grading.pl
```

Note that you can also make the script executable by running `chmod a+x pa4-grading.pl` first, and then running it directly as `./pa4-grading.pl`

3. The script will give you a grade at the end, as well as a submission code. If you want to figure out why your code generator is failing certain tests, the tests will be put in the `./grading` subdirectory. The output from your code will be in the `./grading/test-output` directory.
4. Once you are satisfied with your grade, click on the arrow above or beneath to go to the "Programming Assignment 4 Submission" quiz. You can use [this link](#) to go directly to the quiz. Copy-and-paste the code from the script (to copy from the terminal in VirtualBox, use `ctrl+shift+c`) into the "Submission code:" box. Once you submit the quiz, your score should appear for the quiz. You can also resubmit the quiz if you wish to update your grade.