

# CS4215 Programming Language Implementation

## Lab task for Week 05

### A Virtual Machine for simPL

1. Download the file <http://www.comp.nus.edu.sg/~cs4215/labtasks/week5.zip>, and extract it to the Eclipse workspace folder. The workspace folder should now contain a file `cs4215_week_5`.
2. In Eclipse, go to “File”, “New”, “Project”, “Java Project”, “Next”, and choose “`cs4215_week_5`” as “Project name”. Press “Finish”.
3. Use the “Run Configurations” to run `simPLcompiler.simplec` with a file name (for example `test.simpl`) as “Program argument”. The file should contain a single integer, say 123. The compiler should reply:

```
sVML code written to test.svml
```

Now, you can interpret the compiled program using the virtual machine by running `simPLvm.simpl` with the base name of the file you just compiled (in the example `test`, resulting in `123`).

Note that the given virtual machine in `VM.java` cannot handle division (`DIV`), jumps (`GOTO`, and `JOF`), variables (`LD`), function definition (`LDF`), recursive function definition (`LDRF`), application (`CALL`) and returning from a function (`RTN`). It is your task to complete the virtual machine by covering the entire instruction set given in `sVML`, except `LDRF`. Follow the notes closely, and note the differences between the paper specification of compiler and VM (relative addressing and symbolic names) and the actual implementation of the compiler and VM (absolute addressing and vector environments), also described in the notes.

Your implementation needs to return the correct value  $v$  for any well-typed `simPL4` expression  $E$  without `recfun`, if and only if  $\emptyset \Vdash E \mapsto v$ . Make sure that  $\perp$  values are handled properly; division by zero produces an instance of the class `ErrorValue`.

4. Submit the resulting file

- `VM.java`

from your folder `simPL` in the IVLE workbin “Lab Tasks Week 5”.

Make sure that you do not change any other files when you test your programs.

Suggestion: When you are done with the solution, save your four files in a secure place. Then download a fresh copy of the lab task, and place your three files into that copy. Then re-do your tests.