

# PY 421 - Introduction to Computational Physics

## Homework # 2. February 1, 2013.

Due at 3PM on Friday February 8.

For this assignment you have to translate into Fortran the code shoot.c You should write a single Fortran program, let us call it shoot.f90, which produces the same results as shoot.c.

### *Hints:*

1) Take advantage of the features of the Emacs editor. For example, you might start by typing `PROGRAM shoot` on the first line and `END` a few lines below. If you hit Tab then on the line with `END` Emacs will generate the completion to `END PROGRAM shoot`. Similarly with the end commands after a do loop, an if statement etc. Also use Tab to properly indent the lines in your program.

2) Compile frequently. After you have written a few lines of code, you may save the current program with Ctrl-X Ctrl-S and compile with:

```
gfortran -c shoot.f90
```

The compiler will give you messages if there are errors in the code, indicating also the lines where the errors have occurred. You can go back to those lines by scrolling in Emacs (the blue bar shows the line number), or by using the Esc x goto-line command (on some Emacs editors Esc g will be a short-cut for Esc x goto-line) to go to the desired line. It is much better to compile the incomplete program (of course do loops, if statements and the like must be closed, otherwise the compiler will give an error message) to get rid of the errors as you progress, than to write the whole program, possibly having to eliminate many errors at one time.

3) Checking the results: The two programs shoot.c and shoot.f90 should produce the same result. If you want to run them both, make sure to give different names to the executables, for example with:

```
gfortran shoot.f90 -o shootf90
```

If you do not get the same result, as a simple debugging procedure you may insert a print statement in the two codes to print out variables which should take the same value and stop the program immediately after.

In the Fortran program the lines to insert would be:

```
PRINT *,a,b ...  
STOP
```

while in the C program you would insert:

```
printf("%f, %f \n",a,b ...):  
exit(0);
```

This may allow you to see where the two programs begin to give diverging results.

4) In any case, you should not spend an excessive amount of time trying to make your program work correctly. Rather get in touch with me for help.

### **Returning the assignment:**

Since this time you will be returning a single file, you should not use the tar command: you should simply copy the file with your program to your asgn2.xxyyyy file. Thus, if you called the file with the Fortran code shoot.f90, on any of the CAS 327 workstations you should simply execute the command

```
cp shoot.f90 ~rebbi/courseware/asgn/asgn2.xxyyyy
```

where xxyyyy stands for your personal identifier.

I remind you that you must type ~rebbi/courseware/asgn/asgn2.xxyyyy in full. You cannot use the tab key to complete the name of the file.

For students working on their own personal computers or laptops, within the bu.edu domain it should also be possible to use the scp command to copy the assignments onto the asgn files, e.g., you should be able to copy it remotely by the command

```
scp shoot.f90 yourusername@327lfs:~rebbi/courseware/asgn/asgn2.xxyyyy
```

### **Grading:**

A correct solution to this assignment will be given a score of 100, with points deducted for mistakes or poor code presentation, according to the severity of the error.