This is your final project and your OWN work. This means closed classmates, but not closed book/notes/internet 😊

For this final exam, you will choose a language, other than C++, to explore. You will write a simple “hello world” program and attempt to rewrite one of your six assignments or any lab from the class in that language. Lastly, you will describe the similarities and differences between the new language you learned and the C++ language. Below is a list of languages that are on access.engr.oregonstate.edu, along with the compiler/interpreter to use:

- C, gcc
- Fortran, gfortran
- Python 2, python
- Java, javac
- Lisp, sbcl
- Scheme, guile
- Haskell, ghc
- Perl, perl
- PHP, php
- Ruby, ruby
- Unix Shell (bash, csh, tcsh)
- Gforth, gforth

If you want more information on these, then you can use man to see more about the compiler/interpreter, man javac, man sbcl, man python, etc. If you are curious about support for a language not on this list, then use apropos and the language to see if we have a compiler/interpreter for it, i.e. apropos pascal.

**25 pts** You must write a correct “hello world” program in the language you choose, and you will attempt to rewrite one of your assignments or labs from this class in that language (you will not be graded on correctness). You will turn in both the programs, the “hello world” and the rewrite, and remember to turn in the source files!!!

**70 pts total** Each report must contain an intelligent analysis of the following areas:

- Compiled vs. Interpreted (10 pts)
  - Definition – what does compiled and interpreted mean?
  - C++ Language – state whether C++ is compiled or interpreted.
  - New Language – state whether your language is compiled or interpreted.

- Declaring Variables/Pointers (10 pts)
  - Location and Type – state whether your language restricts you to the location of where you can declare variables in the code and whether the new language supports pointers/references to memory locations.
  - Syntax – provide the syntax for declaring a variable in the new language. If supported, give the syntax for declaring a pointer and how you would allocate the memory to assign to the pointer.
  - Comparison – state the similarities and differences between the way C++ and the language you chose declare variables, i.e. dynamic vs. static typing.
• **Control Structures (10 pts)**
  o **If/Else** – provide the syntax for writing an if/else statement in the new language.
  o **Switch/Case** – state whether your language supports switch/case statements
  o **Comparison** – state the similarities and differences between the way C++ and the language you chose express if/else statements and the kind of control structures they do support.

• **Repetition (10 pts)**
  o **Syntax** – provide the syntax for writing a loop in the new language.
  o **For, While, Do…While, Recursion** – discuss which of these types of loops are and are not supported by your new language.
  o **Comparison** – state the similarities and differences between the way C++ and the language you chose express loops and the kind of loops supported, e.g. foreach loops are in some languages.

• **Functions (10 pts)**
  o **Pass by Reference vs. Value** – discuss whether your language supports functions and whether the language supports pass by reference, value, or both.
  o **Syntax** – provide the syntax for defining a function in your new language and the syntax for calling the function. If your new language supports pass by value and pass by reference, then provide the syntax for these differences when defining and calling the function.
  o **Comparison** – state the similarities and differences between the way C++ and the language you chose express functions and the ways they pass variables to functions.

• **Arrays (10 pts)**
  o **Static vs. Dynamic** – discuss whether your language supports static and/or dynamic arrays.
  o **Syntax** – provide the syntax for declaring an array in your new language. If you can declare an array statically and dynamically, then provide the syntax for both, including the syntax for allocating memory.
  o **Comparison** – state the similarities and differences between the way C++ and the language you chose express arrays, initialize arrays at the time of declaration, and pass arrays to functions.

• **Structs/Classes (10 pts)**
  o **Struct vs. Class** – discuss whether your language supports structures and/or classes.
  o **Syntax** – provide the syntax for defining a struct and/or class in your new language. In addition, add the syntax for declaring a struct or object.
  o **Comparison** – state the similarities and differences between the way C++ and the language you chose express define and declare structs and objects, as well as how structs and/or objects are passed to functions.

(5 pts) In addition, please provide a self-reflection paragraph, which includes the following:
  o What did you learned from this final exam?
o Did it help or hinder your learning of how to program?
  o Would you recommend this final for future classes?

You need to submit two source files, the “hello world” program and the rewritten program, and your report, as a pdf, to TEACH.

I enjoyed your class, and I hope you all have a great winter break!!!