**Project title:** Language Interpreters—case study in Python Virtual Machine [CPython]

**Team members:** Ryan Eggert

**Brief description of project (1-3 paragraphs):**

Python, unlike C, is typically interpreted instead of compiled. When one writes a program in C, he compiles it and produces a file of machine-specific instructions. These instructions are able to be run directly on the processor of the computer compiled on. Python, however, is usually turned into an interpreter-specific bytecode which is read by a ‘virtual machine’ and translated into machine-specific instructions at runtime.

I wish to examine python implementations (likely starting with reference CPython), specifically the bits of C which drive the PVM. If possible, I would like to develop a way of seeing the instructions generated by the PVM to be run by the CPU.

This project also has the possibility of exploring other important facets of python implementations such as the global interpreter lock and its effect on threading/parallel processing.

**2-3 references you plan to use**

Python source code, especially ceval.c, “Python” directory

<http://cython.org/>

<https://docs.python.org/3.3/library/dis.html>

**Deliverables:**

The minimum deliverable would be a document.

Minimum:

* Description of CPython Python interpretation/running process
* Description of Python bytecode instructions

Planned:

* Comparison of generated python bytecode instructions with C/C++ compiled assembly for two equivalent programs (one in Python, one in C/C++)
  + Ideally would compare assembly instructions [gcc –S …], but this depends on being able to get python assembly/machine code.

Stretch:

* Tool to view processor instructions for a given Python program.
  + Could be done by modifying python source code [C]?
* This may also require an overview of the instruction set used by Olin laptops.
* Cross-compile python for MIPS
  + If we find a way to visualize the instructions from the interpreter, see if we can get MIPS instructions, which we personally recognize.
  + This area would need much more research.

**Work plan (by Tuesday)**

*[Pending project discussion]*