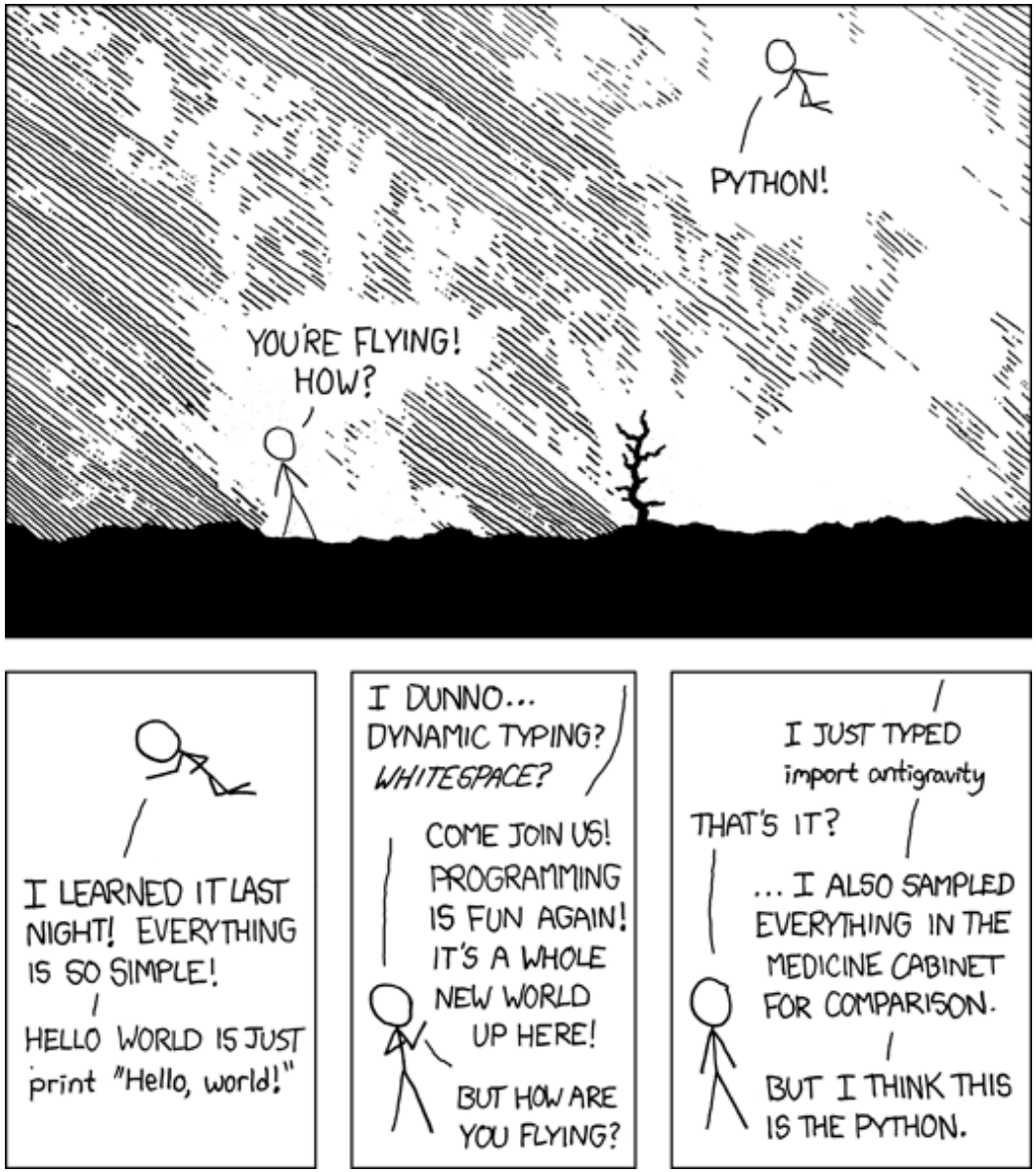

http://xkcd.com/353/

Python

- Python is a general-purpose programming language, meaning you can write any kind of program in Python.[1]
  - The opposite of a general purpose language is a domain-specific language, which is designed for one kind of application. Later we'll learn a domain-specific langauge called SQL which is just for manipulating relational databases.
- Python is interpreted, meaning you can run programs directly after you write them; you don't have to compile programs to some intermediate form for the operating system or a virtual machine to execute.

[1] Python was named for Monty Python, of which Python's creator, Guido van Rossum, is a big fan. This is the single coolest thing about Python.

Python

- Python is dynamically typed, meaning you don't have to specify the types of variables in Python code (you'll see what this means soon).
- Python was designed to be easy to learn and use.
- The Python community is huge, which means there are plenty of people to help you with Python, and tons of libraries for all kinds of applications, from web servers to video games.

These properties make Python an excellent tool to add to an engineer's tool box.

The `python3` Program

Practically speaking, Python is a program on your computer that interprets Python programs and statements.[2]

- You can ask `python3` a question without running any Python code. For example, this is how you ask which version of Python is installed (Note: the `$` character is the command prompt in the Unix Bash shell. The Windows command prompt is `C:\>`.):

```
$ python3 --version
Python 3.4.0
```

  If you get some other response, like `command not found`, then you haven't properly installed Python.

[2] Note that there are two versions of Python in wide use: Python 2 and Python 3. The `python` program is Python 2, the `python3` program is Python 3. In this course we use Python 3.

Executing Python Code with `python3`

- You can run a Python program, which has a `.py` extension by convention:

```
$ python myprogram.py
```

- Or you can invoke the interactive Python shell (sometimes called REPL for "Read-Eval-Print Loop"):

```
$ python3
Python 3.4.0 (v3.4.0:04f714765c13, Mar 15 2014, 23:02:41)
[GCC 4.2.1 (Apple Inc. build 5666) (dot 3)] on darwin
Type "help", "copyright", "credits" or "license" for more
    information.
>>>
```

To exit the Python shell type Ctrl-D on Unix, or Ctrl-Z on Windows.

Our First Python Program

Open your text editor, paste the following code into a buffer (or tab or window or whatever your editor calls it), and save it as `hello.py`:

```
print("Hello, world!")
```

Then open your command shell (terminal on Unix or CMD.exe on Windows), go to the directory where you saved `hello.py` and enter:

```
$ python3 hello.py
```

`Hello, world!` will be printed to the console on the next line.

Interpreting Python Programs

What happened when we entered `python3 hello.py` at an operating system command shell prompt?

1. `python3` told the operating system to load the python interpreter into memory and run it. `python3` is the name of an executable file on your hard disk which your OS can find because its directory is on the `PATH`
2. We invoked `python3` with a *command line argument*, which `python3` reads after it starts running
3. Since the command line argument was the name of a file (`hello.py`), the `python3` program treated the file as a Python program, or script, and read the file line by line, executing the Python statements in the file
   - A Python program, or script, is just a sequence of Python statements

The Python REPL

Invoke the Python interactive shell by entering `python3` at your command shell's prompt without any arguments and type in the same line we put in `hello.py`:

```
$ python3
Python 3.4.0 (v3.4.0:04f714765c13, Mar 15 2014, 23:02:41)
[GCC 4.2.1 (Apple Inc. build 5666) (dot 3)] on darwin
Type "help", "copyright", "credits" or "license" for more information.
>>> print("Hello, world!")
Hello, world!
>>>
```

`>>>` is the command prompt for the Python REPL.

- The Python interactive shell is also called a REPL, for Read Eval Print Loop, becuase it runs the following loop: **R**ead an expression or statement at the command prompt, **E**valuate the expression or execute the statement, and **P**rint the result to the console

We'll spend a lot of time in the REPL.

A Python Programming Ecosystem

For now this is all you need to program in Python:

- a correctly installed `python3`,
- a text editor to create and edit Python programs, and
- a command shell in which to invoke `python3`.

If you don't have these, install them ASAP.