What language will we learn?

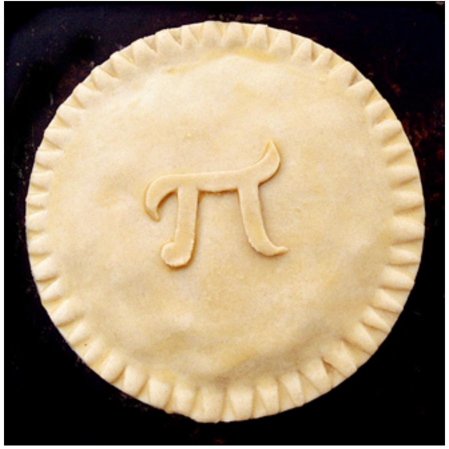
- http://www.python.org/
- Python is a *multi-paradigm* language
  - Procedural
  - Functional
  - Object-Oriented
- Simple, huge libraries, widely used
- Guido is BDFL

Why is it called Python?

- http://www.youtube.com/watch?v=anwy2MPT5RE

B

MONTY PYTHON'S PERSONAL BEST



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Python vocabulary

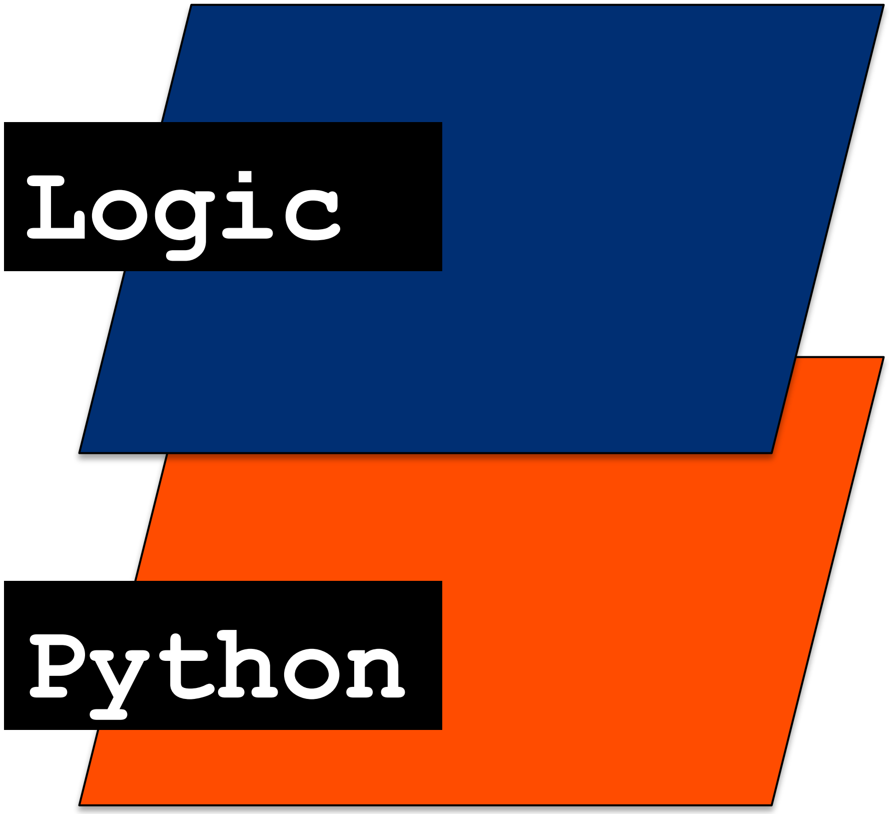
- Python has a large standard library
  - Organized in *modules*: sys, io, math, os, …
  - http://docs.python.org/library/index.html
  - API browseable online, but Eclipse IDE helps a lot

- Python users often use third-party libraries too
  - Scientific, visual, plotting, …
  - We will use EPD: Enthought Python Distribution

- Python is a multi-paradigm language, though this won't matter so much in the beginning
  - Very useful later!

Writing Functions and Programs

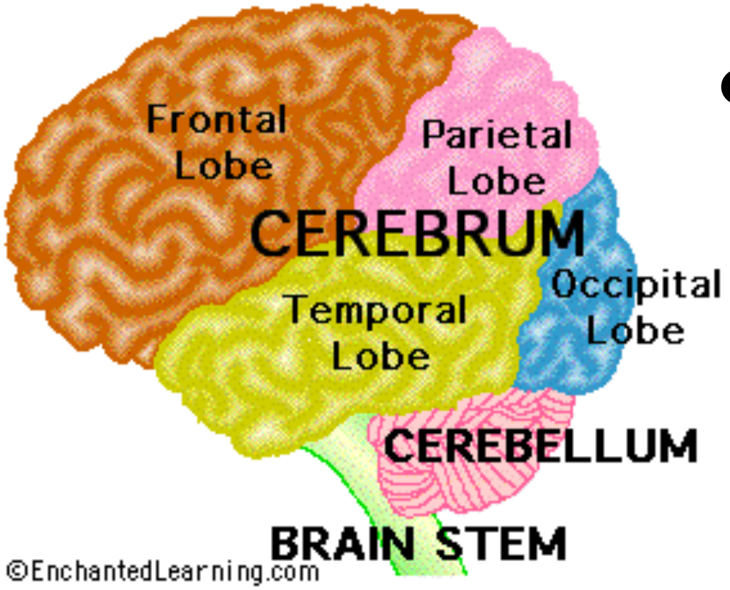
- Programming is about thinking and syntax



Logic

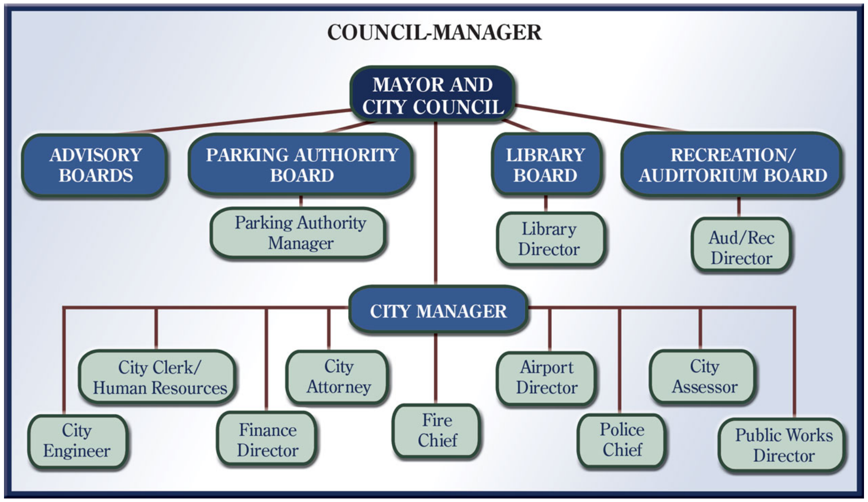
Python

Metaphors for Functions



- **When your brain learns, a hard task become rote**

- **Delegation to others who can do a task, they may delegate as well**



Functions: abstractions over code

- Naming something gives you power
  - How do you read a file into a string?
  - What is length of a string? Of a list?
- We can write and call functions
  - Store in module, import and re-use functions
  - Import standard modules and use functions from them
  - Parameters allow customization of results
- Abstraction
  - Functions allow programming at higher and higher levels

Anatomy of a Python function

```
def name(params):
    body
```

- Define function by providing
  - Name
  - Parameters
  - Definition (body of function)

- Defining function is also creative
  - How to decide on name?
  - Do we need parameters?
  - How much should function do

2.8

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Running Python

- Python is an interpreter, platform specific
  - So is Java, so is Android, … contrast compilers
  - Python can execute a .py file, need a "launch point"

- Can run in Eclipse Console Window
  - How to start? What to type?
  - Also run on command-line, e.g. simple Mac/Linux

- Can import code into another module/.py file
  - Understand how your Python code is executed
  - Understand where Python code is and how it got there

Eclipse Particulars

- Supports many languages: we care about Python
  - PyDev perspective: Windows>Open Perspective>Other>…
  - Also use console: Windows>Show View>Console
  - Use PyDev console (right click console icon)
- Preferences are per project or per 'concept'
  - Interpreter for Python? Color for code? Indentation?
  - See Preferences (Windows/Windows, Mac/Eclipse)
- Creating projects, Python Module

Flow of Control

- Programs execute one line at a time
  - After one statement finishes, the next executes
  - Calling a function causes its code to execute
    - What happens in the code that calls the function?

- How do we alter control of execution?
  - Conditionally execute code in certain situations
  - Repeatedly execute code for set # times or until condition
  - Blocks of code are indented, following :
    - Functions, if/else, loops, other …

Anatomy of a Python Loop

```
for var in group:
    body
```

- Define loop by providing
  - Group of things used to control repetition
  - Variable to hold current value during this iteration
  - Code to be repeated (body of loop)

- Separation of concerns
  - Group can be many things: numbers, list, image, file, etc.
  - Calling function in loop body makes reasoning easier
  - Do For Each: many different "kinds" of loops

Big Ideas Summarized

- This has been a quick tour of programming
  - We will explore these ideas in much more detail

- Big ideas
  - Functions allow us to divide and conquer problem
  - Parameters allow us to generalize our solutions
  - Loops allow us to scale our solution easily

Alan Kay

- Turing award 2003
  - OO programming, Dynabook
- "The best way to predict the future is to invent it"
- "Americans have no past and no future, they live in an extended present."

I think the main thing about doing ...any kind of programming work, is that there has to be some exquisite blend between beauty and practicality. There's no reason to sacrifice either one of those, and people who are willing to sacrifice either one of those, I don't think really get what computing is all about.