Python Next Steps

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- Functions and Libraries
- Structuring Python Code
- Interacting with the web in Python

Built-in Python Functions

- We have already used some built-in functions, e.g. range()
- A fuller list can be found here http://docs.python.org/2/library/functions.html

```
# Text-based Mandelbrot set generator
# Play with the values of 'centre' and 'realsize'
# to explore the set.
# Author: Alan Davies
# Taken from http://wiki.laptop.org/go/Pippy#Mandelbrot_Set
centre, realsize, maxiter = -.3+0j, 2.8, 50
width, height, aspect = 60, 30, 1.9
charmap = "abcdefghijklmnopqrstuvwxyz"
for y in range(height):
    output = ""
    for x in range(width):
        real = (float(x)/width-.5)*realsize
        imag = (float(y)/height-.5)*aspect*realsize*height/width
        z = c = complex(real, imag) + centre
        iterations = 0
        while abs(z) < 2 and iterations < maxiter:
            z = z**2 + c
            iterations += 1
        if iterations == maxiter:
            output += " "
        else:
            output += charmap[iterations%len(charmap)]
    print output
#Functions are range, float, complex, abs, len and print – in Purple in IDLE
# More on Mandelbrot in Python, see http://preshing.com/20110926/high-resolution-mandelbrot-in-obfuscated-python
```

Python Standard Library

- The python Standard Library includes Numeric and Mathematical Modules (e.g. random), File and Directory Access, Generic Operating System Services (e.g. time), Internet Protocols and Support (e.g. urllib2)
- For a full listing, see http://docs.python.org/2/library/
- Simple example using urllib2:

```
import urllib2
page_content =
urllib2.urlopen("http://www.bcs.org").read(100)
print page_content
```

User Defined Functions

- Example of a simple function to printout the Fibonacci series first n elements

```
def fib(n):
 a,b = 0,1
 print a
 for i in range(n-1):
  a,b = b,a+b
  print a
 return a
fib(10)
```

- Functions can be recursive so try re-writing this so it uses recursion.

Basic Python Structures

- Functions are Python code containers that can return a result.
- Modules are containers for code and functions.
- Built-in functions and user-defined functions can be imported from previously developed modules using import, e.g.

  import module_name or

  from module_name import specific_function(s)

Definitions

- Script ... "Therefore, if you want to write a somewhat longer program, you are better off using a text editor to prepare the input for the interpreter and running it with that file as input instead. This is known as creating a *script*."
- Module ... "the basic unit of code reusability in Python: a block of code imported by some other code. Three types of modules concern us here: pure Python modules, ..., and packages."
- pure Python module ... "a module written in Python and contained in a single .py file ... Sometimes referred to as a “pure module.”"
- package ... "a module that contains other modules; typically contained in a directory in the filesystem and distinguished from other directories by the presence of a file __init__.py."

(Reference: http://wiki.sugarlabs.org/go/User:Quozl)

- More examples at http://docs.python.org/2/tutorial/modules.html

Exercise

- Review GitHub, using helpful link recommended by Lucy Hunt at https://help.github.com/categories/54/articles
- Inspect the Python projects available and fork and clone one to examine on your system, looking at their use of functions and libraries as well as how the Python code has been structured into files.