

Introduction to Jupyter Notebook

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Unidata Python Workshop

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Overview

- Brief overview of Jupyter Notebook
 - What is it?
 - How do you use it?
- Examples of basic Jupyter Notebook Usage.
- Discuss some Advanced Jupyter Notebook Uses.

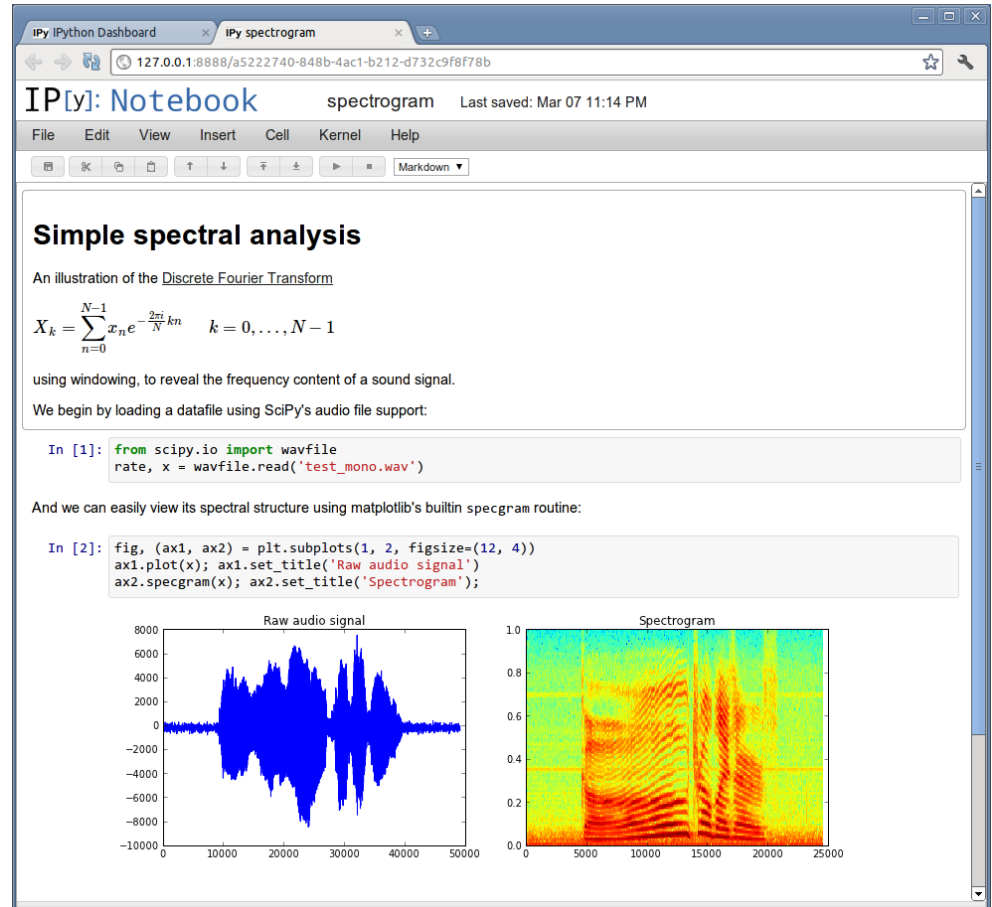
Overview

- We will not be going too in-depth with what you can do in regards to using Jupyter Notebooks for actual science.
- You will be seeing that throughout the rest of the workshop.

Remember IPython Notebook?

“The IPython Notebook is a web-based interactive computational environment where you can combine code execution, text, mathematics, plots and rich media into a single document”

<http://ipython.org/notebook.html>



What is Jupyter Notebook?

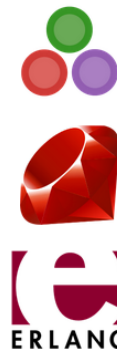
(...) the language-agnostic parts of the project: the notebook format, message protocol, qtconsole, notebook web application, etc. will move to new projects under the name Jupyter.

IPython itself will return to being focused on interactive Python, part of which will be providing a Python kernel for Jupyter. IPython 3.0 contains some indications of the project transition, including the logo in the notebook web UI being that of Jupyter.



Evolved from the IPython Project

The language-agnostic parts of IPython are getting a new home in Project Jupyter



And More

What is Jupyter Notebook?

- Jupyter Notebooks has two components:
 - The Jupyter Notebook server
 - Individual Notebooks (.ipynb)

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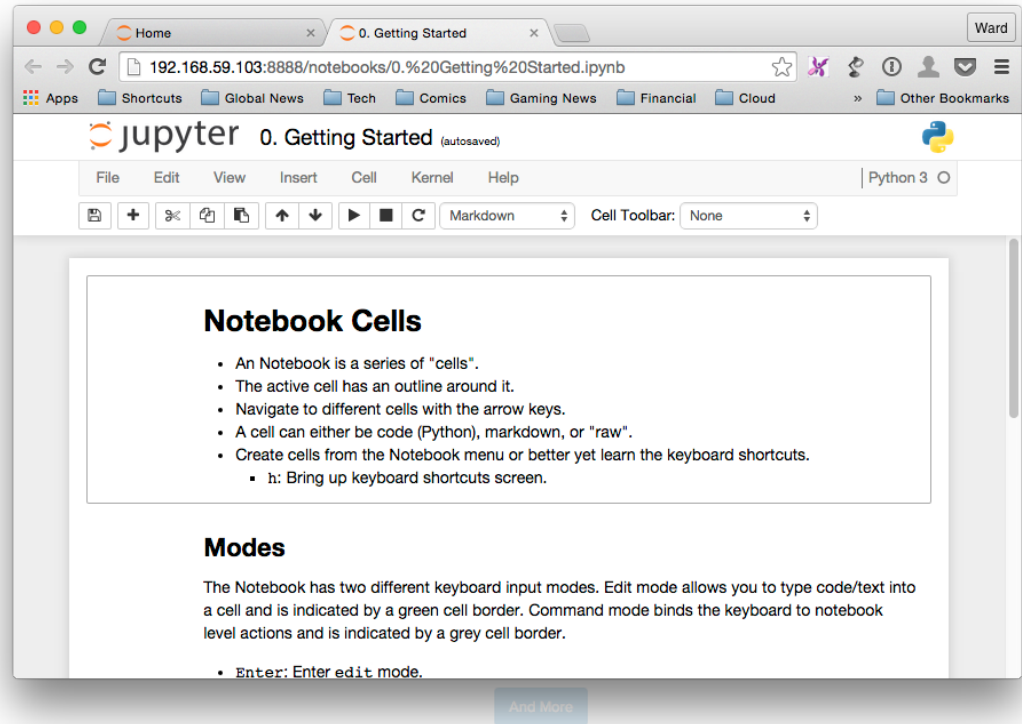


And More

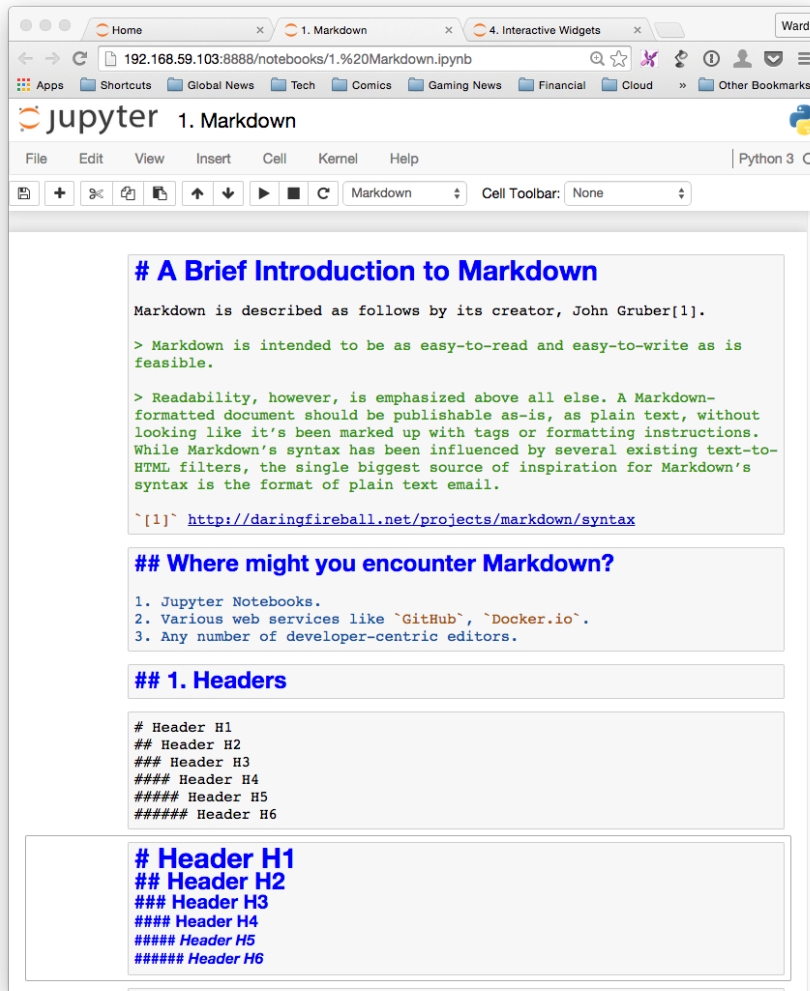


Jupyter Notebooks

- An Jupyter Notebook is a collection of *cells*.
- Markdown
- Code
- “Raw” - Raw cells are left ‘as is’ and are not processed.



Markdown Cells



Home 1. Markdown 4. Interactive Widgets Ward

192.168.59.103:8888/notebooks/1.%20Markdown.ipynb

jupyter 1. Markdown Python 3

File Edit View Insert Cell Kernel Help

Markdown Cell Toolbar: None

```
# A Brief Introduction to Markdown

Markdown is described as follows by its creator, John Gruber[1].

> Markdown is intended to be as easy-to-read and easy-to-write as is
feasible.

> Readability, however, is emphasized above all else. A Markdown-
formatted document should be publishable as-is, as plain text, without
looking like it's been marked up with tags or formatting instructions.
While Markdown's syntax has been influenced by several existing text-to-
HTML filters, the single biggest source of inspiration for Markdown's
syntax is the format of plain text email.

`[1]` http://daringfireball.net/projects/markdown/syntax
```

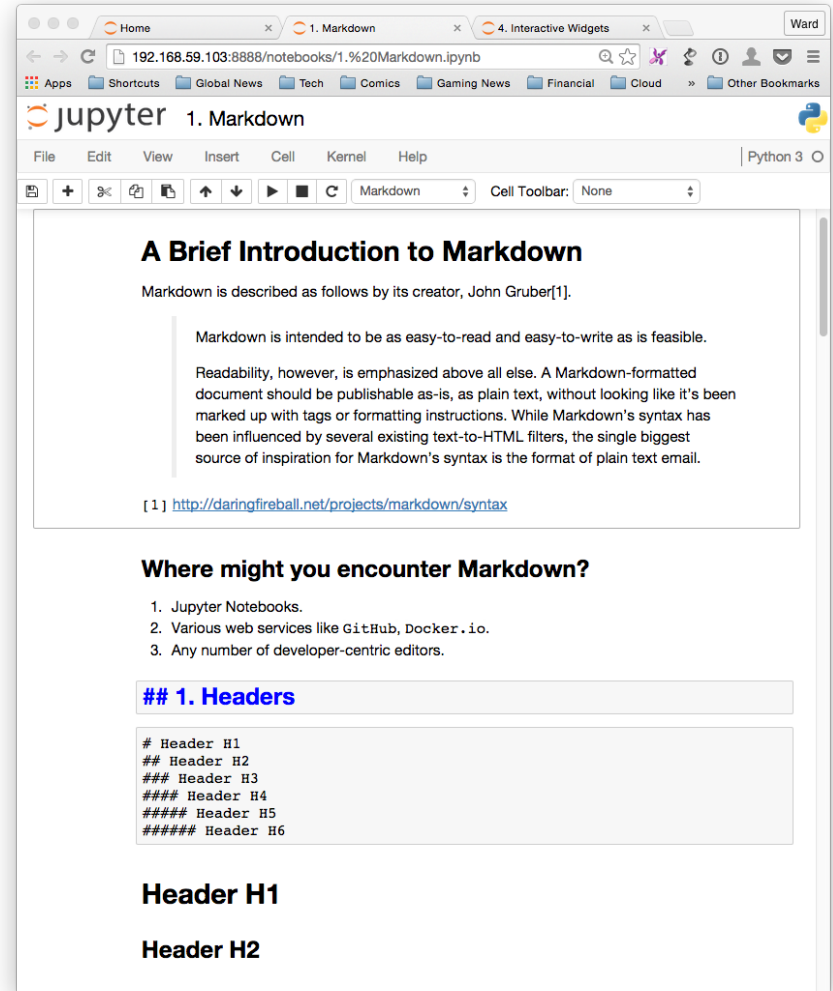
```
## Where might you encounter Markdown?

1. Jupyter Notebooks.
2. Various web services like `GitHub`, `Docker.io`.
3. Any number of developer-centric editors.
```

```
## 1. Headers

# Header H1
## Header H2
### Header H3
#### Header H4
##### Header H5
##### Header H6
```

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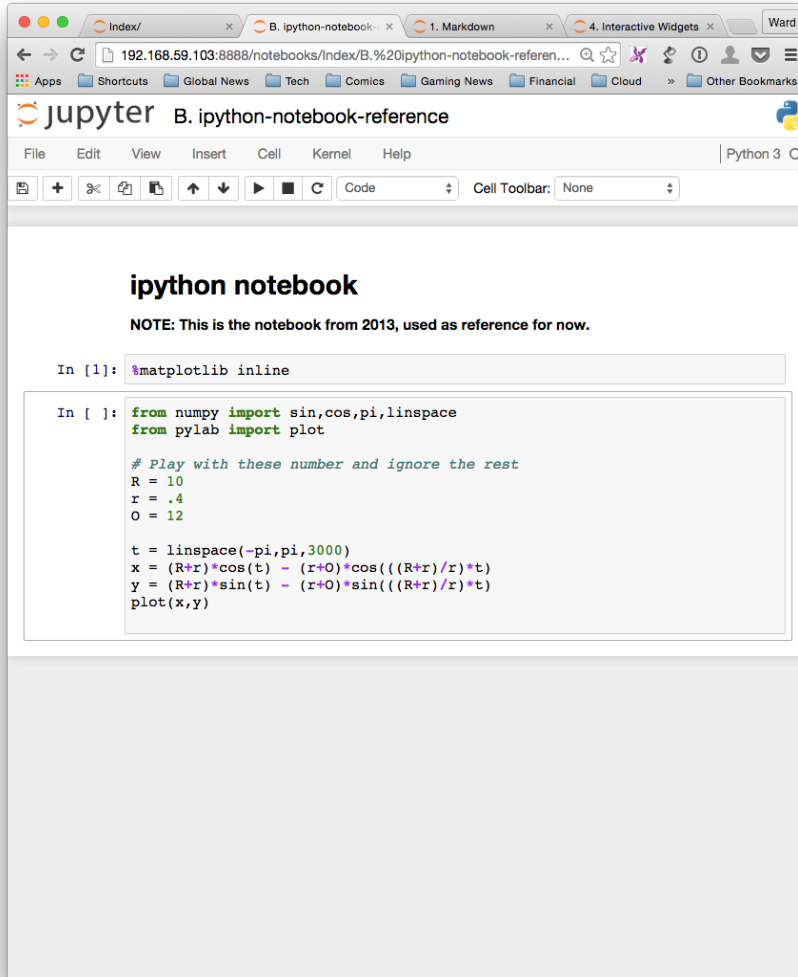
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Header H1

Header H2

Python Cells



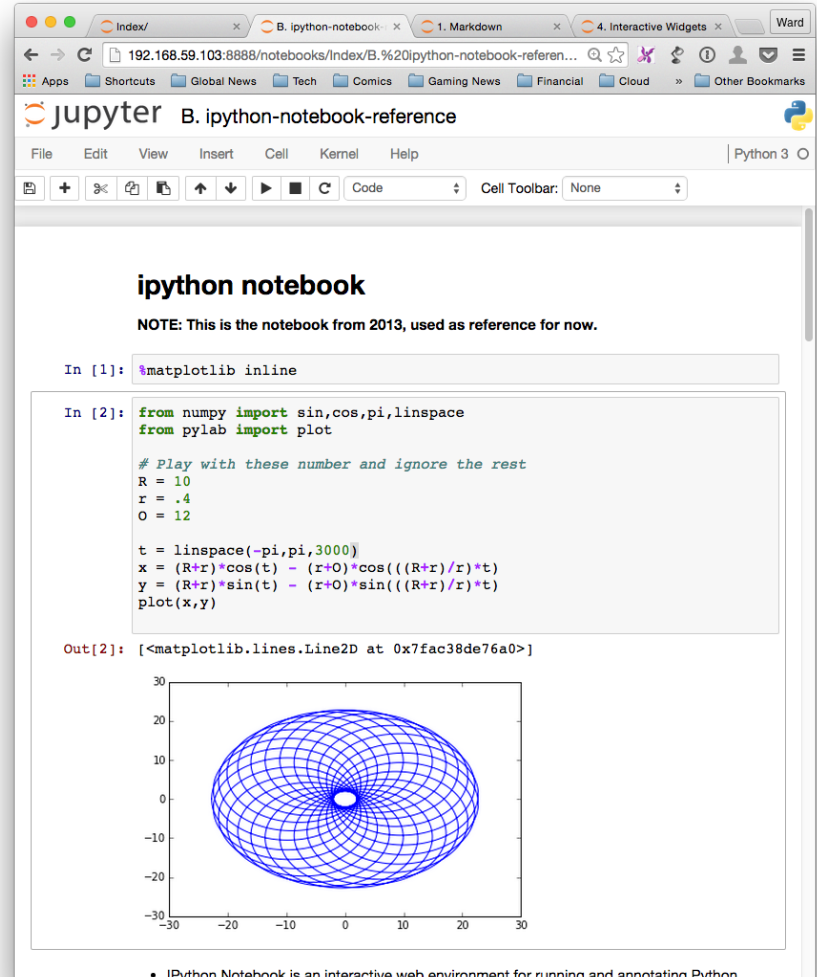
The screenshot shows a Jupyter Notebook browser interface. The title bar indicates the notebook is 'B. ipython-notebook-reference'. The menu bar includes File, Edit, View, Insert, Cell, Kernel, and Help. The toolbar shows various icons for file operations and execution. The notebook content includes a title 'ipython notebook', a note 'NOTE: This is the notebook from 2013, used as reference for now.', and a code cell with the following Python code:

```
In [1]: %matplotlib inline

In [ ]: from numpy import sin,cos,pi,linspace
        from pylab import plot

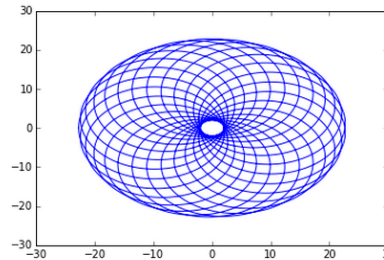
        # Play with these number and ignore the rest
        R = 10
        r = .4
        O = 12

        t = linspace(-pi,pi,3000)
        x = (R+r)*cos(t) - (r+O)*cos(((R+r)/r)*t)
        y = (R+r)*sin(t) - (r+O)*sin(((R+r)/r)*t)
        plot(x,y)
```



The screenshot shows the same Jupyter Notebook interface, but with the second cell executed. The code cell is identical to the one in the first screenshot. Below the code cell, the output is displayed, showing the execution result and a plot:

```
Out[2]: [<matplotlib.lines.Line2D at 0x7fac38de76a0>]
```



The plot shows a complex, symmetric curve with multiple loops, rendered in blue lines. The axes range from -30 to 30 on both the x and y dimensions.

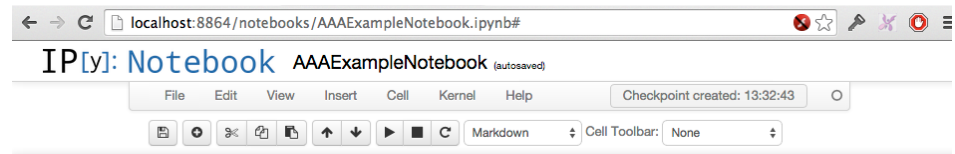
- IPython Notebook is an interactive web environment for running and annotating Python

What does this get you?

- A sharable document with embedded, reproducible experimental data analysis.

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Monotonically Increasing Integers: Are they Monotonically Increasing?

Author: Ward Fisher

Abstract

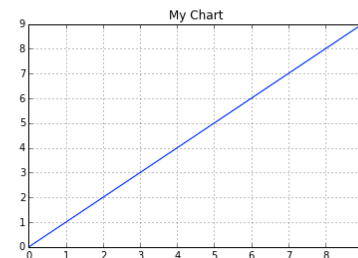
This is a test paper. In it I will show that numbers can be plotted, and that a monotonically increasing set of integers will have a positive slope.

Introduction

As we can see in the figure below, monotonically increasing integers have a positive slope.

```
In [11]: from pylab import *  
x = range(10)  
plot(x)  
grid(True)  
title('My Chart')
```

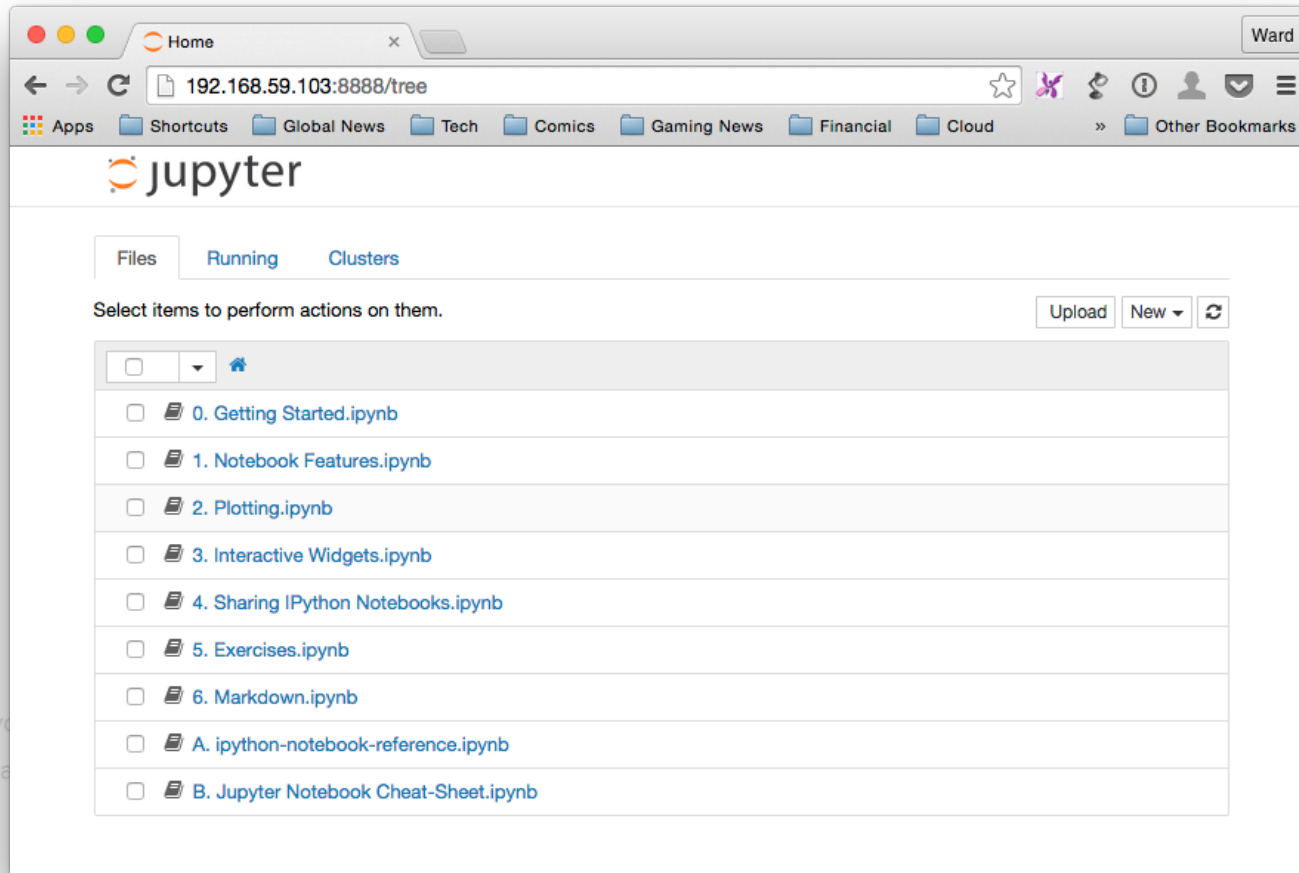
Out[11]: <matplotlib.text.Text at 0x7f4dc0503b50>



Conclusion

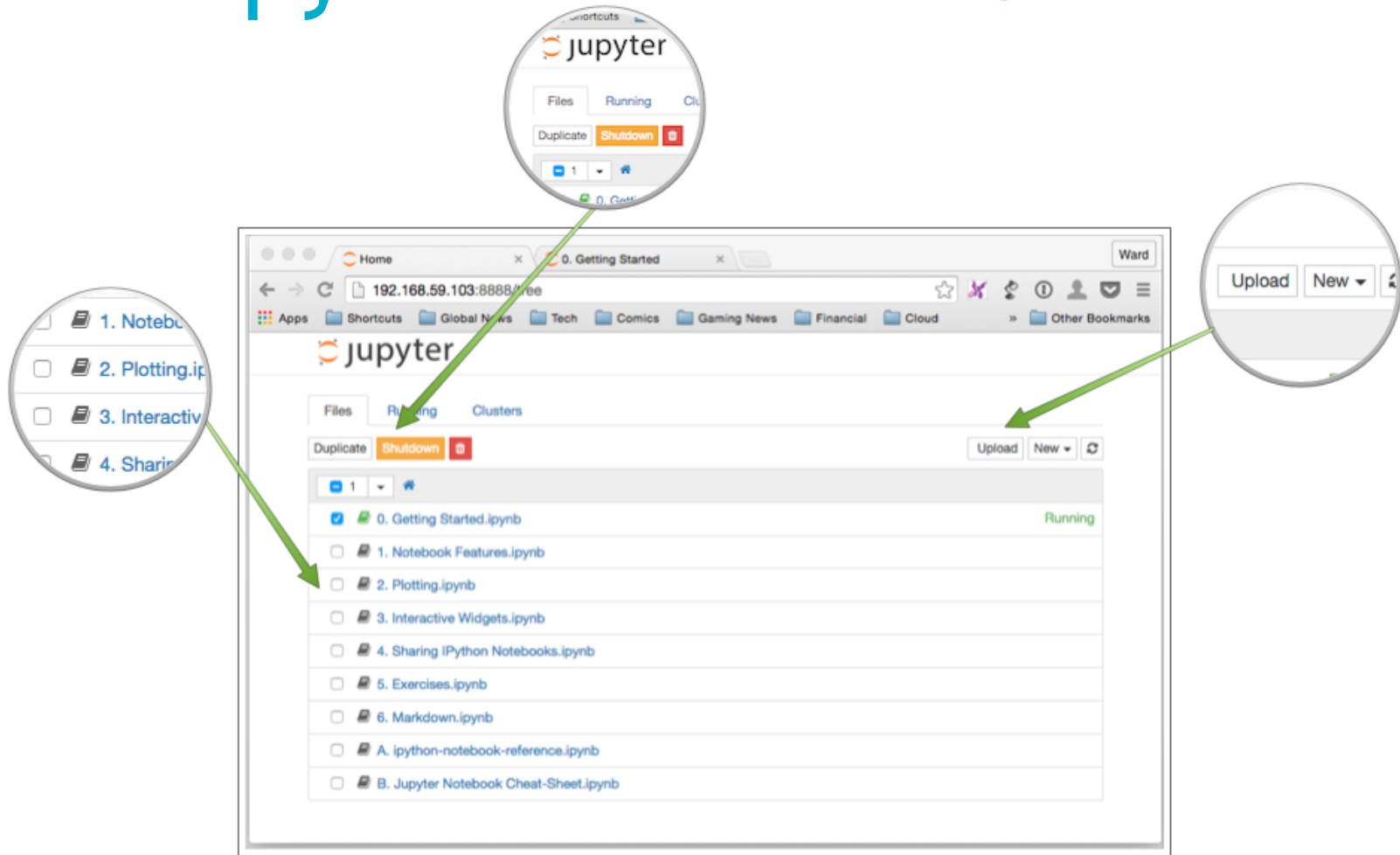
As we have seen, monotonically increasing integers appear to have a positive slope.

Jupyter Notebook Server



- The Jupyter Notebook Server acts as a dashboard for a collection of individual notebooks.

Jupyter Notebook Server



Installing Jupyter Notebook

- The easiest way to install Jupyter notebook is with a package manager like “Conda”
 - Maintained by Continuum Analytics
 - <http://continuum.io/downloads>

Installing Jupyter Notebook

- Once Anaconda is installed, you can use the ‘conda’ command to install jupyter notebook (and other packages).

```
$ conda install ipython ipython-notebook
```

Launching Jupyter Notebook

- Jupyter Notebook is launched via the command line.

```
$ ipython notebook
```

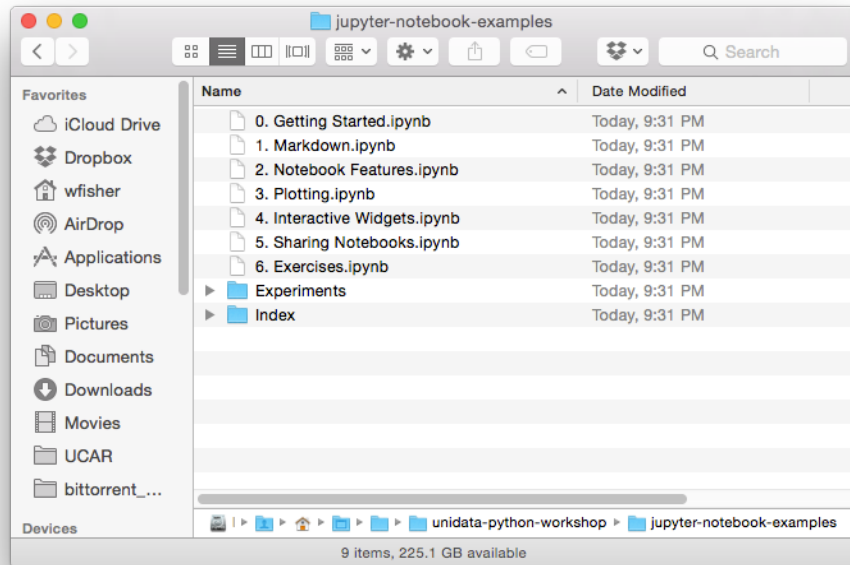
Launching Jupyter Notebook

- Jupyter Notebook is launched via the command line.

```
$ ipython notebook [options]
```

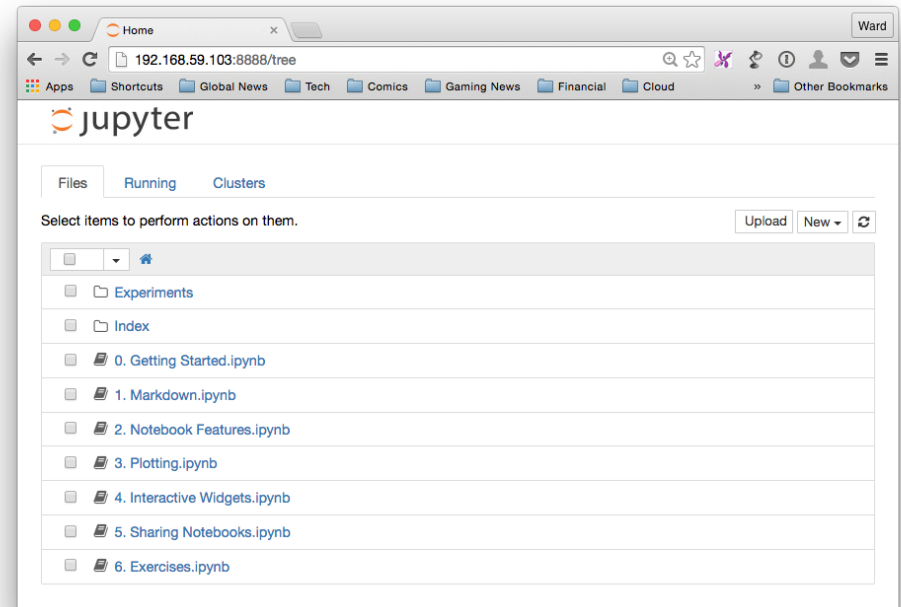
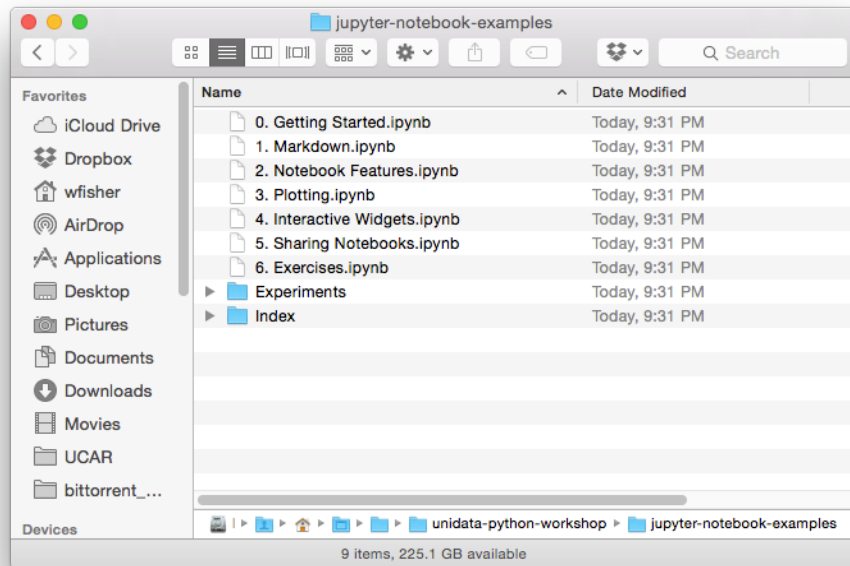
- There are a number of command line options for advanced usage.

Running Jupyter Notebook Server



- Notebooks are arranged in a directory.
- You launch Jupyter Notebook from the root of this directory structure.

Running Jupyter Notebook Server



Working in Jupyter Notebook

Switching to the Browser.