

Introduction to IPython Notebook

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Unidata Python Workshop

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Overview

- Brief overview of IPython Notebook
 - What is it?
 - How do you use it?

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- Examples of basic IPython Notebook Usage.

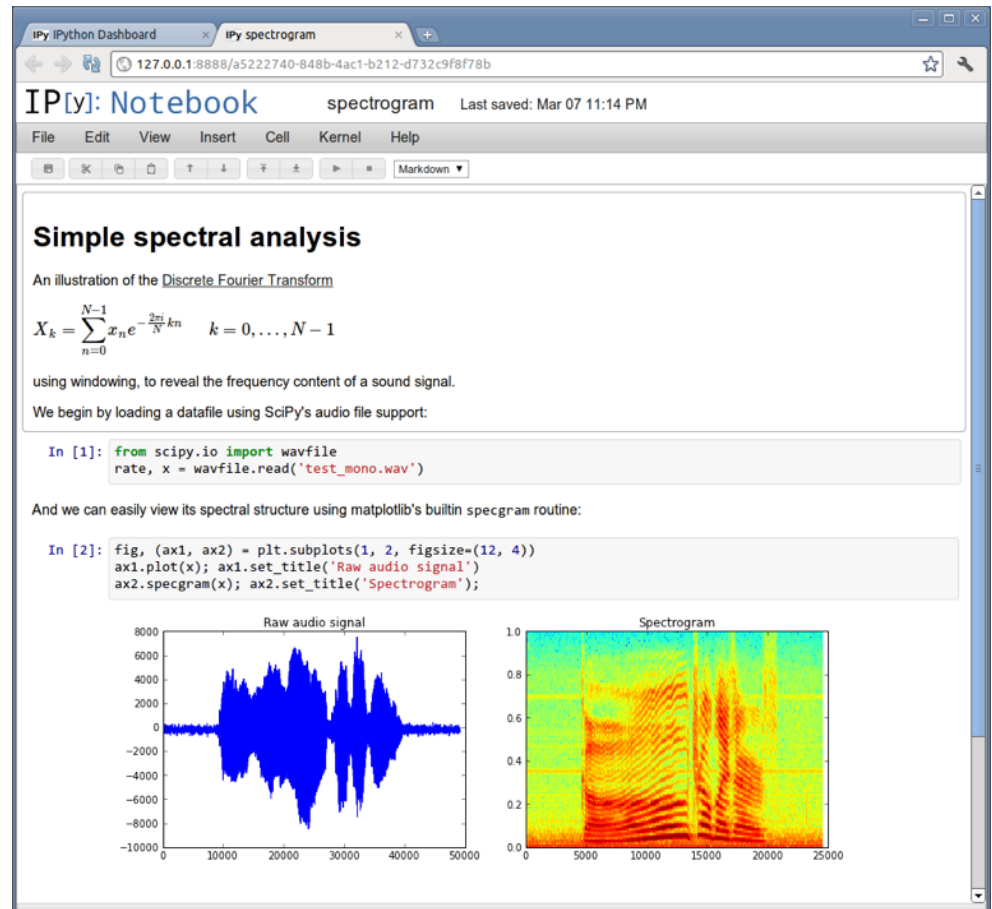
Overview

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

What is 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>

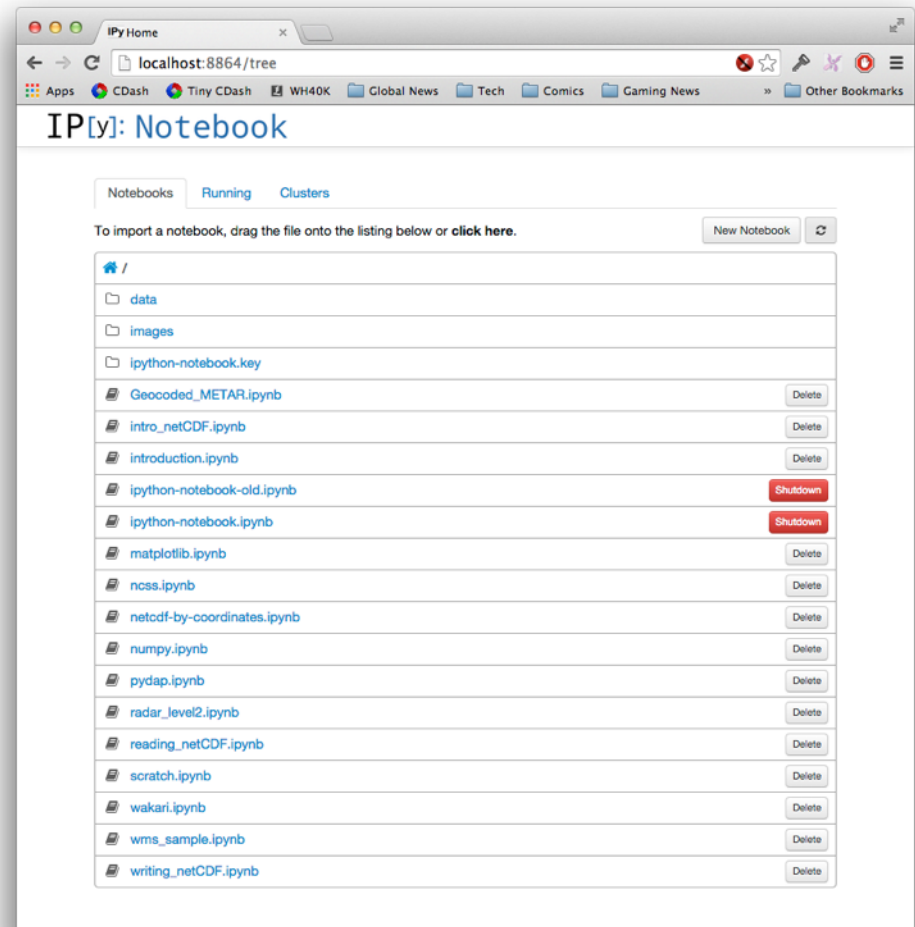


What is IPython Notebook

- IPython Notebook is comprised of two parts:
 - The IPython Notebook server
 - Individual Notebooks (.ipynb)

IPython Notebook Server

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



IPython Notebook Server

The screenshot shows the IPython Notebook Server interface in a web browser at `localhost:8864/tree`. The page title is "IP[y]: Notebook". It features tabs for "Notebooks", "Running", and "Clusters". A message states: "To import a notebook, drag the file onto the listing below or click here." Below this is a file listing with columns for file names and actions (Delete, Shutdown). The file listing includes:

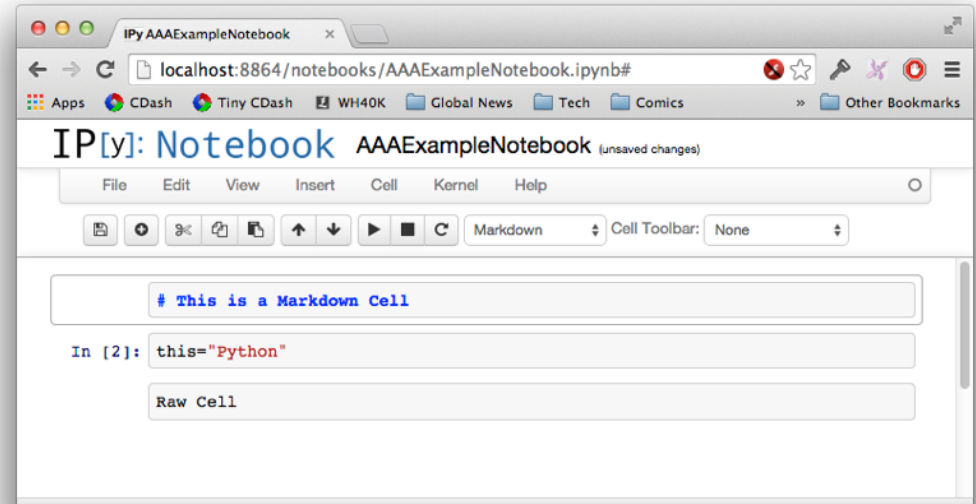
File Name	Action
/	
data	
images	
ipython-notebook.key	
Geocoded_METAR.ipynb	Delete
intro_netCDF.ipynb	Delete
introduction.ipynb	Delete
ipython-notebook-old.ipynb	Shutdown
ipython-notebook.ipynb	Shutdown
matplotlib.ipynb	Delete
ncss.ipynb	Delete
netcdf-by-coordinates.ipynb	Delete
numpy.ipynb	Delete
pydap.ipynb	Delete
radar_level2.ipynb	Delete
reading_netCDF.ipynb	Delete
scratch.ipynb	Delete
wakari.ipynb	Delete
wms_sample.ipynb	Delete
writing_netCDF.ipynb	Delete

Three callouts provide additional details:

- Top Left Callout:** A circular inset showing a list of notebook files, including `intro_netCDF.ipynb`, `ipython-notebook-old.ipynb`, `ipython-notebook.ipynb`, `matplotlib.ipynb`, `ncss.ipynb`, `netcdf-by-coordinates.ipynb`, `numpy.ipynb`, and `pydap.ipynb`.
- Top Right Callout:** A circular inset showing a "New Notebook" button and a refresh icon.
- Bottom Right Callout:** A circular inset showing a "Delete" button, two "Shutdown" buttons, and another "Delete" button.

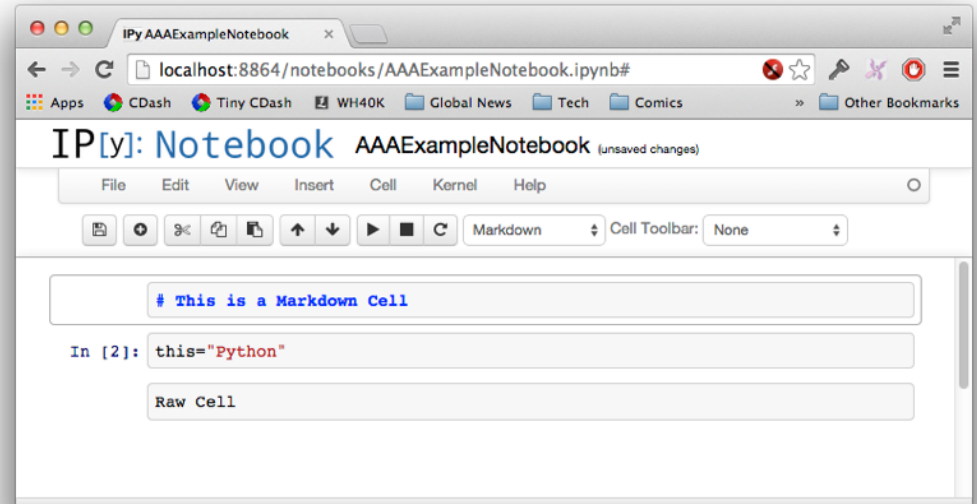
IPython Notebooks

- An IPython Notebook is a collection of *cells*.



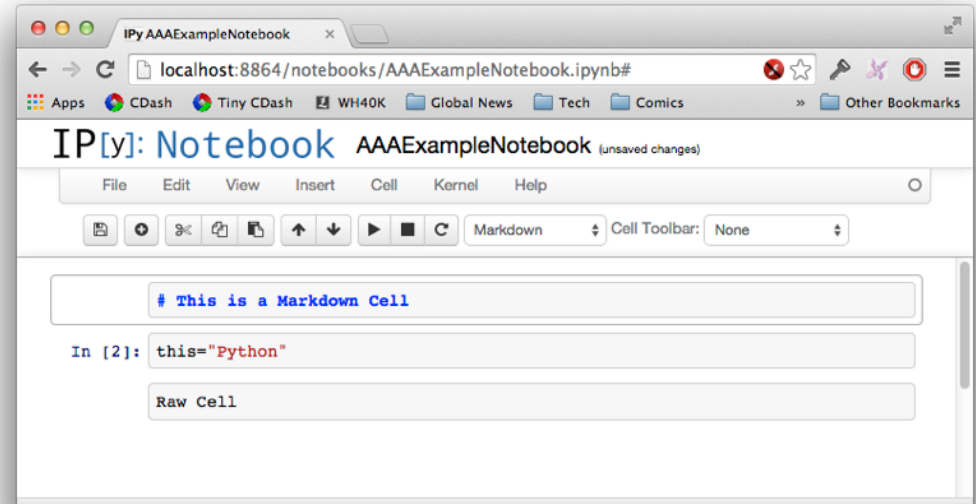
IPython Notebooks

- An IPython Notebook is a collection of *cells*.
 - Markdown



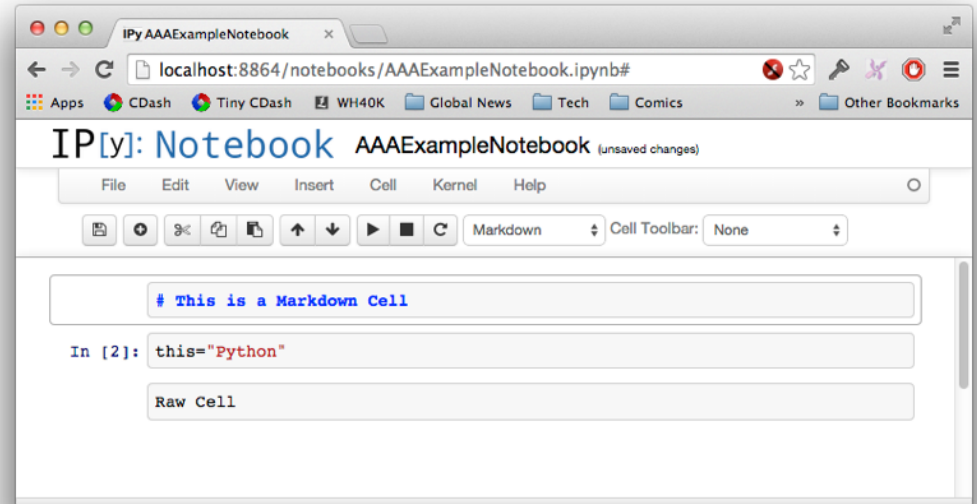
IPython Notebooks

- An IPython Notebook is a collection of *cells*.
 - Markdown
 - Code

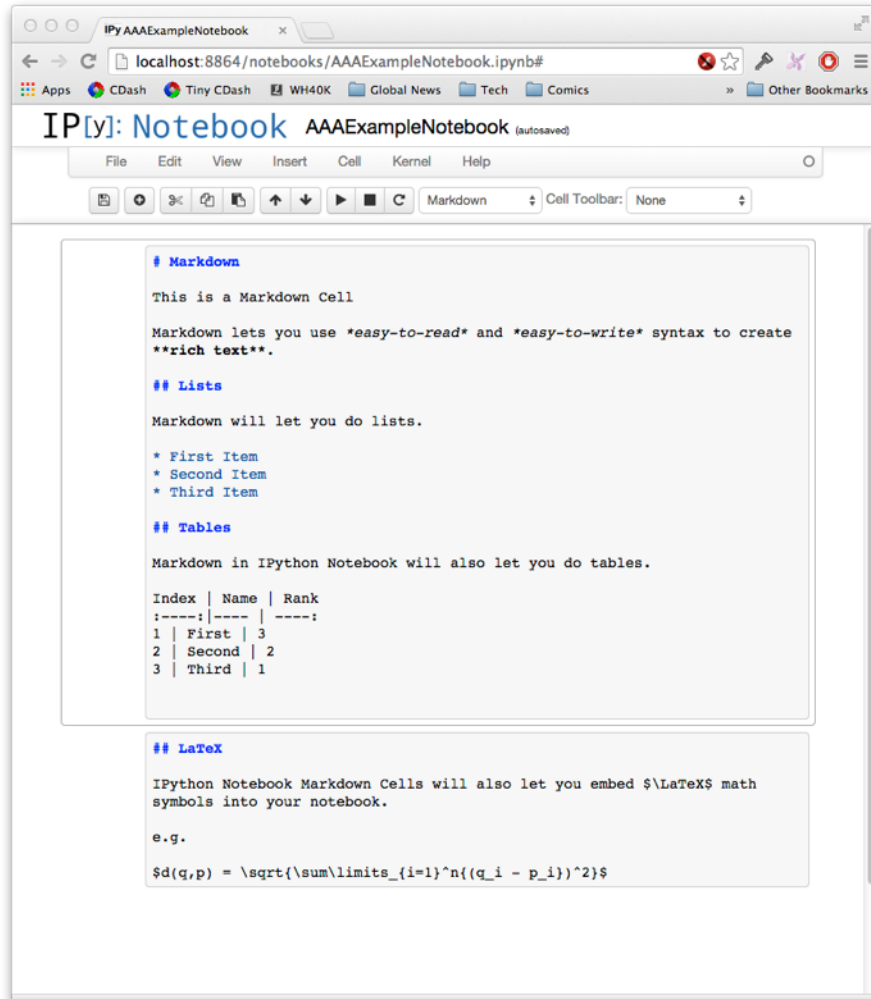


IPython Notebooks

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



Markdown Cells



IPy AAAExampleNotebook

localhost:8864/notebooks/AAAExampleNotebook.ipynb#

Apps CDash Tiny CDash WH40K Global News Tech Comics » Other Bookmarks

IP[y]: Notebook AAAExampleNotebook (autosaved)

File Edit View Insert Cell Kernel Help

Markdown Cell Toolbar: None

```
## Markdown

This is a Markdown Cell

Markdown lets you use *easy-to-read* and *easy-to-write* syntax to create
**rich text**.

## Lists

Markdown will let you do lists.

* First Item
* Second Item
* Third Item

## Tables

Markdown in IPython Notebook will also let you do tables.

Index | Name | Rank
:----:|:----:|:----:
1 | First | 3
2 | Second | 2
3 | Third | 1

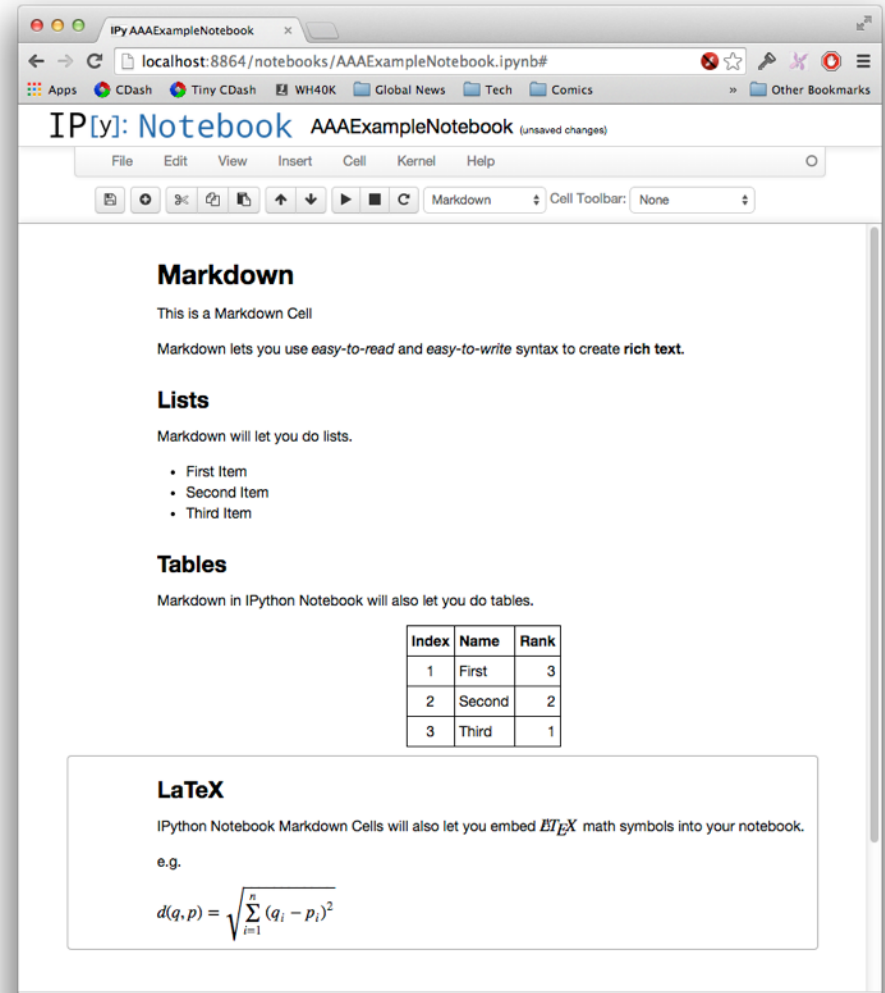
## LaTeX

IPython Notebook Markdown Cells will also let you embed  $\LaTeX$  math
symbols into your notebook.

e.g.


$$d(q,p) = \sqrt{\sum \limits_{i=1}^n (q_i - p_i)^2}$$

```



IPy AAAExampleNotebook

localhost:8864/notebooks/AAAExampleNotebook.ipynb#

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IP[y]: Notebook AAAExampleNotebook (unsaved changes)

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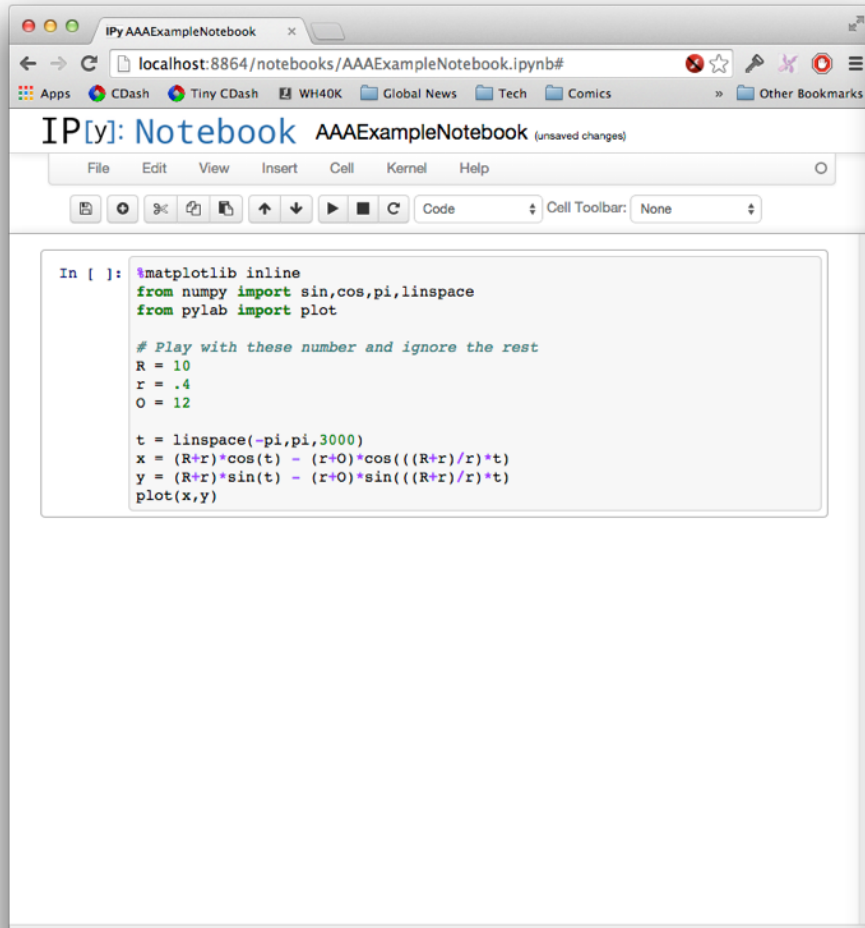
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$$d(q,p) = \sqrt{\sum_{i=1}^n (q_i - p_i)^2}$$

Python Cells



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Apps CDash Tiny CDash WH40K Global News Tech Comics » Other Bookmarks

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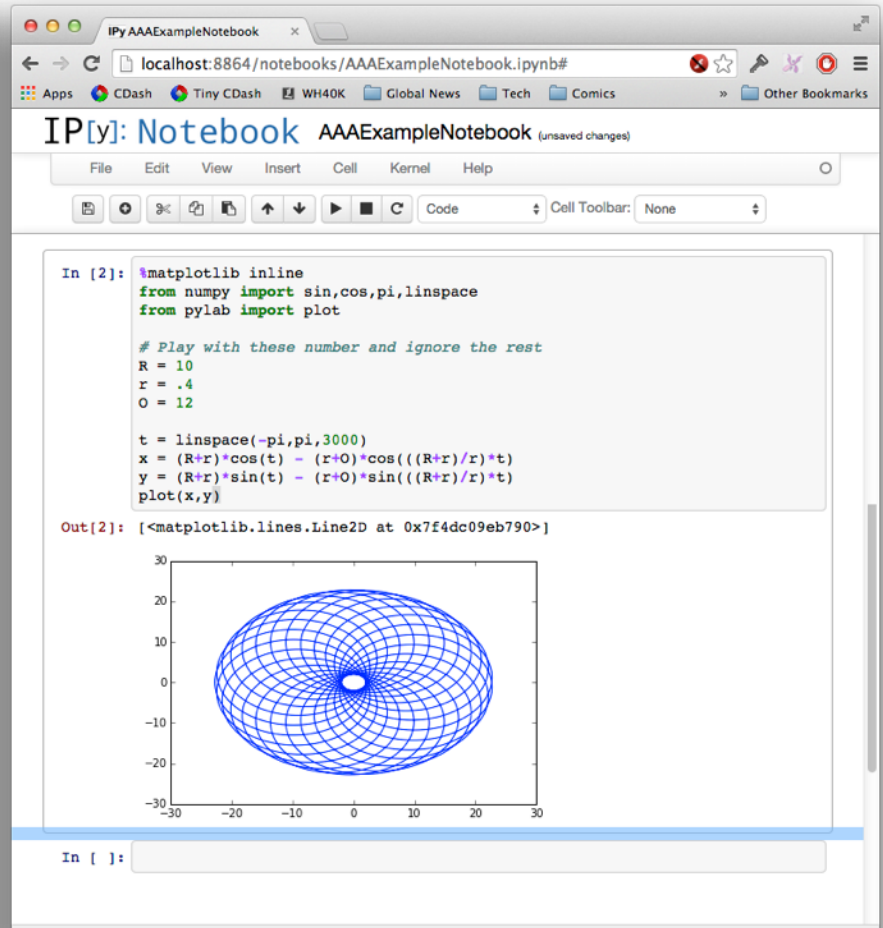
File Edit View Insert Cell Kernel Help

Code Cell Toolbar: None

```
In [ ]: %matplotlib inline
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)
```



IPy AAAExampleNotebook

localhost:8864/notebooks/AAAExampleNotebook.ipynb#

Apps CDash Tiny CDash WH40K Global News Tech Comics » Other Bookmarks

IP[y]: Notebook AAAExampleNotebook (unsaved changes)

File Edit View Insert Cell Kernel Help

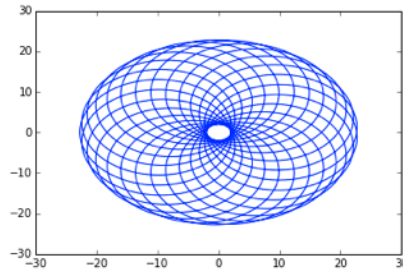
Code Cell Toolbar: None

```
In [2]: %matplotlib inline
from numpy import sin,cos,pi,linspace
from pylab import plot

# Play with these number and ignore the rest
R = 10
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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)
```

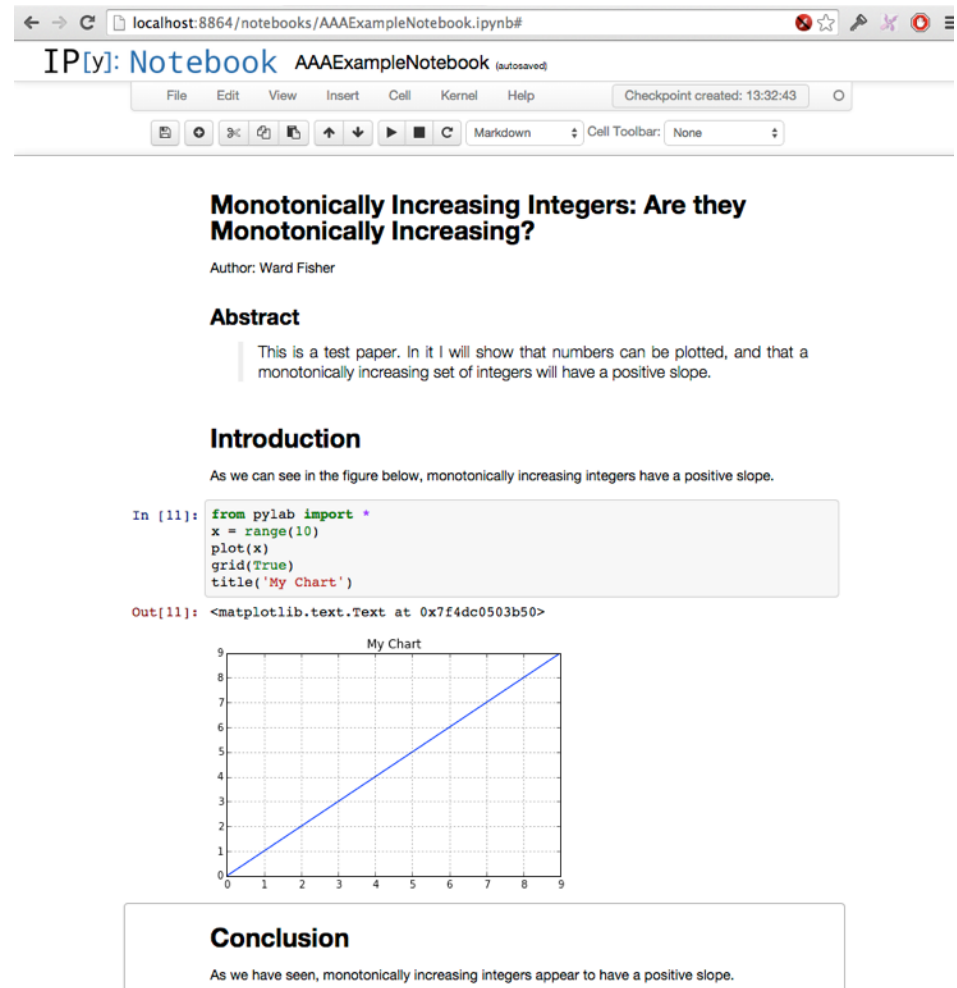
Out[2]: [<matplotlib.lines.Line2D at 0x7f4dc09eb790>]



In []:

What does this get you?

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



localhost:8864/notebooks/AAAExampleNotebook.ipynb#

IP[y]: Notebook AAAExampleNotebook (autosaved)

File Edit View Insert Cell Kernel Help Checkpoint created: 13:32:43

Monotonically Increasing Integers: Are they Monotonically Increasing?

Author: Ward Fisher

Abstract

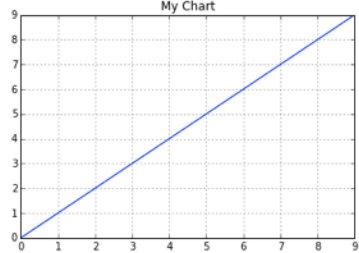
This is a test paper. In it I will show that numbers can be plotted, and that a monotonically increasing set of integers will have a positive slope.

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.

Installing IPython Notebook

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

Installing IPython Notebook

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

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

Launching IPython Notebook

- IPython Notebook is launched via the command line.

```
$ ipython notebook
```

Launching IPython Notebook

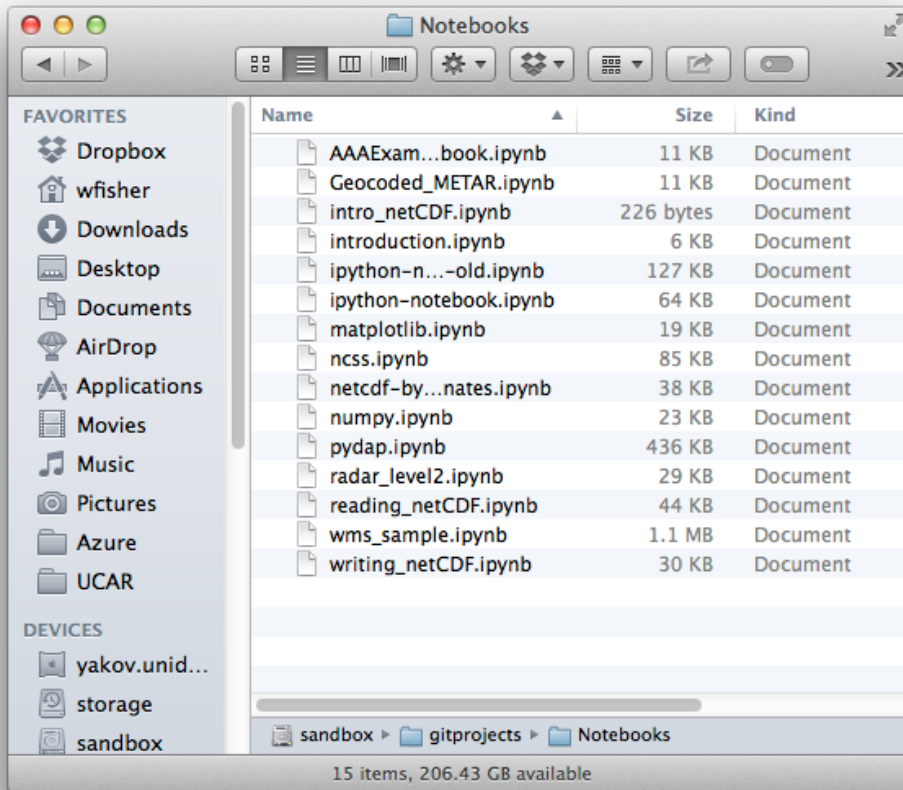
- IPython Notebook is launched via the command line.

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

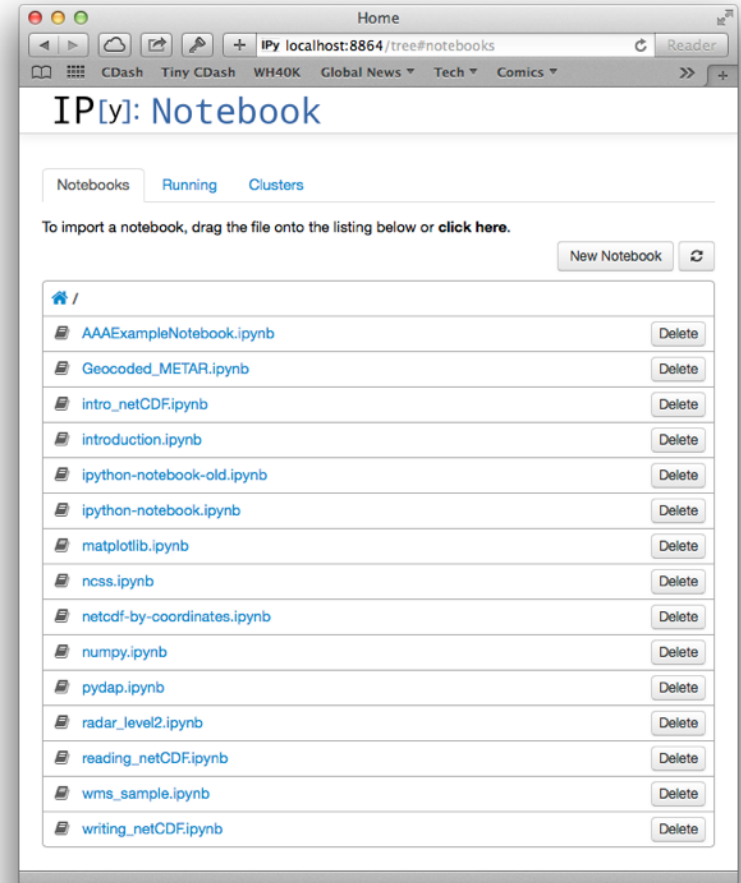
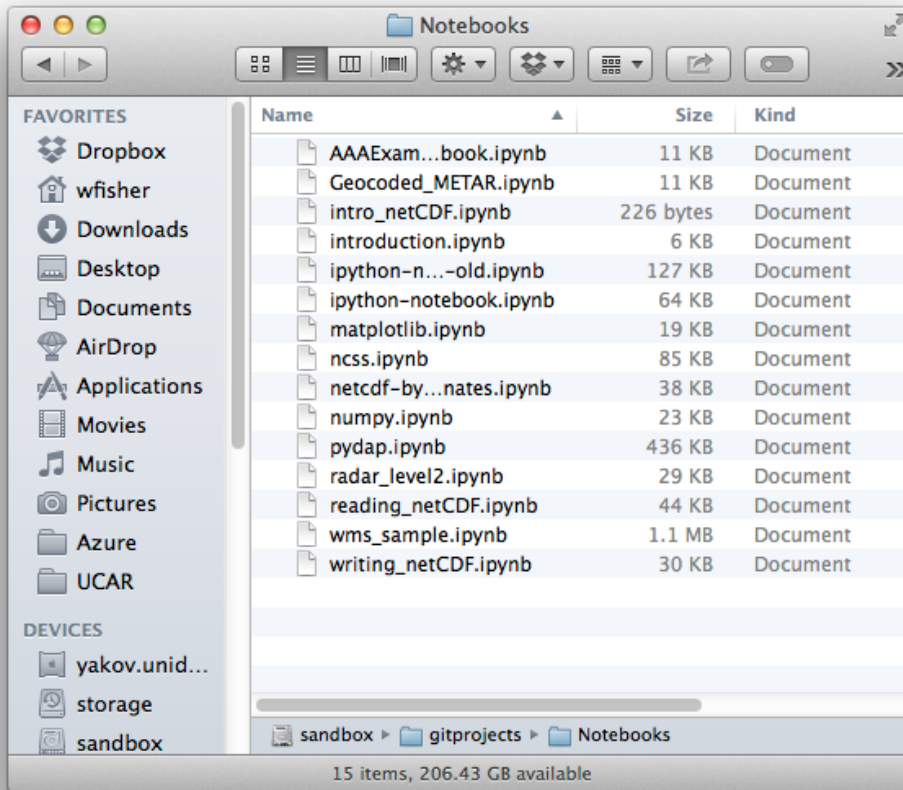
- There are a number of command line options for advanced usage.

Running IPython Notebook Server

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



Running IPython Notebook Server



Working in IPython Notebook

Switching to the Browser.