The SciPy Stack

Data Analytics in Python

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The SciPy Stack

SciPy is a Python-based ecosystem of libraries and tools for scientific computing and data analytics

- iPython
- Jupyter notebooks
- Numpy
- Pandas
- Matplotlib

iPython is the primary way of interacting with the SciPy stack – whether through the shell or a Jupyter notebook.

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iPython

Two modes:

- Interactive shell
  - Replacement for `python` REPL
- Jupyter notebook
  - Interactive web-based documents mixing text, executable code, graphics

Before we proceed, make sure your computer is ready (OS shell):

```
$ conda update conda
$ conda update python ipython jupyter numpy pandas matplotlib
```

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A Taste of Data Analytics in iPython Shell

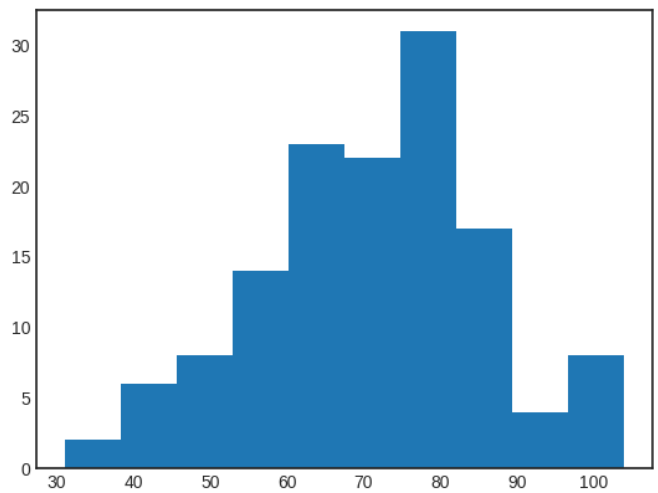
```
In [1]: cd analytics/
/home/chris/vcs/github.com/cs2316/cs2316.github.io/code/analytics

In [3]: exam1grades = np.loadtxt('exam1grades.txt')

In [4]: import matplotlib.pyplot as plt

In [5]: %matplotlib qt5

In [6]: plt.hist(exam1grades)
Out[6]:
(array([ 2.,  6.,  8., 14., 23., 22., 31., 17.,  4.,  8.]),
 array([ 31. ,  38.3,  45.6,  52.9,  60.2,  67.5,  74.8,  82.1,
         89.4,  96.7, 104. ]),
 <a list of 10 Patch objects>)
```



Jupyter Notebooks

Go to the directory that holds your notebooks, or the class web site repo's `code/analytics` directory for this example and enter `jupter notebook`.

```
[chris@bolshoi ~/vcs/github.com/cs2316/cs2316.github.io/code/analytics]
$ jupyter notebook
[I 15:06:15.705 NotebookApp] Serving notebooks from local directory:
     /home/chris/vcs/github.com/cs2316/cs2316.github.io/code/analytics
[I 15:06:15.705 NotebookApp] 0 active kernels
[I 15:06:15.705 NotebookApp] The Jupyter Notebook is running at:
     http://localhost:8888/
[I 15:06:15.705 NotebookApp] Use Control-C to stop this server and shut down all
     kernels (twice to skip confirmation).
Created new window in existing browser session.
```

Now a Jupter Notebook server is running and you're ready to use iPython from the Jupyter Notebook web interface.

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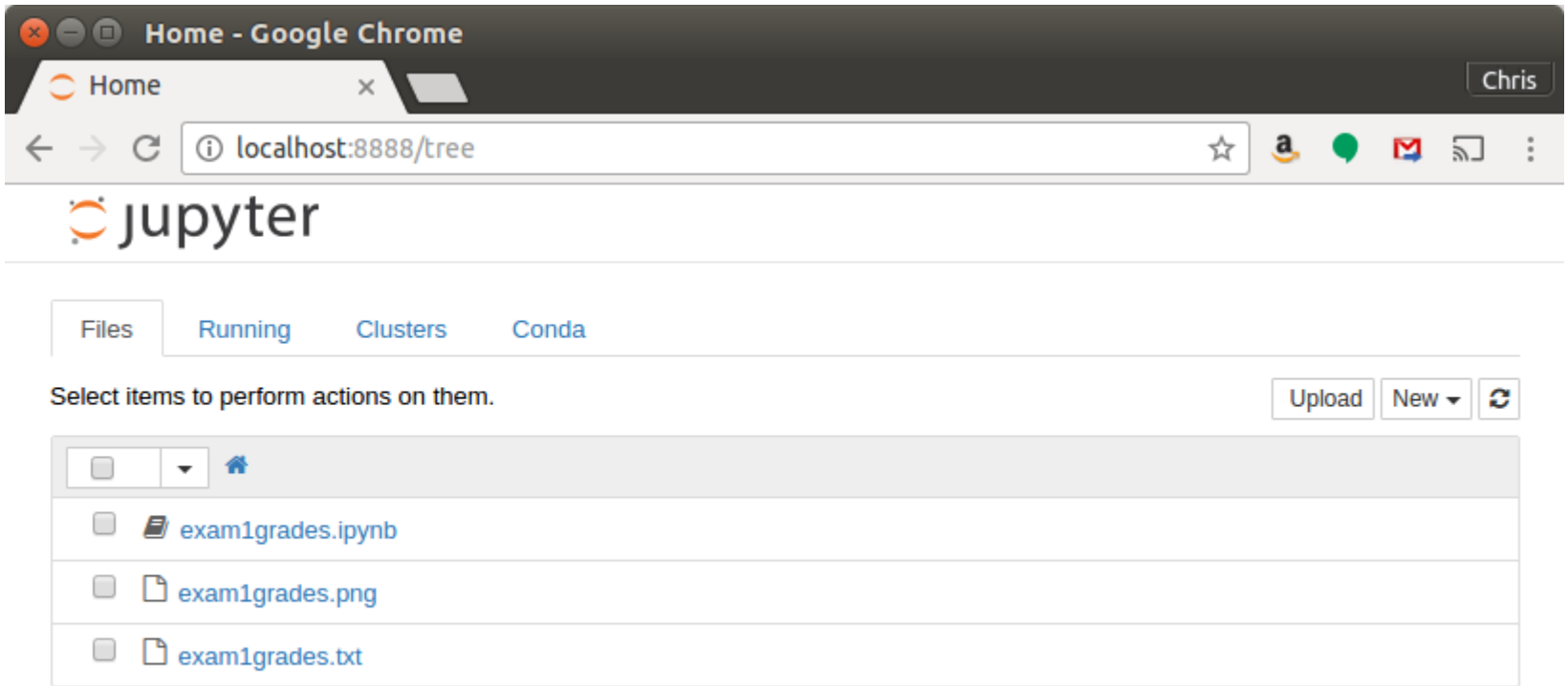
Jupyter Web Interface

After running `jupyter notebook` from your OS command shell, open a browser and navigate to `localhost:8888`. You'll see a screen that looks like this:



Notice the listing of files in the directory in which you started the Jupyter notebook server.

A Taste of Data Analytics in Jupyter Notebook

Select the `exam1grades.ipynb` file and you'll get this: