



Introduction to Data Science

(Lecture 4)

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Python Programming Language

- In this course, we work with Python and its libraries.



Python Programming

- In this class, we will briefly review the basics of python programming for beginners, and then we will more focus on python libraries and packages (such as scikit-learn machine learning library, ...).
- For Python beginners, we highly recommend you to boost your programming skills. Here are some good and free references:
 - Python Doc: <https://docs.python.org/3.7/tutorial/index.html>
 - Google's Python class: <https://developers.google.com/edu/python>
 - Python for Informatics: www.pythonlearn.com
 - ...



Jupyter Notebook

Jupyter Notebook

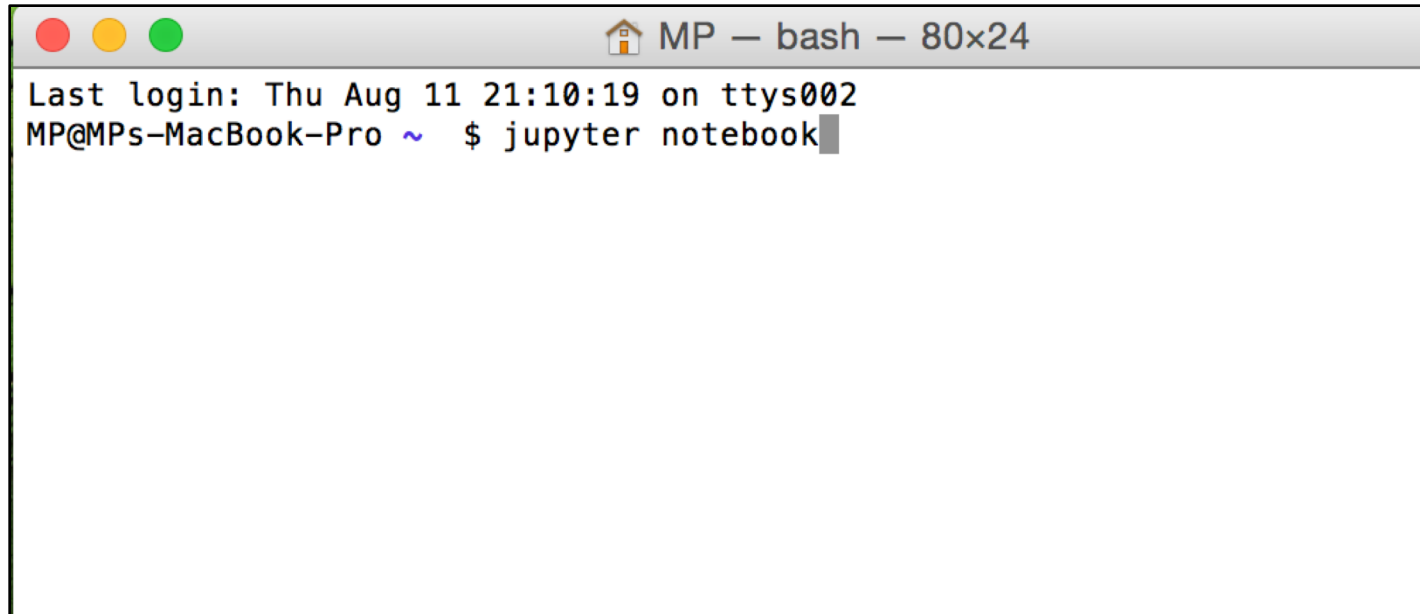
- **Jupyter Notebook** (previously known as *ipython Notebook*) is a web-based interactive development environment, in which you can combine code execution, text and notations (markdown), mathematics, and plots.
- The Jupyter Notebook will be run under your browser. It supports a number of programming languages including Python, Julia, Octave, and R.
- See <http://jupyter.org/> for more information ...
- In this class, we will be using Jupyter Notebook to do your homework and projects.

How to install Jupyter Notebook?

- There are various ways to install Jupyter. However, for new users, we recommend installing **Anaconda** package that includes Python and Jupyter.
- Anaconda is a free platform that easily installs Python, Jupyter Notebook, and many other popular packages for data science such as Scikit-Learn, Numpy, Pandas, Scipy, ...
- Installation steps:
 - Go to <https://www.continuum.io>
 - Click on Download
 - Download and Install **Anaconda** with **Python 3.x version**.
 - Now, you have Python, Jupyter Notebook, and many other useful data processing packages!

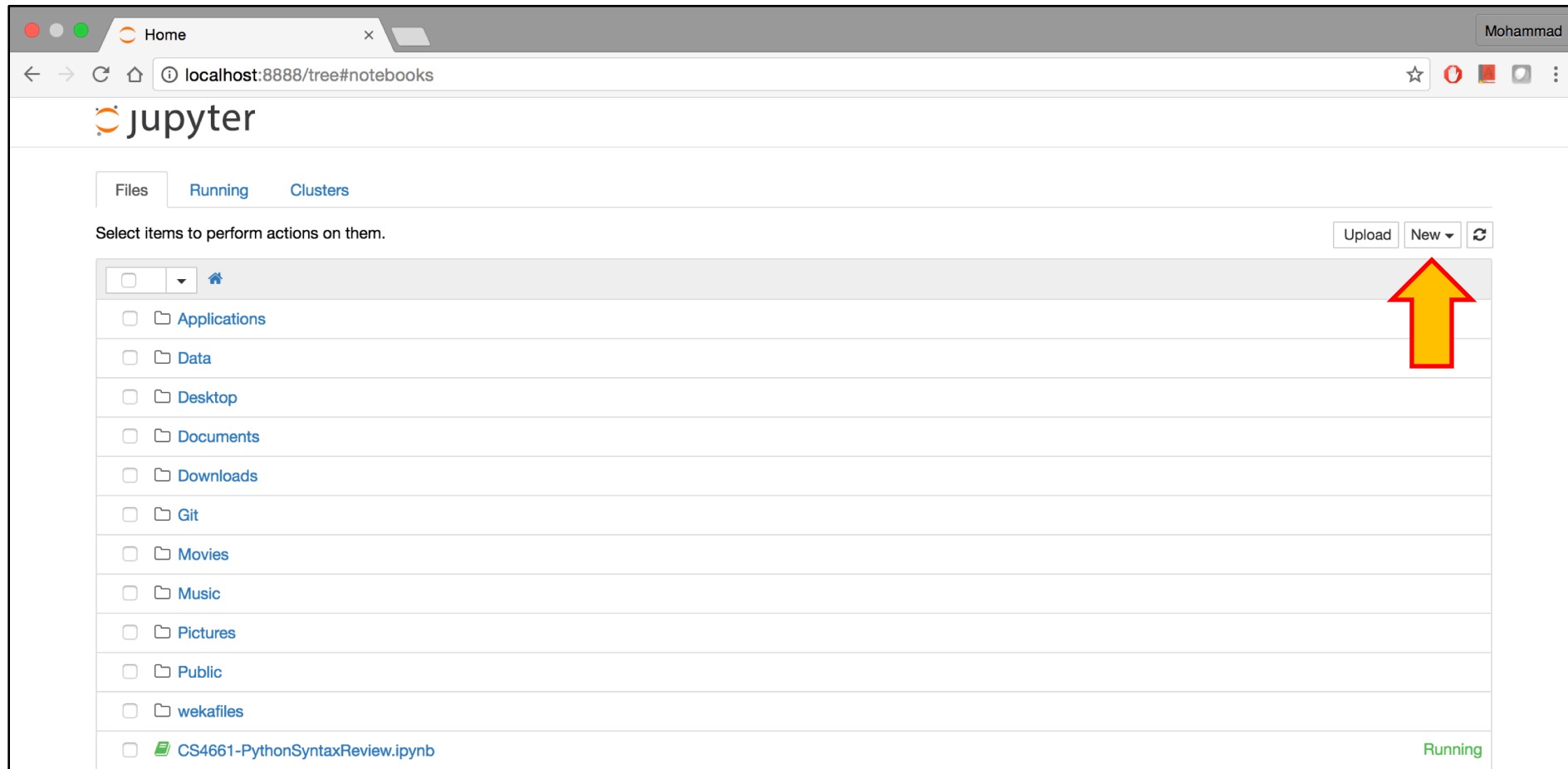
How to run Jupyter Notebook?

- To run the Jupyter notebook:
 - Type "**jupyter notebook**" at the terminal (command line) to open the dashboard.
 - Don't close the terminal window while the Notebook is running.

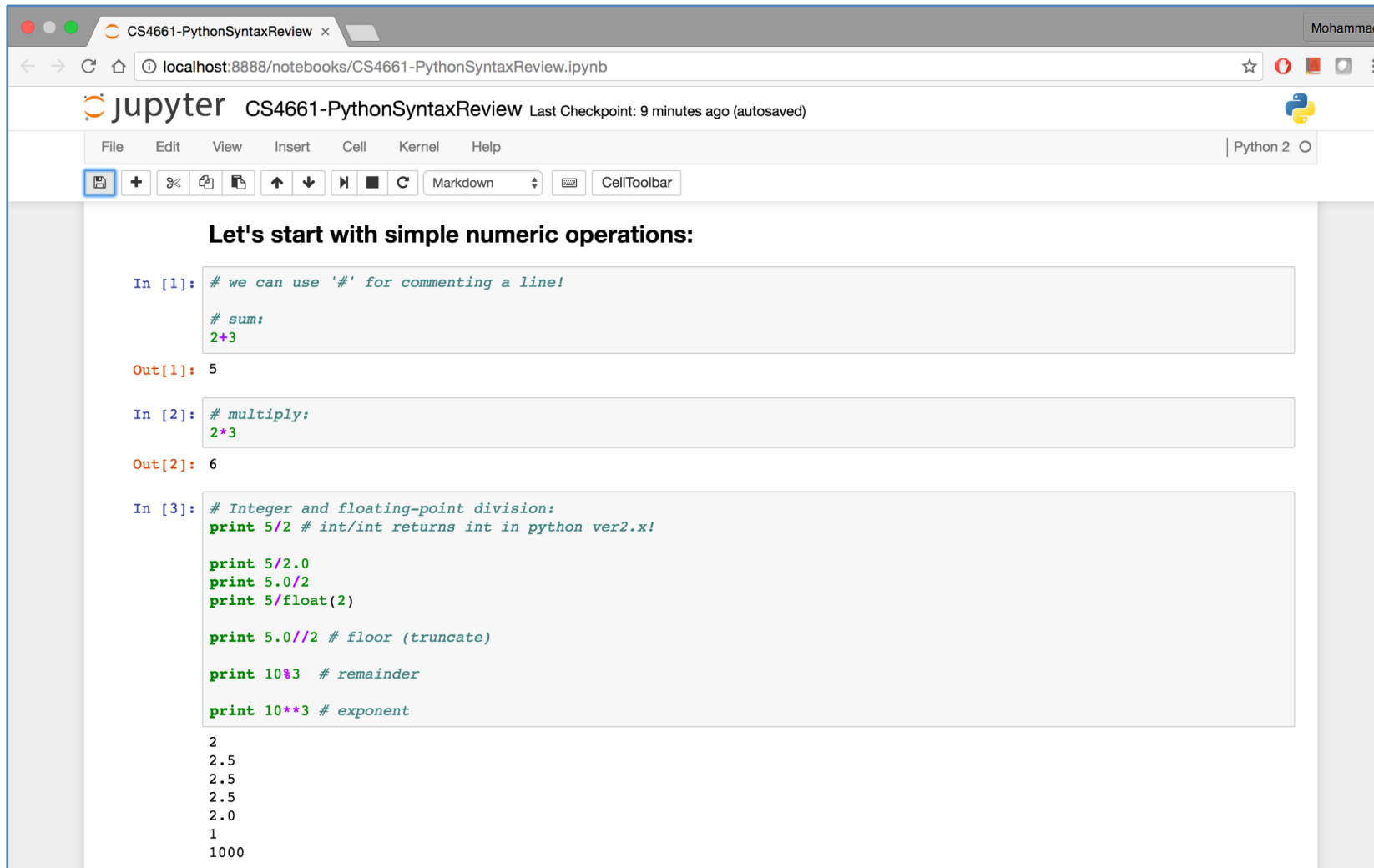
A screenshot of a macOS terminal window. The title bar at the top shows three colored window control buttons (red, yellow, green) on the left, a home icon, and the text "MP — bash — 80x24". The terminal content shows the last login information: "Last login: Thu Aug 11 21:10:19 on ttys002". Below that, the prompt "MP@MPs-MacBook-Pro ~" is followed by the command "\$ jupyter notebook" which has been entered and is currently at the end of the line with a cursor.

```
MP@MPs-MacBook-Pro ~ $ jupyter notebook
```

Jupyter Notebook



Jupyter Notebook



The screenshot displays a Jupyter Notebook window titled "CS4661-PythonSyntaxReview". The browser address bar shows "localhost:8888/notebooks/CS4661-PythonSyntaxReview.ipynb". The notebook interface includes a menu bar (File, Edit, View, Insert, Cell, Kernel, Help) and a toolbar with icons for saving, undo, redo, and other actions. The notebook content consists of three code cells:

```
Let's start with simple numeric operations:
```

```
In [1]: # we can use '#' for commenting a line!
        # sum:
        2+3

Out[1]: 5
```

```
In [2]: # multiply:
        2*3

Out[2]: 6
```

```
In [3]: # Integer and floating-point division:
        print 5/2 # int/int returns int in python ver2.x!

        print 5/2.0
        print 5.0/2
        print 5/float(2)

        print 5.0//2 # floor (truncate)

        print 10%3 # remainder

        print 10**3 # exponent

2
2.5
2.5
2.5
2.0
1
1000
```

Jupyter Notebook

- The Jupyter Notebook include cells. Each cell can be executed independently. You can add/remove cells, or arrange the order of them.
- A piece of code, or several lines of the code that we want to run together can be written in a single cell.
- Now, Let's open file ***CS4661-PythonSyntaxReview.ipynb*** in Jupyter notebook to continue python tutorial.