What is Jupyter Notebooks?

Jupyter is a web-based interactive development environment that supports multiple programming languages, however most commonly used with the Python programming language.

The interactive environment that Jupyter provides enables students, scientists, and researchers to create reproducible analysis and formulate a story within a single document.

Lets take a look at an example of a completed Jupyter Notebook: Example Notebook (http://nbviewer.jupyter.org/github/cossatot/lanf_earthquake_likelihood/blob/master/notebooks/lanf_manuscript_notebook.ipynb)

Jupyter Notebook Features

- File Browser
- Markdown Cells & Syntax
- Kernels, Variables, & Environment
- Command vs. Edit Mode & Shortcuts

What is Markdown?

Markdown is a markup language that uses plain text formatting syntax. This means that we can modify the formatting our text with the use of various symbols on our keyboard as indicators.

Some examples include:

- Headers
- Text modifications such as italics and bold
- Ordered and Unordered lists
- Links
- Tables
- Images
- Etc.

Now I'll showcase some examples of how this formatting is done:

Headers:

H1

H2

H3

H4

H5

H6

Text modifications:

Emphasis, aka italics, with *asterisks* or *underscores*.

Strong emphasis, aka bold, with **asterisks** or **underscores**.

Combined emphasis with **asterisks and *underscores***.

Strikethrough uses two tildes. ~~Scratch this.~~

Lists:

1. First ordered list item
2. Another item
    - Unordered sub-list.
3. Actual numbers don't matter, just that it's a number
    A. Ordered sub-list
4. And another item.
5. Unordered list can use asterisks
6. Or minuses
7. Or pluses

Links:

http://www.umich.edu (http://www.umich.edu)

http://www.umich.edu (http://www.umich.edu)

The University of Michigan's Homepage (www.http://umich.edu/)

To look into more examples of Markdown syntax and features such as tables, images, etc. head to the following link: Markdown Reference (https://github.com/adam-p/markdown-here/wiki/Markdown-Cheatsheet)

Kernels, Variables, and Environment

A notebook kernel is a “computational engine” that executes the code contained in a Notebook document. There are kernels for various programming languages, however we are solely using the python kernel which executes python code.

When a notebook is opened, the associated kernel is automatically launched for our convenience.

In [1]:
```
### This is python
print("This is a python code cell")
```

```
This is a python code cell
```

A kernel is the back-end of our notebook which not only executes our python code, but stores our initialized variables.

In [2]:
```
### For example, lets initialize variable x

x = 1738

print("x has been set to " + str(x))
```

```
x has been set to 1738
```

In [3]:
```
### Print x

print(x)
```

```
1738
```

Issues arrise when we restart our kernel and attempt to run code with variables that have not been reinitialized.

If the kernel is reset, make sure to rerun code where variables are intialized.

In [4]:
```
## We can also run code that accepts input

name = input("What is your name? ")

print("The name you entered is " + name)
```

```
What is your name? Winston
The name you entered is Winston
```

It is important to note that Jupyter Notebooks have in-line cell execution. This means that a prior executing cell must complete its operations prior to another cell being executed. A cell still being executing is indicated by the [*] on the left-hand side of the cell.

In [5]:
```
print("This won't print until all prior cells have finished executing.")
```

```
This won't print until all prior cells have finished executing.
```

Command vs. Edit Mode & Shortcuts

There is an edit and a command mode for jupyter notebooks. The mode is easily identifiable by the color of the left border of the cell.

Blue = Command Mode.

Green = Edit Mode.

Command Mode can be toggled by pressing **esc** on your keyboard.

Commands can be used to execute notebook functions. For example, changing the format of a markdown cell or adding line numbers.

Lets toggle line numbers while in command mode by pressing **L**.

Additional Shortcuts

There are a lot of shortcuts that can be used to improve productivity while using Jupyter Notebooks.

Here is a list:

Command Mode (press Esc to enable)	
Enter	enter edit mode
Shift-Enter	run cell, select below
Ctrl-Enter	run cell
Alt-Enter	run cell, insert below
Y	to code
M	to markdown
R	to raw
1	to heading 1
2,3,4,5,6	to heading 2,3,4,5,6
Up/K	select cell above
Down/J	select cell below
A/B	insert cell above/below
X	cut selected cell
C	copy selected cell
Shift-V	paste cell above
V	paste cell below
Z	undo last cell deletion
D,D	delete selected cell

Edit Mode (press Enter to enable)	
Tab	code completion or indent
Shift-Tab	tooltip
Ctrl-]	indent
Ctrl-[	dedent
Ctrl-A	select all
Ctrl-Z	undo
Ctrl-Shift-Z	redo
Ctrl-Y	redo
Ctrl-Home	go to cell start
Ctrl-Up	go to cell start
Ctrl-End	go to cell end
Ctrl-Down	go to cell end
Ctrl-Left	go one word left
Ctrl-Right	go one word right
Ctrl-Backspace	delete word before
Ctrl-Delete	delete word after
Esc	command mode
Ctrl-M	command mode

How do you install Jupyter Notebooks?

Note: *Coursera provides embedded jupyter notebooks within the course, thus the download is not a requirement unless you wish to explore jupyter further on your own computer.*

Official Installation Guide: https://jupyter.readthedocs.io/en/latest/install.html (https://jupyter.readthedocs.io/en/latest/install.html)

Jupyter recommends utilizing Anaconda, which is a platform compatible with Windows, macOS, and Linux systems.

Anaconda Download: https://www.anaconda.com/download/#macos (https://www.anaconda.com/download/#macos)