Tutorial and Intro to Data Analytics with Python

In this brief tutorial, we will look at the use of the pandas library in Python for data analytics. We'll first use the mysql.connector libray to query and retrieve data from an SQL server, then load that data into a pandas dataframe, and ultimately plot the data. *Note: This tutorial is written in and for Python 2.7. It has not been tested with any other version of Python.*

This project is based on an energy-analytics project, which means that we will query energy related data. More specifically, we querying the energy consumption of solar hyrbrid mini split air conditioner used for produce cooling. You will have access to both temperature and energy data at a temporal resolutions of 15 minutes.

Have fun exploring.

Software preparation

To do this tutorial, you will need to have some software and libraries installed on your computer. If you'd rather use a Unix box on Cloud9, you can skip this step read the Using Cloud9 instructions instead. The following instructions are for Unix-based systems (including Mac). Please refer to the online documentation for doing this in Windows (Sorry, Python is the reason why I traded Windows one night for Arch Linux a few years ago before moving over to Mac.)

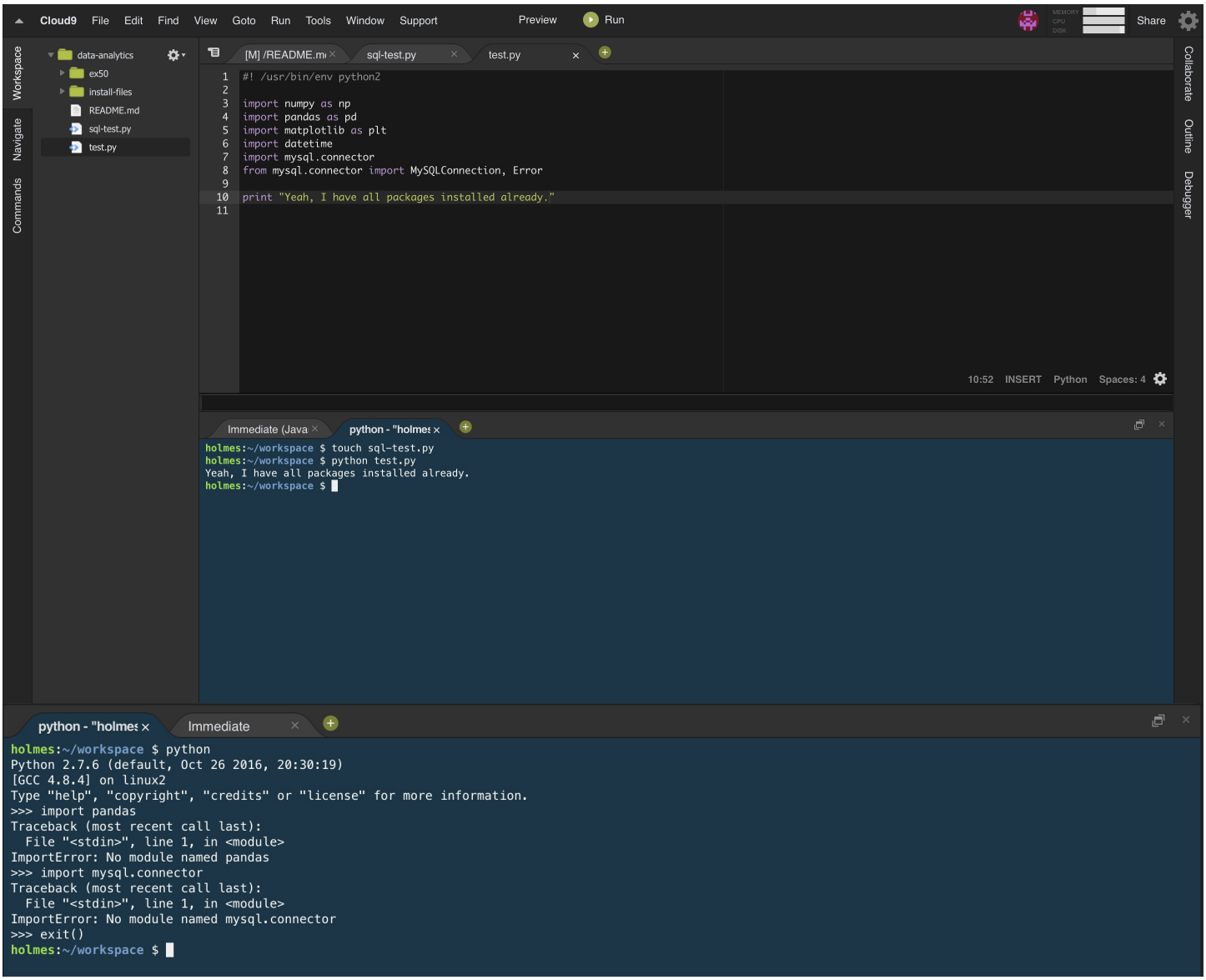
You need to make sure that you have the following software/libraries (and their dependencies) installed on your machine:

- Python 2.7
- pip
- numpy --- `pip install numpy`
- pandas --- `pip install pandas` or `conda install pandas` (if you previously install conda)
- matplotlib --- `pip install matplotlib`
- mysql.connector --- `pip install mysql-connector==2.1.6`

If you're on a Mac, my recommendation is to install Homebrew, then `brew install python2`, and then `pip2 install` instead of `pip install`. Again, there are so many instructions online that are fantastic.

Importing libraries in Python
To test if you have everything, open your Python shell (it should say `Python 2.7.x`), and run the following commands (this is how you import libraris). Hopefully you will not see any error messages.

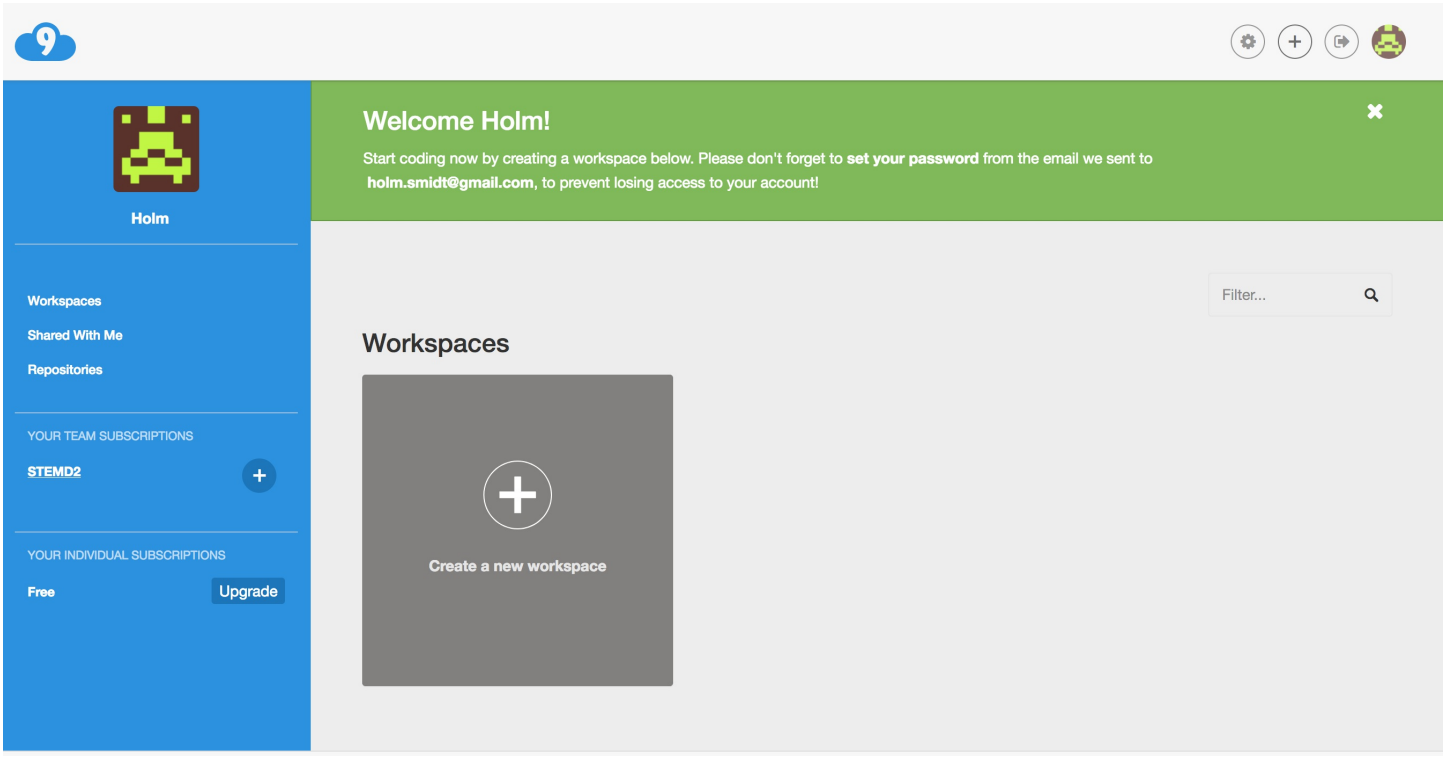
```
import numpy
import pandas
import matplotlib
```

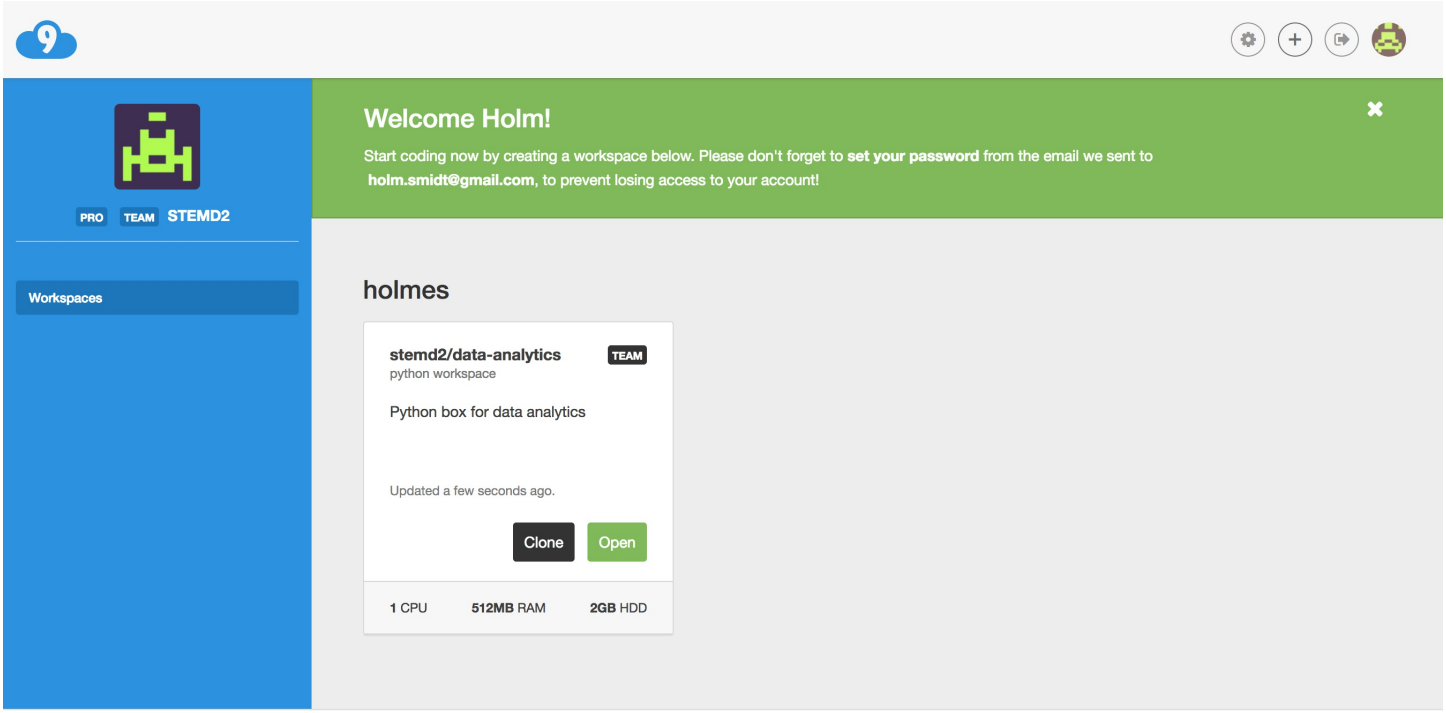


Using Cloud9

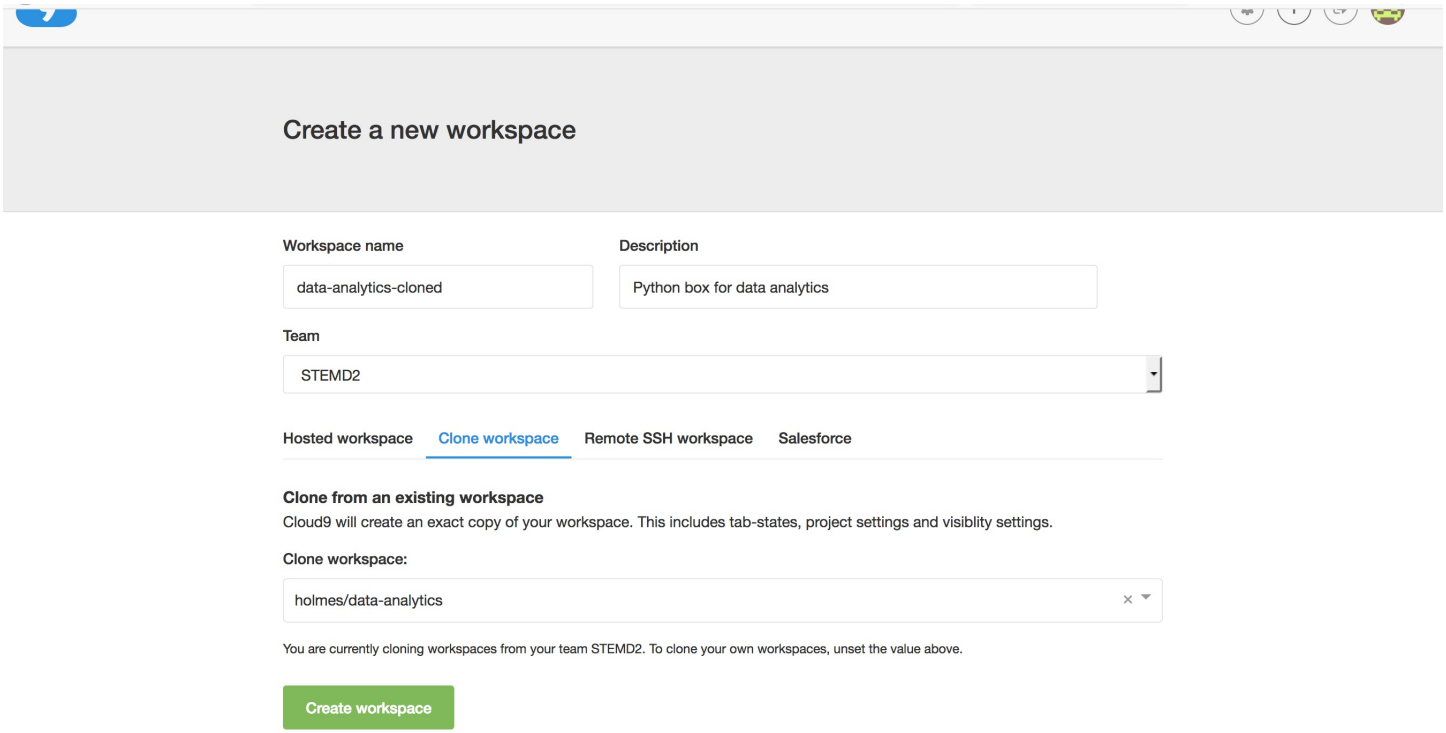
In order for you to use the preconfigured cloud9 environment, email hsmidt@hawaii.edu with the email account that you want to use. You will then receive an invitation of join `Team stemd2` on cloud9. Follow the link and sign up for an account if you don't have one yet.

Once you sign up, you want to click `join team`. You should be redirected to something that looks like the first image below. You then want to click on the stemd2 link on the navigation pane on the left, which should take you to the page shown in the second image below.

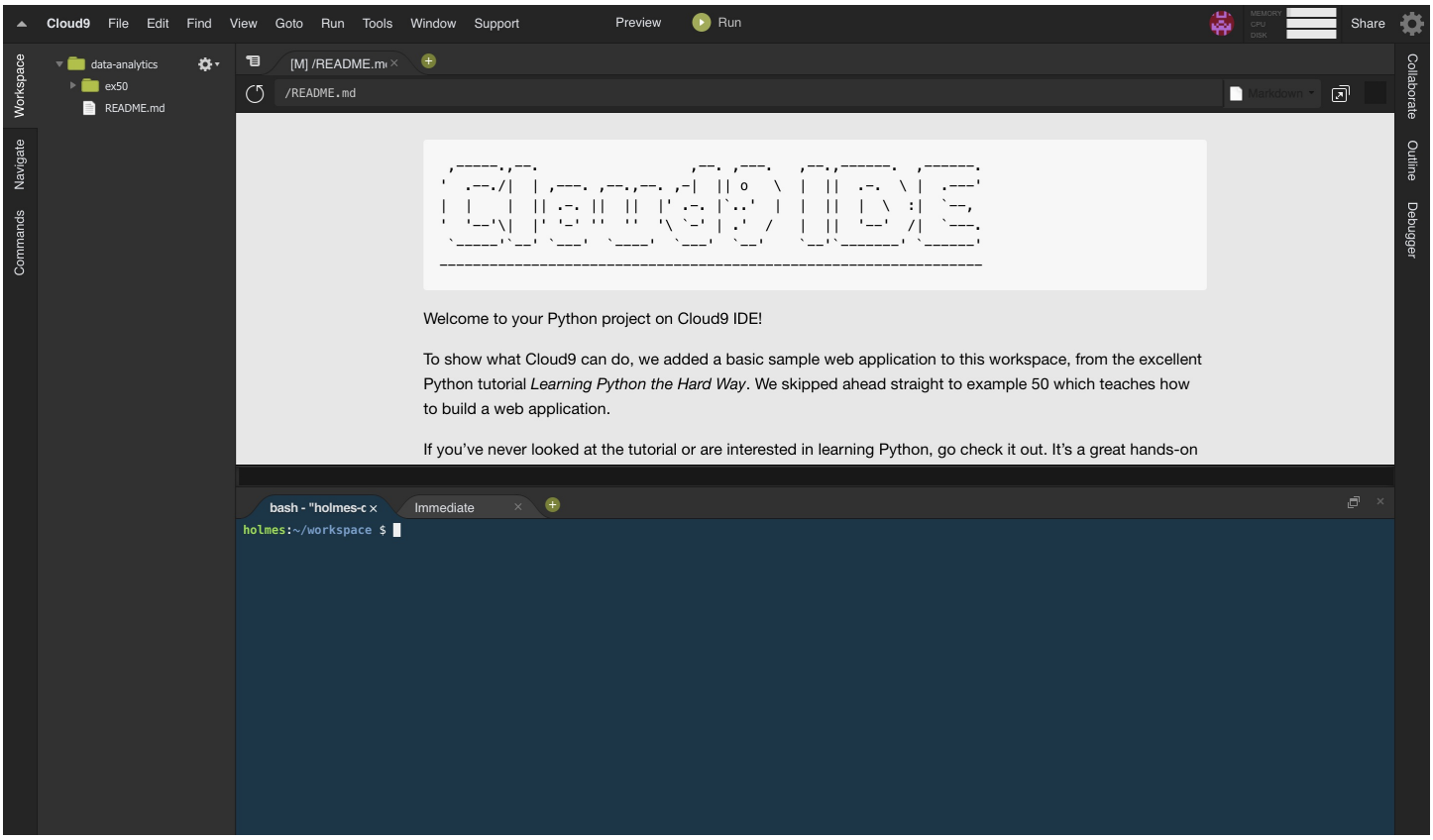




You then want to clone the only workspace that you can see.



Once you're being redirected to the cloud9 workspace, you should see somthing like shown below. You can create files by right-clicking on the left and selecting `New File` and the open it in the editor page. Once you save a file, you can execute it by typing `python test.py` in the terminal.



You can start a python shell by typing `python` into your terminal. To run a python scrip, type `python test.py` into your terminal.

Starter Documents

To work through the tutorial, you should download the provided archive from Google Classroom or Github and use the provided files in the cloud9 directory. The file structure should be as follows:

```
- output/
- config.ini
- energyAnalyzer.py     <-- this is the tutorial file
- sqlUtils.py
```

Tutorial

The Python file steps you through the analysis process. It is separated in to three section:

- data retrieval using SQL
- data processing using pandas data frames
- data visualization using the matplotlib and pandas Library

Throughout the Python script, you are asked to make changes to existing code or some code.