Setting Up a Virtual Machine, Docker and JupyterLab

We will be using Docker to start a predefined python environment to perform all our GeoAI lessons, and it is assumed that you are comfortable with the Linux command line interfaces, such as `ls`, `cd` and `ssh`.

We will use Amazon Web Services EC2 (Elastic Computing Cloud) for all our work this semester.

Open a web browser and navigate to https://login.johnshopkins.edu/aws

Use your JHU credentials to log into AWS.

Click on `Services` on the top left corner and select `EC2`, then click on `Instances` on the left, to see the list of instances. Even though you can see everyone's instances, you can only start, stop or reboot your instance. The EC2 service is the only AWS resource available to you. AWS has many other services, which we will not utilize in this class and are therefore not available. Make sure to use `N. Virginia` as the active Zone - this is available as a drop down on the top right next to `Support` – if you are in a different zone, you will not be able to see the list of instances.

With the mouse on the instance with your name, click the right mouse button. A menu will show up. Move the mouse to `Instance State,` and a sub-menu will show up. Select the `Start` menu item. Give it a few minutes until you get a green checkmark with `2/2 checks passed`. You might want to press the refresh icon on the top right; otherwise, you may see `Pending` status for a while.

Once the instance is running, with the mouse on the instance with your name, click the right mouse button and select the `Connect` menu item. A popup window will appear with information about your instance. Please note down your public DNS, and you will see instructions on how to SSH to your instance.

PLEASE STOP YOUR INSTANCE WHEN YOU ARE NOT WORKING ON ASSIGNMENTS. YOU WILL START THE INSTANCE AGAIN TO WORK ON A NEW ASSIGNMENT, THEN PLEASE STOP IT WHEN YOU ARE DONE.

AWS Setup

Download to your local machine the file `BigDataClass.pem`. (It is file item in the lesson table of contents)

Note For students using Windows OS, make sure to convert the `.pem` to `.ppk`. More info can be found here.

Log into your AWS instance.

```
ssh -i "BigDataClass.pem" ec2-user@ec2-XXX-XXX-XXX-XXX.compute-1.amazonaws.com
```

For students using Windows OS, Use `Putty`. More info can be found here, or use Git BASH

The following is based on Docker Basics:

Update packages:

```
sudo yum update -y
```

Install Docker:

```
sudo yum install -y docker
```

Start the Docker service:

```
sudo service docker start
```

Add the ec2-user to the docker group:

```
sudo usermod -a -G docker ec2-user
```

Log out and log back in, and validate the installation using:

```
docker info
```

Jupyter Setup

We will be using a Docker Image in which we will author all of our lessons in the form of Jupyter Notebooks in a JupyterLab environment.

```
docker run --rm -p 8888:8888 -e JUPYTER_ENABLE_LAB=yes jupyter/scipy-notebook
```

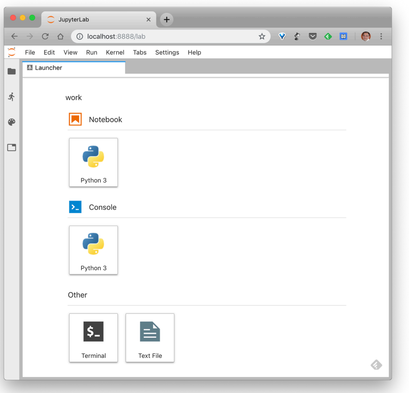
Something like the following will be displayed on the console:

```
Copy/paste this URL into your browser when you connect for the first time, to login with a token:
        http://(68a6da2c797d or 127.0.0.1):8888/?token=cb86df2c15ec0b26ba505928327aa31f4d59c41a060e223e
```

Again, the above is a sample output. In the browser address bar enter the following:

```
http://your-ec2-hostname-here:8888/?token=some-long-token-here
```

Something like the following should appear in your browser:



Select `Python 3 Notebook`, and a new notebook will be created.

A notebook is composed of a header toolbar and a set of input and output cells. An input cell can be of type `Code`, `Markdown` or `Raw`.
A `Code` cell consists of Python instructions. To execute the instructions, press Shift-Enter, and the result will be displayed below the input cell in an output cell.
A `Markdown` cell enables you to progressively document your notebook in Markdown format. To interpret the content, press Shift-Enter, and the input cell will be transformed into the desired output.
A `Raw` cell contains non-executable content.