Install Jupyterlab in Virtualenv

Install `jupyterlab` under `virtualenv`

The first step is to install `virtualenv` for `python3`. In `Fedora` system, do the followings:

```
sudo dnf install python3-virtualenv
virtualenv-3.6 --no-site-packages /home/fguo/Env/python3
source /home/fguo/Env/python3/bin/activate
pip3 install jupyterlab
```

Configuration File

Still inside virtualenv run the following command:

```
jupyter lab --generate-config
```

This creates a configuation file likely at `\home\fguo\.jupyter\jupyter_notebook_config.py`

To start `jupyterlab` manually, just type the following under `virtualenv` bash terminal:

```
jupyter lab
```

Generate Web Sever Password

Inside virtualenv start an ipython session in terminal and run the following code. It generates a hash code for password.

```
from notebook.auth import passwd
passwd()
```

Copy the output hash code string and put it into the line in `jupyter_notebook_config.py` file.

```
c.NotebookApp.password = u'<hash code of password>'
```

SSL Connection Encryption

We can create SSL key and certificate files by using `openssl` command in bash. It will output files `mykey.key` and `mycert.pem` under `~/.jupyter` dir.

```
cd ~/.jupyter
openssl req -x509 -nodes -days 365 -newkey rsa:1024 -keyout mykey.key -out mycert.pem
```

Again update the following lines in `jupyter_notebook_config.py` file.

```
c.NotebookApp.keyfile = u'/home/fguo/.jupyter/mykey.key'
c.NotebookApp.certfile = u'/home/fguo/.jupyter/mycert.pem'
```

Additional config

Update the following additional lines in `jupyter_notebook_config.py` file.

```
c.NotebookApp.ip = '0.0.0.0'
c.NotebookApp.open_browser = False
c.NotebookApp.port = 9999
c.NotebookApp.enable_mathjax = True
c.LabApp.workspaces_dir = u'/home/fguo/jupyter_workdir'
```

Save the above change in `jupyter_notebook_config.py` file and we can manually start the server.

```
jupyter lab
```

In the client browser go to URL `https://smrc-chi12:9999` and the jupyterlab server should be ready there.

Setup Jupyterlab a startup service

We can set up a `jupyterlab` startup service using `systemctl`. First create a script file that `systemctl` looks for services:

```
cd /usr/lib/systemd/system
sudo touch jupyterlab.service
sudo chown root:root jupyterlab.service
```

Edit the file `/usr/lib/systemd/system/jupyterlab.service` to look like this:

```
[Unit]
Description=Jupyterlab

[Service]
ExecStart=/usr/bin/bash -c "source /home/fguo/Env/python3/bin/activate;
          cd /home/fguo; jupyter lab"
User=fguo
Group=users

[Install]
WantedBy=default.target
```

Now enable the `jupyterlab.service` by running:

```
sudo systemctl enable jupyterlab
```

To start and check status of the `jupyterlab` service:

```
sudo systemctl start jupyterlab
```

We can check the status of `jupyterlab` service by calling:

```
systemctl status jupyterlab
```

Whenever `systemd` script file is updated, we need to do a reload:

```
sudo systemctl daemon-reload
```

Install `jupyterlab-vim` extension

```
source /home/fguo/Env/python3/bin/activate
jupyter labextension install jupyterlab_vim
```

Install `jupytext` package

The default file format `.ipynb` of `Jupyterlab` notebook is a customized `json` file. It's not an ideal format to track the difference in `git` which prefers a text based file format. Package `jupytext` needs to be installed so that a text file (like `.py`) can be automatically saved along with the `.ipynb` file.

```
source /home/fguo/Env/python3/bin/activate
pip3 install jupytext --upgrade
```

We need to add the following lines in `~/.jupyter/jupyter_notebook_config.py` file:

```
c.NotebookApp.contents_manager_class = 'jupytext.TextFileContentsManager'
c.ContentsManager.default_jupytext_formats = 'ipynb,py'
```

To make the change effective immediately, we need to restart the service:

```
sudo systemctl restart jupyterlab
```

New login on `jupyterlab` webpage usually prompt a rebuild to integrate `jupytext`. It takes a while for the rebuild to complete and then reload of `jupyterlab` webpage is prompted. You can check that `jupytext` is properly installed by click the `Commands` tab and find options under `JUPYTEXT`.

Install `jupyter-matplotlib` extension

Again we need to do this in `virtualenv`.

```
pip3 install ipympl
jupyter labextension install @jupyter-widgets/jupyterlab-manager
jupyter labextension install jupyter-matplotlib
```

In the `jupyterlab` notebook, we need to put the magic:

```
%matplotlib widget
```