

README.md

Step-by-Step Instructions for Installing Jupyter Lab and Java Environment

🔗 This document provides the step-by-step instructions for installing Jupyter Lab and activating the Java runtime environment in your personal computer. It aims to cover web-based version of the Jupyter lab. The procedure to integrate Jupyter Lab to VSCode or other IDEs may vary from what is shown in this document.

Pre-requisites

- 🔗 • **Java Development Kit (JDK):** Ensure that you have the recent JDK installed on your system. You can check this by running the following commands in your terminal.

```
java -version
```

```
bash-3.2$ java -version
java version "20.0.2" 2023-07-18
Java(TM) SE Runtime Environment (build 20.0.2+9-78)
Java HotSpot(TM) 64-Bit Server VM (build 20.0.2+9-78, mixed mode, sharing)
bash-3.2$
```

```
javac -version
```

```
bash-3.2$ javac -version
javac 20.0.2
bash-3.2$
```

If it's not installed, download and install it from the [Oracle website](#) or install it using a package manager of your operating system. For example,

for Ubuntu

```
sudo apt install default-jdk
```

for macOS

```
brew install openjdk
```

- **Python:** Jupyter Lab requires Python. You can install Python from the [official Python website](#) if it's not already installed. Verify your installation with following command.

```
python --version
```

```
bash-3.2$ python --version
Python 3.9.6
bash-3.2$
```


- **pip:** Ensure that PIP is installed to manage Python packages. This typically comes with Python, but you can check it by running the following command.

```
pip --version
```

If it's not installed, you can follow the installation methods on [PIP official website](#).

Installation Steps

Install Jupyter Lab using PIP

-  Run the following command in terminal to install Jupyter Lab. PIP will download and install required packages.

```
pip install jupyterlab
```

```
bash-3.2$ pip install jupyterlab
Collecting jupyterlab
  Downloading jupyterlab-4.2.4-py3-none-any.whl (11.6 MB)
    | 11.6 MB 14.3 MB/s
Collecting async-lru<=1.0.0
  Downloading async_lru-2.0.4-py3-none-any.whl (6.1 kB)
Collecting httpx<=0.25.0
  Downloading httpx-0.27.0-py3-none-any.whl (75 kB)
    | 75 kB 21.5 MB/s
Collecting jinja2<=3.0.3
  Downloading jinja2-3.1.4-py3-none-any.whl (133 kB)
    | 133 kB 80.7 MB/s
Collecting tomli<=1.2.2
  Downloading tomli-2.0.1-py3-none-any.whl (12 kB)
Collecting tornado<=6.2.0
  Downloading tornado-6.4.1-cp38-abi3-macosx_10_9_universal2.whl (435 kB)
    | 435 kB 23.6 MB/s
```

Verify whether the installation is complete by running following command.

```
jupyter lab --version
```

```
bash-3.2$ jupyter lab --version
4.2.4
bash-3.2$
```

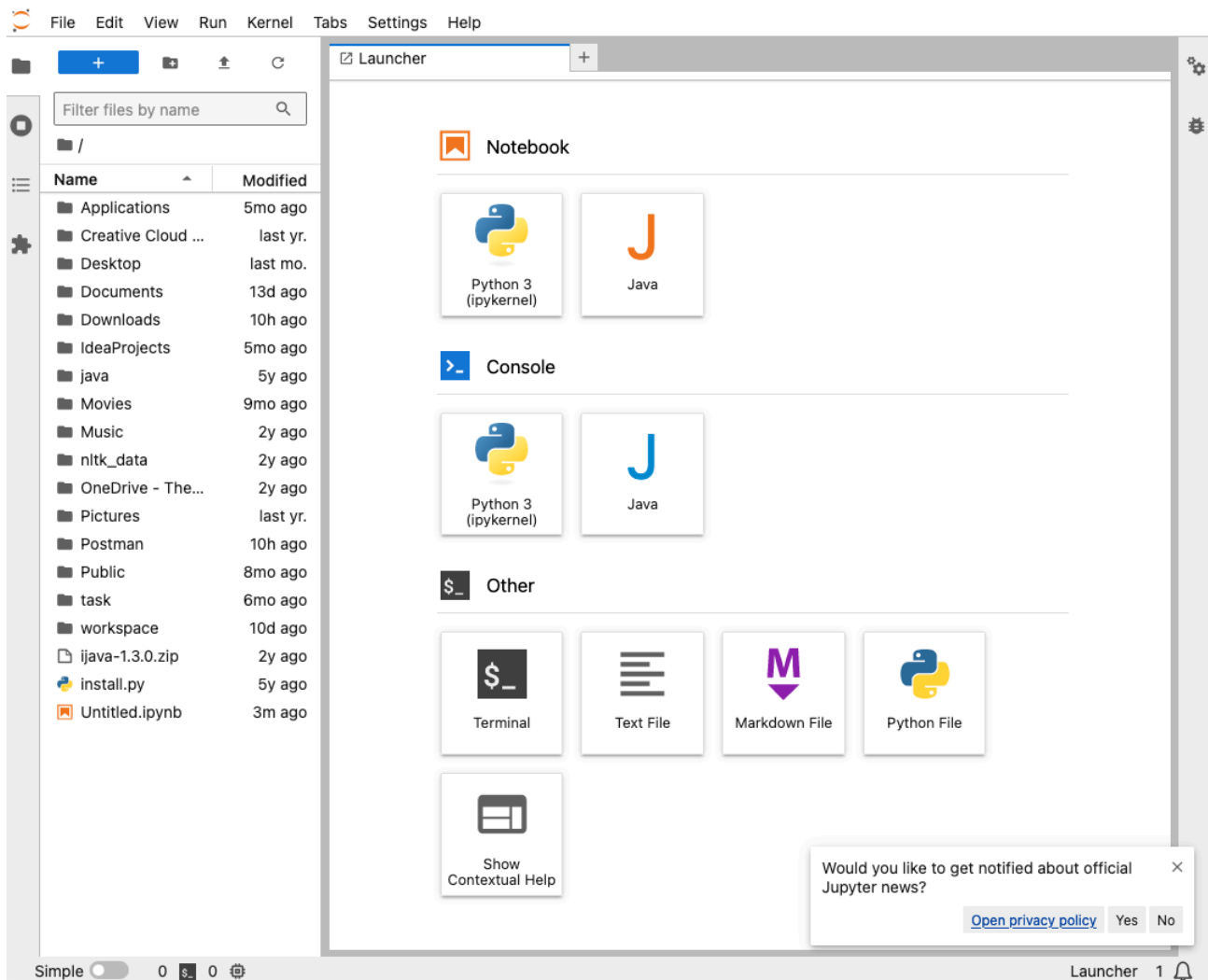
Start Jupyter Lab (Python Kernel)

🔗 To start Jupyter Lab with Python Kernel, run the following command. Jupyter Lab will open a web browser as shown below.

```
jupyter lab
```

```
bash-3.2$ jupyter lab
[I 2024-08-16 19:21:02.959 ServerApp] jupyter_lsp | extension was successfully linked.
[I 2024-08-16 19:21:02.961 ServerApp] jupyter_server_terminals | extension was successfully linked.
[I 2024-08-16 19:21:02.963 ServerApp] jupyterlab | extension was successfully linked.
[I 2024-08-16 19:21:03.123 ServerApp] notebook_shim | extension was successfully linked.
[I 2024-08-16 19:21:03.149 ServerApp] notebook_shim | extension was successfully loaded.
[I 2024-08-16 19:21:03.151 ServerApp] jupyter_lsp | extension was successfully loaded.
[I 2024-08-16 19:21:03.151 ServerApp] jupyter_server_terminals | extension was successfully loaded.
[I 2024-08-16 19:21:03.152 LabApp] JupyterLab extension loaded from , .pyenv/versions/3.9.6/lib/python3.9/site-packages/jupyterlab
[I 2024-08-16 19:21:03.152 LabApp] JupyterLab application directory is '.pyenv/versions/3.9.6/share/jupyter/lab'
[I 2024-08-16 19:21:03.152 LabApp] Extension Manager is 'pypi'.
[I 2024-08-16 19:21:03.161 ServerApp] jupyterlab | extension was successfully loaded.
[I 2024-08-16 19:21:03.162 ServerApp] Serving notebooks from local directory: /Users/wcharoenwet
[I 2024-08-16 19:21:03.162 ServerApp] Jupyter Server 2.14.2 is running at:
[I 2024-08-16 19:21:03.162 ServerApp] http://localhost:8888/lab?token=264de0e4da363e8d5639d57bb01883fa3c94ac8dbb708761
[I 2024-08-16 19:21:03.162 ServerApp] http://127.0.0.1:8888/lab?token=264de0e4da363e8d5639d57bb01883fa3c94ac8dbb708761
[I 2024-08-16 19:21:03.162 ServerApp] Use Control-C to stop this server and shut down all kernels (twice to skip confirmation).
[C 2024-08-16 19:21:03.169 ServerApp]

To access the server, open this file in a browser:
file:///Library/Jupyter/runtime/jpserver-25382-open.html
Or copy and paste one of these URLs:
http://localhost:8888/lab?token=264de0e4da363e8d5639d57bb01883fa3c94ac8dbb708761
http://127.0.0.1:8888/lab?token=264de0e4da363e8d5639d57bb01883fa3c94ac8dbb708761
```

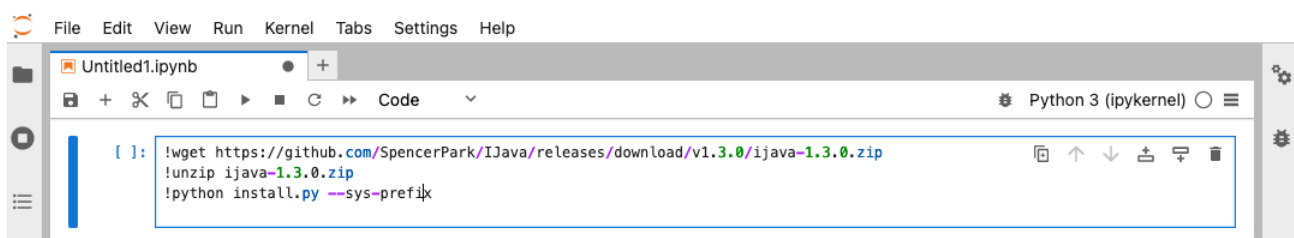


To shutdown Jupyter Lab, press CTRL + C and follow the prompt in terminal.

Install Java Kernel

- Click Python 3 (ipykernel) to create a new python notebook. Enter following commands in the cell and execute the cell to download and install Java kernel. This step needs to be executed only once.

```
!wget https://github.com/SpencerPark/IJava/releases/download/v1.3.0/ijava-1.3.0.zip
!unzip ijava-1.3.0.zip
!python install.py --sys-prefix
```



Check the status message to ensure that there is no error. The following message indicate that the Java kernel is downloaded twice. Delete the file `ijava-1.3.0.zip`, `install.py`, and folder `java` before running the commands again.

```

--2024-08-16 19:29:42-- https://github.com/SpencerPark/IJJava/releases/download/v1.3.0/ijava-1.3.0.zip
Resolving github.com (github.com)... 4.237.22.38
Connecting to github.com (github.com)|4.237.22.38|:443... connected.
HTTP request sent, awaiting response... 302 Found
Location: https://objects.githubusercontent.com/github-production-release-asset-2e65be/106150621/74abd180-6f8d-11e9-870e-c2f882fb5dbe7X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=releaseassetproduction%2F20240816%2Fus-east-1%2Fs3%2Faws4_requ
e6&X-Amz-Date=20240816T092755Z&X-Amz-Expires=300&X-Amz-Signature=7893969384e7f4daf6fcec5a709942b5e3a139c8381d4638c4e8c7ac6b
e39a9e56&X-Amz-SignedHeaders=host&actor_id=0&key_id=0&repo_id=106150621&response-content-disposition=attachment%3B%20filename
e%3Dijava-1.3.0.zip&response-content-type=application%2Foctet-stream [following]
--2024-08-16 19:29:43-- https://objects.githubusercontent.com/github-production-release-asset-2e65be/106150621/74abd180-6f
8d-11e9-870e-c2f882fb5dbe7X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=releaseassetproduction%2F20240816%2Fus-east-1%2
Fs3%2Faws4_requ
e6&X-Amz-Date=20240816T092755Z&X-Amz-Expires=300&X-Amz-Signature=7893969384e7f4daf6fcec5a709942b5e3a139c8381
d4638c4e8c7ac6be39a9e56&X-Amz-SignedHeaders=host&actor_id=0&key_id=0&repo_id=106150621&response-content-disposition=attachme
nt%3B%20filename%3Dijava-1.3.0.zip&response-content-type=application%2Foctet-stream
Resolving objects.githubusercontent.com (objects.githubusercontent.com)... 185.199.109.133, 185.199.110.133, 185.199.111.13
3, ...
Connecting to objects.githubusercontent.com (objects.githubusercontent.com)|185.199.109.133|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 3366077 (3.2M) [application/octet-stream]
Saving to: 'ijava-1.3.0.zip.1'

ijava-1.3.0.zip.1  100%[=====] 3.21M --.-KB/s in 0.09s

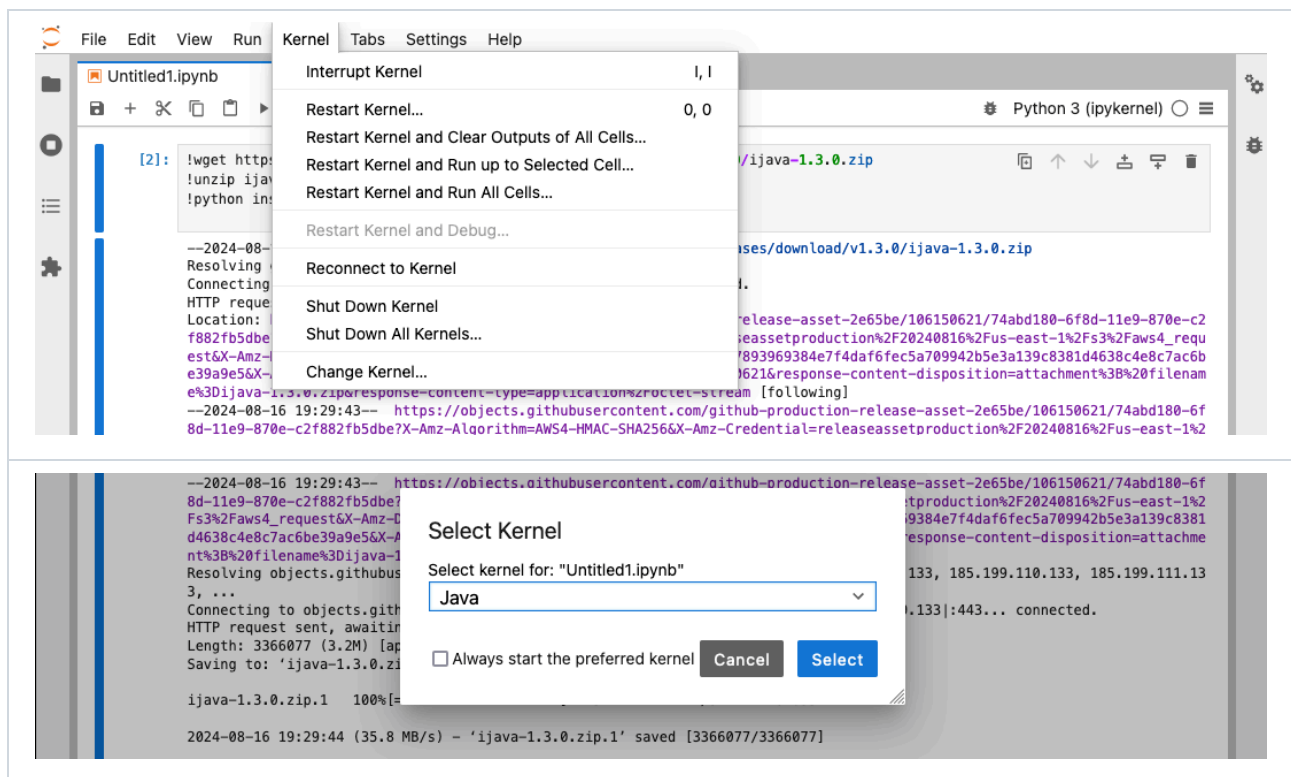
2024-08-16 19:29:44 (35.8 MB/s) - 'ijava-1.3.0.zip.1' saved [3366077/3366077]

Archive: ijava-1.3.0.zip
replace java/ijava-1.3.0.jar? [y]es, [n]o, [A]ll, [N]one, [r]ename:

```

Switch to Java Kernel

Click Kernel > Change Kernel... to switch to Java kernel. Choose Java, then click Select.



To test the Java Kernel, create a black cell and enter following command, then execute the cell. There should be no error message.

```
%%loadFromPOM
<dependency>
<groupId>junit</groupId>
<artifactId>junit</artifactId>
<version>4.13.2</version>
</dependency>
```

A screenshot of a Jupyter Lab code cell. The cell is labeled [1]: and contains XML code for loading a dependency from a POM file. The code is:


```
%%loadFromPOM
<dependency>
  <groupId>junit</groupId>
  <artifactId>junit</artifactId>
  <version>4.13.2</version>
</dependency>
```

 The code is syntax-highlighted with colors: purple for the magic command, green for the XML tags, and blue for the version number. The cell has a toolbar on the right with icons for copy, paste, undo, redo, and delete.


Switch to Java Kernel before running the cell that contains Java code.

Troubleshooting (To-Be Updated)

Make sure you installed JDK not JRE

-  You might encounter issues when trying to run Java programs in Jupyter Lab if you have the Java Runtime Environment (JRE) installed instead of the Java Development Kit (JDK). The JDK is required because it includes development tools like Java compiler (javac) and other utilities necessary for compiling and running Java code. The JRE only includes the environment to run compiled Java programs, not to compile them.

Make sure **wget** is installed

-  Java Kernel installation commands use `wget` program to download installation script. `wget` can be installed in various ways depending on your operating system and your development environment. For example, [Windows](#), MacOS [Brew](#), [Linux](#), [Pip](#). Also, make sure that it can be run from command line.