

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

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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
```

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

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$
```

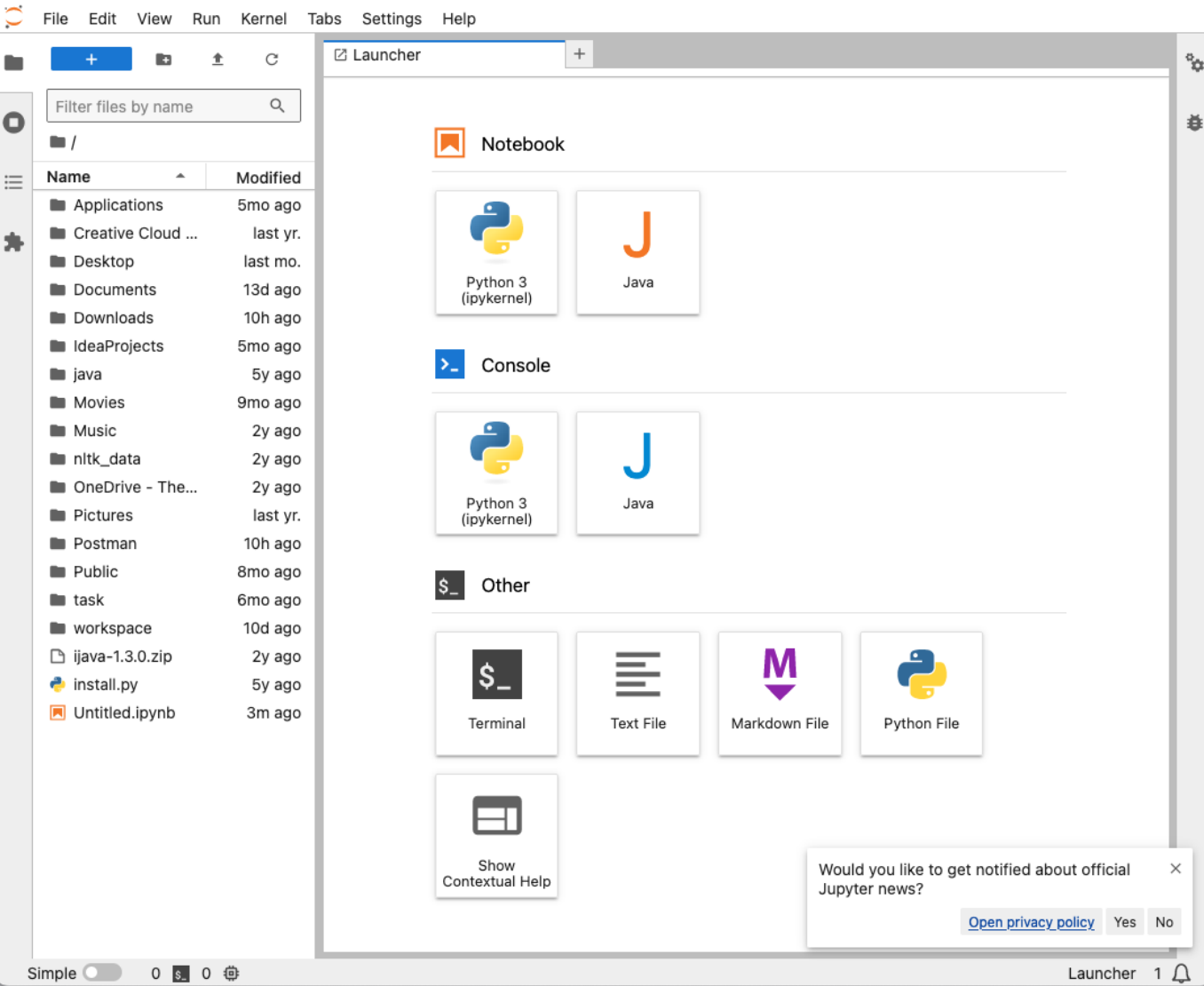
### Start Jupyter Lab (Python Kernel)

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 /Users/wcharoenwet/.pyenv/versions/3.9.6/lib/python3.9/site-packages/jupyterlab
[I 2024-08-16 19:21:03.152 LabApp] JupyterLab application directory is /Users/wcharoenwet/.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:///Users/wcharoenwet/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
```

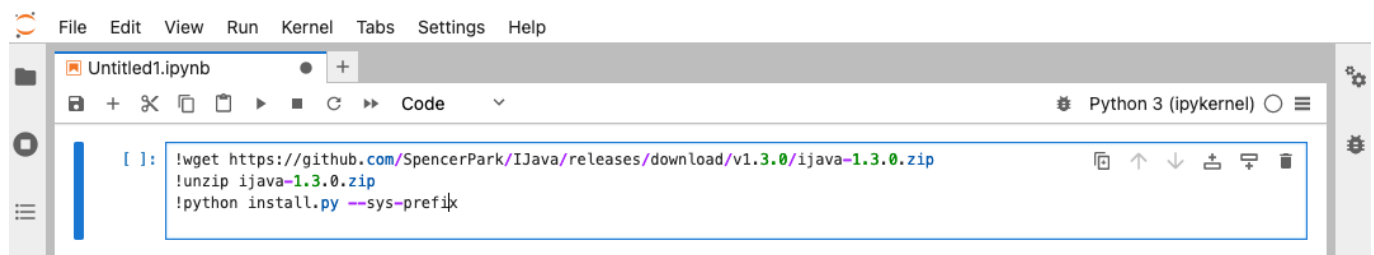


To shutdown Jupyter Lab, press CTRL + C and follow the prompt in terminal.

## 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
```

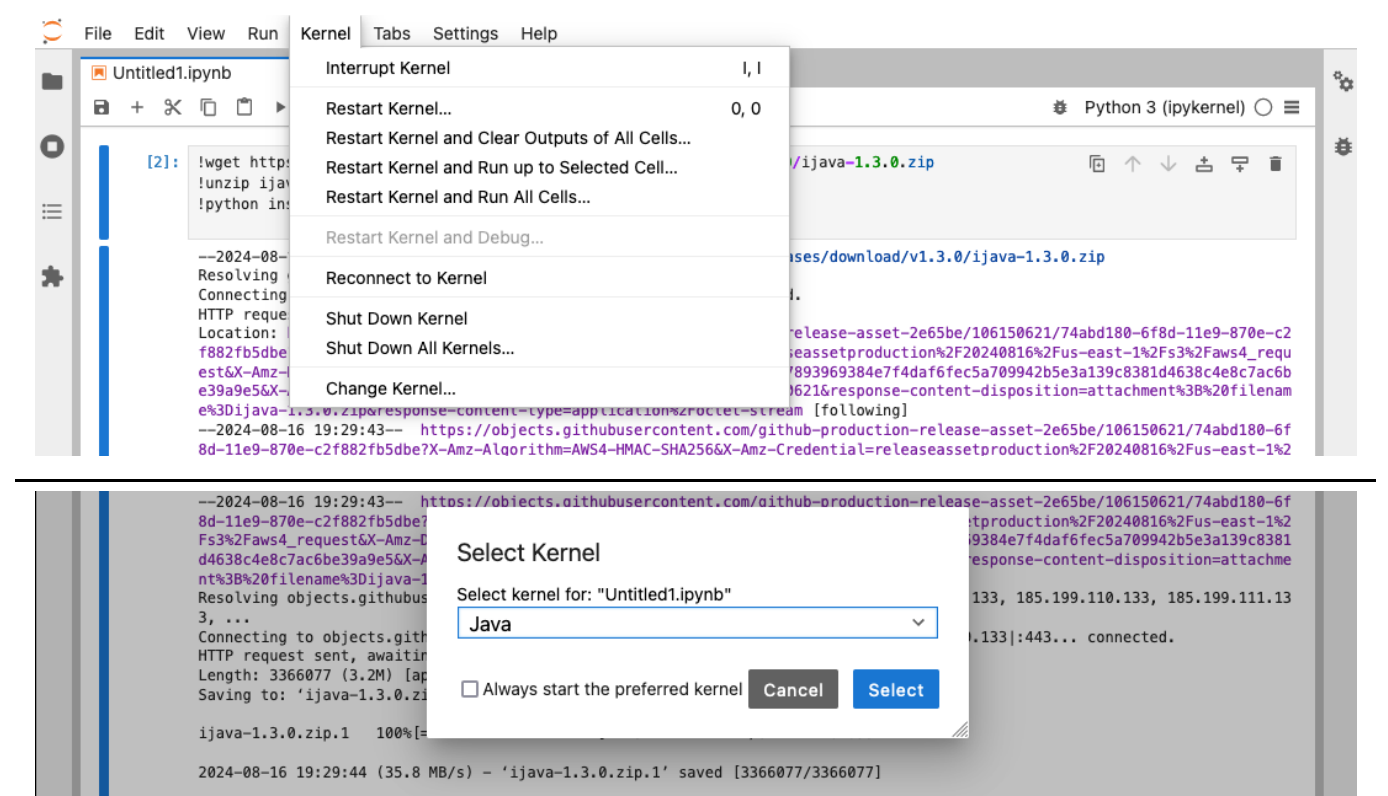


Check the status message to ensure that there is no error. The following message indicate that the Java kernel is downloaded twice. Delete the file ijava-1.3.0.zip, install.py, and folder java before running the commands again.



## 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>
```

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.