Pairs Trading Strategy

1 hour 15 minutes 1 Credit Rate Lab

Overview

Pairs trading is a strategy that attempts to take advantage of the divergence between assets whose ratio or difference in price is typically constant over time. One of the biggest advantages of pairs trading is that it enables traders to profit regardless of market conditions.

In this lab, some of the concepts behind pairs trading will be explored by leveraging the Auquan Toolbox, a Python library that provides tools for developing trading algorithms.

This lab is based on the Auquan blog post Pairs Trading using Data-Driven Techniques: Simple Trading Strategies Part 3.

Objectives

In this lab, you will learn about the following:

- Define cointegration and perform statistical testing to check for it.
- Find pairs of securities that are cointegrated.
- Devise a trading strategy based on cointegrated securities.
- Backtest the trading strategy to check for overfitting.

Set up your environment

What you'll need

To complete this lab, you'll need:

- Access to a standard internet browser (Chrome browser recommended).
- Time. Note the lab's **Completion** time in Qwiklabs. This is an estimate of the time it should take to complete all steps. Plan your schedule so you have time to complete the lab. Once you start the lab, you will not be able to pause and return later (you begin at step 1 every time you start a lab).
- The lab's **Access** time is how long your lab resources will be available. If you finish your lab with access time still available, you will be able to explore the Google Cloud Platform or work on any section of the lab that was marked "if you have time". Once the Access time runs out, your lab will end and all resources will terminate.
- You **DO NOT** need a Google Cloud Platform account or project. An account, project and associated resources are provided to you as part of this lab.
- If you already have your own GCP account, make sure you do not use it for this lab.
- If your lab prompts you to log into the console, **use only the student account provided to you by the lab**. This prevents you from incurring charges for lab activities in your personal GCP account.

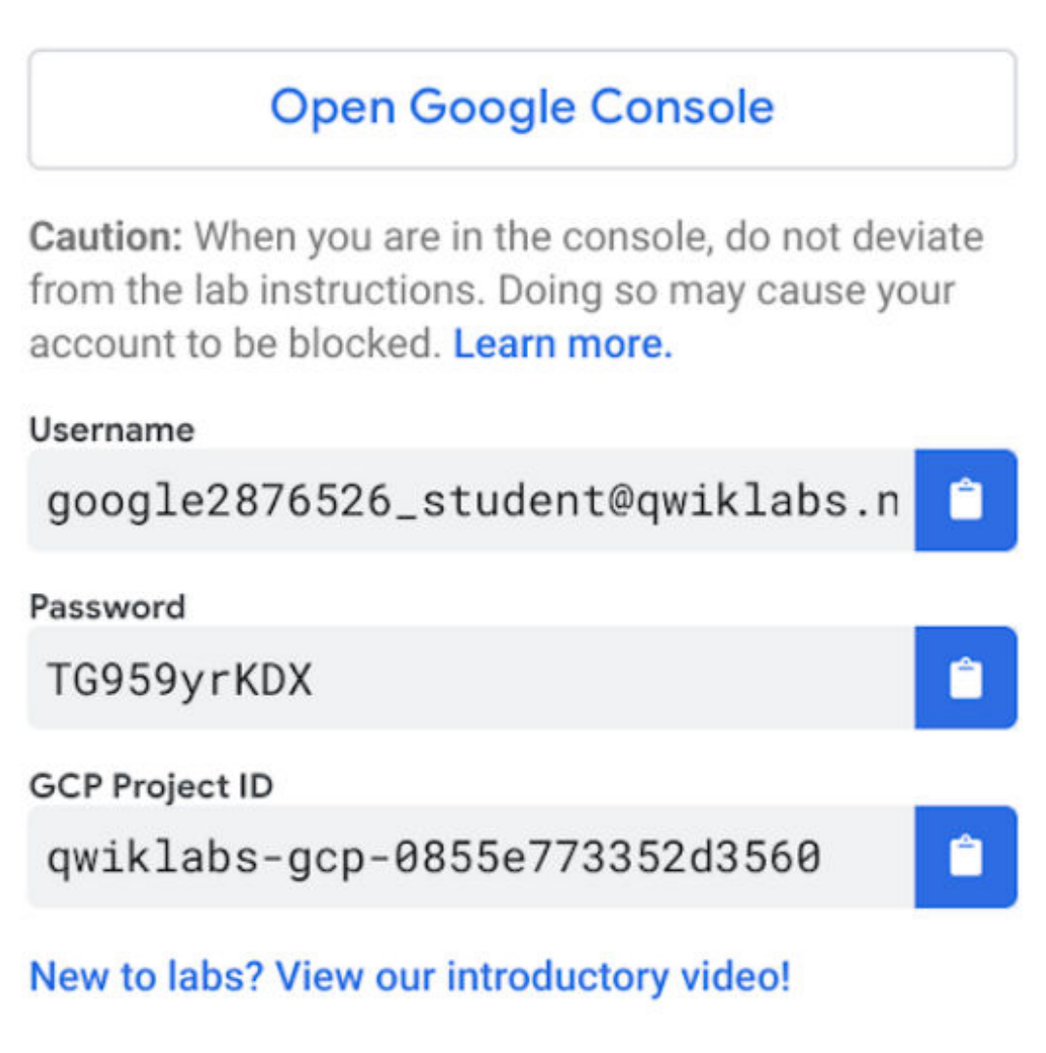
Start your lab

When you are ready, click **Start Lab**. You can track your lab's progress with the status bar at the top of your screen.

> **Important** What is happening during this time? Your lab is spinning up GCP resources for you behind the scenes, including an account, a project, resources within the project, and permission for you to control the resources needed to run the lab. This means that instead of spending time manually setting up a project and building resources from scratch as part of your lab, you can begin learning more quickly.

Find Your Lab's GCP Username and Password

To access the resources and console for this lab, locate the Connection Details panel in Qwiklabs. Here you will find the account ID and password for the account you will use to log in to the Google Cloud Platform:

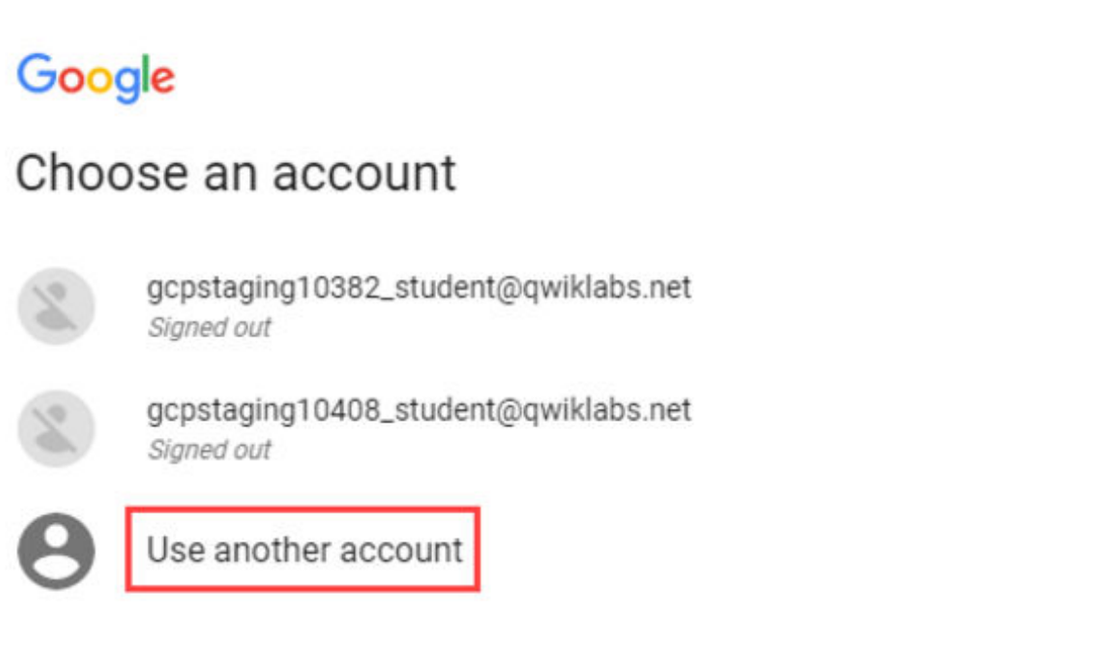


If your lab provides other resource identifiers or connection-related information, it will appear on this panel as well.

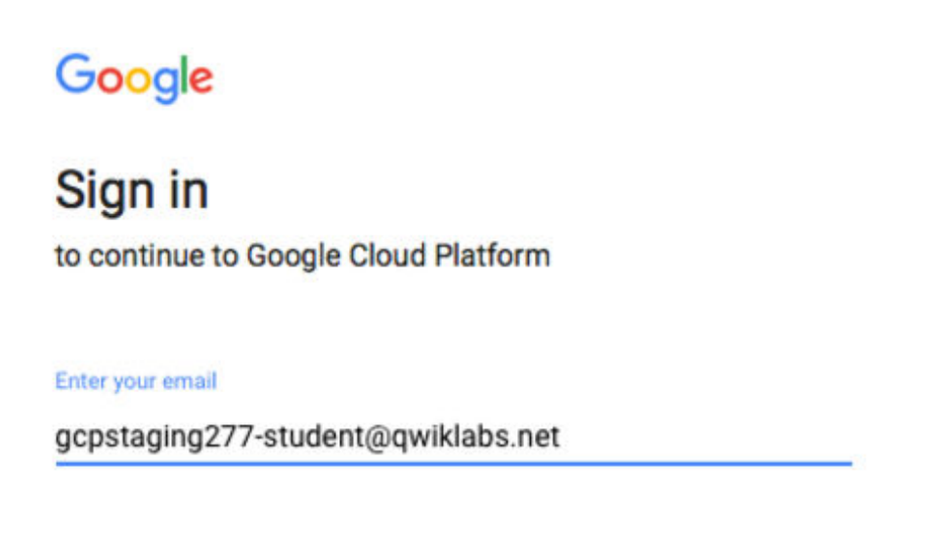
Log in to Google Cloud Console

Using the Qwiklabs browser tab/window or the separate browser you are using for the Qwiklabs session, copy the Username from the Connection Details panel and click the **Open Google Console** button.

You'll be asked to Choose an account. Click **Use another account**.



Paste in the Username, and then the Password as prompted:

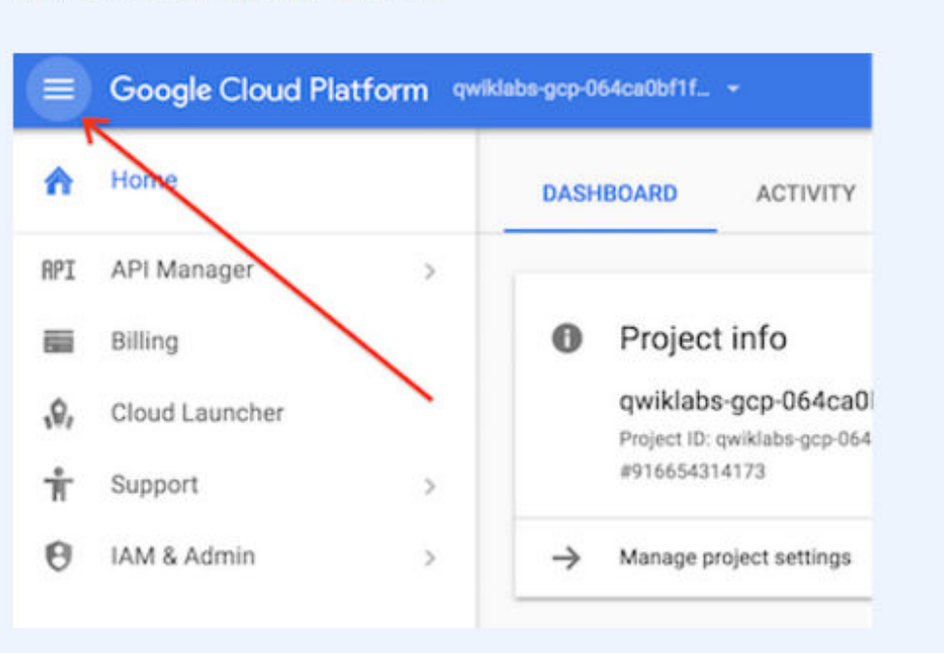


Accept the terms and conditions.

Since this is a temporary account, which you will only have to access for this one lab:

- Do not add recovery options
- Do not sign up for free trials

> **Note:** You can view the list of services by clicking the GCP Navigation menu button at the top-left next to "Google Cloud Platform".

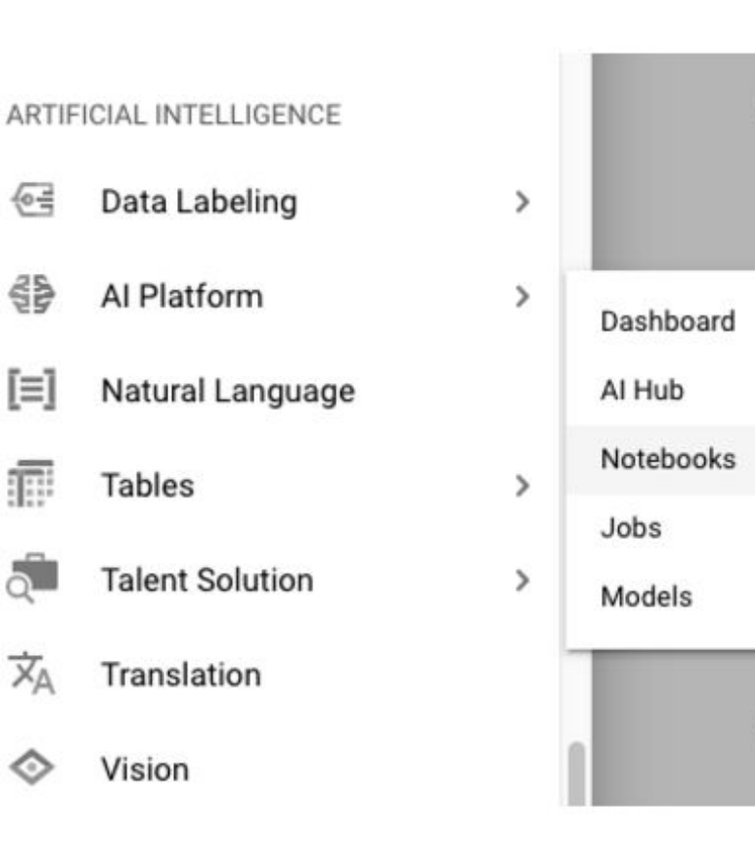


Launch AI Platform Notebooks

To launch AI Platform Notebooks:

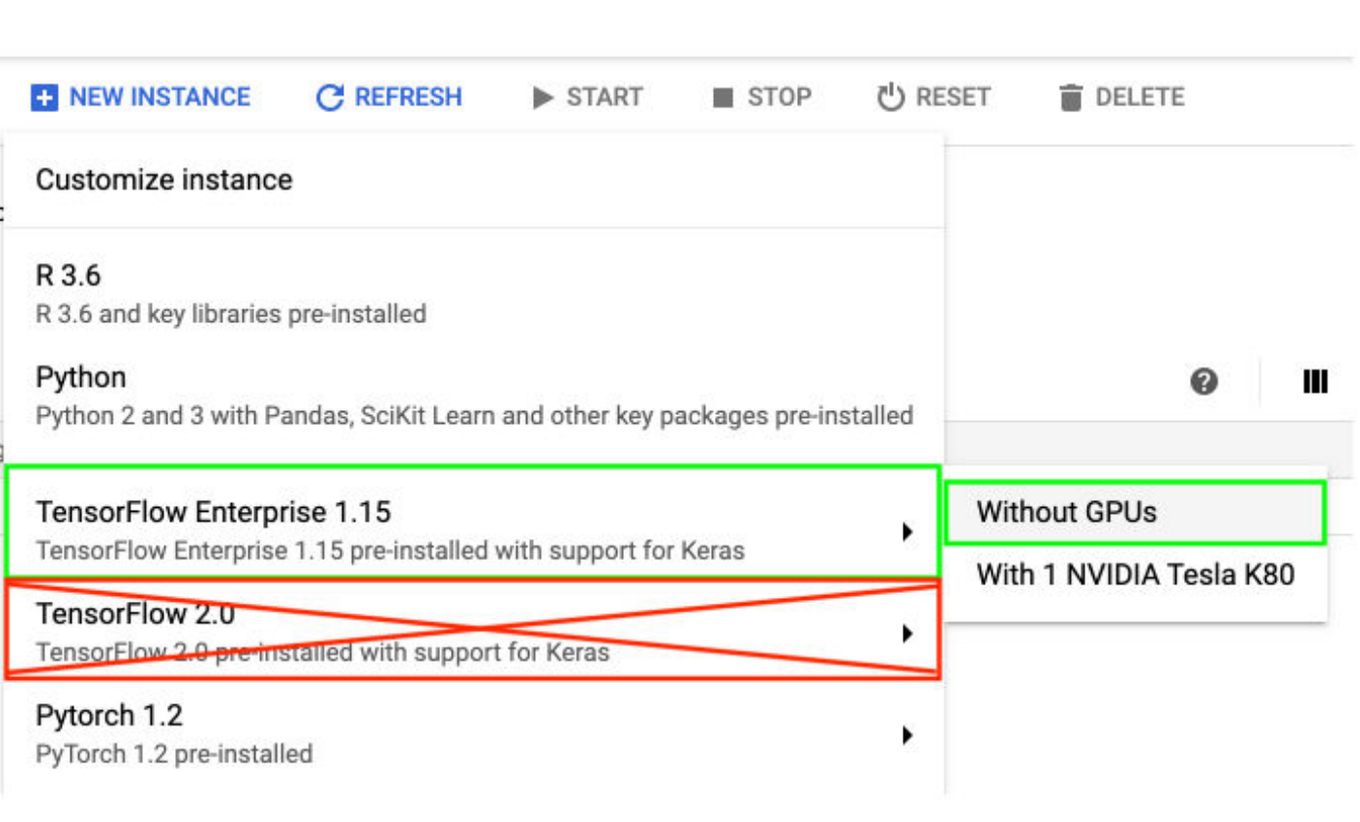
Step 1

Click on the **Navigation Menu**. Navigate to **AI Platform**, then to **Notebooks**.



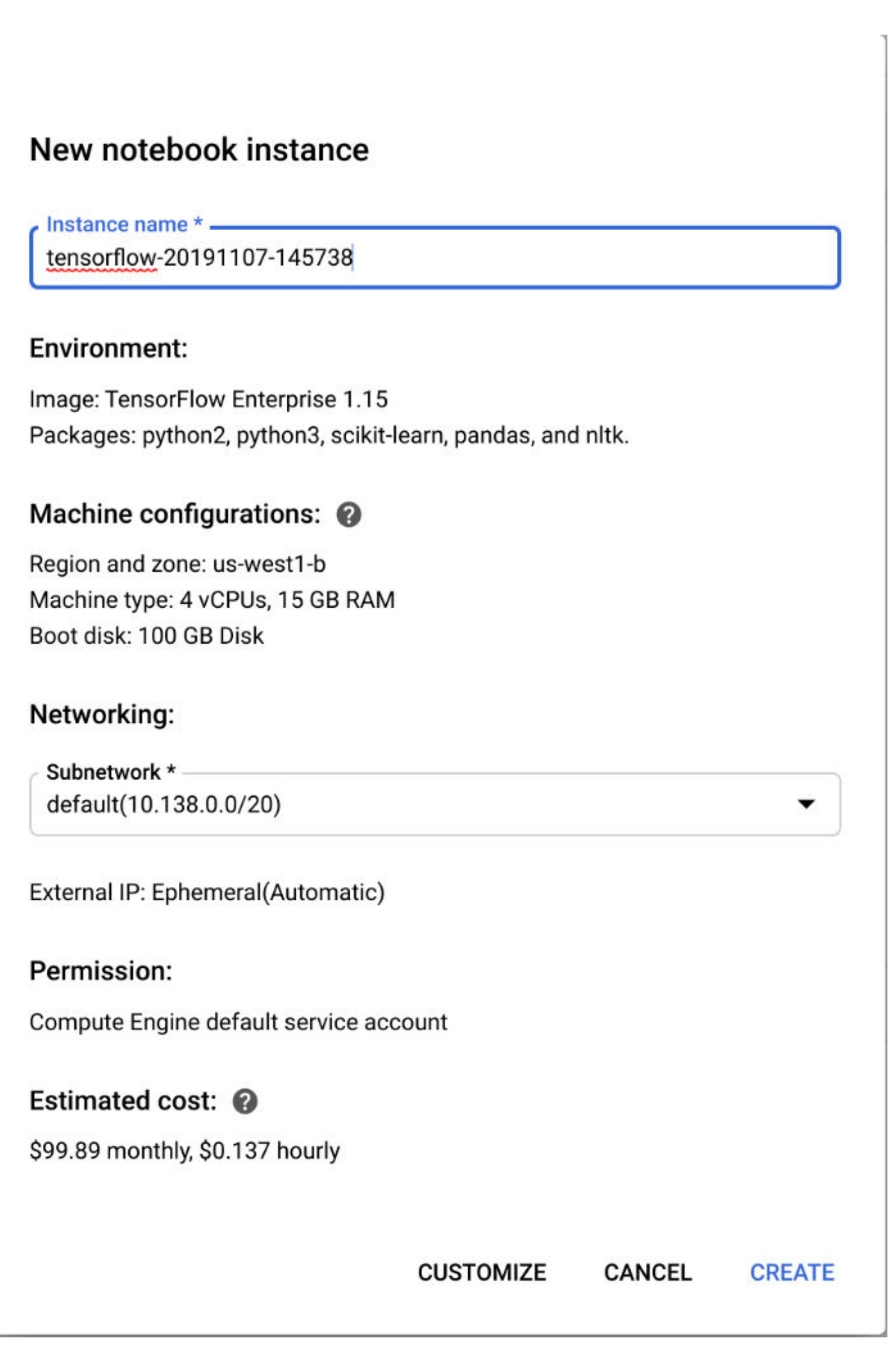
Step 2

On the Notebook instances page, click + NEW INSTANCE . Select a `1.XX` version of TensorFlow (not a 2.0) *without GPUs*. In the following example, you would select **Tensorflow Enterprise 1.15** > **Without GPUs**:



Tensorflow 1.XX versions change semi-frequently, so the version you pick may be different.

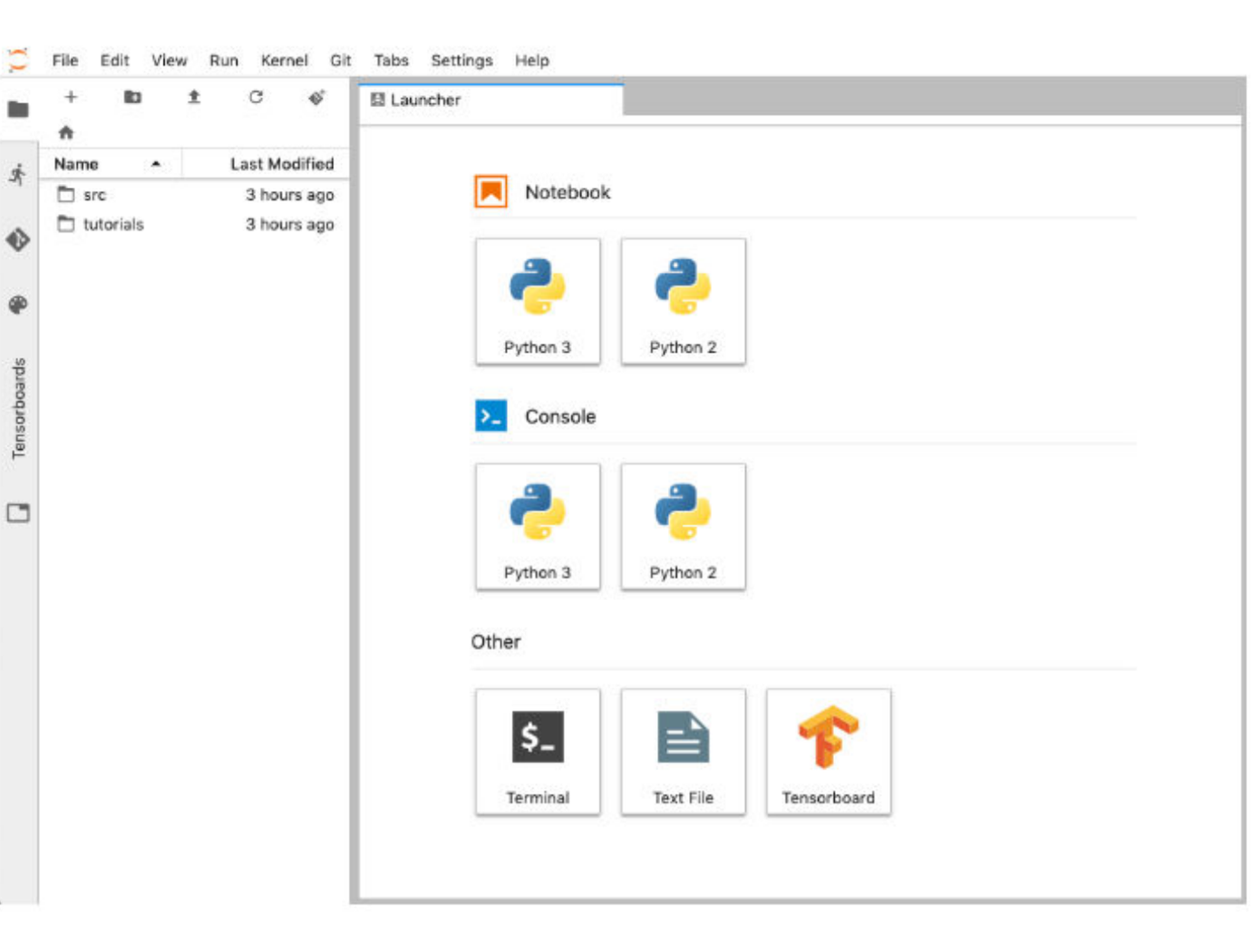
In the pop-up, confirm the name of the deep learning VM and click **Create**.



The new VM will take 2-3 minutes to start.

Step 3

Click **Open JupyterLab**. A JupyterLab window will open in a new tab.

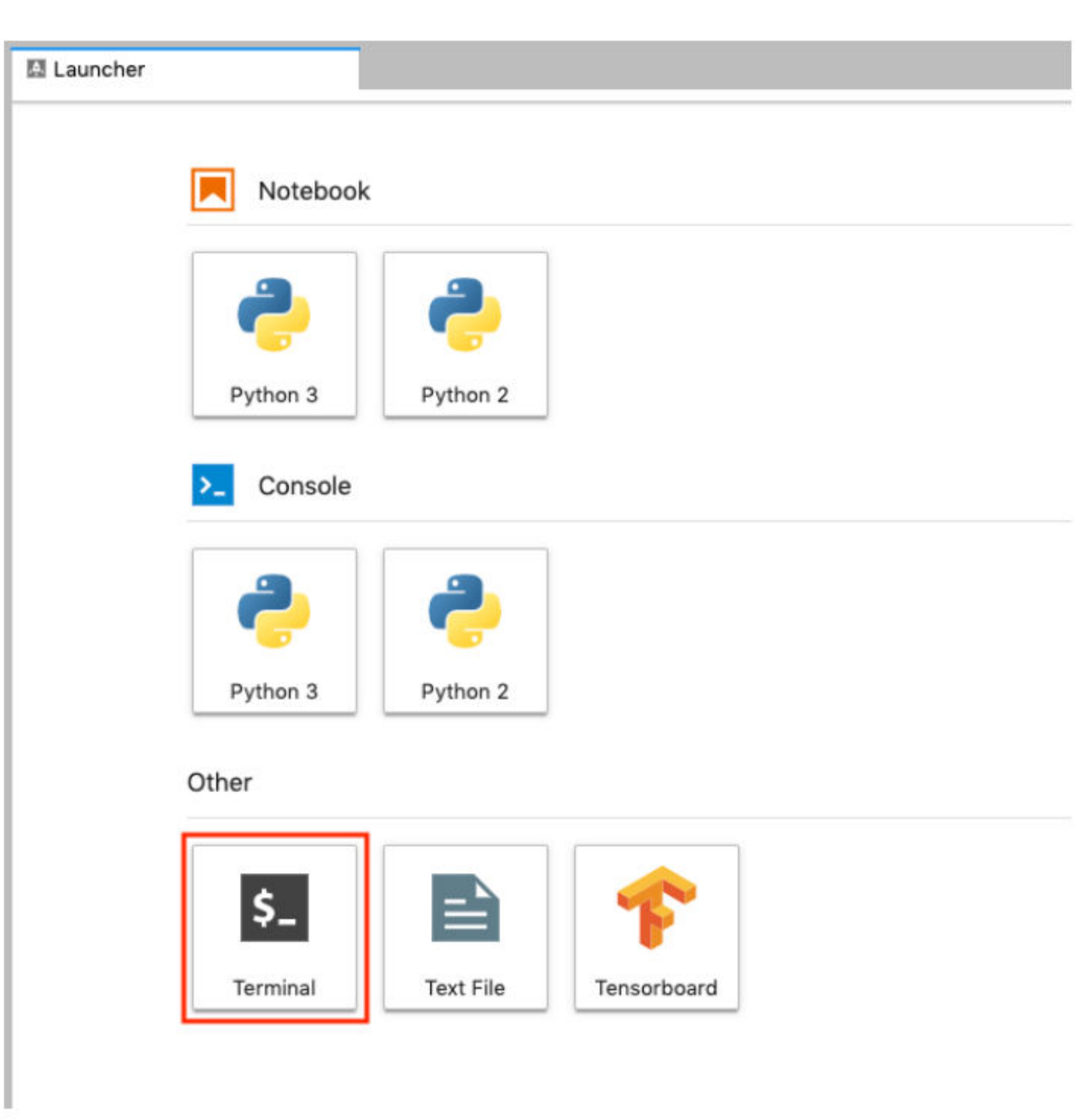


Clone Auquan Tutorials

To clone the Auquan tutorial notebooks into your JupyterLab instance:

Step 1

In JupyterLab, click the Terminal icon to open a new terminal.



Step 2

At the command-line prompt, type in the following command and press Enter.

```
git clone https://github.com/Auquan/Tutorials.git
```

Step 3

Confirm that you have cloned the repository by double clicking on the `Tutorials` directory and ensuring that you can see its contents.

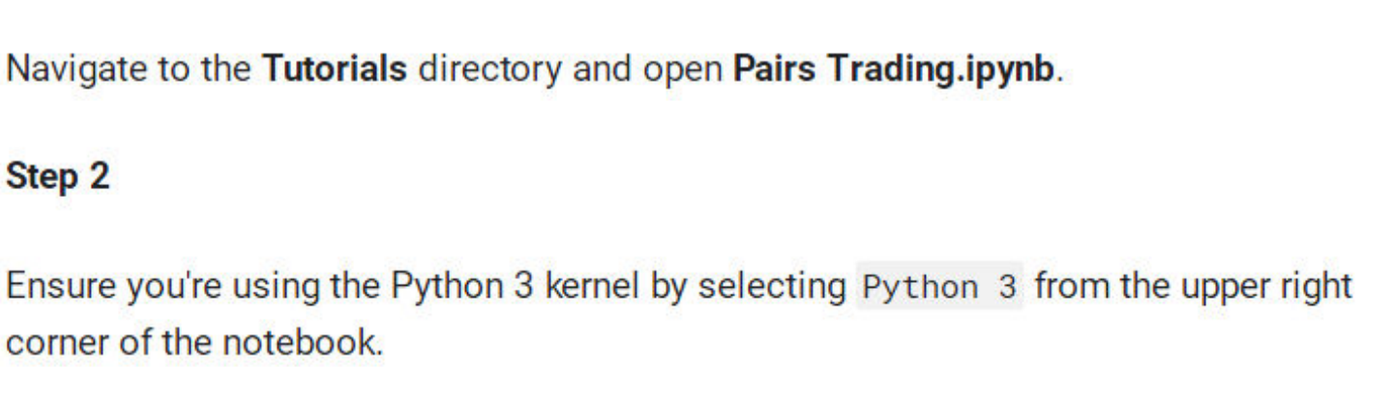
Pairs Trading

Step 1

Navigate to the **Tutorials** directory and open **Pairs Trading.ipynb**.

Step 2

Ensure you're using the Python 3 kernel by selecting `Python 3` from the upper right corner of the notebook.



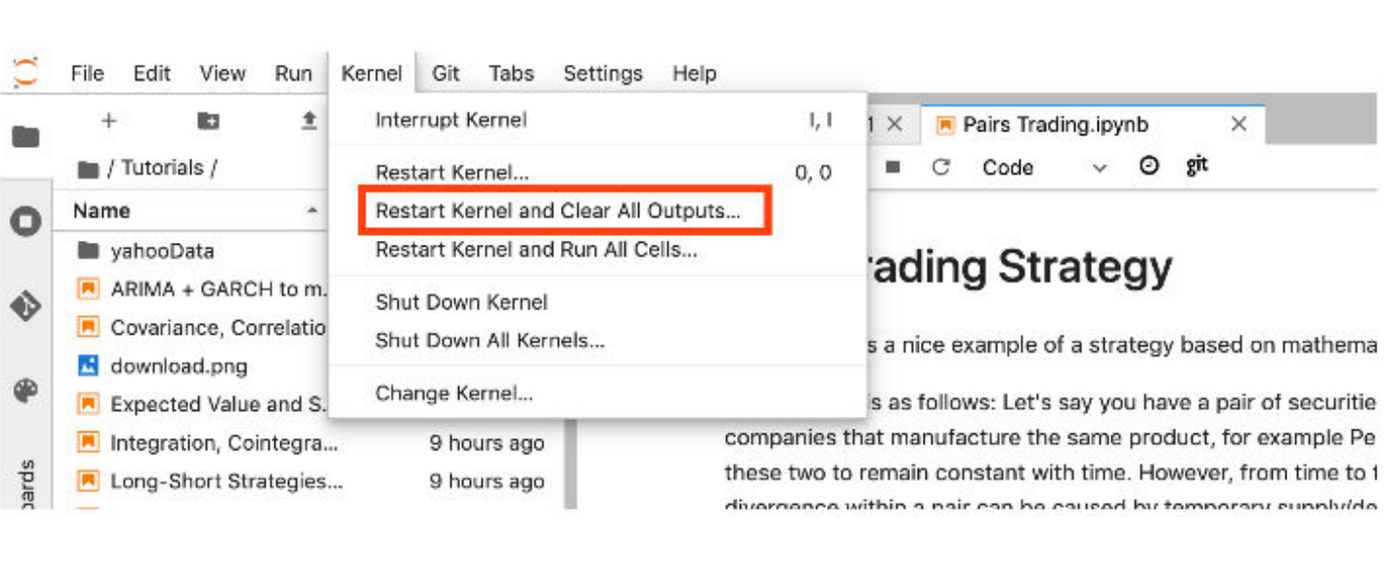
Step 3

You'll need to install some libraries to complete the notebook. Create a new cell at the top of the notebook and execute the following code:

```
%pip install statsmodels --user
%pip install tensorboardX --user
%pip install bs4 --user
%pip install -U auquan_toolbox --user
```

Step 4

In the notebook interface, click on **Kernel > Restart Kernel and Clear All Outputs**.



Step 5

Read the narrative and execute each cell in turn.

Next Steps / Learn More

- Official documentation on AI Platform Notebooks
- Blogpost on pairs trading by Bart Chrzaszcz
- Auquan blogpost on pairs trading

End your lab

When you have completed your lab, click **End Lab**. Qwiklabs removes the resources you've used and cleans the account for you.

You will be given an opportunity to rate the lab experience. Select the applicable number of stars, type a comment, and then click **Submit**.

The number of stars indicates the following:

- 1 star = Very dissatisfied
- 2 stars = Dissatisfied
- 3 stars = Neutral
- 4 stars = Satisfied
- 5 stars = Very satisfied

You can close the dialog box if you don't want to provide feedback.

For feedback, suggestions, or corrections, please use the **Support** tab.

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Manual Last Updated November 4, 2019
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