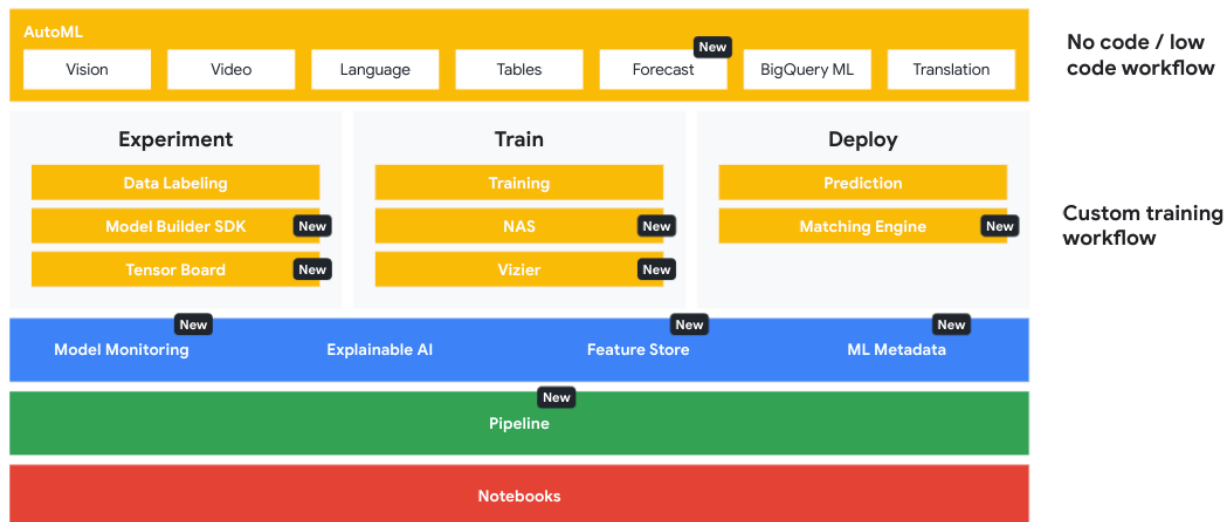


Vertex AI: Qwik Start

Overview

In this lab, you will use [BigQuery](#) for data processing and exploratory data analysis and the [Vertex AI](#) platform to train and deploy a custom TensorFlow Regressor model to predict customer lifetime value. The goal of the lab is to introduce to Vertex AI through a high value real world use case - predictive CLV. You will start with a local BigQuery and TensorFlow workflow that you may already be familiar with and progress toward training and deploying your model in the cloud with Vertex AI.

Vertex AI ^{GA}



Vertex AI is Google Cloud's next generation, unified platform for machine learning development and the successor to AI Platform announced at Google I/O in May 2021. By developing machine learning solutions on Vertex AI, you can leverage the latest ML pre-built components and AutoML to significantly enhance development productivity, the ability to scale your workflow and decision making with your data, and accelerate time to value.

Objectives

- Train a TensorFlow model locally in a hosted [Vertex Notebook](#).
- Create a [managed Tabular dataset](#) artifact for experiment tracking.
- Containerize your training code with [Cloud Build](#) and push it to [Google Cloud Artifact Registry](#).
- Run a [Vertex AI custom training job](#) with your custom model container.
- Use [Vertex TensorBoard](#) to visualize model performance.
- Deploy your trained model to a [Vertex Online Prediction Endpoint](#) for serving predictions.
- Request an online prediction and explanation and see the response.

Enable Google Cloud services

1. In Cloud Shell, use `gcloud` to enable the services used in the lab.

```
gcloud services enable \
  compute.googleapis.com \
  iam.googleapis.com \
  iamcredentials.googleapis.com \
  monitoring.googleapis.com \
  logging.googleapis.com \
  notebooks.googleapis.com \
  aiplatform.googleapis.com \
  bigquery.googleapis.com \
  artifactregistry.googleapis.com \
  cloudbuild.googleapis.com \
  container.googleapis.com
```

Create Vertex AI custom service account for Vertex Tensorboard integration

1. Create custom service account

```
SERVICE_ACCOUNT_ID=vertex-custom-training-sa
gcloud iam service-accounts create $SERVICE_ACCOUNT_ID \
  --description="A custom service account for Vertex custom training with Tensorboard" \
  --display-name="Vertex AI Custom Training"
```

2. Grant it access to GCS for writing and retrieving Tensorboard logs

```
PROJECT_ID=$(gcloud config get-value core/project)
gcloud projects add-iam-policy-binding $PROJECT_ID \
  --member=serviceAccount:$SERVICE_ACCOUNT_ID@$PROJECT_ID.iam.gserviceaccount.com \
  --role="roles/storage.admin"
```

3. Grant it access to your BigQuery data source to read data into your TensorFlow model

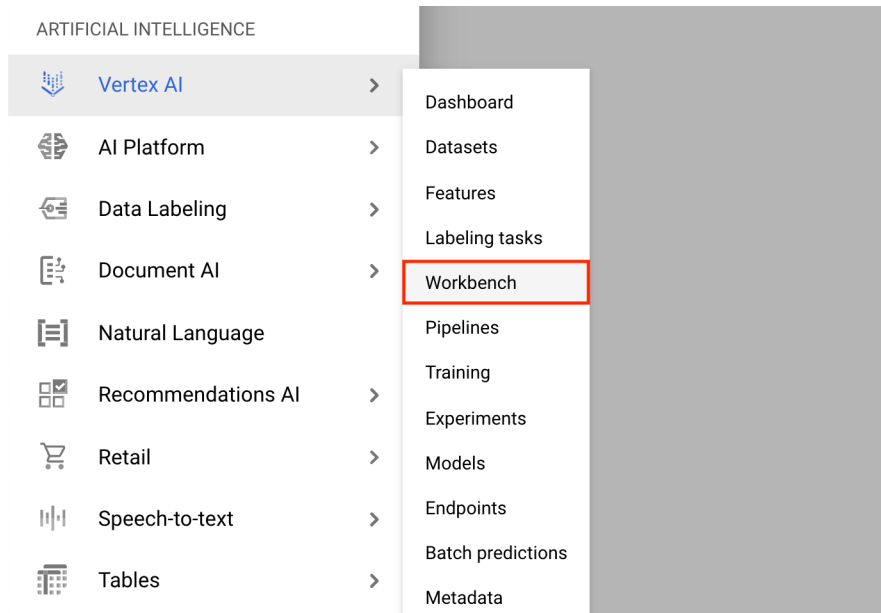
```
gcloud projects add-iam-policy-binding $PROJECT_ID \
  --member=serviceAccount:$SERVICE_ACCOUNT_ID@$PROJECT_ID.iam.gserviceaccount.com \
  --role="roles/bigquery.admin"
```

4. Grant it access to Vertex AI for running model training, deployment, and explanation jobs.

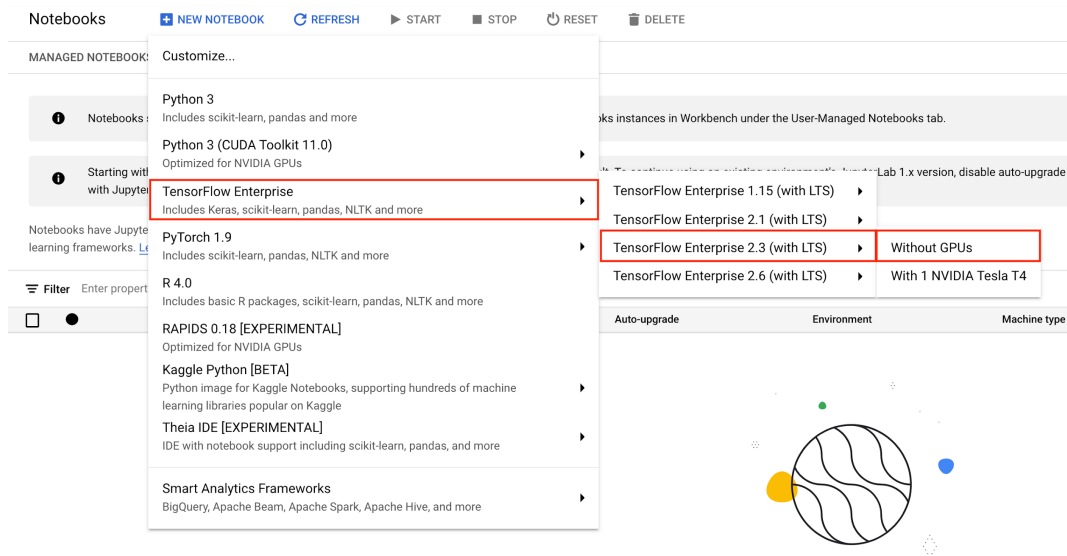
```
gcloud projects add-iam-policy-binding $PROJECT_ID \
  --member=serviceAccount:$SERVICE_ACCOUNT_ID@$PROJECT_ID.iam.gserviceaccount.com \
  --role="roles/aiplatform.user"
```

Deploy Vertex Notebook instance

1. Click on the **Navigation Menu**.
2. Navigate to **Vertex AI**, then to **Workbench**



- On the Notebook instances page, navigate to the **User-Managed Notebooks** tab and click **New Notebook**.
- In the Customize instance menu, select **TensorFlow Enterprise** and choose the version of **TensorFlow Enterprise 2.3 (with LTS) > Without GPUs**.



- In the **New notebook instance** dialog, for **Region**, select **us-central1**, for **Zone**, select a zone within the selected region, leave all other fields with their default options, and click **Create**.

After a few minutes, the Vertex AI console will display your instance name, followed by `Open Jupyterlab`.

6. Click **Open JupyterLab**. Your notebook is now set up.

Clone the lab repository

Next you'll clone the training-data-analyst notebook in your JupyterLab instance.

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

Note: If prompted, click **Cancel** for **Build Recommended**.

2. To clone the training-data-analyst Github repository, type in the following command, and press **Enter**.

`cd`

`git clone https://github.com/GoogleCloudPlatform/training-data-analyst`

3. To confirm that you have cloned the repository, double-click the training-data-analyst directory and confirm that you can see its contents.

/ training-data-analyst /		
Name		Last Modified
blogs		2 minutes ago
bootcamps		2 minutes ago
courses		2 minutes ago
CPB100		2 minutes ago
datalab		2 minutes ago
doc		2 minutes ago
iot		2 minutes ago
quests		2 minutes ago
self-paced-labs		2 minutes ago
CODEOWNERS		2 minutes ago
CONTRIBUTING.md		2 minutes ago
learning_rate.ipynb		2 minutes ago
LICENSE		2 minutes ago
README.md		2 minutes ago

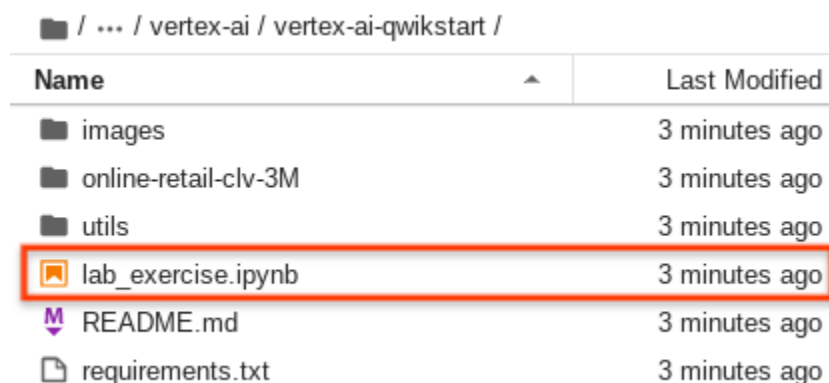
Install lab dependencies

1. Run the following to go to the `training-data-analyst/self-paced-labs/vertex-ai/vertex-ai-qwikstart` folder, then `pip install requirements.txt` to install lab dependencies:

```
cd training-data-analyst/self-paced-labs/vertex-ai/vertex-ai-qwikstart
pip install -U -r requirements.txt
```

Navigate to lab notebook

1. In your notebook, navigate to **training-data-analyst > self-paced-labs > vertex-ai > vertex-ai-qwikstart**, and open **lab_exercise.ipynb**.

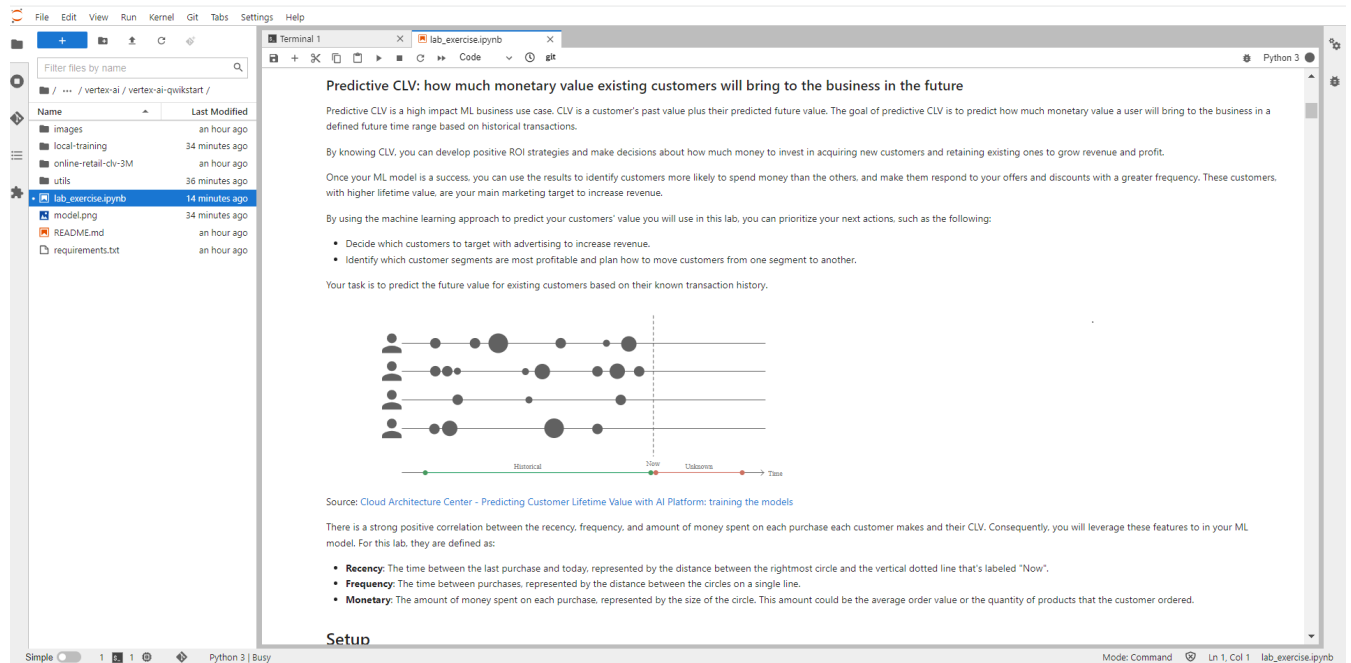


The screenshot shows a file explorer interface with the breadcrumb path `/ ... / vertex-ai / vertex-ai-qwikstart /`. Below the path is a table with two columns: **Name** and **Last Modified**. The table lists several files and folders, all of which were last modified '3 minutes ago'. The file `lab_exercise.ipynb` is highlighted with a red rectangular box.

Name	Last Modified
images	3 minutes ago
online-retail-clv-3M	3 minutes ago
utils	3 minutes ago
lab_exercise.ipynb	3 minutes ago
README.md	3 minutes ago
requirements.txt	3 minutes ago

2. Continue the lab in the notebook, and run each cell by clicking the **Run** (▶) icon at the top of the screen. Alternatively, you can execute the code in a cell with **SHIFT + ENTER**.

Read the narrative and make sure you understand what's happening in each cell.



Congratulations!

Congratulations! In this lab, you walked through a machine learning experimentation workflow using Google Cloud's BigQuery for data storage and analysis and Vertex AI's machine learning services to train and deploy a TensorFlow model to predict customer lifetime value. You progressed from training a TensorFlow model locally to training on the cloud with Vertex AI and leveraged several new unified platform capabilities such as Vertex TensorBoard and prediction feature attributions.