Labs Data & AI Innovation Day

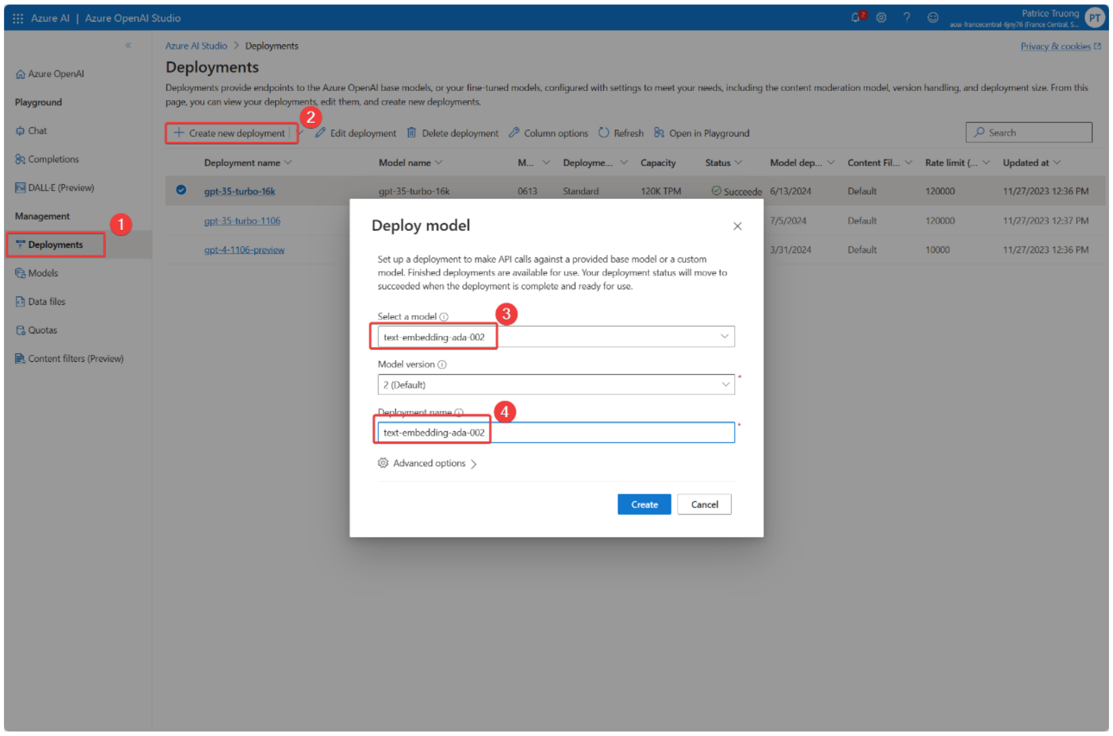
Lab 1: Prepare environment

This document explains how to create databases and containers that support vector search in a Cosmos DB for NoSQL account

Deploy Azure OpenAI models

Follow these steps to deploy the Azure OpenAI models (GPT 3.5 Turbo and Text-embeddingt-ada-002)

- Login to the Azure Portal
- Connect to the Azure OpenAI account
- In the left menu, select "Model deployments"
- Click "Manage deployments"
- Select the "Deployments" section
- Click on the "Create deployment" button
- Select the "text-embedding-ada-002" model in the dropdown list
- In the deployment name, type `text-embedding-ada-002`
- Click on the "Create" button to deploy the model



Deployments

Deployments provide endpoints to the Azure OpenAI base models, or your fine-tuned models, configured with settings to meet your needs, including the content moderation model, version handling, and deployment size. From this page, you can view your deployments, edit them, and create new deployments.

Deployment name	Model name	M...	Deployme...	Capacity	Status	Model dep...	Content Fil...	Rate limit (...	Updated at
gpt-35-turbo-16k	gpt-35-turbo-16k	0613	Standard	120K TPM	Succeede	6/13/2024	Default	120000	11/27/2023 12:36 PM
gpt-35-turbo-1106						7/5/2024	Default	120000	11/27/2023 12:37 PM
gpt-4-1106-preview						3/31/2024	Default	10000	11/27/2023 12:36 PM

Deploy model

Set up a deployment to make API calls against a provided base model or a custom model. Finished deployments are available for use. Your deployment status will move to succeeded when the deployment is complete and ready for use.

Select a model: text-embedding-ada-002

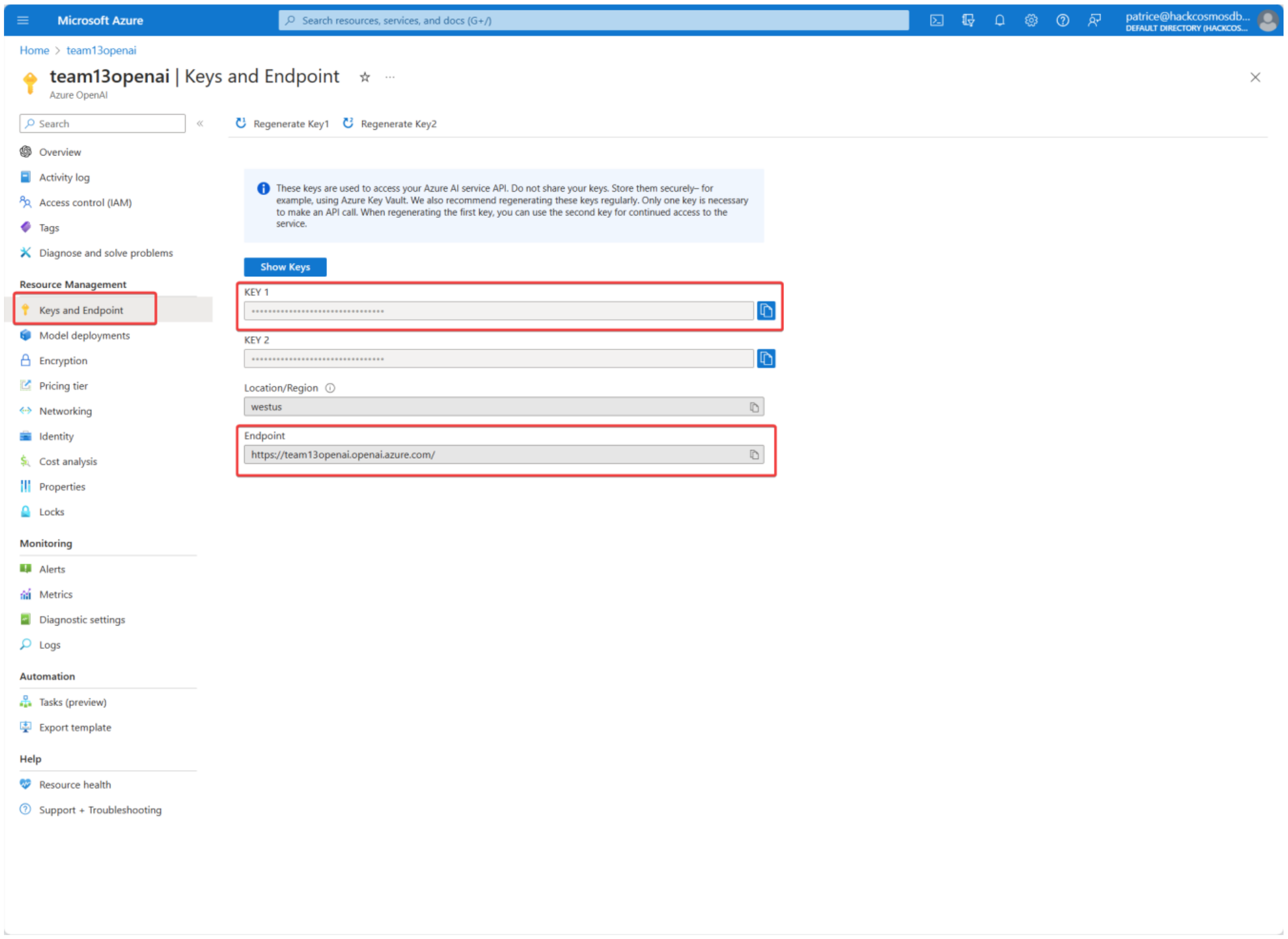
Model version: 2 (Default) *

Deployment name: text-embedding-ada-002 *

- Repeat the previous steps to deploy the gpt-3.5-turbo model

Get Azure OpenAI key

- Connect to Azure Portal
- Connect to Azure OpenAI account
- In the left navigation menu, select “Keys and Endpoint”
- Key 1 and endpoint are the values you will need to add to your .env file



These keys are used to access your Azure AI service API. Do not share your keys. Store them securely– for example, using Azure Key Vault. We also recommend regenerating these keys regularly. Only one key is necessary to make an API call. When regenerating the first key, you can use the second key for continued access to the service.

KEY 1: ••••••••••••••••••••••••••••••••

KEY 2: ••••••••••••••••••••••••••••••••

Location/Region: westus

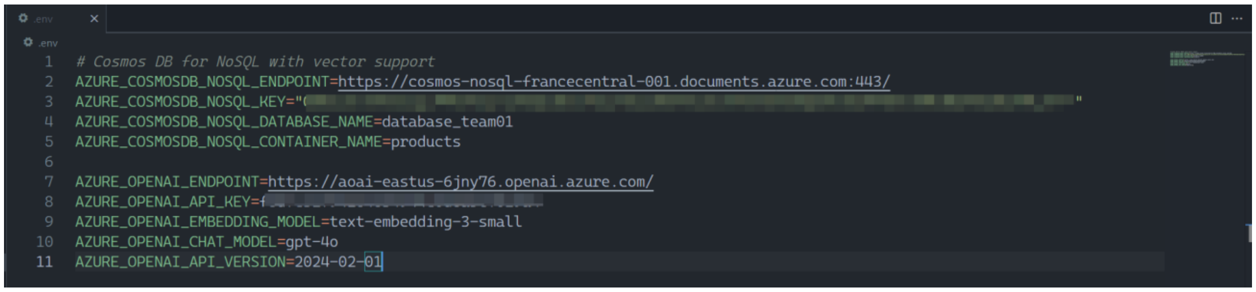
Endpoint: https://team13openai.openai.azure.com/

Prepare Python environment

Create environment variables

1. Create a "`labs`" folder on your local machine
2. Create a "`.env`" file at the root of the labs folder
3. Add the following environment variables

AZURE_COSMOSDB_NOSQL_ENDPOINT	The name of your Cosmos DB for NoSQL	cosmos-nosql-001documents.azure.com
AZURE_COSMOSDB_NOSQL_KEY	Cosmos DB key	xxxx
AZURE_COSMOSDB_NOSQL_DATABASE_NAME	Database name	Database_teamXX
AZURE_COSMOSDB_NOSQL_DATABASE_NAME	Database name	database_<team_name>, e.g. **`database_team01`**
AZURE_COSMOSDB_NOSQL_VECTORS_CONTAINER_NAME	Vectors container name	Vectors
AZURE_OPENAI_ENDPOINT	Azure OpenAI account url	https://<team_name>openai.openai.azure.com/
AZURE_OPENAI_API_KEY	Azure OpenAI account key	
AZURE_OPENAI_EMBEDDING_MODEL	Name of your embedding model deployment	Defaults to text-embedding-ada-002
AZURE_OPENAI_CHAT_MODEL	Name of your chat model deployment	Defaults to gpt-35-turbo
AZURE_OPENAI_API_VERSION	API version	2024-02-01



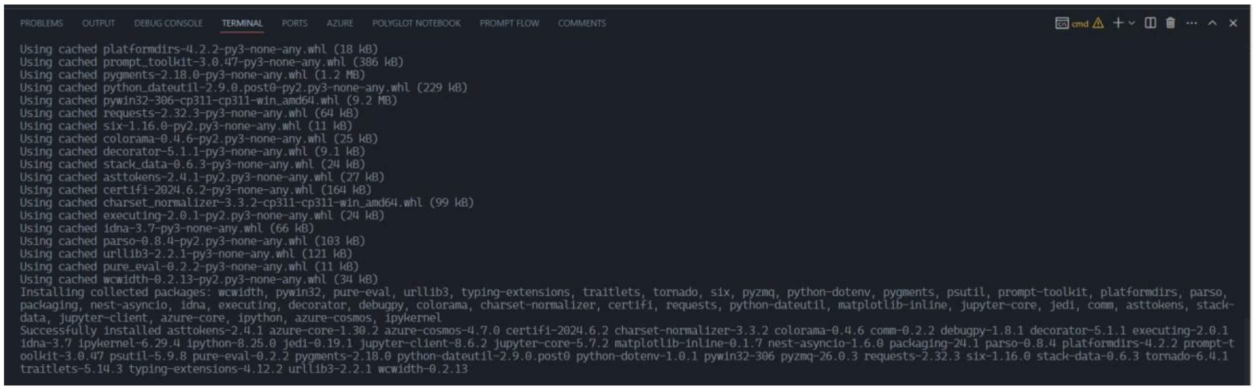
```
# Cosmos DB for NoSQL with vector support
AZURE_COSMOSDB_NOSQL_ENDPOINT=https://cosmos-nosql-francecentral-001.documents.azure.com:443/
AZURE_COSMOSDB_NOSQL_KEY="[redacted]"
AZURE_COSMOSDB_NOSQL_DATABASE_NAME=database_team01
AZURE_COSMOSDB_NOSQL_CONTAINER_NAME=products

AZURE_OPENAI_ENDPOINT=https://aoai-eastus-6jny76.openai.azure.com/
AZURE_OPENAI_API_KEY=[redacted]
AZURE_OPENAI_EMBEDDING_MODEL=text-embedding-3-small
AZURE_OPENAI_CHAT_MODEL=gpt-4o
AZURE_OPENAI_API_VERSION=2024-02-01
```

Create virtual environment

1. Create a “`requirements.txt`” file at the root of the “`labs`” folder
2. Add the following libraries

```
python-dotenv
tenacity
ipykernel
matplotlib
plotly
scikit-learn
openai
azure-cosmos
streamlit
pymongo
tiktoken
azure-identity
```

3. Open a command prompt and navigate to the “`labs`” folder
4. Create a virtual environment with this command: `python -m venv .venv`
5. Activate the virtual environment with `.venv\scripts\activate`
6. Install the required libraries with `pip install -r requirements.txt`



```
Using cached platformdirs-4.2.2-py3-none-any.whl (18 kB)
Using cached prompt_toolkit-3.0.47-py3-none-any.whl (386 kB)
Using cached pygments-2.18.0-py3-none-any.whl (1.2 MB)
Using cached python_dateutil-2.9.0.post0-py2.py3-none-any.whl (229 kB)
Using cached pywin32-306-cp311-cp311-win_amd64.whl (9.2 MB)
Using cached requests-2.32.3-py3-none-any.whl (64 kB)
Using cached six-1.16.0-py2.py3-none-any.whl (11 kB)
Using cached colorama-0.4.6-py2.py3-none-any.whl (25 kB)
Using cached decorator-5.1.1-py3-none-any.whl (9.1 kB)
Using cached stack_data-0.6.3-py3-none-any.whl (24 kB)
Using cached asttokens-2.4.1-py2.py3-none-any.whl (27 kB)
Using cached certifi-2024.6.2-py3-none-any.whl (164 kB)
Using cached charset_normalizer-3.3.2-cp311-cp311-win_amd64.whl (99 kB)
Using cached executing-2.0.1-py2.py3-none-any.whl (24 kB)
Using cached idna-3.7-py3-none-any.whl (66 kB)
Using cached parso-0.8.4-py2.py3-none-any.whl (103 kB)
Using cached urllib3-2.2.1-py3-none-any.whl (121 kB)
Using cached pure_eval-0.2.2-py3-none-any.whl (11 kB)
Using cached wcwidth-0.2.13-py2.py3-none-any.whl (34 kB)
Installing collected packages: wcwidth, pywin32, pure-eval, urllib3, typing-extensions, traitlets, tornado, six, pyzmq, python-dotenv, pygments, psutil, prompt-toolkit, platformdirs, parso,
packaging, nest-asyncio, idna, executing, decorator, debugpy, colorama, charset-normalizer, certifi, requests, python-dateutil, matplotlib-inline, jupyter-core, jedi, comm, asttokens, stack-
data, jupyter-client, azure-core, ipython, azure-cosmos, ipykernel
Successfully installed asttokens-2.4.1 azure-core-1.30.2 azure-cosmos-4.7.0 certifi-2024.6.2 charset-normalizer-3.3.2 colorama-0.4.6 comm-0.2.2 debugpy-1.8.1 decorator-5.1.1 executing-2.0.1
idna-3.7 ipykernel-6.29.4 ipython-8.25.0 jedi-0.19.1 jupyter-client-8.6.2 jupyter-core-5.7.2 matplotlib-inline-0.1.7 nest-asyncio-1.6.0 packaging-24.1 parso-0.8.4 platformdirs-4.2.2 prompt-t
oolkit-3.0.47 psutil-5.9.8 pure-eval-0.2.2 pygments-2.18.0 python-dateutil-2.9.0.post0 python-dotenv-1.0.1 pywin32-306 pyzmq-26.0.3 requests-2.32.3 six-1.16.0 stack-data-0.6.3 tornado-6.4.1
traitlets-5.14.3 typing-extensions-4.12.2 urllib3-2.2.1 wcwidth-0.2.13
```

Create a container that supports vector search

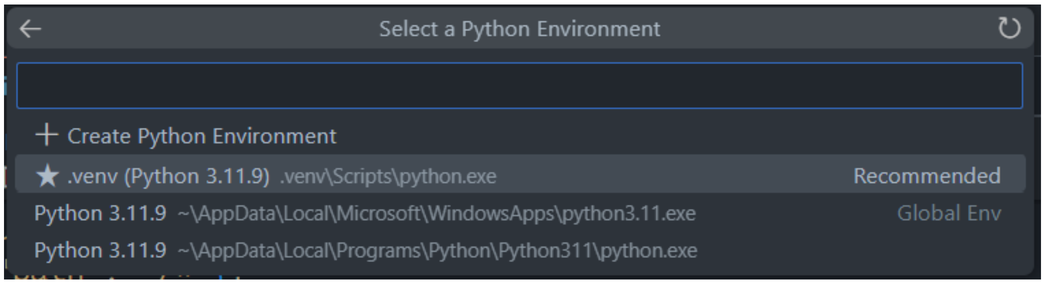
In this section, we will use a Python notebook to create a container that supports vector search

Create product container

1. Create a "`Lab1`" folder in the "`Labs`" foler
2. Open Visual Studio Code
3. In the "`Lab1`" folder, create a new Jupyter notebook called "`create_container.ipynb`"
4. Create a new cell and add the following content

```
from azure.cosmos import CosmosClient, PartitionKey
from azure.cosmos.cosmos_client import ThroughputProperties
from dotenv import load_dotenv

load_dotenv("..\.env")

COSMOS_DB_ENDPOINT = os.getenv('AZURE_COSMOSDB_NOSQL_ENDPOINT')
COSMOS_DB_KEY = os.getenv('AZURE_COSMOSDB_NOSQL_KEY')
DATABASE_NAME = os.getenv('AZURE_COSMOSDB_NOSQL_DATABASE_NAME')
CONTAINER_NAME = os.getenv('AZURE_COSMOSDB_NOSQL_CONTAINER_NAME')
OFFER_THROUGHPUT = 1000

throughput_properties =
ThroughputProperties(auto_scale_max_throughput=OFFER_THROUGHPUT)

indexing_policy = {
    "includedPaths": [
        {"path": "/*"},
    ],
    "excludedPaths": [
        {"path": "/\"_etag\"/?"},
        {"path": "/embedding/*"}
    ],
    "vectorIndexes": [
        {
            "path": "/embedding",
            "type": "quantizedFlat"
        }
    ]
}

embedding_policy = {
    "vectorEmbeddings": [
        {
            "path": "/embedding",
            "dataType": "float32",
            "distanceFunction": "cosine",
            "dimensions": 384
        }
    ]
}

print("Getting database..")
client = CosmosClient(COSMOS_DB_ENDPOINT, COSMOS_DB_KEY)
database = client.get_database_client(DATABASE_NAME)

# Create "products" container
print(f"Creating '{CONTAINER_NAME}' container..")
container = database.create_container_if_not_exists(
    id=CONTAINER_NAME,
    partition_key=PartitionKey(path="/id"),
    indexing_policy=indexing_policy,
    vector_embedding_policy=embedding_policy,
    offer_throughput=throughput_properties
)
print(f"'{CONTAINER_NAME}' container created.")
```

5. In the top-right corner, click on "Select kernel"
6. Select "Python environment" and select the recommended environment (that should point to the .venv environment that you created in the preview section)



Select a Python Environment

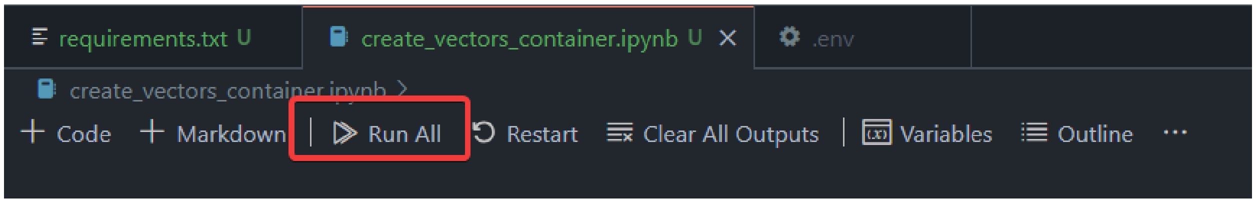
+ Create Python Environment

★ .venv (Python 3.11.9) .venv\Scripts\python.exe Recommended

Python 3.11.9 ~\AppData\Local\Microsoft\WindowsApps\python3.11.exe Global Env

Python 3.11.9 ~\AppData\Local\Programs\Python\Python311\python.exe

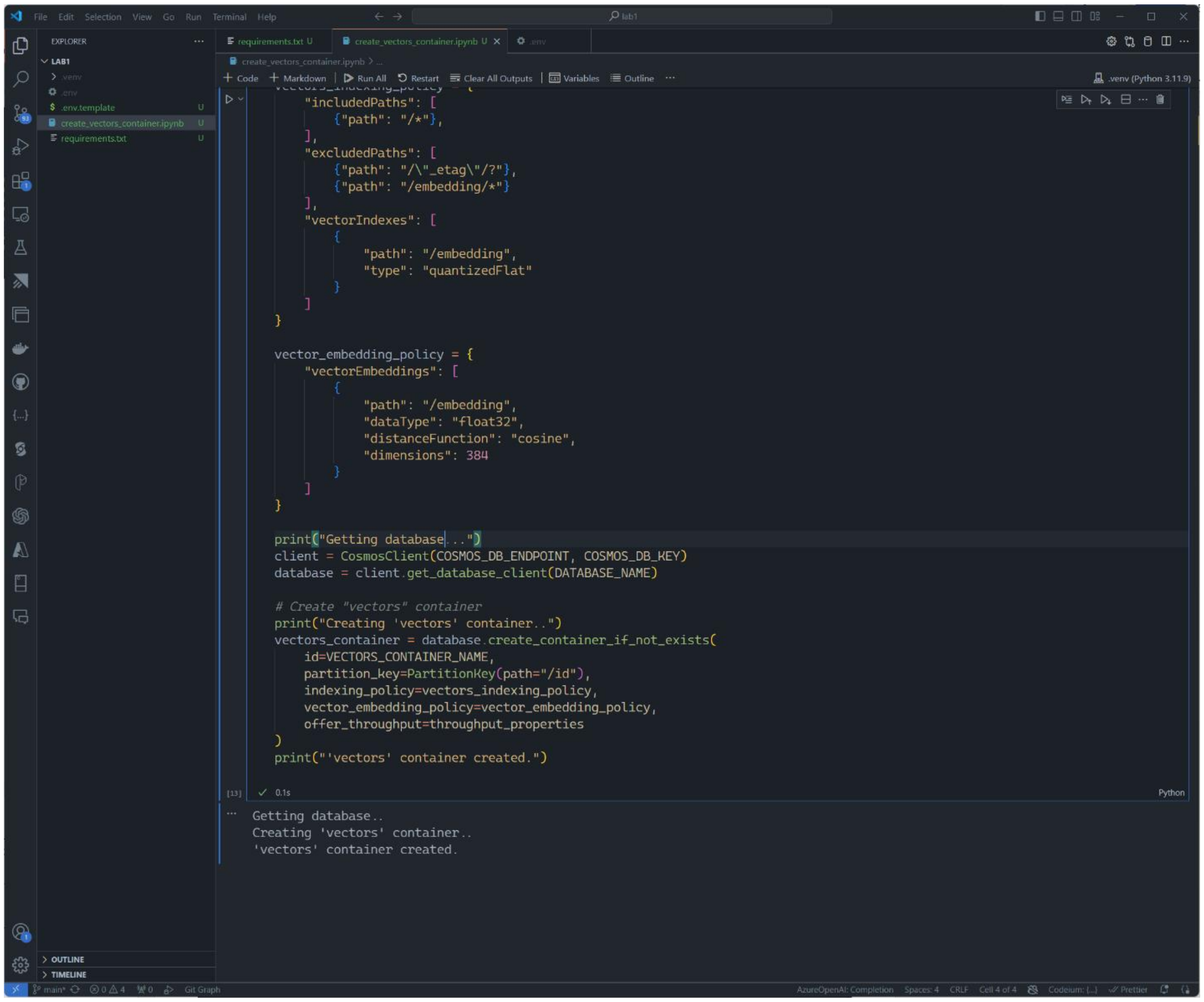
7. In the menu bar, click on "Run all"



requirements.txt U | create_vectors_container.ipynb U | .env

create_vectors_container.ipynb >

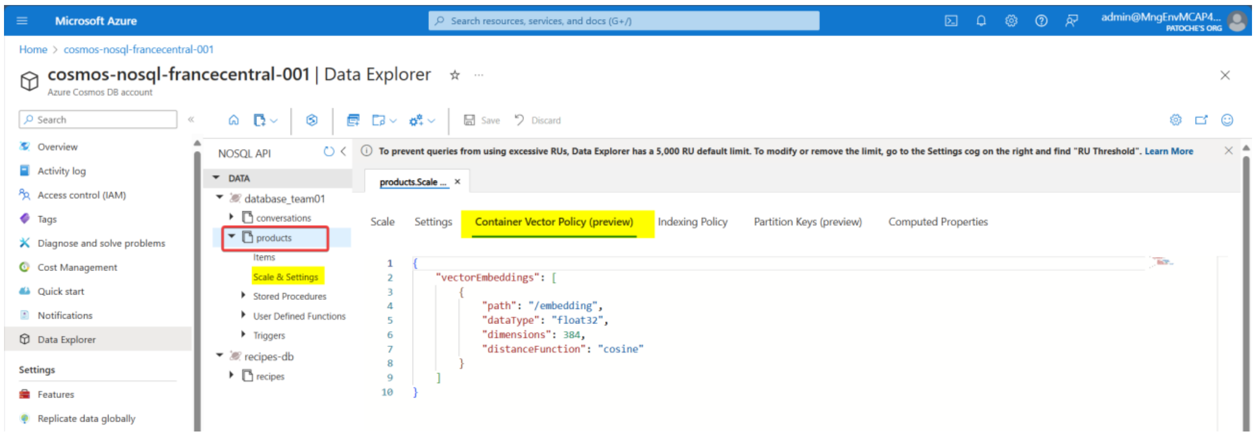
+ Code + Markdown | Run All | Restart | Clear All Outputs | Variables | Outline ...



```
    "includedPaths": [
        {"path": "/*"},
    ],
    "excludedPaths": [
        {"path": "/\"_etag\"/?"},
        {"path": "/embedding/*"}
    ],
    "vectorIndexes": [
        {
            "path": "/embedding",
            "type": "quantizedFlat"
        }
    ]
}

vector_embedding_policy = {
    "vectorEmbeddings": [
        {
            "path": "/embedding",
            "dataType": "float32",
            "distanceFunction": "cosine",
            "dimensions": 384
        }
    ]
}

print("Getting database...")
client = CosmosClient(COSMOS_DB_ENDPOINT, COSMOS_DB_KEY)
database = client.get_database_client(DATABASE_NAME)

# Create "vectors" container
print("Creating 'vectors' container..")
vectors_container = database.create_container_if_not_exists(
    id=VECTORS_CONTAINER_NAME,
    partition_key=PartitionKey(path="/id"),
    indexing_policy=vectors_indexing_policy,
    vector_embedding_policy=vector_embedding_policy,
    offer_throughput=throughput_properties
)
print("'vectors' container created.")
```

```
Getting database..
Creating 'vectors' container..
'vectors' container created.
```

8. Verify in the Azure portal that the “products” container has been successfully created.



To prevent queries from using excessive RUs, Data Explorer has a 5,000 RU default limit. To modify or remove the limit, go to the Settings cog on the right and find "RU Threshold". Learn More

```
{
    "vectorEmbeddings": [
        {
            "path": "/embedding",
            "dataType": "float32",
            "dimensions": 384,
            "distanceFunction": "cosine"
        }
    ]
}
```