Communicating with APIs

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What is an API?

- Application Programming Interface
- Allows programs to talk to each other
- The messenger between client and server

Why are APIs useful?

- Access real-time data (weather, news, music, etc.)
- Automate tasks
- Let your application integrate with other applications (Instagram, Spotify, etc.)

https://www.botdistrikt.com/busuncle

Types of APIs

1. **REST API**: most common
   - Every piece of data lives at a specific URL (endpoint)
   - Response is pre-defined
   - https://accuweather.com/weather?location=Singapore
2. **GraphQL**: newer, more efficient, but also more complex
   - One URL for all data, but need to modify the request body
   - Response is customized by you
   - https://accuweather.com/graphql

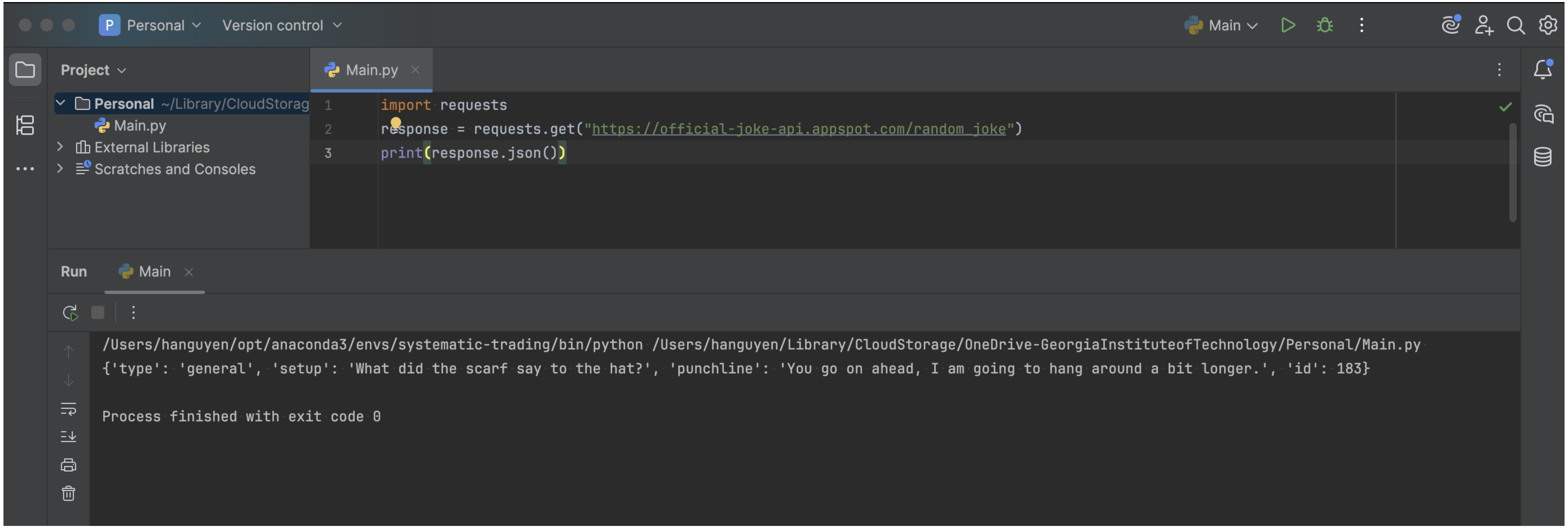
We focus on REST API in this workshop.

Key Concepts in REST API

- Endpoint: URL to access the resource
- Query methods:
  1. GET (retrieve data)
  2. POST (send new data)
  3. PUT (update data)
  4. DELETE (remove data)
- Headers: contain metadata (such as API key)
- Parameters: extra information to the query
- Response: usually in JSON format

Fun Example

http://www.official-joke-api.appspot.com/random_joke



```python
import requests
response = requests.get("https://official-joke-api.appspot.com/random_joke")
print(response.json())
```

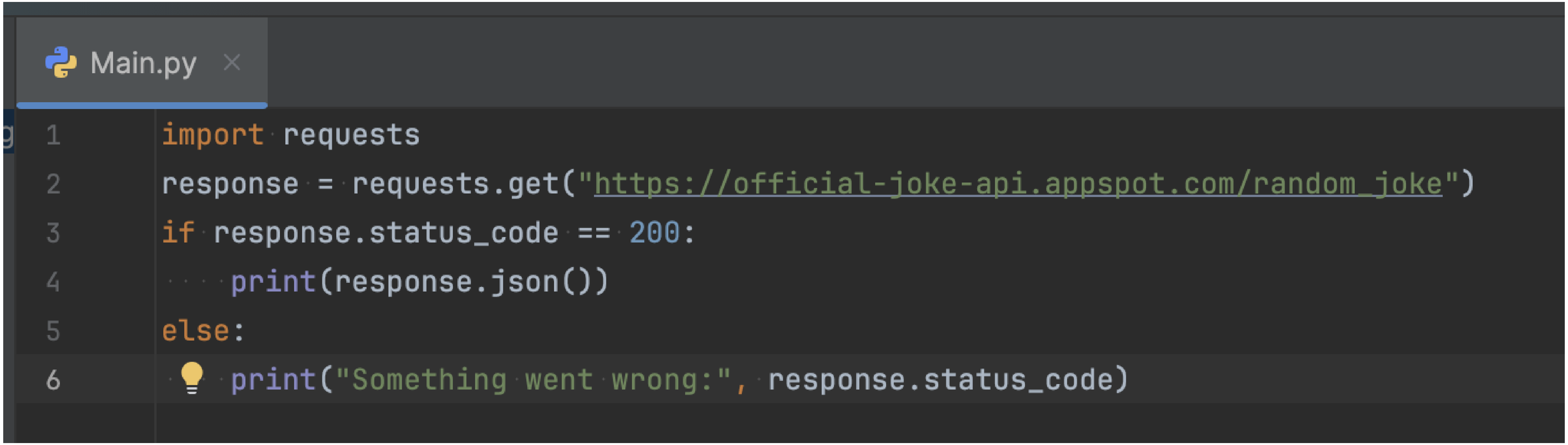
```
/Users/hanguyen/opt/anaconda3/envs/systematic-trading/bin/python /Users/hanguyen/Library/CloudStorage/OneDrive-GeorgiaInstituteofTechnology/Personal/Main.py
{'type': 'general', 'setup': 'What did the scarf say to the hat?', 'punchline': 'You go on ahead, I am going to hang around a bit longer.', 'id': 183}

Process finished with exit code 0
```

Rate Limits & Other Errors

- APIs don’t allow unlimited requests
- Rate limit: how many requests you can make in a certain time
  - For example: 60 requests per minute
- If you exceed the limit (by sending too many requests), the API might block you
- Other common errors:
  - 400 – Bad Request: typo or wrong request format
  - 404 – Not Found: the endpoint doesn’t exist
  - 500 – Internal Server Error: server is having problems

Response Handling Example



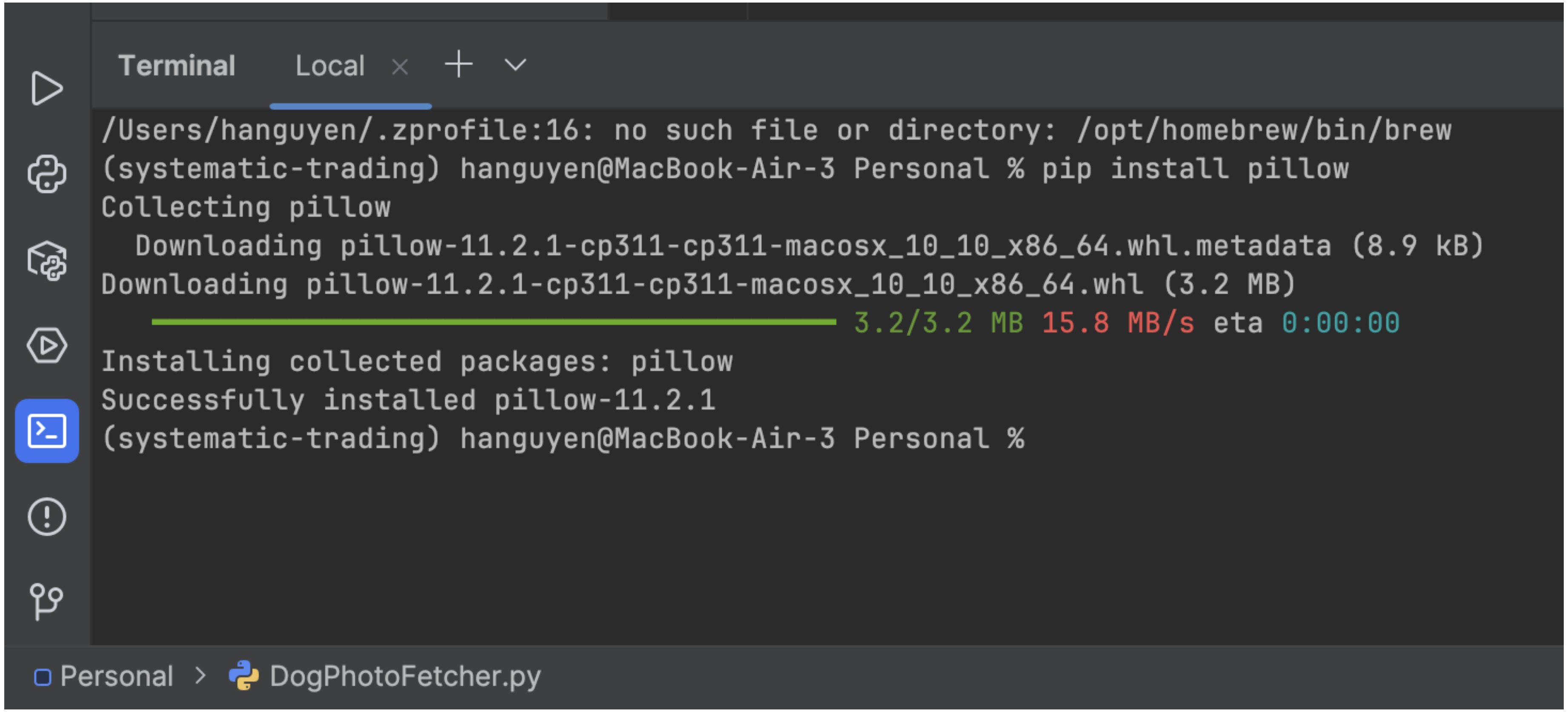
```python
import requests
response = requests.get("https://official-joke-api.appspot.com/random_joke")
if response.status_code == 200:
    print(response.json())
else:
    print("Something went wrong:", response.status_code)
```

Challenge Time

Can you get a random dog photo using this URL and display it?

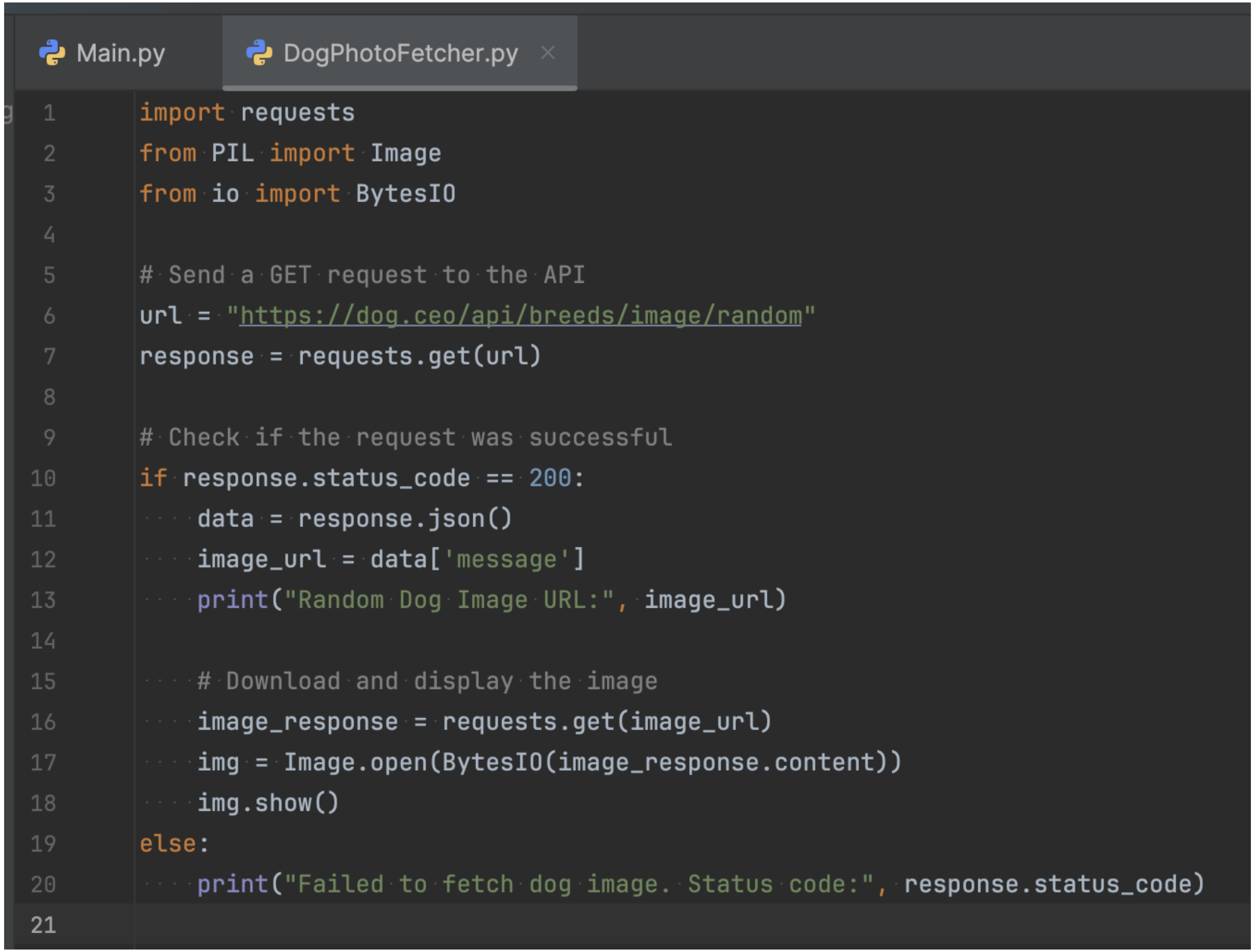
https://dog.ceo/api/breeds/image/random

Pre-requisite



```
/Users/hanguyen/.zprofile:16: no such file or directory: /opt/homebrew/bin/brew
(systematic-trading) hanguyen@MacBook-Air-3 Personal % pip install pillow
Collecting pillow
  Downloading pillow-11.2.1-cp311-cp311-macosx_10_10_x86_64.whl.metadata (8.9 kB)
Downloading pillow-11.2.1-cp311-cp311-macosx_10_10_x86_64.whl (3.2 MB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 3.2/3.2 MB 15.8 MB/s eta 0:00:00
Installing collected packages: pillow
Successfully installed pillow-11.2.1
(systematic-trading) hanguyen@MacBook-Air-3 Personal %
```

Solution



```python
import requests
from PIL import Image
from io import BytesIO

# Send a GET request to the API
url = "https://dog.ceo/api/breeds/image/random"
response = requests.get(url)

# Check if the request was successful
if response.status_code == 200:
    data = response.json()
    image_url = data['message']
    print("Random Dog Image URL:", image_url)

    # Download and display the image
    image_response = requests.get(image_url)
    img = Image.open(BytesIO(image_response.content))
    img.show()
else:
    print("Failed to fetch dog image. Status code:", response.status_code)
```

Real World Applications

Social Media

Content creators can use TikTok API to schedule posts

Map & Transport Apps

Google Maps use APIs to plan your route, calculate ETA

TADA and Grab use APIs to check for routes and available drivers

Music

Connect with Spotify API to build a music search tool

Using Spotify API

- Go to https://developer.spotify.com/dashboard
- Log in with your account
- Click "Create App"
- Fill in the details
- Copy your Client ID and Client Secret
- Use the sample code to run your song search application

Try out Telegram Bot now!