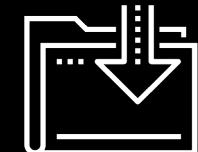




Python APIs: Day 1

Data Boot Camp
Lesson 6.1



Class Objectives

By the end of today's class, you will be able to:



Make `get` requests with Python's Requests library



Manipulate JSON responses to retrieve necessary values



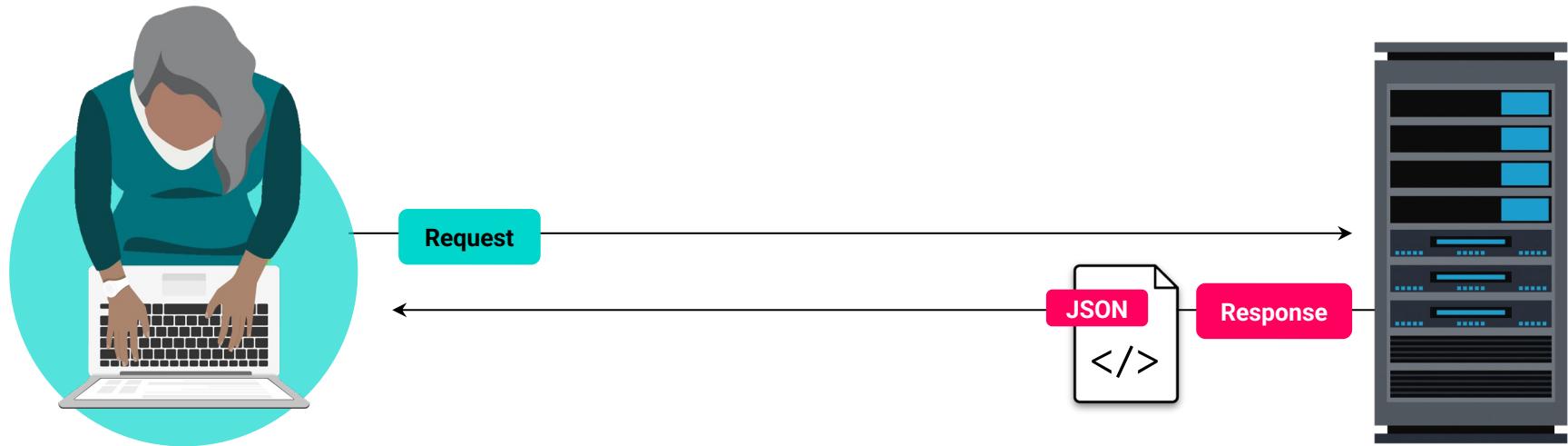
Store JSON responses in Python lists and dictionaries



Use the OMDb API documentation to create requests for movie data

What Is a Client versus a Server?

Analogy: A patient asks a health question, and a doctor supplies the answer.



A **client** is an application or device that asks for information.

A **server** is an application or device that supplies information to the client.



What is an API?

Application Programming Interface (API)



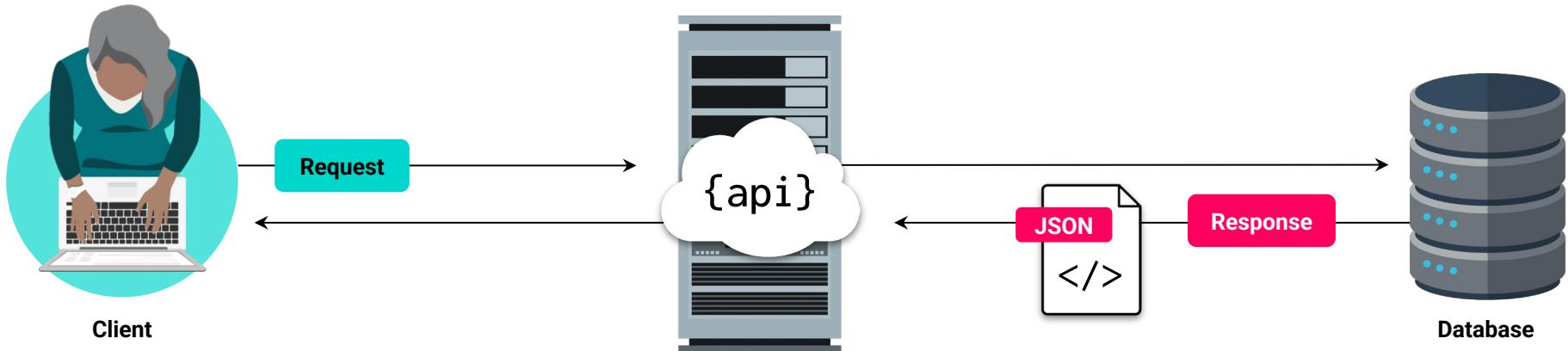
A request is a communication to the API to retrieve data.



API calls are similar to visiting a website in a browser.



They point to a URL and collect some data from the page.



JavaScript Object Notation (JSON)



A webpage may return a JSON in response to an API call.



The URLs used to communicate with APIs are called endpoints.

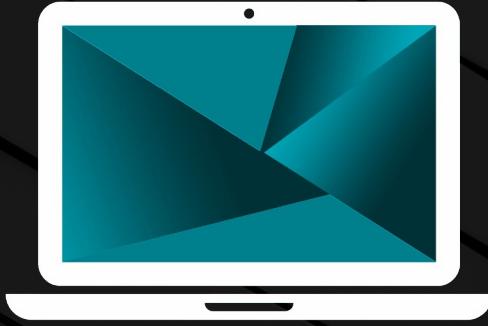


The text in the web browser is identical to what a client script would receive.

```
[  
  {  
    "userId": 1,  
    "id": 1,  
    "title": "sunt aut facere repellat provident occaecati excepturi optio  
reprehenderit",  
    "body": "quia et suscipit\\nsuscipit recusandae consequuntur expedita et  
cum\\nreprehenderit molestiae ut ut quas totam\\nnostrum rerum est autem sunt rem  
eveniet architecto"  
  },  
  {  
    "userId": 1,  
    "id": 2,  
    "title": "qui est esse",  
    "body": "est rerum tempore vitae\\nsequi sint nihil reprehenderit dolor beatae ea  
dolores neque\\nfugiat blanditiis voluptate porro vel nihil molestiae ut  
reiciendis\\nqui aperiam non debitis possimus qui neque nisi nulla"  
  },
```

Uniform Resource Locator (URL)

- **URL:** Internet address of a specific webpage or file
- Components:
 - **Protocol:** Defines how messages are transmitted (e.g., HTTP, HTTPS)
 - **Domain Name:** Website where the resource is located (e.g., www.google.com)
 - **Path:** Specific page or file on the website
 - **Query Parameters:** Optional, pass additional information to the server
- Example URL: <https://www.example.com/path?query=value>
 - Protocol: <https://>
 - Domain Name: www.example.com
 - Path: specific path on the website server </path>
 - Query Parameter: [?query=value](https://www.example.com/path?query=value)



Instructor Demonstration

Intro to Requests

There Are Two Components to Our API Request

01

`requests.get(url)` Sends a get request to the URL, passed as a parameter.

```
# Dependencies
import requests
import json
```

```
# URL for GET requests to retrieve vehicle data
url = "https://api.spacexdata.com/v2/launchpads"
```

```
# Print the response object to the console
print(requests.get(url))
```

There Are Two Components to Our API Request

02

A call to convert the response object into a JSON format.

`json.dumps()` is a method used to “pretty print” the response.

```
# Pretty Print the output of the JSON
response = requests.get(url).json()
print(json.dumps(response, indent=4, sort_keys=True))

[
    {
        "details": "SpaceX primary Falcon 9 launch pad, where all east coast Falcon 9s launched prior to the AMOS-6 anomaly. Initially used to launch Titan rockets for Lockheed Martin. Heavily damaged by the AMOS-6 anomaly with repairs expected to be complete by late summer 2017.",
        "full_name": "Cape Canaveral Air Force Station Space Launch Complex 40",
        "id": "ccafs_slc_40",
        "location": {
            "latitude": 28.5618571,
            "longitude": -80.577366,
            "name": "Cape Canaveral",
            "region": "Florida"
        },
        "status": "under construction",
        "vehicles_launched": "falcon 9"
    },
    {
        "details": "SpaceX new launch site currently under construction to help keep up with the Falcon 9 and Heavy manifests. Expected to be completed in late 2018. Initially will be li
```



Activity: Requesting SpaceX

In this activity, you will dig into a simple, well-documented API—The SpaceX API—and make calls to the API using the Requests library.
(Instructions sent via Slack.)

Suggested Time:

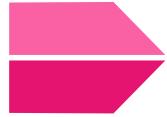
10 minutes

Activity: Requesting SpaceX

Take a few minutes to explore the SpaceX V3 API:



GitHub: <https://github.com/r-spacex/SpaceX-API>



API Documentation: <http://bit.ly/SpaceXAPI>

Once you understand the structure of the API and its endpoint, choose one of the endpoints and do the following:



Retrieve and print the JSON for ***all*** of the records from your chosen endpoint.



Retrieve and print the JSON for a ***specific*** record from your chosen endpoint.

Example SpaceX Response

```
{  
    "details": "SpaceX west coast landing pad, has not yet been used. Expected to first be used during the Formosat-5 launch.",  
    "full_name": "Vandenberg Air Force Base Space Launch Complex 4W",  
    "id": "vafb_slc_4w",  
    "location": {  
        "latitude": 34.6332043,  
        "longitude": -120.6156234,  
        "name": "Vandenberg Air Force Base",  
        "region": "California"  
    },  
    "status": "active",  
    "vehicles_launched": "falcon 9"  
}
```



Time's Up! Let's Review.



Instructor Demonstration

Manipulating Responses

Working with JSON Responses

Simple Method

Use `requests.get()`, store the output, and print the JSON response.

- Must interpret the full JSON object each time
- More difficult to import into Pandas
- Less scalable

Advanced Method

Store the `requests.get()` object, store the `response.json()`, and access the JSON object directly.

- Navigate the JSON object like a dictionary
- Easy to import into Pandas
- More scalable



Time's Up! Let's Review.



Activity: Requesting a Galaxy Far, Far Away

In this activity, you will create an application that accesses data from the Star Wars API and prints out values from the data.
(Instructions sent via Slack.)

Suggested Time:

15 minutes

Activity: Requesting a Galaxy Far, Far Away

Instructions

Using the provided starter file, collect the following pieces of information from the Star Wars API.

- The name of the character
- The number of films they were in
- The name of their first starship

Once the data has been collected, print it out to the console.

Hints

It's in your best interest to print out the JSON from the initial request before anything else. This will let you know what keys you should reference.

The "starship" values are links to another API call. This means that you will need to create a request based on the values of a previous request.

Bonus

Collect and print out all of the films that a character appeared in.

Requesting a Galaxy Far, Far Away

```
# Print character name and how many films they were in  
print(f"{character_name} was in {film_number} films")
```

Darth Vader was in 4 films

```
# Print what their first ship was  
print(f"Their first ship: {first_ship}")
```

Their first ship: TIE Advanced x1



Time's Up! Let's Review.



Activity: Number Facts

In this activity, you and a partner will join forces to create an interactive application that uses the Numbers API.

The application will take in a number and then return a random fact about that number.

(Instructions sent via Slack.)

Suggested Time:

20 minutes

Activity: Number Facts

Instructions

Using the Numbers API (<http://numbersapi.com>), create an application that takes in a user's inputs and returns a number fact based on the inputs.

Hints

The URL to make your request to must have `?json` at its end so that the data format returned is JSON. The default response is pure text.

Make sure to read through the documentation when creating your application. Some types require more or less data than others.



Time's Up! Let's Review.

Back at 8:16 pm

Break 

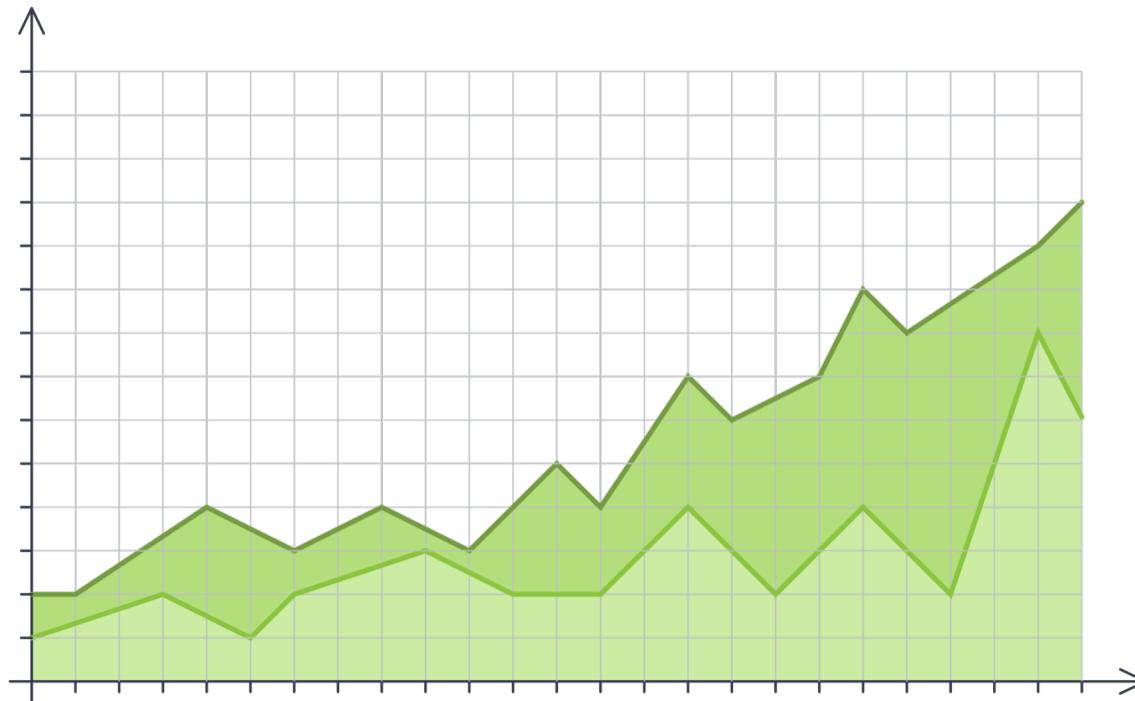


Instructor Demonstration

OMDb API

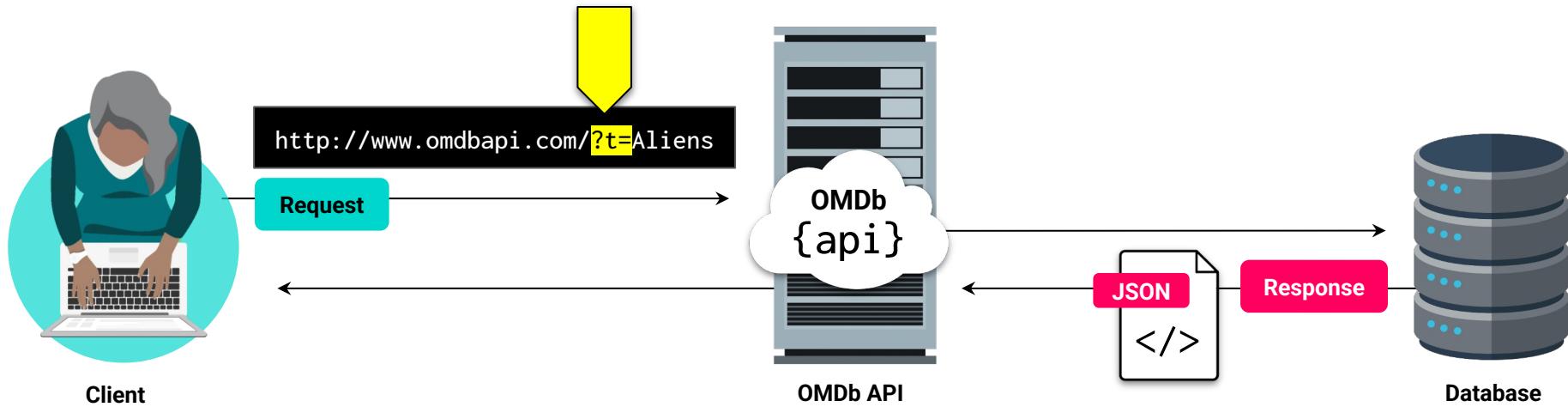
JSON responses so far

Our previous API responses have been pretty simple but the OMDb API is slightly more complex



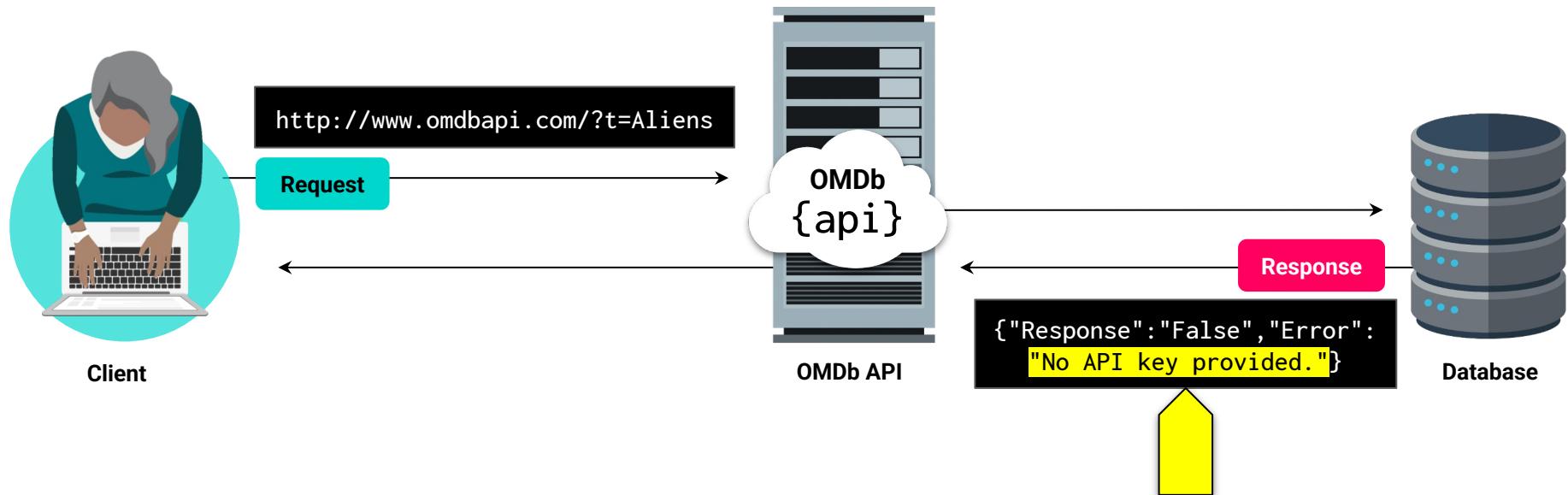
URL Parameters: ?t=

This is asking the API to return all information on movies with the title “Aliens”.



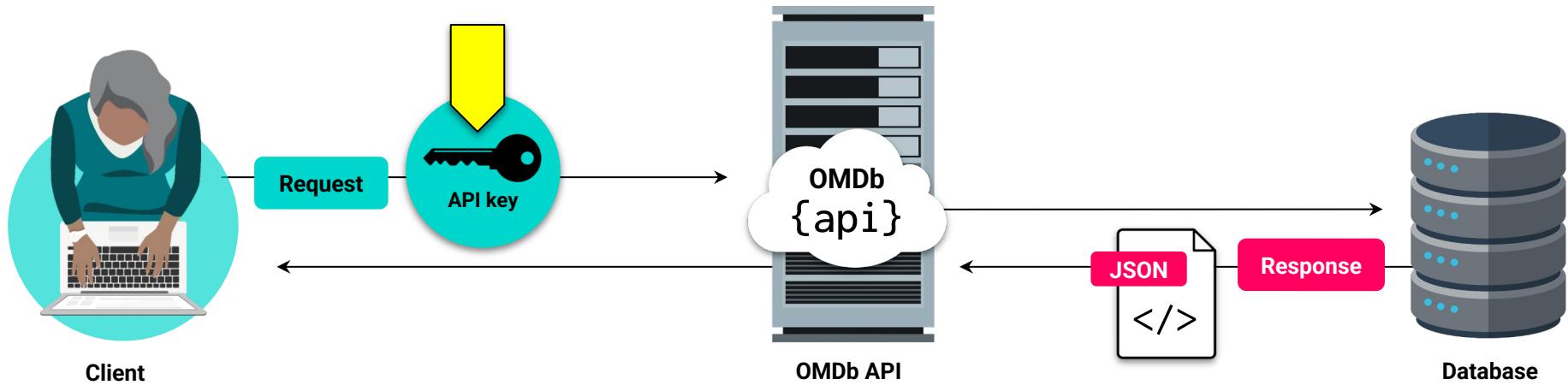
URL Parameters: api_key

Without an API key, no data would be returned.



URL Parameters: api_key

API keys restrict API access to specific users.



URL Parameters: api_key

```
# Note that the ?t= is a query param for title of the movie we want to search for
url = "http://www.omdbapi.com/?t="
api_key = "&apikey=trilogy"
```

```
# Performing a GET request similar to the one we executed earlier
response = requests.get(url + "Aliens" + api_key)
print(response.url)
```

<http://www.omdbapi.com/?t=Aliens&apikey=trilogy>



Activity: Study the OMDB API

In this activity, you'll review the OMDB API documentation, and you'll practice using the API!

(Instructions sent via Slack.)

Suggested Time:

5 minutes



Time's Up! Let's Review.



Activity: Movie Questions

In this activity, you will test your skills with the OMDB API by collecting data to answer a series of questions.

(Instructions sent via Slack.)

Suggested Time:

20 minutes

Activity: Movie Questions

Use the OMDb API to retrieve and print answers to the following questions:



Who was the director of the movie **Aliens**?



What was the movie **Gladiator** rated?



What year was **50 First Dates** released?



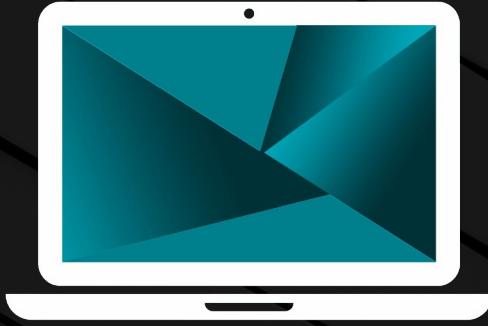
Who wrote **Moana**?



What was the plot of the movie **Sing**?



Time's Up! Let's Review.



Instructor Demonstration

Iterative Request



So far, we have been able to get all
the information we've requested
using single requests.

Our Requests So Far

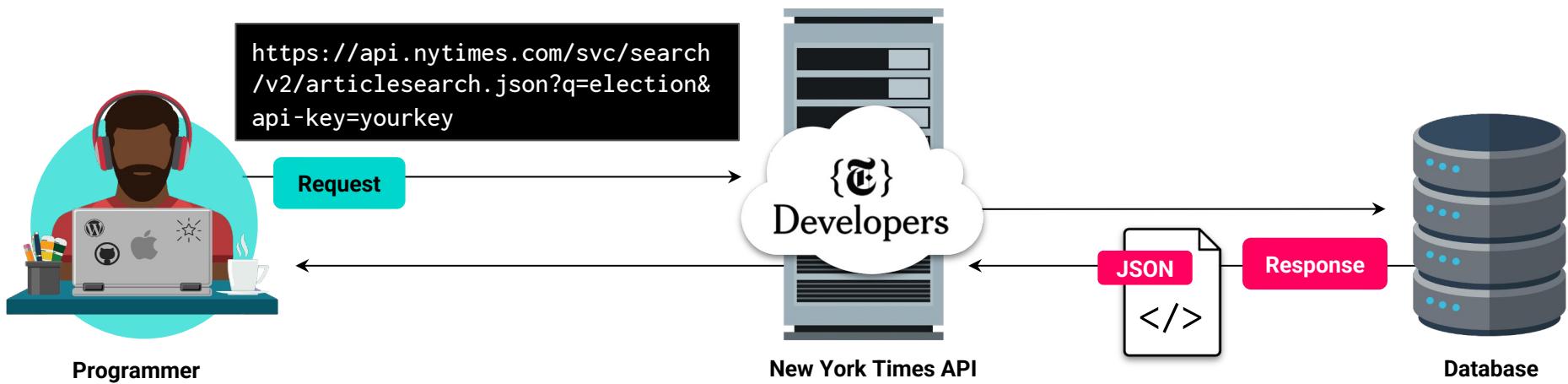


API keys restrict API access to specific users.



Without an API key, no data would be returned.

For example, the New York Times API will return only 10 articles at a time. A programmer would have to make 3 requests to retrieve 30 articles.



Programmer

New York Times API

Database

Requests on a Loop!

```
# Make a request for each of the indices
for x in range (len(indices)):
    print(f"Making request number: {x} for ID: {indices[x]}")

# Get one of the posts
post_response = requests.get(url + str(indices[x]))

# Save post's JSON
response_json.append(post_response.json())
```

```
Making a request number: 0 for ID: 30
Making a request number: 1 for ID: 54
Making a request number: 2 for ID: 44
Making a request number: 3 for ID: 76
Making a request number: 4 for ID: 46
Making a request number: 5 for ID: 75
Making a request number: 6 for ID: 69
Making a request number: 7 for ID: 40
Making a request number: 8 for ID: 48
Making a request number: 9 for ID: 5
```



Activity: Iterative Requests

In this activity, you will test your knowledge of iterative requests by looping through a list of movies and collecting data on each movie from the OMDB API.

(Instructions sent via Slack.)

Suggested Time:

10 minutes

Activity: Iterative Requests

Instructions

Consider the following list of movie titles: `movies = ["Aliens", "Sing", "Moana"]`

Make a request to the OMDb API for each movie in the list. Then, do the following:

- Print the director of each movie.
- Save the responses in another list.

The director of Aliens was James Cameron.

The rating of Gladiator was R.

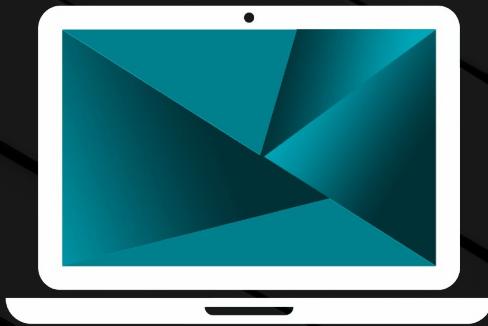
The movie 50 First Dates was released in 2004.

Moana was written by Jared Bush (screenplay by), Ron Clements (story by), John Musker (story by), Chris Williams (story by), Don Hall (story by), Pamela Ribon (story by), Aaron Kandell (story by), Jordan Kandell (story by).

The plot of Sing was: In a city of humanoid animals, a hustling theater impresario's attempt to save his theater with a singing competition becomes grander than he anticipates even as its finalists' find that their lives will never be the same..



Time's Up! Let's Review.



Instructor Demonstration

NYT API

NYT API Sign-up

This API requires a sign-up. Fill out the form at <https://developer.nytimes.com/accounts/create>



Create your account

First Name

Last Name

Email

Password



I agree to the [terms](#) and the [conditions](#).

[Create Account](#)

Have an account? [Sign in](#).

NYT API Documentation

The screenshot shows the Article Search API documentation page. At the top, there's a navigation bar with tabs for "README", "Documentation" (which is active), and "Console". Below the navigation is a search bar and a sidebar menu titled "Stories" with a "GET /articlesearch.json" option. The main content area has a blue header "Stories" and a section for the "GET /articlesearch.json" endpoint. It includes a "Try it out" button and sections for "Parameters", "Responses", and "Responses" details.

Stories

GET /articlesearch.json

Article Search

Article Search requests use the following URL structure:

Hide details ↑ Try it out →

Parameters

q string

Location: `query ?q=xyz`

Search query term. Search is performed on the article body, headline and byline.

fq string

Location: `query ?fq=xyz`

"Filtered search query using standard Lucene syntax.

The filter query can be specified with or without a limiting field: label.

See Filtering Your Search for more information about filtering."

begin_date string

Responses

200

The docs requested by the article search.

Schema Example

▼ {
 response: ▼ {
 docs: ▼ [
 ▶ {}
]
 meta: ▼ {
 hits: integer
 time: integer
 offset: integer
 }
 }
}

NYT API Sign-up



When using API keys, make sure to store in a `config.py` file.



Add the config file to a `.gitignore` file so keys are not added to a public repo.

The screenshot shows a Jupyter Notebook interface. On the left, there is a code cell containing Python code for searching the NYT API. On the right, there is a configuration file named `config.py` which contains a single line: `api_key = "164b73c522a8420c8e05343ef1da0a7e"`. Two blue arrows point from the text in the configuration file to the corresponding lines in the code cell below it.

```
# Dependencies
import requests
from pprint import pprint
from config import api_key

url = "https://api.nytimes.com/svc/search/v2/articlesearch.json?"

# Search for articles that mention granola
query = "granola"

# Build query URL
query_url = url + "api-key=" + api_key + "&q=" + query
query_url

# Request articles
articles = requests.get(query_url).json()

# The "response" property in articles contains the actual articles
# list comprehension.
articles_list = [article for article in articles["response"]["docs"]]
pprint(articles_list)

# Print the web_url of each stored article
print("Your Reading List")
for article in articles_list:
    print(article["web_url"])
```

```
1 api_key = "164b73c522a8420c8e05343ef1da0a7e"
2
```



Activity: Retrieving Articles

In this activity, you will create an application that grabs articles from the NYT API, stores them within a list, and prints snippets of the articles to the screen.

(Instructions sent via Slack.)

Suggested Time:

20 minutes

Activity: Retrieving Articles

A snippet from the article: When the president goes to the Illinois Capitol next month to speak, he will call for a less divisive politics, aides say.

A snippet from the article: The first time the president met with House Democrats, in 2009, there were 257 of them. Now there are 188. Some point a finger at him.

A snippet from the article: Tucked into a piece of legislation are a few words that will change how American officials treat Israeli settlements in the West Bank.

A snippet from the article: "We must confront the reality that around the world anti-Semitism is on the rise," the president urged at an event to posthumously honor individuals who protected Jews during the Holocaust.

A snippet from the article: Katie Beirne Fallon, the president's legislative director, has been credited with improving his relations with lawmakers on Capitol Hill.

A snippet from the article: Mrs. Clinton also said that Mr. Sanders's proposal for a single-payer health care system would thrust the nation into "a terrible, terrible national debate."

A snippet from the article: A federal order will deprive local authorities of critical tools in an age of heightened fears about terrorism and mass shootings, some law enforcement leaders say.

A snippet from the article: The new rules, announced by the Obama administration, allow banks to provide direct financing for products other than agricultural commodities.

A snippet from the article: A compromise to reaffirm concealed-carry reciprocity with 25 states looks like a sellout to gun-control advocates.

A snippet from the article: Nader Modanlo, released by the United States this month in a prisoner exchange with Iran, was reluctant to accept the deal because it required him to abandon an appeal of his conviction.

Activity: Retrieving Articles

Instructions

Save the following to variables in your script:

- The NYT API endpoint—make sure that you include the right query parameter for retrieving JSON data!
- Your selected search term

Build your query URL, and save it to a variable.

Retrieve your list of articles with a get request.

Store each article in the response inside of a list.

Print a **snippet** from each article.



Time's Up! Let's Review.