Quandoo Data Engineering Task

Problem statement

https://gitlab.com/quandoo-recruitment/data-engineer

Assumptions

1. Fetch the restaurant data from the tripadvisor.com platform only. The code will work may not work for other websites such as booking.com, agoda, etc
2. We are fetching the restaurant data from the first three pages for sake of this assignment.(This value can be changed in the scraper.py script)

Eg.
https://www.tripadvisor.com/RestaurantSearch?Action=PAGE&geo=187323&sortOrder=relevance&o=a

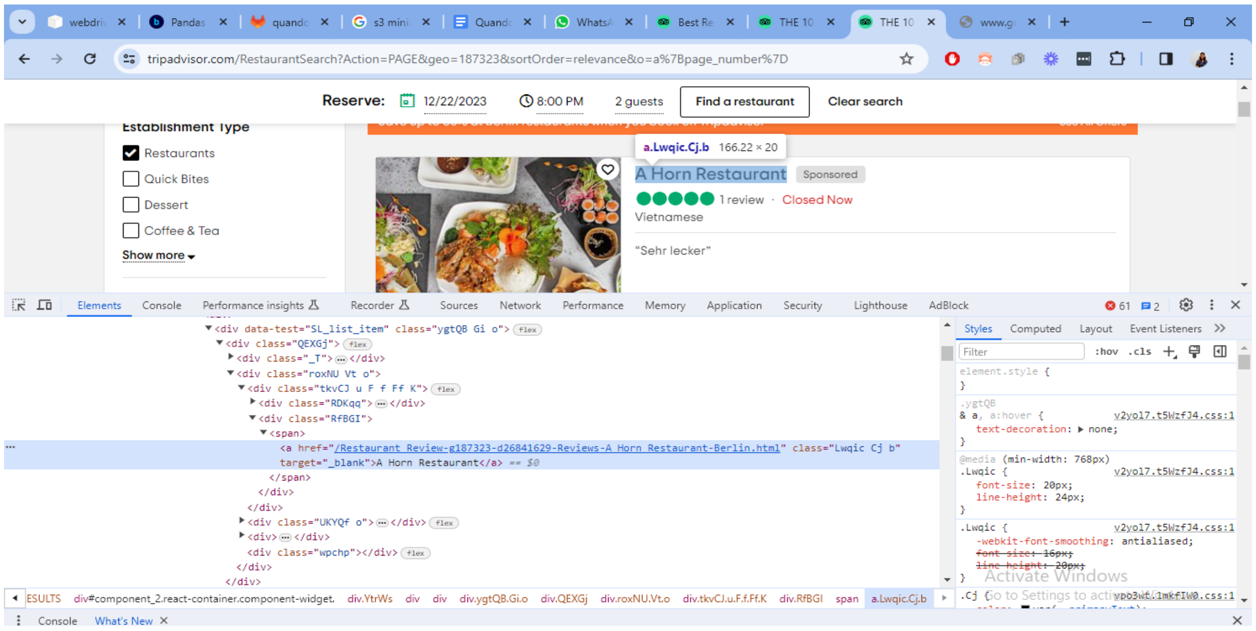
https://www.tripadvisor.com/RestaurantSearch?Action=PAGE&geo=187323&sortOrder=relevance&o=a30
https://www.tripadvisor.com/RestaurantSearch?Action=PAGE&geo=187323&sortOrder=relevance&o=a60

Understanding the problem statement

We need to fetch the restaurant data from tripadvisor.com.
Link:

"https://www.tripadvisor.com/RestaurantSearch?Action=PAGE&geo=**%s**"+"&sortOrder=relevance&o=a**%s**"

Logic:
In the link, the first %s denotes geo_id, the second denotes the offset which is a multiple of 30 (value 0 means the first page, value 30 means the second page, value 60 means the third page, and so on.) and the third %s is the name of the place (eg. London_England).


tripadvisor.com/RestaurantSearch?Action=PAGE&geo=187323&sortOrder=relevance&o=a%7Bpage_number%7D
Reserve: 12/22/2023 8:00 PM 2 guests Find a restaurant Clear search
Establishment Type
Restaurants
Quick Bites
Dessert
Coffee & Tea
Show more
a.Lwqic.Cj.b 166.22 × 20
A Horn Restaurant
Sponsored
1 review · Closed Now
Vietnamese
"Sehr lecker"
Elements Console Performance insights Recorder Sources Network Performance Memory Application Security Lighthouse AdBlock
Styles Computed Layout Event Listeners

```
<div data-test="SL_list_item" class="ygtQB Gi o"> flex
  <div class="QEXGj"> flex
    <div class="_T">…</div>
    <div class="roxNU Vt o">
      <div class="tkvCJ u F f Ff K"> flex
        <div class="RDKqq">…</div>
        <div class="RfBGI">
          <span>
            <a href="/Restaurant_Review-g187323-d26841629-Reviews-A_Horn_Restaurant-Berlin.html" class="Lwqic Cj b"
            target="_blank">A Horn Restaurant</a> == $0
          </span>
        </div>
      </div>
      <div class="UKYQf o">…</div> flex
      <div>…</div>
      <div class="wpchp"></div> flex
    </div>
  </div>
```

```
element.style {
}
.ygtQB
& a, a:hover {                    v2yol7.t5WzfJ4.css:1
   text-decoration: ▶ none;
}
@media (min-width: 768px)
.Lwqic {                          v2yol7.t5WzfJ4.css:1
   font-size: 20px;
   line-height: 24px;
}
.Lwqic {                          v2yol7.t5WzfJ4.css:1
   -webkit-font-smoothing: antialiased;
   ~~font-size: 16px;~~
   ~~line-height: 20px;~~
}
.Cj {                             vpo3wt.1mkfIW0.css:1
```

ESULTS div#component_2.react-container.component-widget. div.YtrWs div div div.ygtQB.Gi.o div.QEXGj div.roxNU.Vt.o div.tkvCJ.u.F.f.Ff.K div.RfBGI span a.Lwqic.Cj.b

We can use the scraper.py program to fetch the data from the URL.
Here is the list of data attributes for the table restaurant_db.

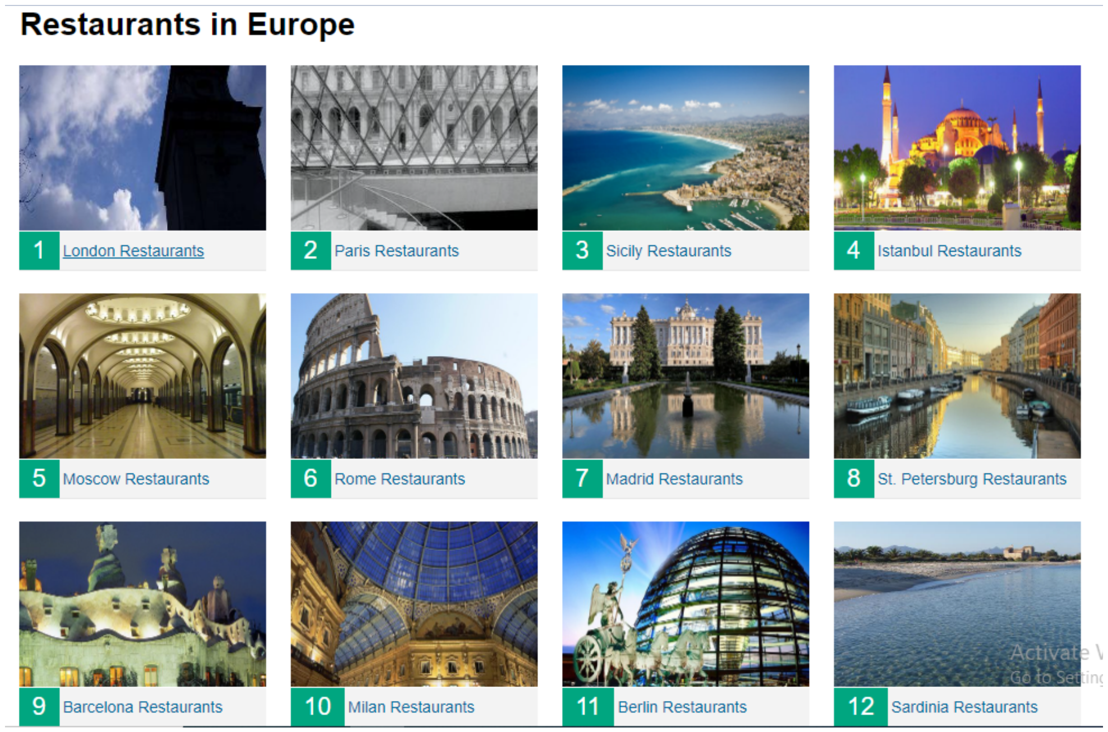
Table 1: restaurant_db

Attribute	Data type
geo_id	varchar(20)
url	varchar(255)
restaurant_id	varchar(255) PRIMARY KEY
rest_name	varchar(255)
fetch_count	int
time_of_fetching_data	varchar(255)
rating	float
address	varchar(255)
telephone	varchar(255)
website	varchar(255)
tags	varchar(255)
CUISINES	varchar(255)
Special_Diets	varchar(255)
Meals	varchar(255)
is_michelin	varchar(3)
neighborhood	varchar(255)
restaurant_rank	varchar(255)
Food_Rating	float
Value_Rating	float
Service_Rating	float
Atmosphere_Rating	float
PRICE_RANGE	varchar(255)
FEATURES	text
total_reviews	int
menu_link	varchar(255)
menu_link_available	varchar(3)

Table 2: geo_info

place (varchar(255))	**geo_id(int)**
Berlin	187323
London_England	186338
Paris	187147

Remarks:
Populate the geo_info table with the data scraped using
https://www.tripadvisor.com/Restaurants-g4-Europe.html
This is out of the scope as of now.

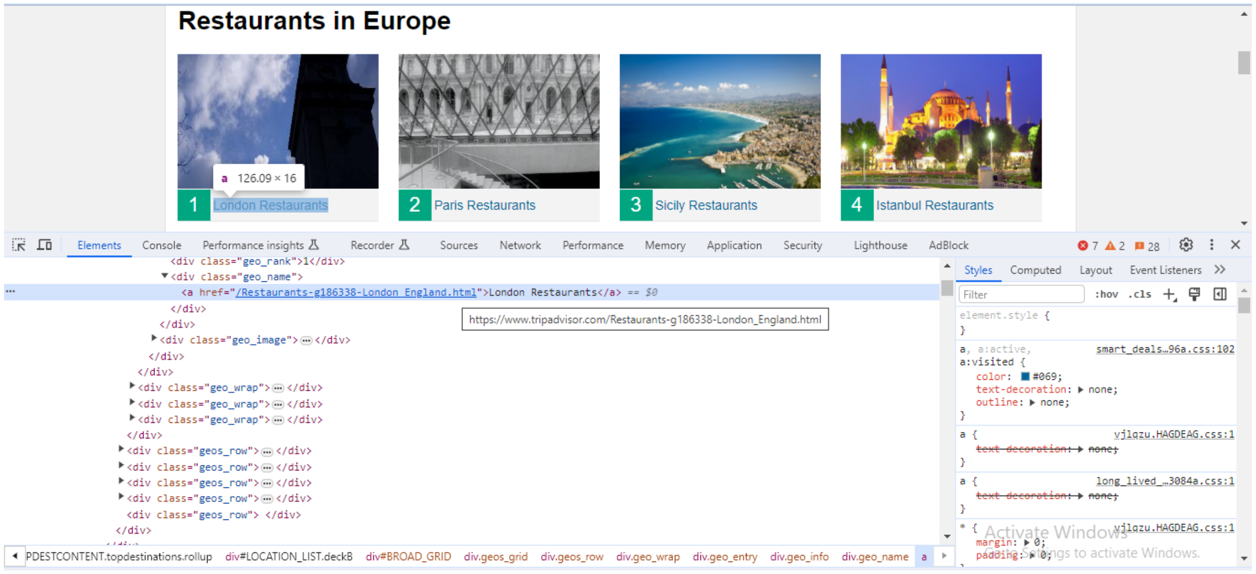


If we inspect the elements and analyze the pattern, we find that we can get the geo_id by fetching all the div elements with class geo_name and then looping over the div elements to get href attribute of the <a> tag.

We get the link to the restaurant list as well as the geo_id.
Eg. <a href="/Restaurants-g186338-London_England.html">London Restaurants</a>

Link = https://www.tripadvisor.com/Restaurants-g186338-London_England.html

geo_id = 186338
place = London_England



```
        <div class="geo_rank">1</div>
      ▼<div class="geo_name">
          <a href="/Restaurants-g186338-London_England.html">London Restaurants</a> == $0
        </div>
      </div>
     ▶<div class="geo_image">…</div>
    </div>
  </div>
 ▶<div class="geo_wrap">…</div>
 ▶<div class="geo_wrap">…</div>
 ▶<div class="geo_wrap">…</div>
</div>
▶<div class="geos_row">…</div>
▶<div class="geos_row">…</div>
▶<div class="geos_row">…</div>
▶<div class="geos_row">…</div>
 <div class="geos_row"> </div>
</div>
```

https://www.tripadvisor.com/Restaurants-g186338-London_England.html

PDESTCONTENT.topdestinations.rollup div#LOCATION_LIST.deckB div#BROAD_GRID div.geos_grid div.geos_row div.geo_wrap div.geo_entry div.geo_info div.geo_name a

```
element.style {
}
a, a:active,                smart_deals…96a.css:102
a:visited {
   color: #069;
   text-decoration: ▶ none;
   outline: ▶ none;
}
a {                             vjlqzu.HAGDEAG.css:1
   ~~text-decoration: ▶ none;~~
}
a {                          long_lived_…3084a.css:1
   ~~text-decoration: ▶ none;~~
}
* {                             vjlqzu.HAGDEAG.css:1
   margin: ▶ 0;
   padding: ▶ 0;
```

Activate Windows
Go to Settings to activate Windows.

Python libraries used

Python Library	Purpose
selenium	To visit the web address and fetch the data
pandas	To load all the data into the data frame and export it as CSV file
pymysql	To connect to the database and insert the data
fast-api	To write the API endpoints

Project files

Sr.	File name	Purpose
1.	requirements.txt	This file contains the Python libraries list required for the project.
2.	constants.py	This file contains constant values.
3.	app.py	This file runs the API.
4.	scraper.py	This file scrapes the restaurant's data.

5.	data_storage.py	This file exports scraped data to the database as well as creates the CSV file of the scraped data.
6.	test.py	This file contains the unit test cases.
7.	Dockerfile	This file contains all the commands to assemble the Python project image.
8.	docker-compose.yml	This YAML file defines and runs multi-container Docker applications, such as the Python app and mysql.
9.	datamart.py	Do manipulation of existing data
10.	load_csv_to_db.py	Load CSV file to database
11.	Dockerfile_sql	Docker container mysql

API Endpoints

Sr	Endpoint	Purpose
1.	/scrape_data/{geo_id}	To fetch the restaurant data for particular geo_id from web
2.	/retreive_data/{geo_id}	To fetch the data of particular geo_id from database

Architecture diagram

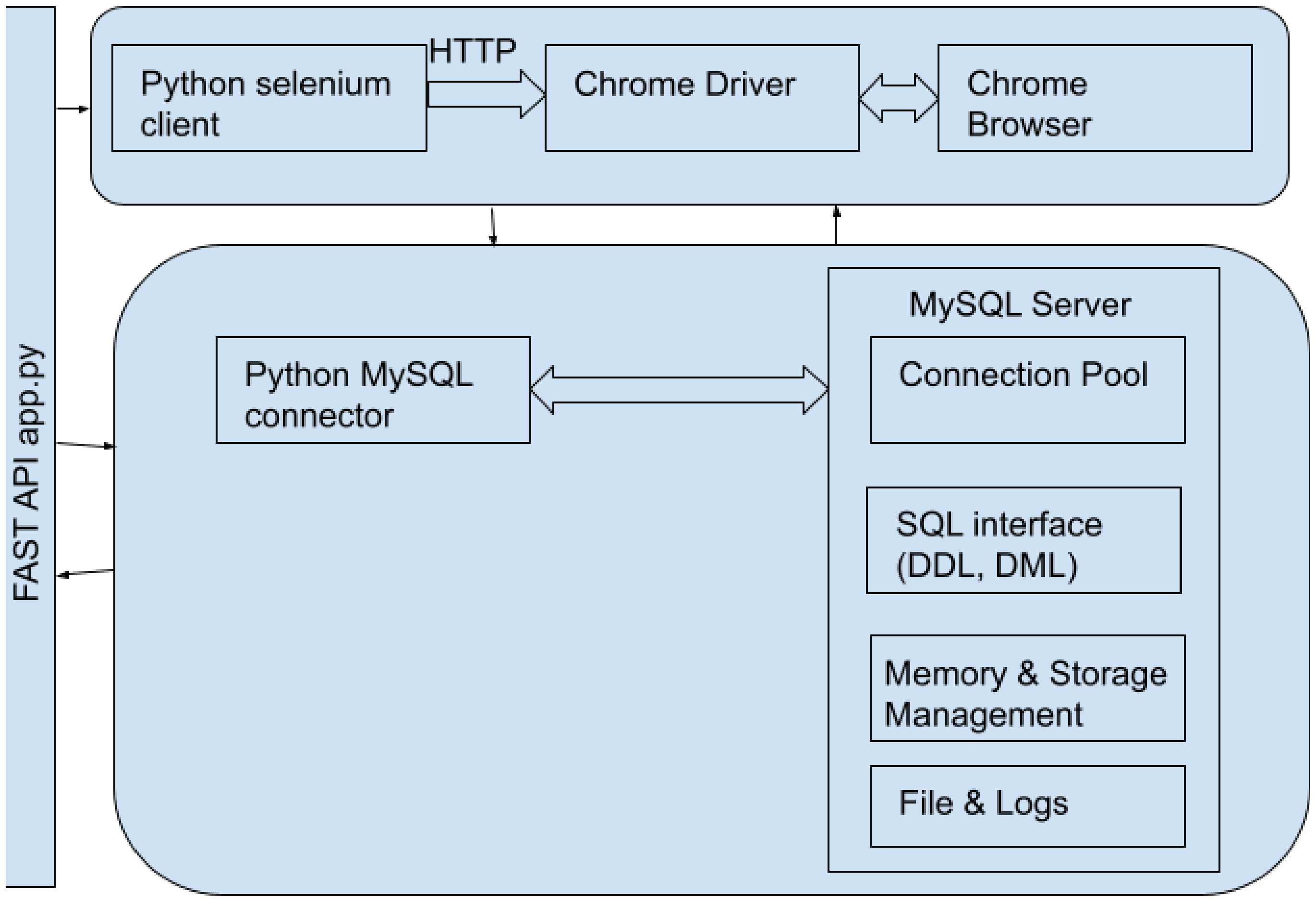


Fig. 1 : Architecture Diagram

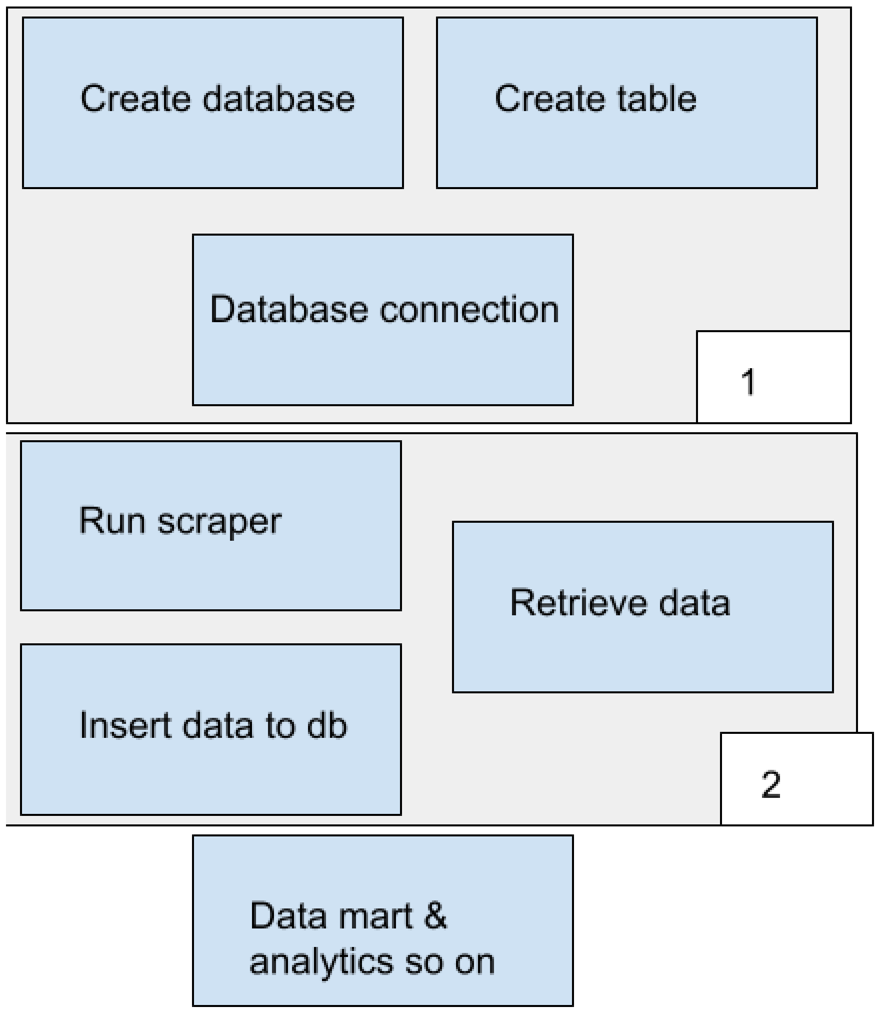


Fig. Workflow Diagram

Workflow diagram explanation:

Firstly, we connect to MySQL server, create a database and create table.

Then, we can run the scraper.py script via the api endpoint /scrape_data/{geo_id}. When all the restaurant data is fetched from the URL, the data is inserted into the database. We can retrieve the data based on the geo_id using the api endpoint /retrieve_data/{geo_id}.

When we have the data populated in the database, we can analyze the data, build the data mart and so on.

How scraped data looks like

{'url': 'https://www.tripadvisor.com/Restaurant_Review-g187147-d19261302-Reviews-Miura-Paris_Ile_de_France.html', 'restaurant_id': 'd19261302', 'geo_id': '187147', 'fetch_count': 1, 'time_of_fetching_data': '23/12/2023 16:28:30', 'total_reviews': 159, 'rating': 5.0, 'rest_name': 'Miura', 'address': "15, rue de l'Arc de Triomphe, 75017 Paris France", 'telephone': '+33 1 47 54 00 28', 'website': None, 'tags': "['$$$$', 'French', 'European', 'Contemporary']", 'CUISINES': "['French', 'European', 'Healthy', 'Contemporary']", 'Special_Diets': '', 'Meals': "['Lunch', 'Dinner', 'Drinks']", 'is_michelin': 'No', 'menu_link_available': 'No', 'menu_link': '', 'neighborhood': '17th Arr. - Batignolles-Monceau0.2 miles from Arc de Triomphe', 'restaurant_rank': '#23 of 14,523 Restaurants in Paris', 'Food_Rating': 0.0, 'Service_Rating': 0.0, 'Value_Rating': 0.0, 'Atmosphere_Rating': 0.0, 'PRICE_RANGE': "['$65 - $94']", 'FEATURES': "['Reservations', 'Seating', 'Serves Alcohol', 'Full Bar', 'Accepts Credit Cards', 'Table Service', 'Private Dining', 'Street Parking', 'Wine and Beer', 'Dog Friendly', 'Non-smoking restaurants', 'Gift Cards Available']"}

How to reproduce the project

(A) Using docker-compose.yml

- Step 1: Download the project zip file
- Step 2: Install the docker
- Step 3: Run the docker-compose.yml using the following command

  docker-compose up

  If running for the first time, use the following command

  docker-compose up –build

- Step 4: Access the endpoints: /scrape_data/{geo_id} and /retreive_data/{geo_id}

(B) Without using docker

- Step 1: Download and extract the project zip file
- Step 2: Install Python and Mysql workbench
- Step 3: On the command prompt, go to the project folder.

- Step 4: Create virtual environment
  python -m venv venv

- Step 5: Activate the virtual environment
  (On windows) venv\Scripts\activate

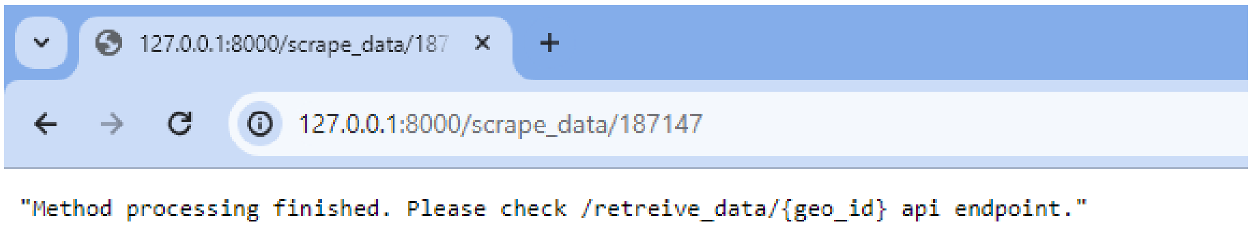
  pip install -r requirements.txt

- Step 6: Connect to MySQL database

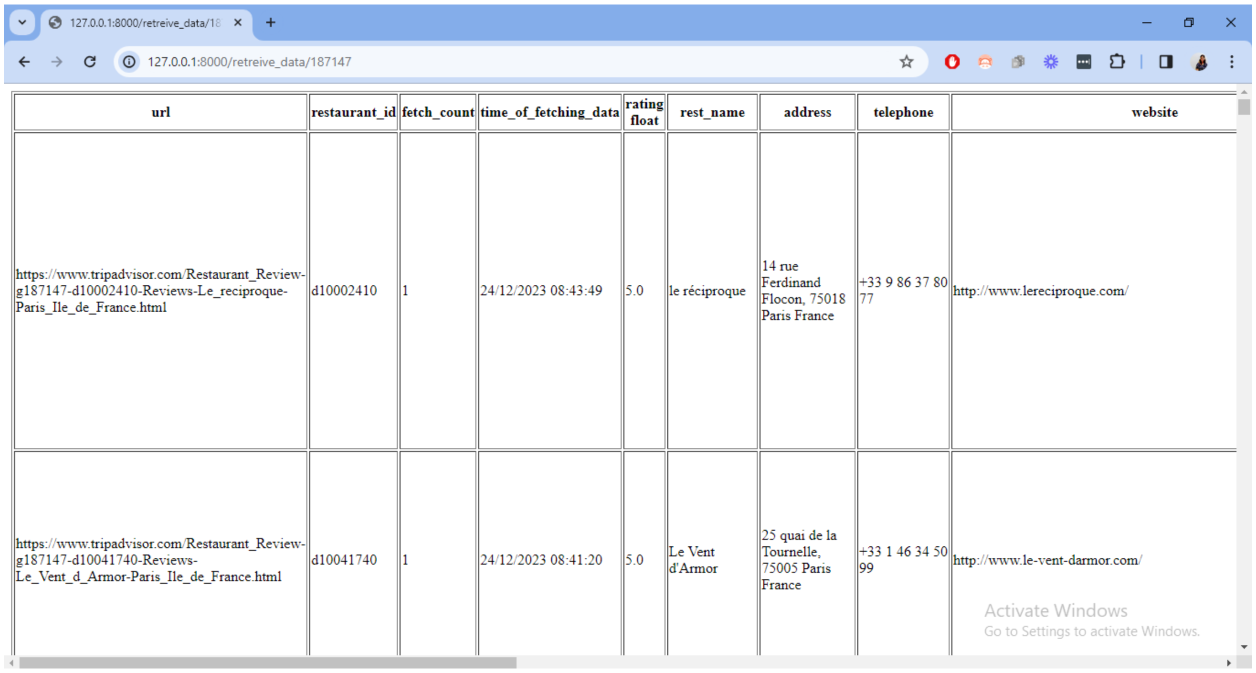
- Step 7: Run load_csv_to_db.py to load the data to database
  python load_csv_to_db.py

- Step 8: Run app.py
  uvicorn app:app

Screenshots


127.0.0.1:8000/scrape_data/187
127.0.0.1:8000/scrape_data/187147

```
"Method processing finished. Please check /retreive_data/{geo_id} api endpoint."
```



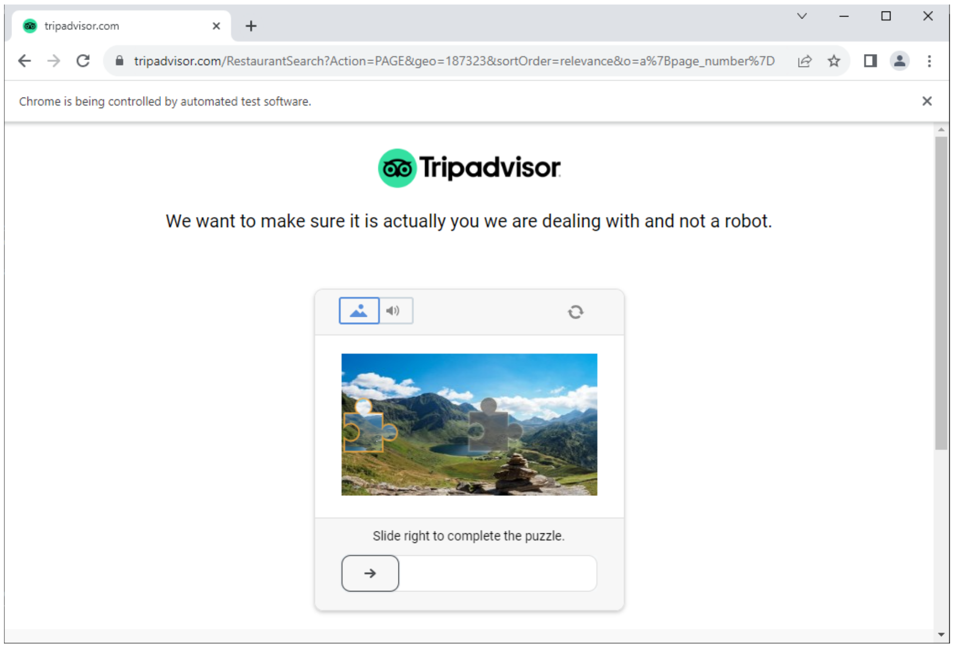
127.0.0.1:8000/retreive_data/187147

url	restaurant_id	fetch_count	time_of_fetching_data	rating float	rest_name	address	telephone	website
https://www.tripadvisor.com/Restaurant_Review-g187147-d10002410-Reviews-Le_reciproque-Paris_Ile_de_France.html	d10002410	1	24/12/2023 08:43:49	5.0	le réciproque	14 rue Ferdinand Flocon, 75018 Paris France	+33 9 86 37 80 77	http://www.lereciproque.com/
https://www.tripadvisor.com/Restaurant_Review-g187147-d10041740-Reviews-Le_Vent_d_Armor-Paris_Ile_de_France.html	d10041740	1	24/12/2023 08:41:20	5.0	Le Vent d'Armor	25 quai de la Tournelle, 75005 Paris France	+33 1 46 34 50 99	http://www.le-vent-darmor.com/

Activate Windows
Go to Settings to activate Windows.

Challenges

A few times Tripadvisor puts out a puzzle if they suspect data is being scraped. This can be solved but will expand the scope of project and hence is considered out of scope for this project right now.



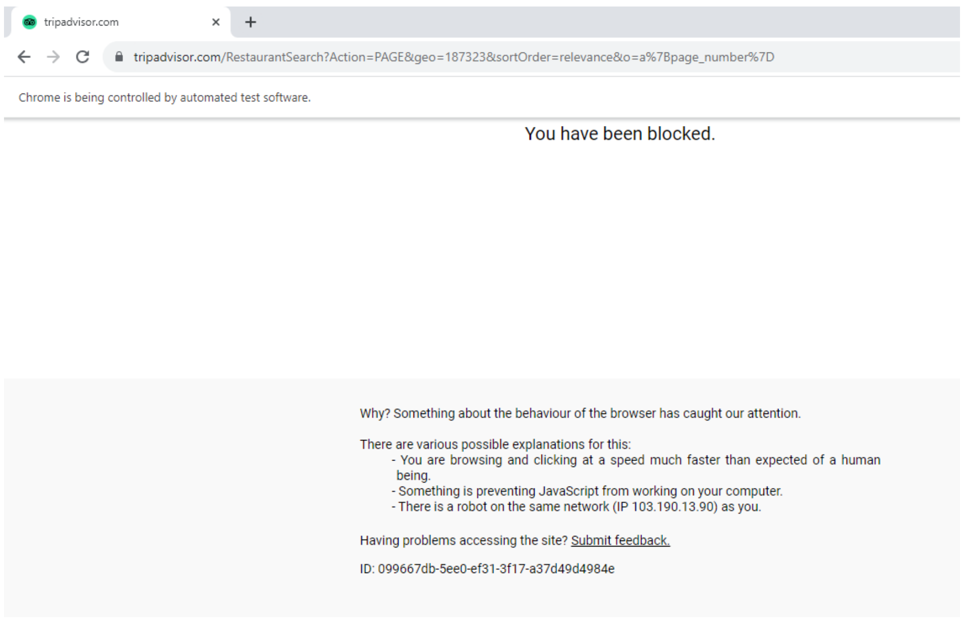
tripadvisor.com/RestaurantSearch?Action=PAGE&geo=187323&sortOrder=relevance&o=a%7Bpage_number%7D

Chrome is being controlled by automated test software.

Tripadvisor

We want to make sure it is actually you we are dealing with and not a robot.

Slide right to complete the puzzle.


tripadvisor.com

tripadvisor.com/RestaurantSearch?Action=PAGE&geo=187323&sortOrder=relevance&o=a%7Bpage_number%7D

Chrome is being controlled by automated test software.

You have been blocked.

Why? Something about the behaviour of the browser has caught our attention.

There are various possible explanations for this:
- You are browsing and clicking at a speed much faster than expected of a human being.
- Something is preventing JavaScript from working on your computer.
- There is a robot on the same network (IP 103.190.13.90) as you.

Having problems accessing the site? Submit feedback.

ID: 099667db-5ee0-ef31-3f17-a37d49d4984e

Discussion

1. **Why the list data is stored as varchar data types?**

Some attributes like CUISINES are stored as varchar data type in the database.

To store a Python list in MySQL, you generally need to convert the list into a format that can be stored in a MySQL column, as MySQL itself doesn't have a native data type for lists.

2. **Data mart Implementation idea**

Storing the results of datamart.py script into NoSQL database can be a good solution. Here's the explanation.

A NoSQL data mart is a data storage and processing system that utilizes a NoSQL (Not Only SQL) database to store and manage data for analytical purposes. Unlike traditional relational databases, NoSQL databases provide a more flexible schema design, scalability, and the ability to handle large volumes of unstructured or semi-structured data. NoSQL databases often used for data marts include MongoDB, Cassandra, Couchbase, and others.

Here are some key considerations and components when implementing a NoSQL data mart:

Data Modeling:

NoSQL databases often use schema-less or dynamic schema approaches, allowing for flexible data modeling.

Document-oriented databases (e.g., MongoDB) store data in JSON-like documents, while key-value stores (e.g., Cassandra) use key-value pairs.

Scalability:
NoSQL databases are designed to scale horizontally, allowing for distributed and scalable architectures.

Data marts can handle large volumes of data and high concurrent queries by adding more nodes to the NoSQL cluster.

Query Language:

NoSQL databases have their query languages. For example, MongoDB uses a query language based on JSON-like documents.

Queries may be optimized for specific use cases, and aggregations are often performed using the database's native features.

Data Ingestion:

Implement mechanisms for efficient data ingestion from various sources into the NoSQL data mart.

Tools like Apache Kafka or custom ETL (Extract, Transform, Load) processes can be used for data integration.

Indexing:

NoSQL databases use indexing to optimize query performance.

3. **Schedule the sourcer to run (daily/hourly/monthly)**

Using AWS service, we can call api scrape_data_endpoint from lambda function and schedule the lambda function (daily/hourly/monthly)