

Documentation

**2022 FBLA NLC
Coding and Programming**

Updated June 2022

**Thomas Lu
Dheeraj Vislawath
Vishwa Muruguppan**

Documentation

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1. Software Documentation

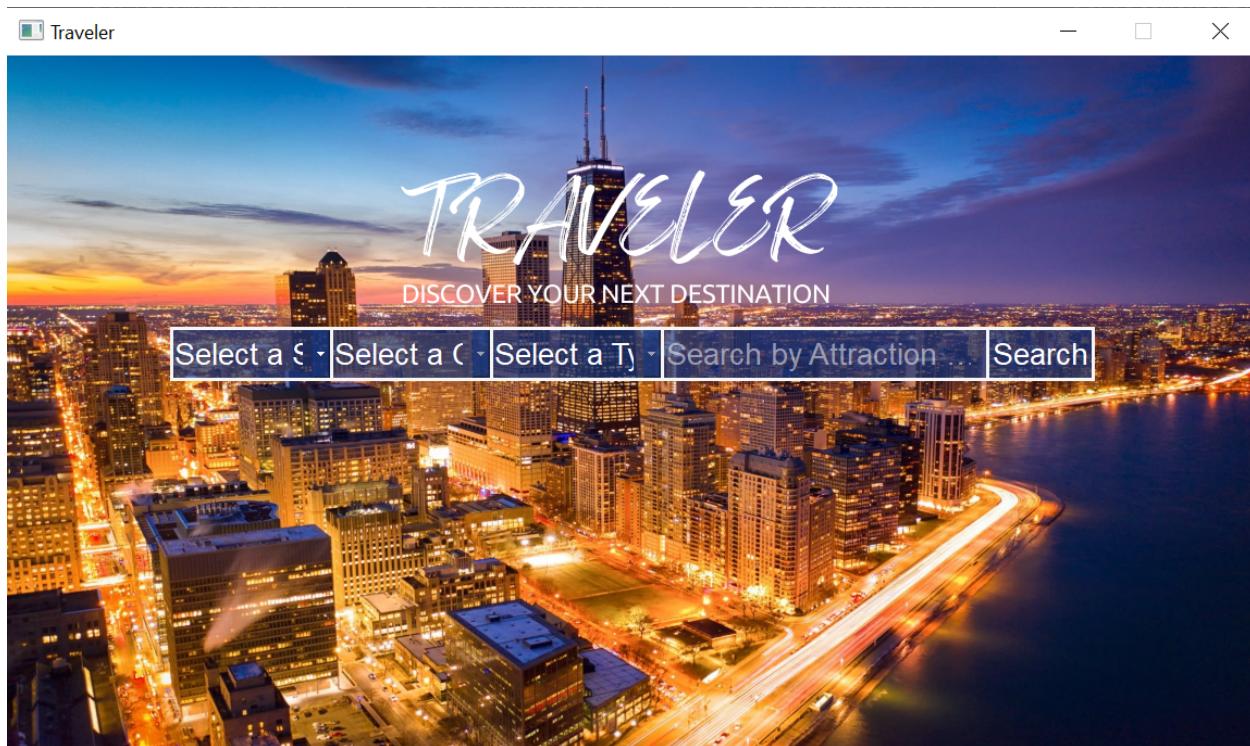
1.1 Overview

As summer begins to kick off, students take their summer break and adults plan their summer vacations. We recognize this newfound desire for adventure, and have created just the thing for it: Traveler, a simple, user-friendly, and powerful PyQt5 application that suggests potential tourist attractions to the user. Through the use of various different features, the user's search results can be personalized to their own desires.

1.2 Title Page

Before running our application, please ensure that all required packages and libraries are installed. Visit sections ____ for more information.

After running the application, the user is first greeted by our title screen. Please note that there may be slight variations in design from device to device.



- The title page is a simple front page that will redirect you to our more sophisticated main window, after you have selected a couple of basic desires.
 - First, we have the state selector. This is a required field in which you choose the state to filter attractions by.

- Next, we have the city selector. This is also a required field in which you choose the city from your selected state to filter attractions by.
 - Attempting to search without either state or city selected will result in the following error message:



- Continuing right, we have a type selector. This is an optional field, and will further filter your attractions based on the four types of attractions: **Food, Entertainment, Nature/Outdoor, or Cultural/Historical.**
- We also offer a search bar in the title page for the user to enter the name of an attraction to search by.
- Once you have completed the required and optional fields, hit “Search” to find your suggested attractions.



1.3 Main Page

After the user has selected their desired attributes and hit search from the title page, they will then be redirected to the main page.

The screenshot shows the TRAVELER application interface. At the top, there's a header bar with tabs for "Find Attractions", "Bookmarked Attractions", and "Sources, Licenses, and References". Below the header, a search bar displays "20 Attractions Found" and a placeholder "Search by Keyword". A "Sort By" dropdown is set to "Recommended". On the left, a sidebar titled "Location Details" shows the current location as "Sandy, Utah" with coordinates "Latitude: 40.58336" and "Longitude: -111.74664". It also includes a dropdown for "Desired Distance From You" set to "Any distance", and buttons for "Show location in maps" and "Find my location". Below this is a "Filter By" section with dropdowns for "State: Illinois", "City: Chicago", and "Type: No preference", and checkboxes for "Wheelchair Accessible", "Family Friendly", and "Pet Friendly". A "Help Menu" button is at the bottom of the sidebar.

Jarabe Mexican Street Food
Chicago, Illinois - 1253.2 miles away
Tacos, tortas & other Mexican street food doled out in an unassuming counter-serve eatery.
Food: Wheelchair Accessible
Price Level: \$ Family Friendly
Moderately Busy
Location: (41.874,-87.673)

The Purple Pig Restaurant
Chicago, Illinois - 1255.6 miles away
Expanded outpost of a famed pork & wine specialist with an open kitchen & a chic, airy setting.
Food: Wheelchair Accessible
Price Level: \$ Family Friendly
Moderately Busy
Location: (41.891,-87.624)

True Food Kitchen
Chicago, Illinois - 1255.4 miles away

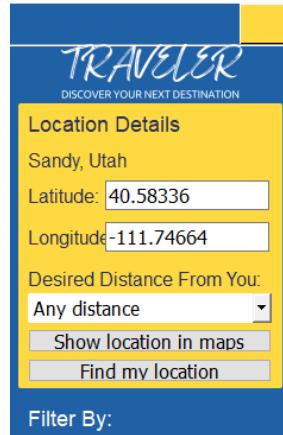
On the right side of the screen, there are two small maps showing the locations of the attractions in Chicago. The first map shows the location of Jarabe Mexican Street Food near West Van Buren Street. The second map shows the location of The Purple Pig Restaurant near Michigan Ave.

The main page includes various features designed to improve your experience as you search for tourist attractions.

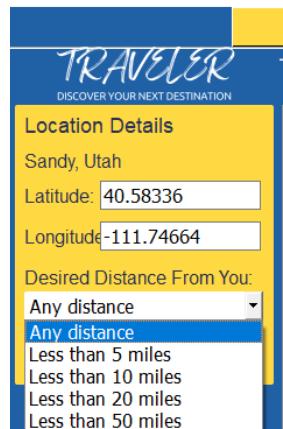
- My Location feature:

This screenshot shows the "My Location" feature. The "Location Details" section has an error message "Please enter a valid location". It contains fields for "Latitude: Enter latitude" and "Longitude: Enter longitude". Below these are dropdowns for "Desired Distance From You: Any distance" and buttons for "Show location in maps" and "Find my location". A "Filter By" section is also present.

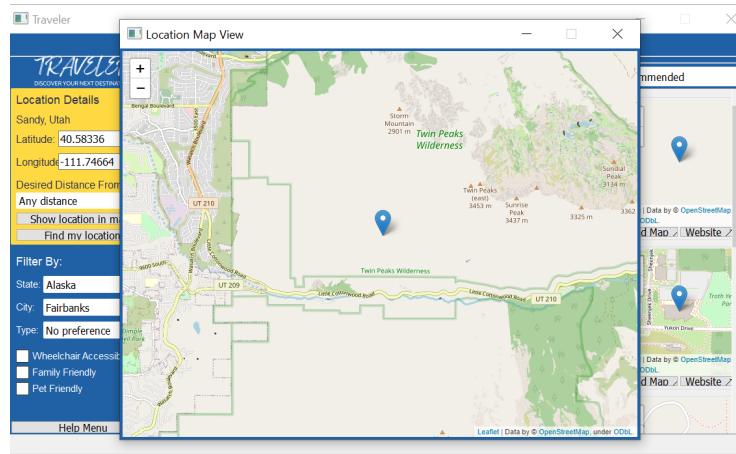
- In the top left of our application, you will see a section of the main page, titled "Location Details". Our application supports the ability to find attractions closest to your specific geospatial location.
 - First, the My Location feature offers you a simple latitude and longitude input for you to input a set of coordinates as your location.
 - Even better, a bit lower lies a button titled "Find my location", in which our application will automatically generate your location coordinates.



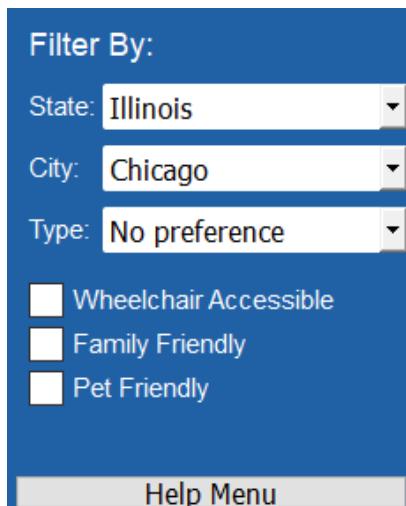
- From there, you are able to sort the displayed attractions based on a specified distance.



- Lastly, this window allows you to open your location in a map window.



- Filters



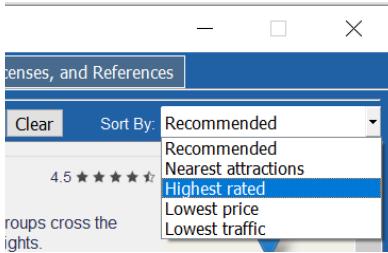
- Next, in the left center we have various filters. These are attributes that if selected, will filter attractions to only show ones that match your selected filters.
 - Wheelchair accessible: selecting this option will filter to only show attractions that are accessible to wheelchair users.
 - Family friendly: selecting this option will filter to only show attractions that are family and kid friendly.
 - Pet friendly: selecting this option will filter to only show attractions that are pet friendly and tolerant.

- Search bar



- Next, in the top center, the application offers the user the ability to search for an attraction, based on the entered keywords.
 - Selecting "Search" will filter and only show attractions whose name matches with your entered keywords.
 - Selecting "Clear" will clear the search bar to no longer only show attractions that match your keywords. In other words, the displayed attractions will simply match your other selected features.
 - Also, please note that this search bar is not case-sensitive.

- Sorting feature



- Next, in the top right you will find a dropdown menu labeled “Sort By”. This feature offers the user to sort the displayed attractions based on a desired attribute.
 - Selecting “Recommended” will display our recommended attractions.
 - “Nearest attractions” sorts the displayed attractions **based on their distance to your location**, using the coordinates in the My Location feature.
 - “Highest rated” sorts the displayed attractions from **highest to lowest rated**.
 - “Lowest price” sorts the displayed attractions from **lowest to highest price**.
 - “Lowest traffic” sorts the displayed attractions from **lowest to highest busyness**.

- Displayed attractions

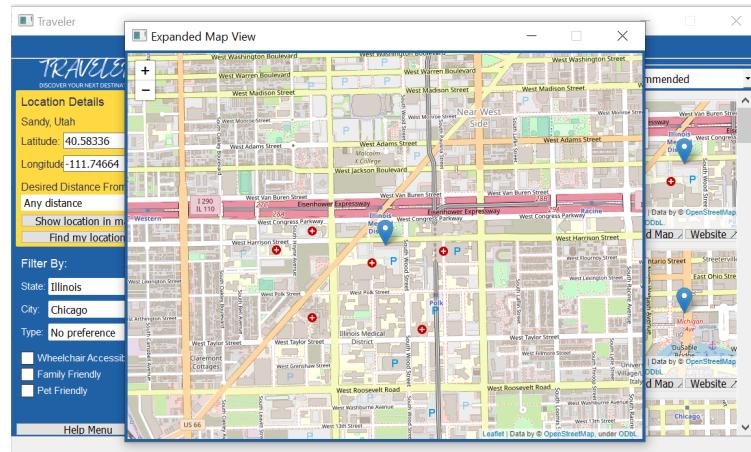
Jarabe Mexican Street Food
Chicago, Illinois - 1253.2 miles away
Tacos, tortas & other Mexican street food doled out in an unassuming counter-serve eatery.

The Purple Pig Restaurant
Chicago, Illinois - 1255.6 miles away
Expanded outpost of a famed pork & wine specialist with an open kitchen & a chic, airy setting.

True Food Kitchen
Chicago, Illinois - 1255.4 miles away

- After you have gone through all of the above features, various attractions will be displayed that match your selected filters, sorters and features. In the area for each tourist attraction lies many pieces of important information, as well as a few unique features.
 - On the very left, you will see an image of each tourist attraction.
 - At the top, the name of the tourist attraction is displayed.

- To the right of the name is a simple display of the attraction's rating, on a scale of 1-5 stars.
- Below the name, you will find more information such as city, state, distance to your entered coordinates, and a short description.
- Further down, information such as type of attraction, price level, traffic level and coordinates are displayed. Wheelchair accessibility, family and pet friendliness are also displayed.
- Further to the right lies a small map preview of the tourist attraction general area. You are able to expand this map preview by selecting the "Expand Map" button. Doing so will open the following popup, with a map icon marking the attraction's location.



- Finally, if you are looking for more information regarding a specific attraction, we offer the ability to navigate to each attraction's homepage. To do so, select the "Website" button to the right of the "Expand Map" button, and the attraction's website will be opened in a new window. Please note that which window opens may depend on your default browser.



1.4 Other Tabs

Beyond the main page of finding tourist attractions that match your needs, we have also implemented a few other intelligent features into other tabs that the user can utilize.

At the very top of the application window, you can find the various tabs that are offered in our application.

Find Attractions Bookmarked Attractions Sources, Licenses, and References

20 Attractions Found Search by Keyword Search Clear Sort By: Recommend

- The first of these features is the ability to bookmark attractions that you may find special or noteworthy.
 - To add a bookmark to the bookmark tabs, locate the bookmark icon for each attraction. The icon can be found on the image for each attraction.



- All attractions that you have bookmarked will be added to the bookmarks tab.

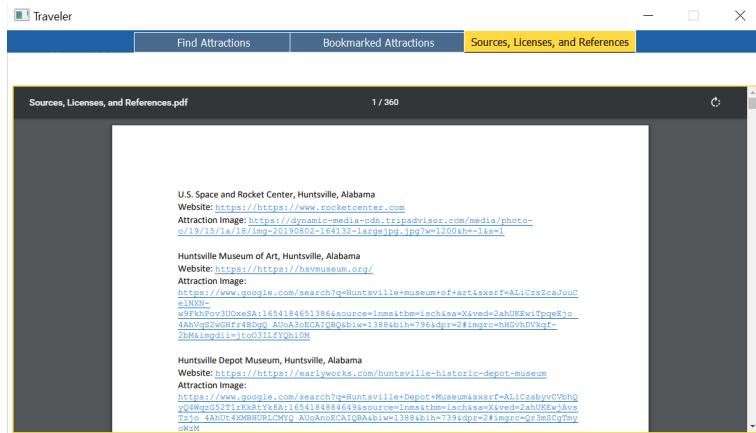
Traveler Find Attractions Bookmarked Attractions Sources, Licenses, and References

4 Total Bookmarks Saved Search by Keyword Search Clear Clear All Bookmarks

Attraction Name	Location	Rating	Details
Jarabe Mexican Street Food	Chicago, Illinois - 1263.2 miles away	4.6 ★★★★☆	Food, Wheelchair Accessible, Price Level - \$, Family Friendly, Moderately Busy, Pet Friendly, Location: (41.874,-87.673)
The Purple Pig Restaurant	Chicago, Illinois - 1255.6 miles away	4.6 ★★★★☆	Food, Wheelchair Accessible, Price Level - \$, Family Friendly, Moderately Busy, Pet Friendly, Location: (41.891,-87.624)
True Food Kitchen		4.5 ★★★★☆	

Leaflet | Data by © OpenStreetMap under ODbL | Expand Map | Website

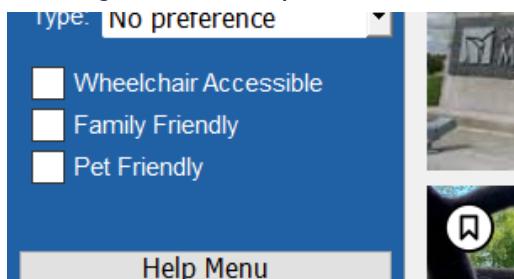
- On the bookmarked tabs, each attraction displays its same information as the main Find Attraction Tab.
- Additionally, there is a search bar to find a specific bookmark, as well as the option to clear all bookmarks.
- The third tab that our application holds is one dedicated to listing all of our sources, licenses and references, and is titled so. Here, you can find all proper citations for attraction information, as well as any other licenses and references used in the creation of this application.



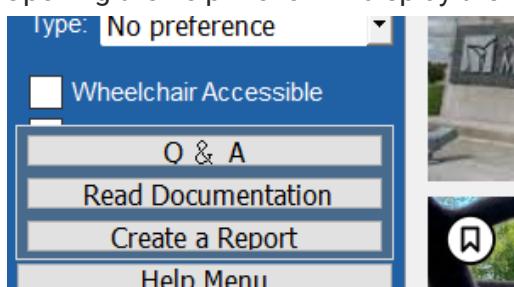
1.5 Help Menu

To further improve the user's experience and offer help, our application includes a Help Menu feature, in which various operations to assist the user's experience and improve their knowledge of application functionality are present.

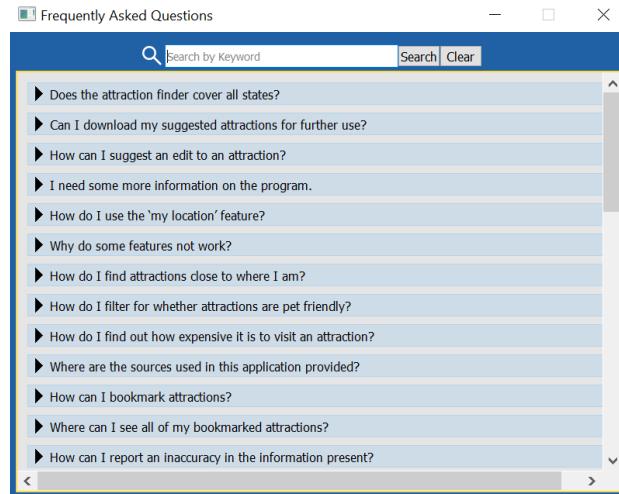
- To navigate to the help menu, locate it in the bottom left of the application's main page.



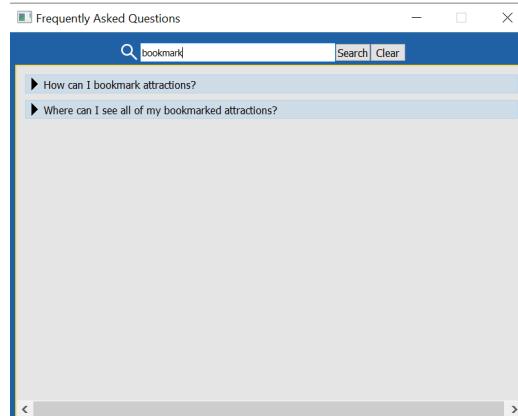
Opening the help menu will display the various operations that are supported.



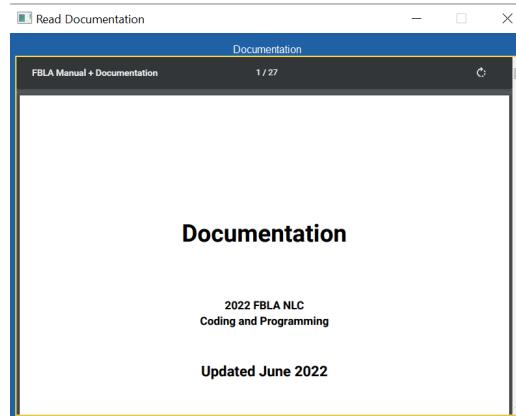
- Q & A:
 - The first operation is a questions and answers section dedicated to answering any questions you may have about our application.



- Here, you can look for any questions that would match your inquiry.
- The FAQ section also offers a search bar to find any questions that match what you are curious about.



- Read Documentation:
 - The next operation supported in the help menu is to open program documentation. The window opens a document that includes information regarding the application and its use.



- Create a Report:
 - The last operation currently supported by the help menu is the ability for the user to create a report, detailing any errors or inaccuracies. The window asks for identification and then a space to describe the error/inaccuracies.

1.6 Usage Tips

In addition to the information regarding various features listed above, there are a handful of useful tips to know when using our application that will vastly improve your experience.

- After filtering for tourist attractions, use the Sort By option in the top right of the main window to sort by a desired attribute. This way, you can further improve your search results by sorting the displayed attractions by highest rating, lowest price, etc.
- Use the my location feature to find attractions close to you.
- Want to keep looking at the search results, but want to mark a specific attraction? Bookmark it, and it will be stored in the bookmarks tab.
- Looking for more in depth information regarding an attraction? Visit its website, found below the map preview on the right-hand side.

2. Source Documentation

2.1 Sources

Our application makes use of various files, libraries and images.

- Text files are generated from running the code
- Images were taken with due credit, for more information see 1.2
- Libraries were imported from the PyCharm IDE, for more information see 1.4

2.2 Image Documentation

Our application makes use of attraction images, application logos and icons.

- Bookmark icons
 - <https://www.awicons.com/stock-icons/symbol-black/bookmark/>
 - Available to the public for free use
 - All rights belong to original author
- Star ratings
 - <https://thenounproject.com/icon/star-rating-766721/>
 - Available to the public for free use
 - All rights belong to original author
- Search icon
 - https://www.iconfinder.com/icons/172546/search_icon
 - Available to the public for free use
 - All rights belong to original author
- Title image
 - <https://www.istockphoto.com/photos/chicago-night>
 - Available to the public for free use
 - All rights belong to original author
- Logo image
 - Credits to team members for image use
 - Available to our project for free use
 - All rights belong to original author
- Sources for attraction images are available in code files, titled **sources.txt**
 - Attraction sources are also available for viewing in the application
 - All attraction images were available to the public for free use
 - Any image rights belong to original author

2.3 Data Documentation

Information on tourist attractions was gathered for use in our application.

- Data and information of tourist attractions acquired from Google Maps

- Available to public for free use, with all content publicly displayed with proper attribution
- All data rights belong to Google

2.4 Licenses

Our application makes use of various programs, libraries and modules. We used such resources under specific rules and licenses, of which are outlined below.

- **Python:** All Python releases are Open Source, and is also GPL-compatible, which guarantees anyone the freedom to run, study, share and modify.
- **PostgreSQL:** PostgreSQL is released under the PostgreSQL License, a liberal Open Source license. Permission to use, copy, modify, and distribute its software and its documentation for any purpose, without fee, and without a written agreement is hereby granted, provided that the above copyright notice and this paragraph and the following two paragraphs appear in all copies.

Portions Copyright © 1996-2022, The PostgreSQL Global Development Group

Portions Copyright © 1994, The Regents of the University of California

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- **pgAdmin:** pgAdmin 4 is released under the above PostgreSQL license.
- **Pycharm:** PyCharm Community Edition is free, open-source and can be used without any license.
- **PyQt5:** released under the GPL v3 license and under a commercial license that allows for the development of proprietary applications.

3. System Requirements

3.1 Windows

- Operating system must be **Windows 8** or above
- Device must be able to install all of the necessary programs and libraries.
- Device must have at least **1 GB of RAM**
- Device must have at least **500 MB of storage space**

3.2 Macintosh

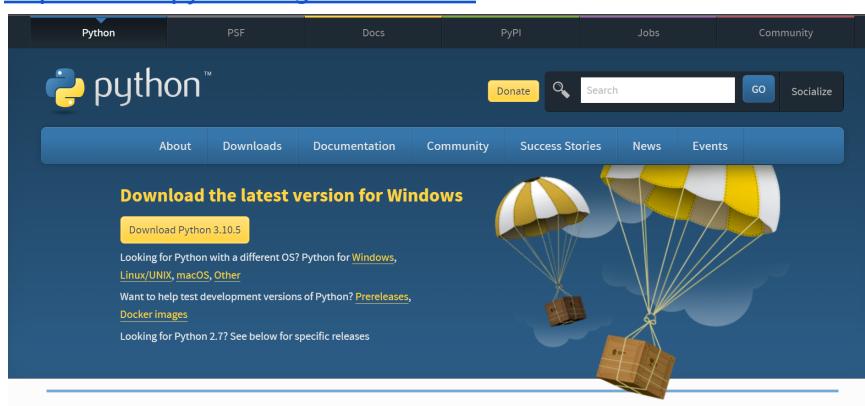
- Operating system must be **macOS 10.14** or above
- Device must be able to install all of the necessary programs and libraries.
- Device must have at least **1 GB of RAM**
- Device must have at least **500 MB of storage space**

4. Requirements and Accessibility

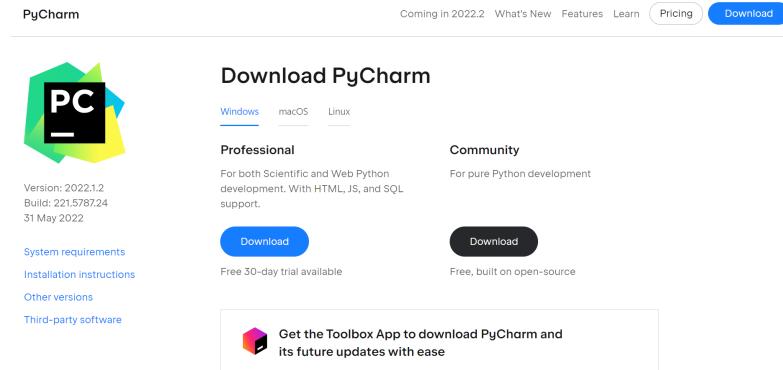
4.1 Application Required Programs

In our application, various programs and libraries are utilized. For the code to properly run, all of the following must be properly installed and functioning.

- Python, v3.8
 - Python is the language in which our code runs. Its usage follows a high-level, interpreted, and general-purpose programming philosophy, and emphasis on code readability with significant use of indentation.
 - To install python:
 - Head to the official homepage for the Python language:
<https://www.python.org/downloads/>



- Download the python installer, and follow its instructions until completion.
- Pycharm, v2022.1
 - For this project, PyCharm was used for the development of the application. To find the system requirements and installation process:
<https://www.jetbrains.com/help/pycharm/installation-guide.html>
 - To install Pycharm:
 - Head to the official homepage for Pycharm.



- Download the Pycharm installer and follow its instructions until completion.

- **psycopg2, v2.8.6**

- This library is used to connect PostgreSQL to the Python project. Over the course of the project, versions 2.8.6 and 2.9.1 were used. To find more about the library and its installation: <https://pypi.org/project/psycopg2/>
- To install psycopg2:
 - Run the following command `pip install psycopg2` in your command prompt.

```
pip install psycopg2
```

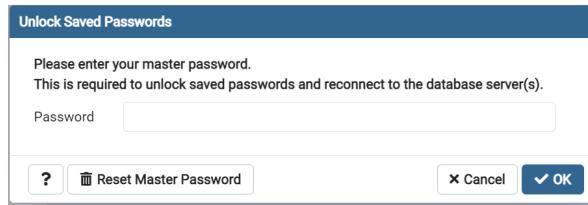
- Follow all instructions until completion.

- **pgAdmin, v14.2**

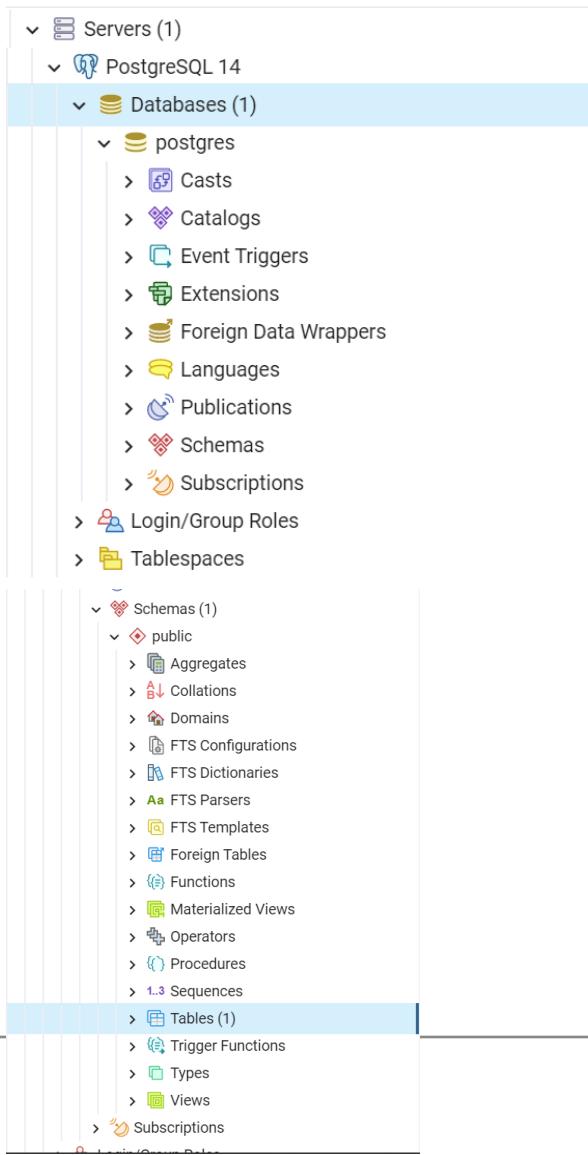
- This library is used to hold all attraction data, and to dynamically store filtered attractions within this project. For this project only version 14.2 was tested and implemented. To find information about the library and the installation process: <https://www.postgresql.org/download/>
- To install pgAdmin:
 - Head to the pgAdmin download website.

The screenshot shows the pgAdmin download page. On the left, there's a sidebar with 'Quick Links' including 'Online Demo', 'Download', 'FAQ', 'Latest Docs', and 'Get Help'. The main area has a large 'Download' button. Below it, text explains that pgAdmin is a free software project released under the PostgreSQL licence. It mentions that the software is available in source and binary format from the PostgreSQL mirror network. It recommends installing binary packages whenever possible. Further down, it describes pgAdmin 4 as a complete rewrite of pgAdmin, built using Python and Javascript/jQuery. It notes that the desktop runtime written in NW.js allows it to run standalone for individual users, or the web application code may be deployed directly on a web server for use by one or more users through their web browser. The software has the look and feels of a desktop application whatever the runtime environment is, and vastly improves on pgAdmin III with updated user interface elements, multi-user/web deployment options, dashboards, and a more modern design. At the bottom, there are download links for 'Container', 'macOS', 'Python', 'APT', 'RPM', 'Source Code', and 'Windows'.

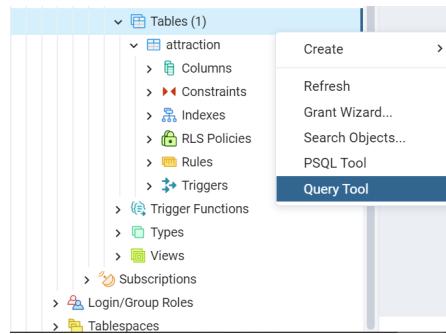
- Find the version that matches your device, and follow instructions until completion.
- Our application makes use of a data table in PostgreSQL, which can be interacted with using pgAdmin. A copy of the data our group used is required in an identical table for the application to run on your own device.
- To set up the same data:
 - Open pgAdmin. Ensure PostgreSQL is installed and running.
 - You will be prompted to create a master password. Create a new password and store it somewhere safe.

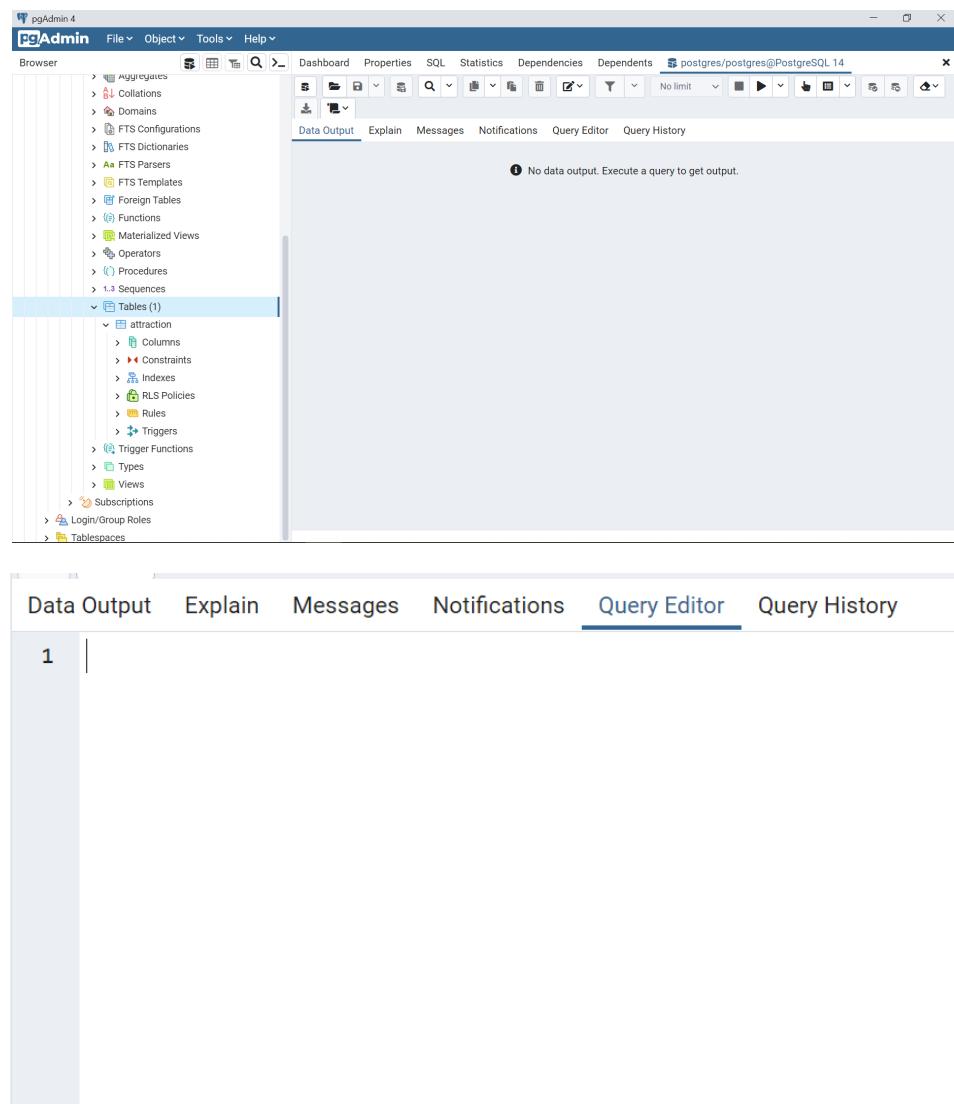


- Next, navigate on the menu on the left from Servers > Postgres > Databases > postgres > Schemas > Tables



- From there, navigate from Tables > Query Tool.





On the bar at the middle top of the new area, navigate to the Query Editor.

- In this query editor text entry, paste the following code to create a table with the correct columns and their attributes. The raw code can also be found [here](#). Run by clicking the execute button.

```
CREATE TABLE ATTRACTION
(
    ID SERIAL PRIMARY KEY,
    NAME VARCHAR(200) NOT NULL,
    DESCRIPTION VARCHAR(2000) NOT NULL,
    STATE VARCHAR(50) NOT NULL,
    CITY VARCHAR(50) NOT NULL,
    TYPE VARCHAR(50) NOT NULL,
```

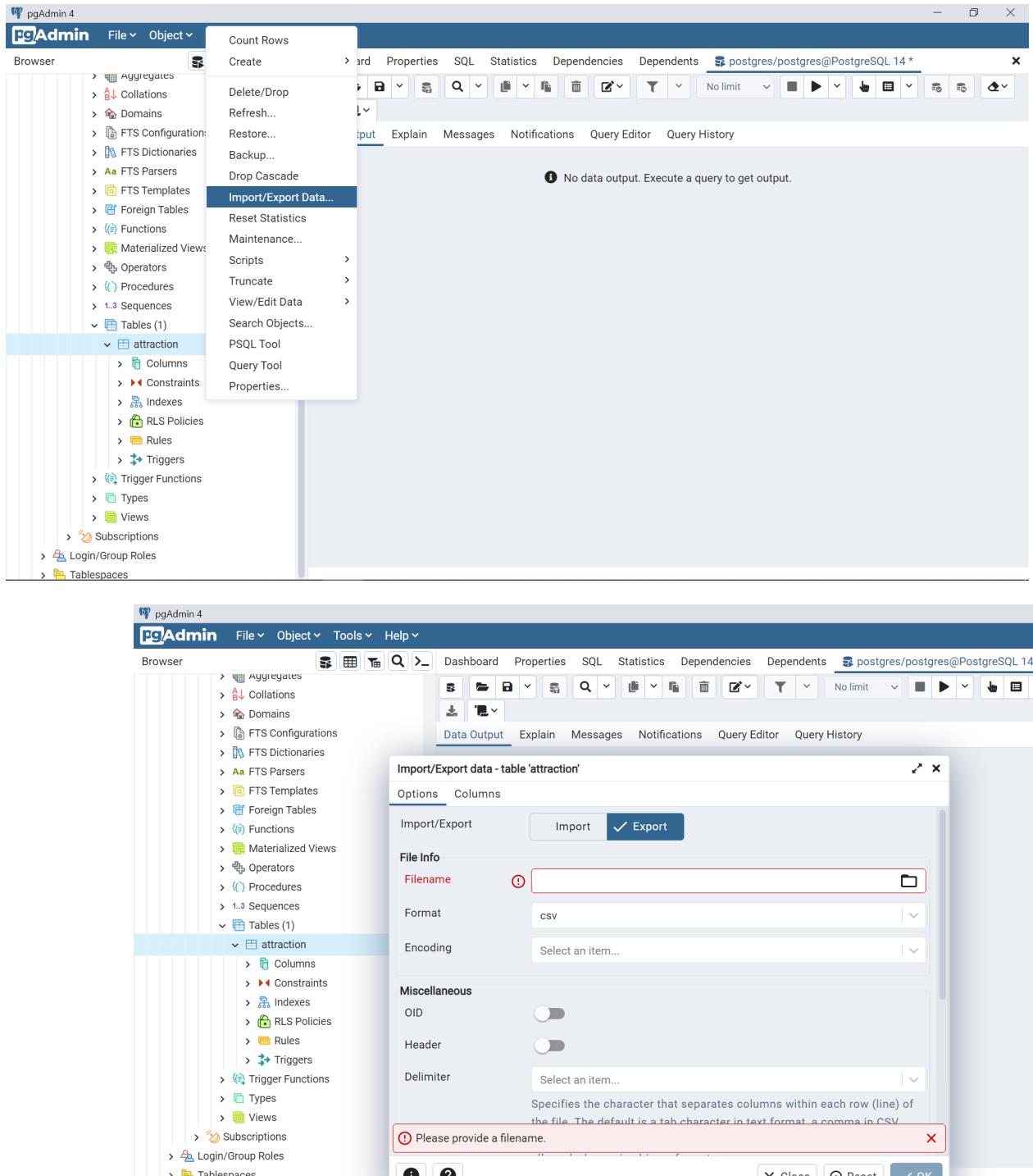
```
PRICE_LEVEL INTEGER,  
TRAFFIC_LEVEL INTEGER,  
RATING NUMERIC(2,1),  
WHEELCHAIR_ACCESSIBILITY BOOLEAN,  
FAMILY_FRIENDLY BOOLEAN,  
PET_FRIENDLY BOOLEAN,  
WEBSITE VARCHAR(500),  
LATITUDE NUMERIC(11,8),  
LONGITUDE NUMERIC(11,8),  
IMAGE_LINK_SRC VARCHAR(50000)  
);
```

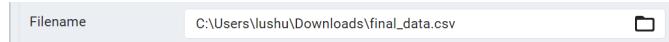
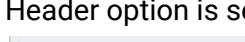
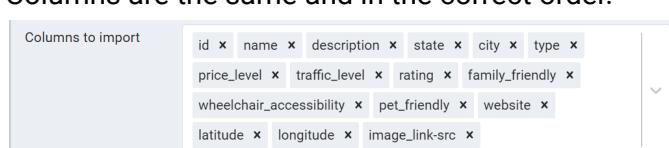
```
CREATE INDEX IDX_STATE ON ATTRACTION (STATE);
CREATE INDEX IDX_CITY ON ATTRACTION (CITY);
CREATE INDEX IDX_TYPE ON ATTRACTION (TYPE);
CREATE INDEX IDX_RATING ON ATTRACTION (RATING);
CREATE INDEX IDX_PRICE_LEVEL ON ATTRACTION (PRICE_LEVEL);
CREATE INDEX IDX_TRAFFIC_LEVEL ON ATTRACTION (TRAFFIC_LEVEL);
CREATE INDEX IDX_WC_ACCESSIBILITY ON ATTRACTION
(WHEELCHAIR_ACCESSIBILITY);
CREATE INDEX IDX_FAMILY_FRIENDLY ON ATTRACTION (FAMILY_FRIENDLY );
CREATE INDEX IDX_PET_FRIENDLY ON ATTRACTION (PET_FRIENDLY);
ALTER TABLE ATTRACTION ADD CONSTRAINT CHK_RATING CHECK RATING >=
0 AND RATING <= 5)
```

```
6 STATE VARCHAR(50) NOT NULL,
7 CITY VARCHAR(50) NOT NULL,
8 TYPE VARCHAR(50) NOT NULL,
9 PRICE_LEVEL INTEGER,
10 TRAFFIC_LEVEL INTEGER,
11 RATING NUMERIC(2,1),
12 WHEELCHAIR_ACCESSIBILITY BOOLEAN,
13 FAMILY_FRIENDLY BOOLEAN,
14 PET_FRIENDLY BOOLEAN,
15 WEBSITE VARCHAR(500),
16 LATITUDE NUMERIC(11,8),
17 LONGITUDE NUMERIC(11,8),
18 IMAGE_LINK_SRC VARCHAR(50000)
19 );
20
21 CREATE INDEX IDX_STATE ON ATTRACTION (STATE);
22 CREATE INDEX IDX_CITY ON ATTRACTION (CITY);
23 CREATE INDEX IDX_TYPE ON ATTRACTION (TYPE);
24 CREATE INDEX IDX_RATING ON ATTRACTION (RATING);
25 CREATE INDEX IDX_PRICE_LEVEL ON ATTRACTION (PRICE_LEVEL);
26 CREATE INDEX IDX_TRAFFIC_LEVEL ON ATTRACTION (TRAFFIC_LEVEL);
27 CREATE INDEX IDX_WC_ACCESSIBILITY ON ATTRACTION (WHEELCHAIR_ACCESSIBILITY);
28 CREATE INDEX IDX_FAMILY_FRIENDLY ON ATTRACTION (FAMILY_FRIENDLY );
29 CREATE INDEX IDX_PET_FRIENDLY ON ATTRACTION (PET_FRIENDLY );
30 ALTER TABLE ATTRACTION ADD CONSTRAINT CHK_RATING CHECK (RATING >= 0 AND RATING <= 5)
```

Now that you have created a table with the correct columns, download the data sheet. The raw csv can be found [here](#).

■ Next, import the data sheet.



- Ensure that:
 - File name is correct.
 - Import is selected rather than export.
 - Header option is selected.
 - Delimiter is set to a comma.
 - Columns are the same and in the correct order.

- The database is now functioning. All extraneous programs should be functioning at this point.

4.2 Packages and Modules

To run our application, various packages and modules were used.

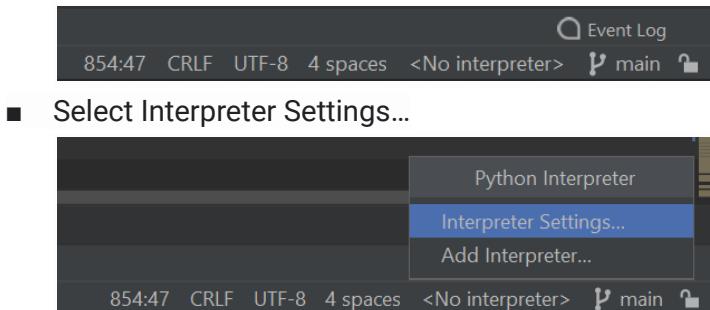
- The **PyQt5** module is a comprehensive set of Python bindings, implementing high-level APIs for accessing many aspects of modern desktop and mobile systems, covering more than 35 extension modules.
- The **ast** module helps Python applications to process trees of the Python abstract syntax grammar. The abstract syntax itself might change with each Python release; this module helps to find out programmatically what the current grammar looks like.
- The **os** module provides a portable way of using operating system dependent functionality.
- The **webbrowser** module provides a high-level interface to allow displaying web-based documents to users.
- The **io** module provides Python's main facilities for dealing with various types of Input/Output.

- The **folium** module builds on the data wrangling strengths of the Python ecosystem and the mapping strengths of the Leaflet.js library. Manipulate your data in Python, then visualize it in a Leaflet map via folium.
- The **ipregistry** is the official Python client library for the ipregistry IP geolocation and threat data API, allowing you to lookup your own IP address or specified ones.
- The **time** module provides various time-related functions.
- The **operator** module exports a set of efficient functions corresponding to the intrinsic operators of Python.
- The **geopy** module is a Python client for several popular geocoding web services.

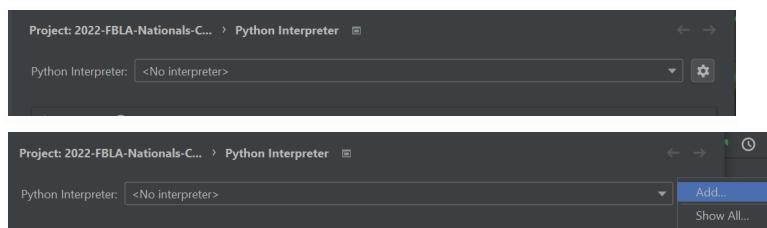
4.3 Accessing Packages

Our application requires various packages and modules to operate. You will need to import the aforementioned packages into your Pycharm IDE.

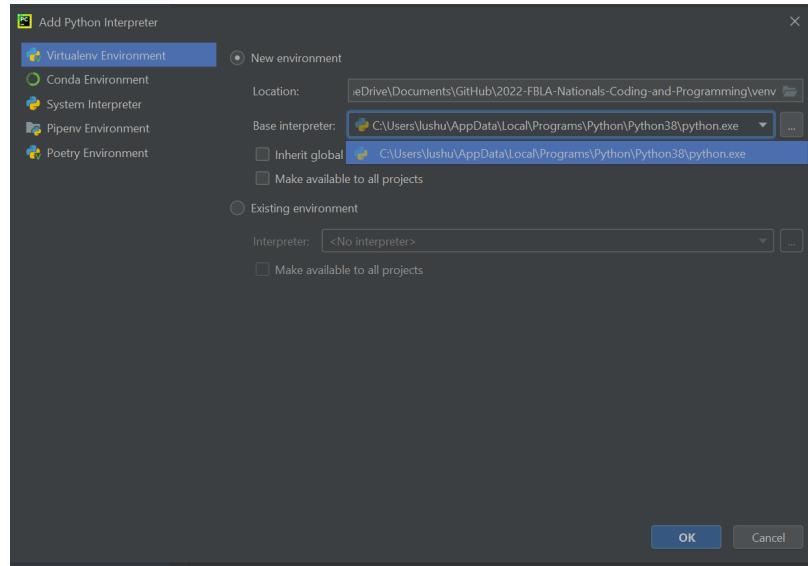
- To import packages:
 - You will first need to select an interpreter. In the bottom right, click on the < No Interpreter > tag.



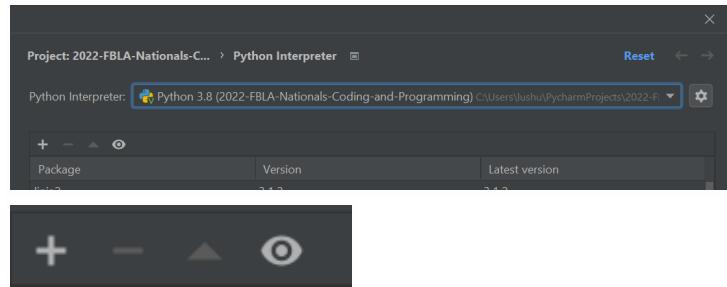
- In the top right, select the settings icon and then select Add...



- Select the base interpreter that matches your device and your version of Python.



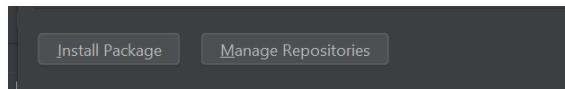
- Now that you have selected an interpreter, install the packages listed above.
 - To do so, from the packages menu, select the + button.



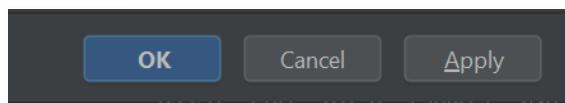
- From the menu on the left, you can search for the modules above.



- Select Install Package in the bottom left for each of the required modules listed above.



- In the bottom right, select OK when you have installed all the required modules.

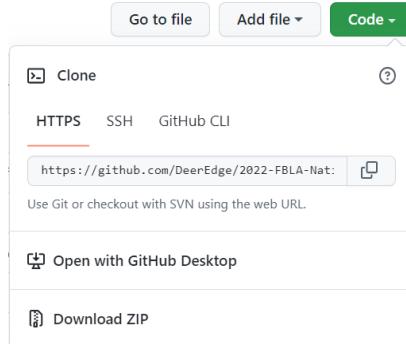


- With that, all of the modules needed to run the application should be installed.

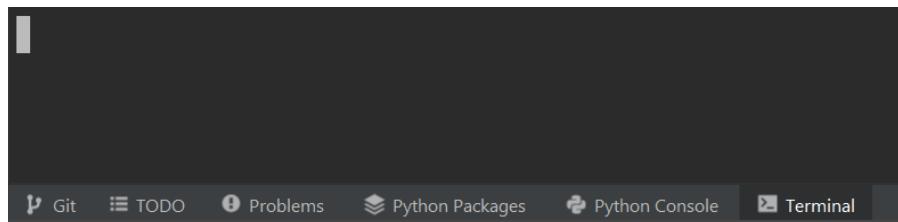
4.4 Accessing Source Code

- All necessary files for the application are stored on Github, a hosting site for project management and version control. The source code includes everything related to running our application and algorithms to find tourist attractions. Commentary is provided to assist the process of running the source code.
- To access the source code and open it on your own device, several approaches can be taken.
 - Clone the code from github onto your local Pycharm IDE. This can be done:

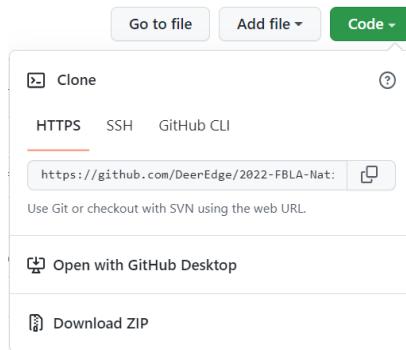
- i. Through the github.com interface. The link to our github repository can be found [here](#).

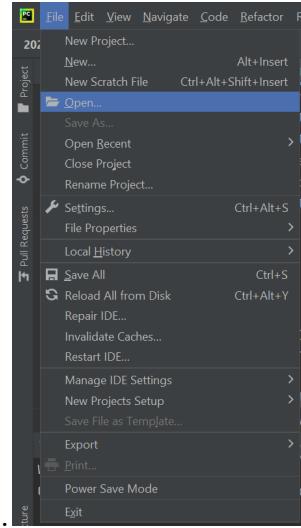


- ii. Directly through the Pycharm terminal. In the terminal, input the command `git clone`.



- b. Download the program files and open them on your local IDE.
 - i. Download the ZIP file with all program files.





ii. In your Pycharm IDE, open those downloaded files.

- With all that, all of the source code should be available on your own device.

5. Program Architecture

5.1 Program Structure

- Our application makes use of filtering as well as sorting algorithms to suggest tourist attractions to the user in a visual application. Additional intelligent features are also supported.
 - The application begins on the title page, in which the basic attributes of state, city and type of attraction are offered, as well as the option of searching for an attraction.
 - When the user hits search, all of their chosen attributes are stored in program memory. From there, the code will then run through the database to find all attractions that match the given user's given attributes. These attractions are then displayed along with their attributes. Further filtering by the user is always allowed.
 - Our application also allows the user to sort the suggested attractions. When such an option is selected, the stored attractions are run through the algorithm that corresponds to the selected sorter, and redisplayed to the user. A special sorter of distance to the user is offered, with support for user input of coordinates, an option to automatically fill in location, and a preview of their location on maps.
 - Alongside filtering and sorting, other intelligent features are also offered to the user. These include a preview map of the attraction's location as well as an expanded map option; the ability to navigate to each attraction's homepage; and a help menu that includes FAQ, documentation, and the ability to create a user report.
 - Another unique feature of our application is the ability to bookmark certain tourist attractions. These are stored in another tab window for bookmarks. This tab is similar to the main window in which attributes of each bookmarked attraction are displayed. A search bar and a button to clear all bookmarks is also offered to the user.
 - Additionally, the application includes a third tab for listing all sources, licenses are references used in the creation of this application.

5.2 PyQt5

- This project makes use of the PyQt library, which is a library that lets you use the Qt GUI framework from Python. Our application makes use of different database connections and algorithms to suggest tourist attractions, which is then displayed in a user-friendly manner using the PyQt5 library. PyQt5 allows us to build a graphic user interface for our code and create a visual application.

5.3 Module purposes

- Different modules and libraries are imported with the goal of enhancing our application and improving the user's experience. Each respective library has a specialized purpose.
 - Assisting with basic code operations and functions (**os, io, operator** modules)
 - Creation of application and its architecture (**pyqt5, ast, folium** modules)
 - Improving user experience and elevating program functions (**geopy, webbrowser, ipregistry, time** modules)

6. Version History

6.1 Previous Version(s)

- 1.0
 - Application opened by tkinter window
 - Basic ability to sort attractions based on simple algorithm
 - Added difference factor algorithm to suggest tourist attractions
 - 50 pieces of data stored locally, in program files
 - Data includes various attributes to sort by
 - Limited window design and styling
 - Limited display ability
- 2.0
 - Modules / libraries updated for greater workability and potential in application
 - Tkinter library replaced by PyQt5
 - Other essential libraries imported to support more application features
 - Database created on local machine to store data
 - All attributes fully created in database
 - Attribute properties in database managed
 - Limited data table
 - Ability to filter and sort attractions fully implemented
 - Limited support for further features
- 3.0
 - Multiple tabs in the application added for further program usability
 - Data table for all 50 states finished
 - Added support for all 50 states and their largest cities
 - Help features added
 - Ability to create a user report
 - Output reports that log user activity generated
 - Support for other features added, but not fully implemented
 - Advanced functions implemented
 - Google maps support added
 - Ability to view a preview of attraction location
 - Ability to expand window of preview map
 - Support for sorting by distance to user added
 - Latitude and longitude input created
 - Ability to automatically fill in user location details
 - Added expandable map or user location
 - Further usability implemented

6.2 Current Version

- 4.0
 - A working title page added to improve user experience
 - A tab designated to citing sources for all attraction information fully implemented
 - Application design polished, further styling of application window
 - All attraction images downloaded, cropped and properly displayed in attraction window
 - Bookmark functionality added to bookmark attractions
 - Bookmarks display all attributes
 - Ability to search, clear bookmark
 - Design and styling of application finalized to improve user experience
 - Help menu polished with support for a FAQ menu

6.3 Future Versions

- Increase in data table for more potential attractions to be suggested to user
- Ability to audially play application details for improved user accessibility
- Ability to store data externally so any user can access data table
- Increase performance
- Improve aesthetics of application