Project Document

For

System Integration

Comp851. Fall 2020

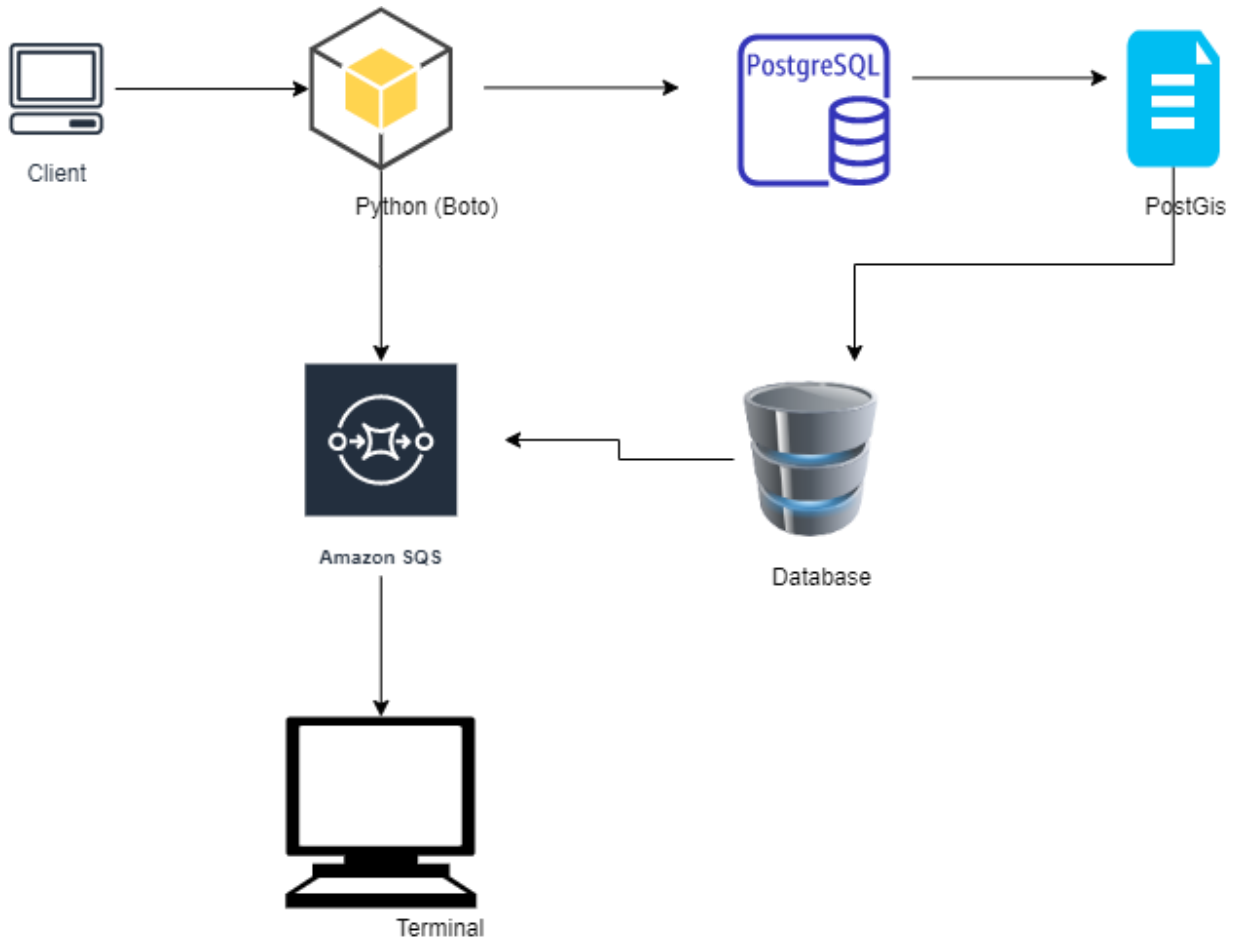
Project Topic:

I have chosen the second integration part for the project:

The PTWC Widgets will be deployed into the field and communicate their GPS position. In order to prepare field operations, we would establish a database which can determine the proximity of Widgets to county and township locations where field operators may be stationed or sent. In order to do this, we would need to deploy a GIS database, called PostGIS and ingest the city latitude / longitude positions.

In addition, we would notify and record the ingest of these positions in preparation for the location of the field operators and Widget positions. We would do so using the AWS SQS, and SNS/ SES interfaces in order to send the notifications and emails, and finally we would deposit log entries on s3. I have implemented the same using Python3.

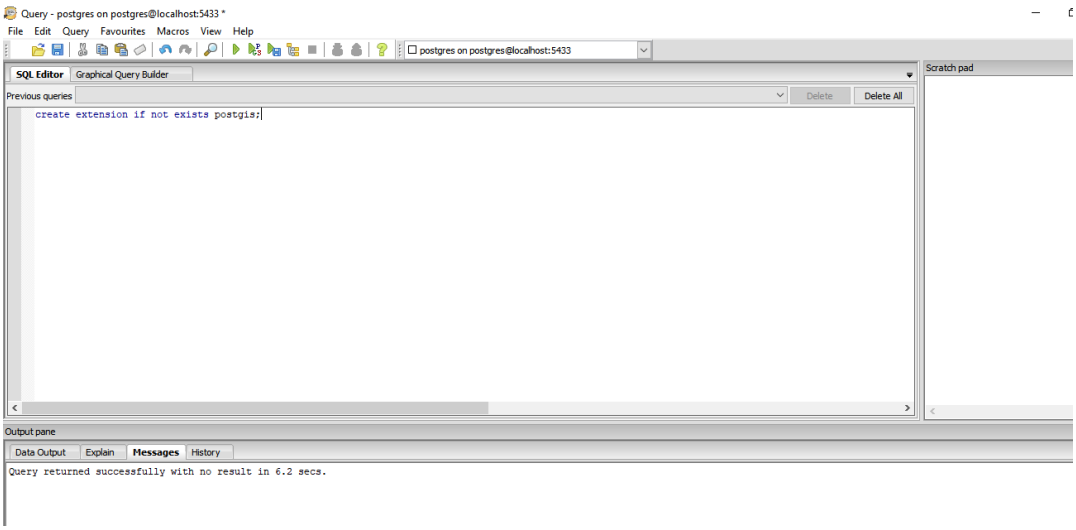
Process Flow Using the Draw.io:



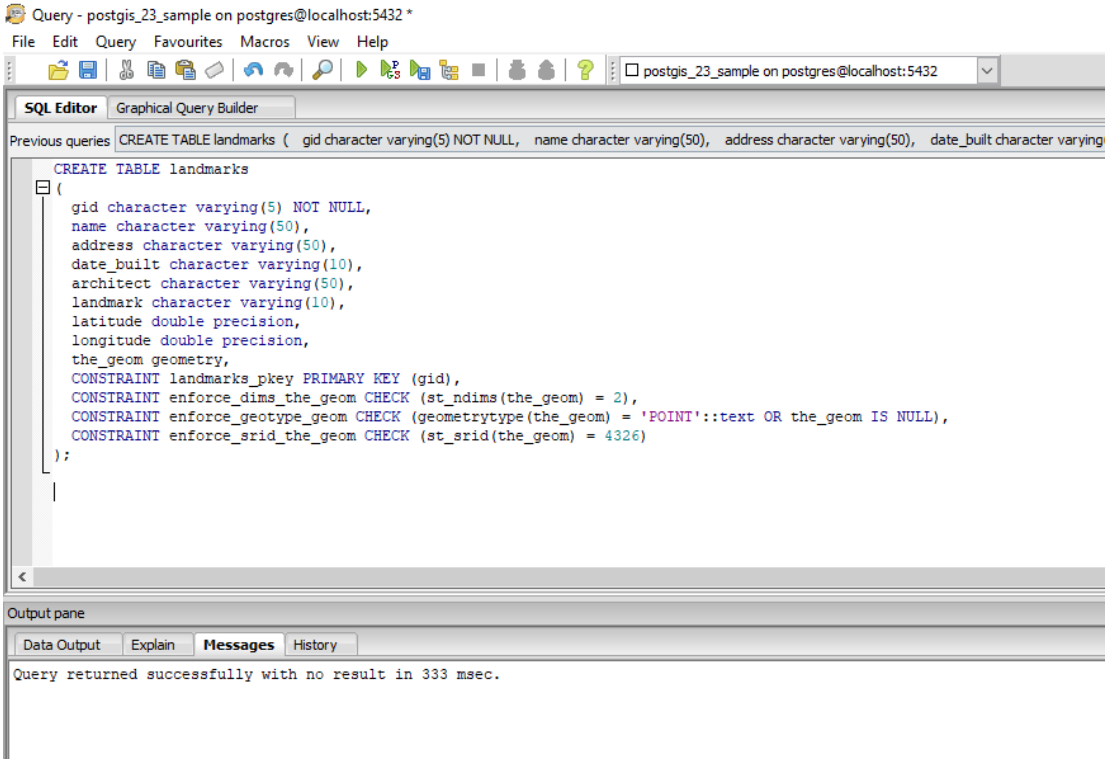
Implementation of the project using PostGres GUI:

Before implementing using python, I have decided to test the process flow using PostGres GUI and then fetching the required results.

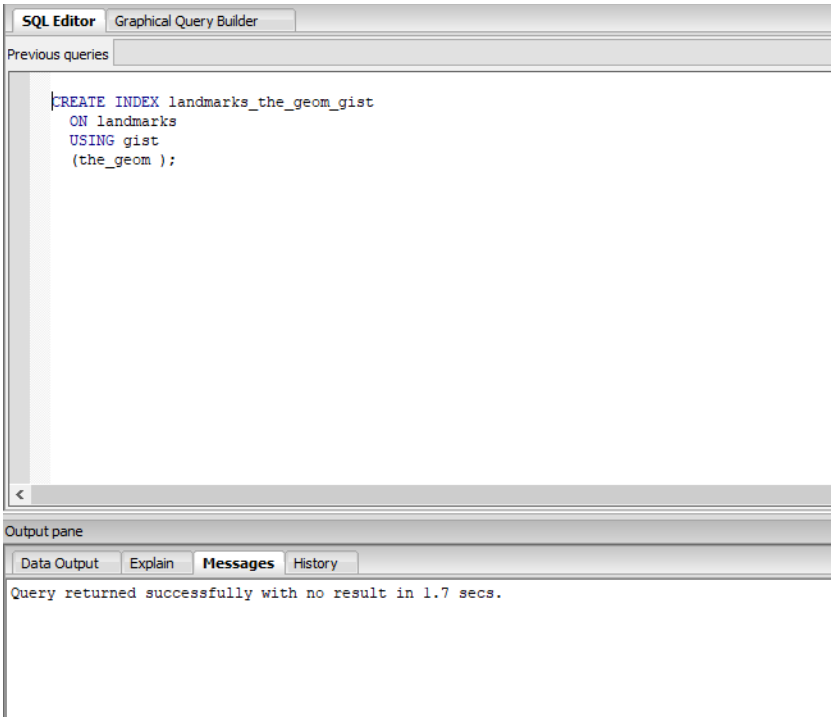
Step1: Create Post GIS Extension



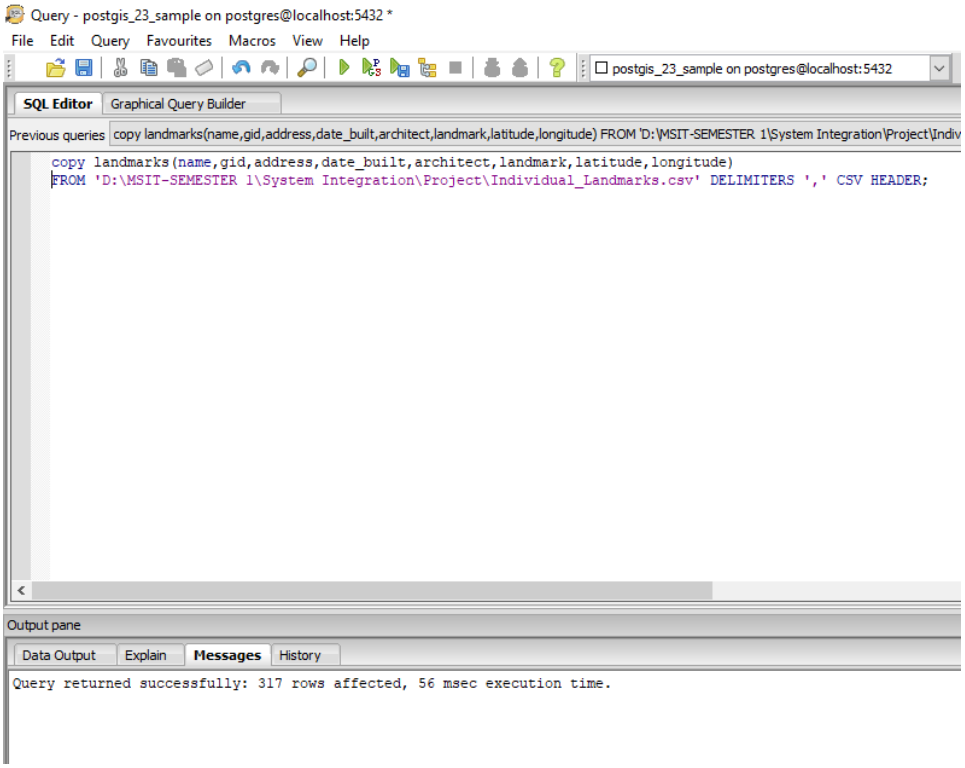
Step 2: Create Table

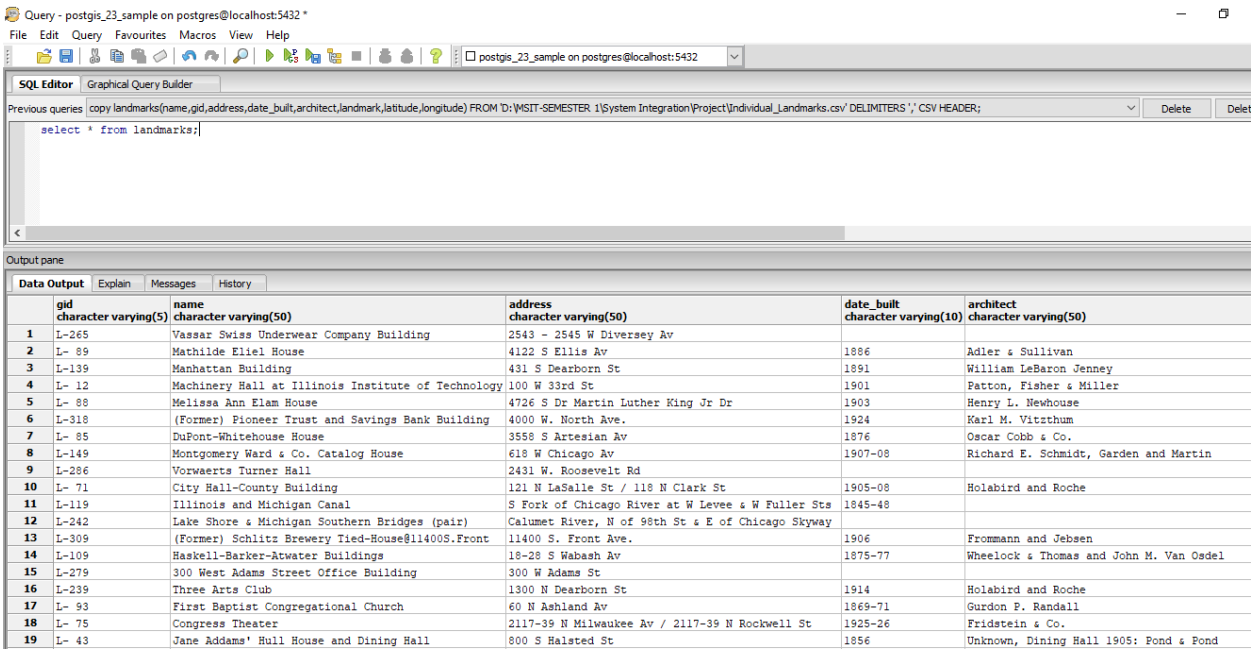


Step3: Create Index



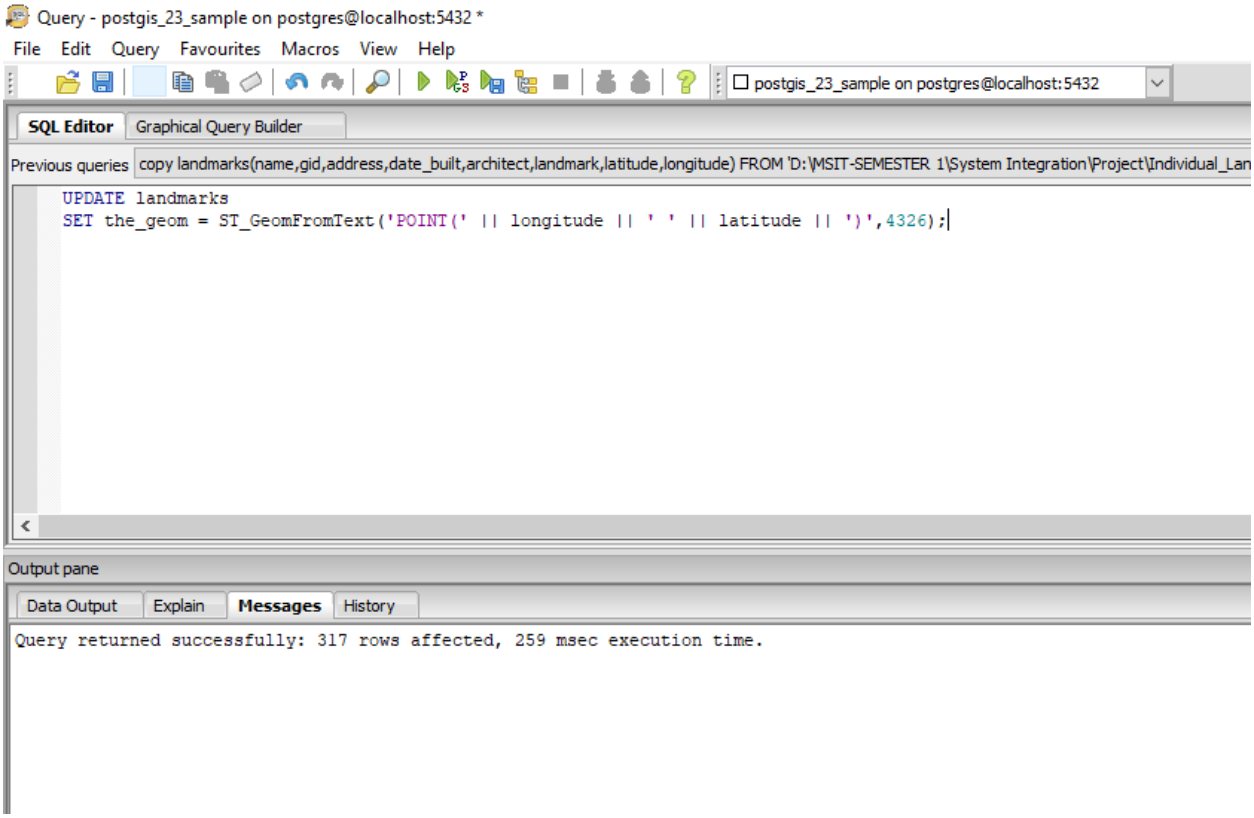
Step4: Import data from the CSV file



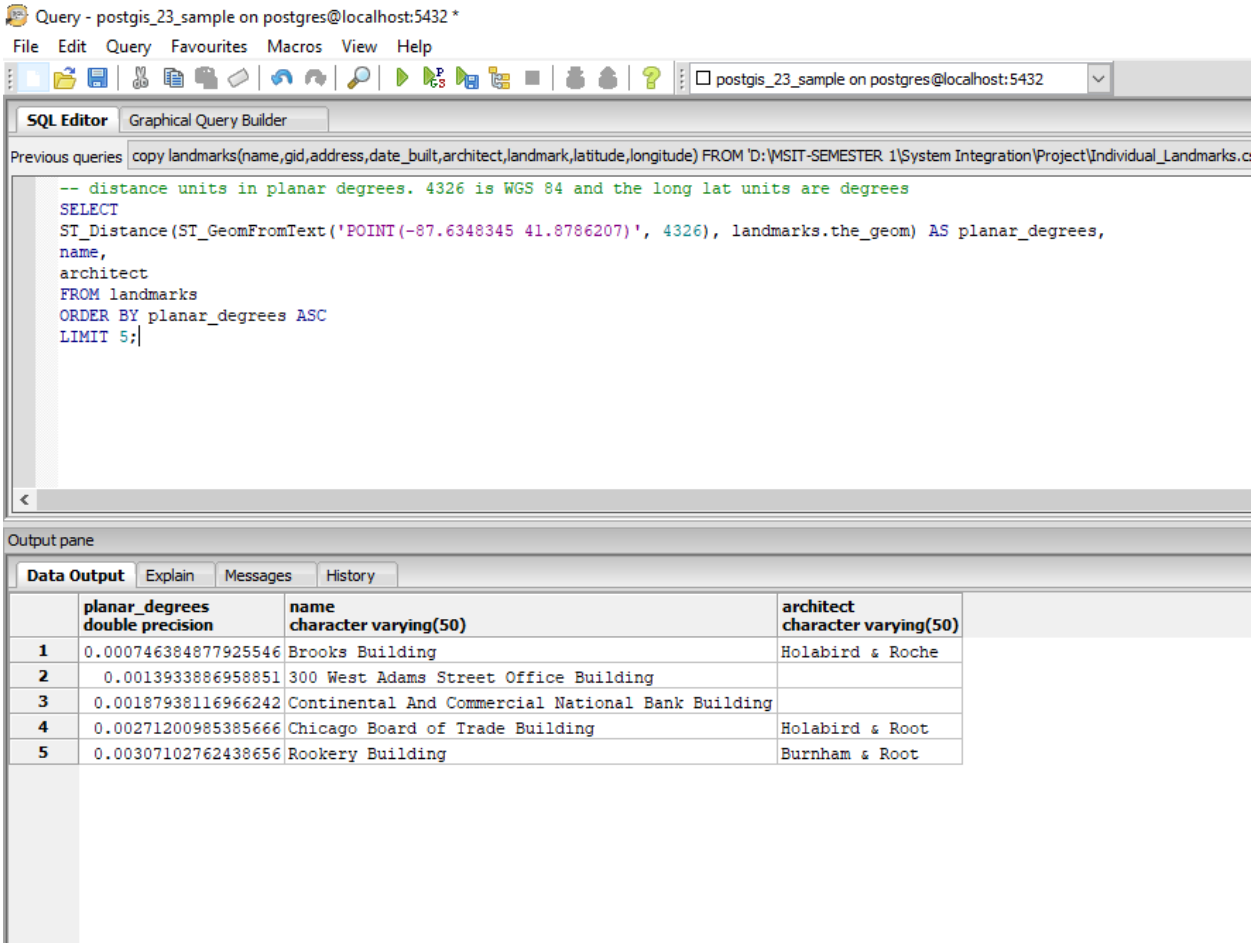


	gid character varying(5)	name character varying(50)	address character varying(50)	date_built character varying(10)	architect character varying(50)
1	L-265	Vassar Swiss Underwear Company Building	2543 - 2545 W Diversey Av		
2	L- 89	Mathilde Eliel House	4122 S Ellis Av	1886	Adler & Sullivan
3	L-139	Manhattan Building	431 S Dearborn St	1891	William LeBaron Jenney
4	L- 12	Machinery Hall at Illinois Institute of Technology	100 W 33rd St	1901	Patton, Fisher & Miller
5	L- 88	Melissa Ann Elam House	4726 S Dr Martin Luther King Jr Dr	1903	Henry L. Newhouse
6	L-318	(Former) Pioneer Trust and Savings Bank Building	4000 W. North Ave.	1924	Karl M. Vitzthum
7	L- 85	DuPont-Whitehouse House	3558 S Artesian Av	1876	Oscar Cobb & Co.
8	L-149	Montgomery Ward & Co. Catalog House	618 W Chicago Av	1907-08	Richard E. Schmidt, Garden and Martin
9	L-286	Vorwaerts Turner Hall	2431 W. Roosevelt Rd		
10	L- 71	City Hall-County Building	121 N LaSalle St / 118 N Clark St	1905-08	Holabird and Roche
11	L-119	Illinois and Michigan Canal	S Fork of Chicago River at W Levee & W Fuller Sts	1845-48	
12	L-242	Lake Shore & Michigan Southern Bridges (pair)	Calumet River, N of 98th St & E of Chicago Skyway		
13	L-309	(Former) Schlitz Brewery Tied-House@11400S.Front	11400 S. Front Ave.	1906	Frommann and Jebsen
14	L-109	Haskell-Barker-Atwater Buildings	18-28 S Wabash Av	1875-77	Wheelock & Thomas and John M. Van Osdel
15	L-279	300 West Adams Street Office Building	300 W Adams St		
16	L-239	Three Arts Club	1300 N Dearborn St	1914	Holabird and Roche
17	L- 93	First Baptist Congregational Church	60 N Ashland Av	1869-71	Gurdon P. Randall
18	L- 75	Congress Theater	2117-39 N Milwaukee Av / 2117-39 N Rockwell St	1925-26	Fridstein & Co.
19	L- 43	Jane Addams' Hull House and Dining Hall	800 S Halsted St	1856	Unknown, Dining Hall 1905: Pond & Pond

Step5: Convert Latitude and longitude coordinates to points that are readable by Post GIS



Step6: Write a Post GIS query to display the nearest 5 locations for the given latitude and longitude



	planar_degrees double precision	name character varying(50)	architect character varying(50)
1	0.000746384877925546	Brooks Building	Holabird & Roche
2	0.0013933886958851	300 West Adams Street Office Building	
3	0.00187938116966242	Continental And Commercial National Bank Building	
4	0.00271200985385666	Chicago Board of Trade Building	Holabird & Root
5	0.00307102762438656	Rookery Building	Burnham & Root

Implementation of the project using Python:

I have attached python files,

below are the outputs generated through terminal.

```
(base) PS C:\Users\dell\Downloads> python .\project.py
5 closest landmarks to -87.6348345 41.8786207
********************
Location-1
----------
Planar_Degrees - 0.000746384877925546
Name - Brooks Building
Architect - Holabird & Roche
Latitude - 41.87787644
Longitude - -87.63477822
********************
Location-2
----------
Planar_Degrees - 0.0013933886958851
Name - 300 West Adams Street Office Building
Architect - None
Latitude - 41.87972743
Longitude - -87.63568107
********************
Location-3
----------
Planar_Degrees - 0.00187938116966242
Name - Continental And Commercial National Bank Building
Architect - None
Latitude - 41.87907898
Longitude - -87.63301185
********************
Location-4
----------
Planar_Degrees - 0.00271200985385666
Name - Chicago Board of Trade Building
Architect - Holabird & Root
Latitude - 41.87773513
Longitude - -87.63227115
********************
Location-5
----------
Planar_Degrees - 0.00307102762438656
Name - Rookery Building
Architect - Burnham & Root
```


```
**********
Location-5
----------
Planar_Degrees - 0.00307102762438656
Name - Rookery Building
Architect - Burnham & Root
Latitude - 41.87907613
Longitude - -87.63179743
**********
PostgreSQL connection is closed
(base) PS C:\Users\dell\Downloads>
```


And then I have tried sending all the 5 locations to the Queue and had to convert each list into a string to achieve the actual result. Below is the output,

```
(base) PS C:\Users\dell\Downloads> python .\processing_message.py
 (Data Uploaded Successfully!!!)
Nearest Five Locations are
************************
 (0.000746384877925546,Brooks Building,Holabird & Roche,41.87787644,-87.63477822,0.0013933886958851,300 West Adams Street Office Building,None,41.87972743,-87.63568107,
0.00187938116966242,Continental And Commercial National Bank Building,None,41.87907898,-87.63301185,0.00271200985385666,Chicago Board of Trade Building,Holabird & Root,
41.87773513,-87.63227115,0.00307102762438656,Rookery Building,Burnham & Root,41.87907613,-87.63179743)
(base) PS C:\Users\dell\Downloads>
```