

**Project Document**  
**For**  
**System Integration**  
**Comp851 Spring 2021**

## GitHub Link:

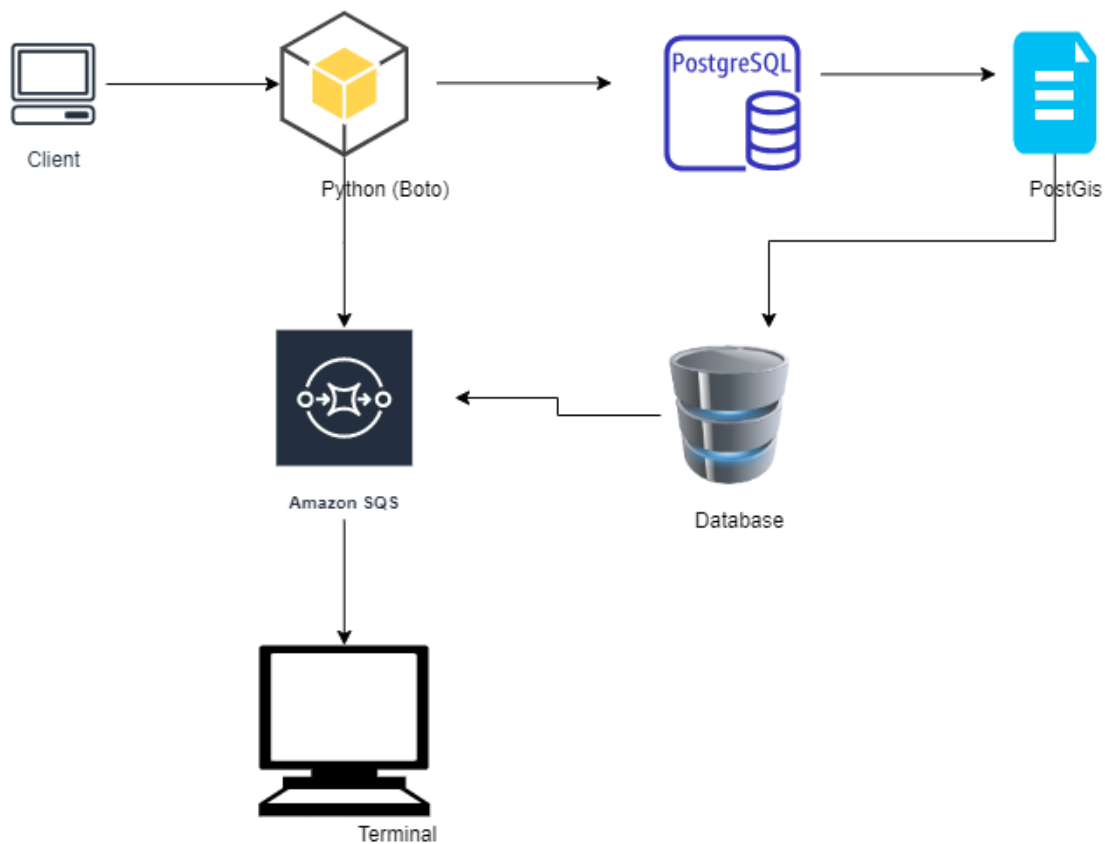
[https://github.com/hb1142/Comp851\\_Project.git](https://github.com/hb1142/Comp851_Project.git)

## I have chosen the second integration part for the project:

PTWC widgets expand in the field and report their GPS location. To prepare for field operations, we create a database that determines the proximity of widgets to county and township locations where field operators may or may not pass. To do this, we need to deploy a GIS database called PostGIS and get the city's latitude and longitude coordinates.

Additionally, we report and document the participation of these positions in preparation for the field manager and widget positions. We do this by using the AWS SQS and SNS / SES interfaces to send notifications and emails and finally we deposit the log entries in s3. I have used python3.

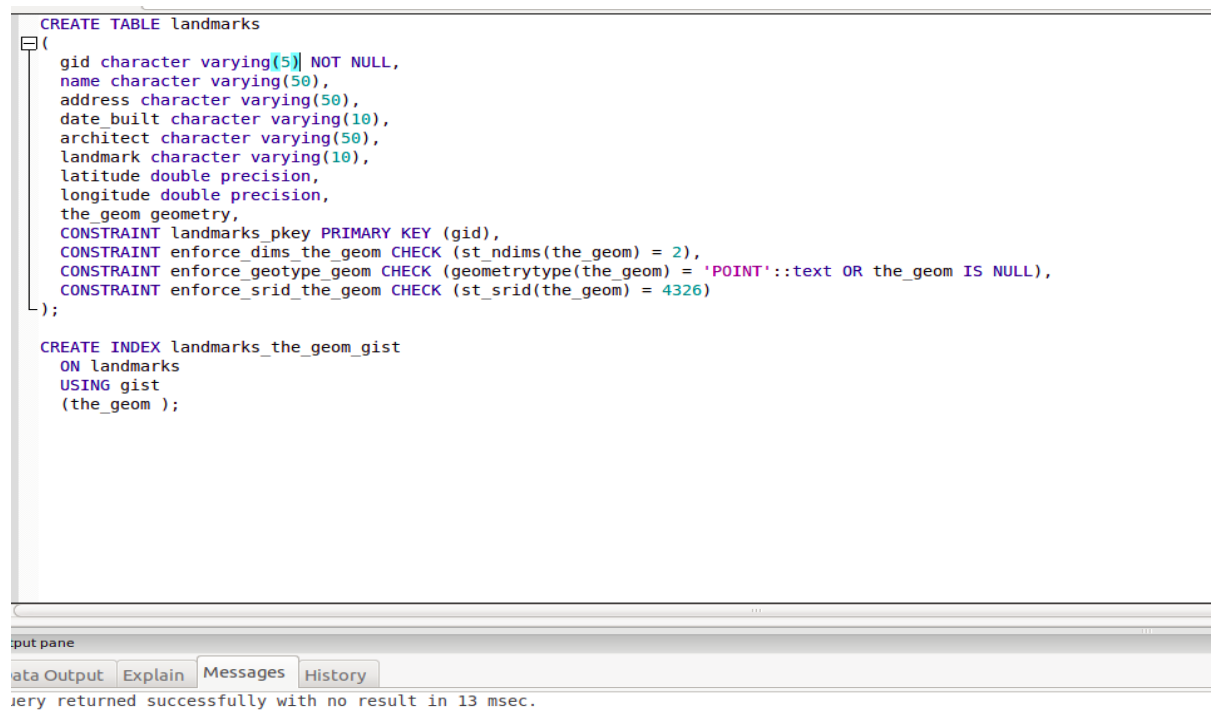
## Process Flow Using the Draw.io:



## 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.

### Step 1: Create Table and Index



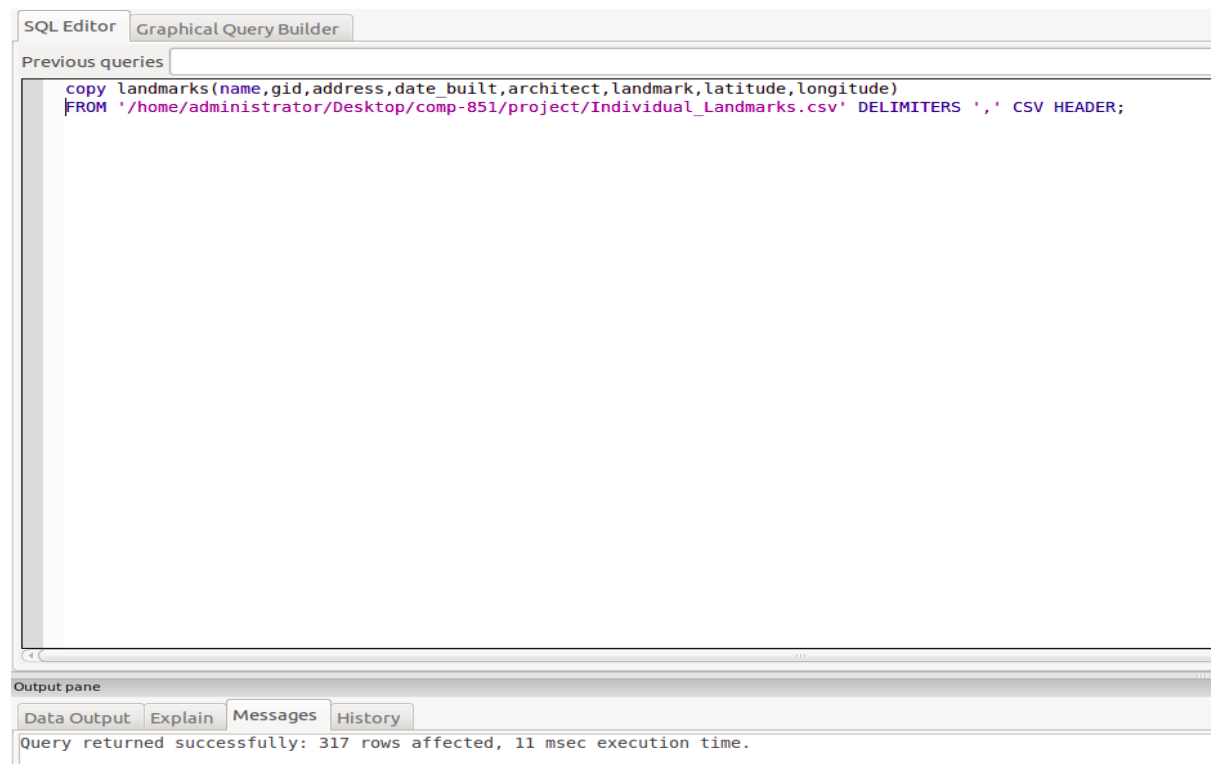
The screenshot shows the PostgreSQL GUI with the SQL Editor tab active. The editor contains the following SQL commands:

```
CREATE TABLE landmarks
(
gid character varying(5) NOT NULL,
name character varying(50),
address character varying(50),
date_built character varying(10),
architect character varying(50),
landmark character varying(10),
latitude double precision,
longitude double precision,
the_geom geometry,
CONSTRAINT landmarks_pkey PRIMARY KEY (gid),
CONSTRAINT enforce_dims_the_geom CHECK (st_ndims(the_geom) = 2),
CONSTRAINT enforce_geotype_geom CHECK (geometrytype(the_geom) = 'POINT'::text OR the_geom IS NULL),
CONSTRAINT enforce_srid_the_geom CHECK (st_srid(the_geom) = 4326)
);

CREATE INDEX landmarks_the_geom_gist
ON landmarks
USING gist
(the_geom );
```

Below the editor, the Output pane is visible with tabs for Data Output, Explain, Messages, and History. The Messages tab is selected, showing the message: "Query returned successfully with no result in 13 msec."

### Step 2: Import data from the CSV file



The screenshot shows the PostgreSQL GUI with the SQL Editor tab active. The editor contains the following SQL query:

```
copy landmarks(name,gid,address,date_built,architect,landmark,latitude,longitude)
FROM '/home/administrator/Desktop/comp-851/project/Individual_Landmarks.csv' DELIMITERS ',' CSV HEADER;
```

Below the editor, the Output pane is visible with tabs for Data Output, Explain, Messages, and History. The Messages tab is selected, showing the message: "Query returned successfully: 317 rows affected, 11 msec execution time."

Activities pgAdmin III Sat 2:11 PM

Query - postgres on postgres@localhost:5432 \*

File Edit Query Favourites Macros View Help

SQL Editor Graphical Query Builder

Previous queries

select \* from landmarks;

Output pane

	gid character varying(5)	name character varying(50)	address character varying(50)	date_built character varying(10)	architect character varying(50)	landmark character varying(10)	latitude double precis
1	L-265	Vassar Swiss Underwear Company Building	2543 - 2545 W Diversey Av			07/30/2008	41.931621
2	L- 89	Mathilde Eliel House	4122 S Ellis Av	1886	Adler & Sullivan	10-02-91	41.819251
3	L-139	Manhattan Building	431 S Dearborn St	1891	William LeBaron Jenney	07-07-78	41.876061
4	L- 12	Machinery Hall at Illinois Institute of Technology	100 W 33rd St	1901	Patton, Fisher & Miller	05/26/2004	41.835161
5	L- 88	Melissa Ann Elan House	4726 S Dr Martin Luther King Jr Dr	1963	Henry L. Newhouse	03/21/1979	41.808321
6	L-318	(Former) Pioneer Trust and Savings Bank Building	4000 W. North Ave.	1924	Karl M. Vitzthum	06-06-12	41.910191
7	L- 85	DuPont-Whitehouse House	3558 S Artesian Av	1876	Oscar Cobb & Co.	04/16/1996	41.828581
8	L-149	Montgomery Ward & Co. Catalog House	618 W Chicago Av	1907-08	Richard E. Schmidt, Garden and Martin	05/17/2000	41.897431
9	L-286	Vorwärts Turner Hall	2431 W. Roosevelt Ad			09-03-09	41.866151
10	L- 71	City Hall-County Building	121 N LaSalle St / 118 N Clark St	1905-08	Holabird and Roche	01/21/1982	41.883841
11	L-119	Illinois and Michigan Canal	S Fork of Chicago River at W Levee & W Fuller Sts	1845-48		05-09-96	41.842651
12	L-242	Lake Shore & Michigan Southern Bridges (pair)	Calumet River, N of 98th St & E of Chicago Skyway			12-12-07	41.719681
13	L-309	(Former) Schlitz Brewery Tied-House	11400 S. Front Ave.	1906	Frommann and Jebsen	07-06-11	41.687121
14	L-109	Haskell-Barker-Atwater Buildings	18-20 S Wabash Av	1875-77	Wheelock & Thomas and John H. Van Osdel	11/13/1996	41.881361
15	L-279	300 West Adams Street Office Building	300 W Adams St				41.879721
16	L-239	Three Arts Club	1300 N Dearborn St	1914	Holabird and Roche	06-10-81	41.906001
17	L- 93	First Baptist Congregational Church	60 N Ashland Av	1869-71	Gurdon P. Randall	01/21/1982	41.88291
18	L- 75	Congress Theater	2117-39 N Milwaukee Av / 2117-39 N Rockwell St	1925-26	Fridstein & Co.	07-10-02	41.903311
19	L- 43	Jane Addams' Hull House and Dining Hall	800 S Halsted St	1896	Unknown, Dining Hall 1905: Pond & Pond	06-12-74	41.871581
20	L- 41	Palliser's Cottage Home No. 35	2314 W 111th Pl	1882	Palliser, Palliser & Co.	02/16/2000	41.691091
21	L-218	Steuben Club Building	188 W Randolph St	1929	Karl M. Vitzthum & Co.	07/26/2006	41.884821
22	L-115	Hotel St. Benedict Flats	40-52 E Chicago Av	1882-83	James J. Egan	03/26/1996	41.896981
23	L- 76	Cortland Street Drawbridge	1440 W Cortland St	1902	John Ernst Ericson, Bridgehse reconst. 1982	07/24/1991	41.916911
24	L- 81	August Deves House	509 W Wrightwood Av	1894-96	Adolph Cudell & Arthur Hercz	03-09-05	41.930271
25	L-217	New York Life Building	37-43 S LaSalle St	1893-94	1898 add:Jenney & Mundie 1903 add:Arch Unknown	07/26/2006	41.880881
26	L-196	Tree Studios, Annexes and Courtyard	601-23 N State St/4-10 E Ohio St/3-7 E Ontario St	1894	Parfitt Brothers, with Bauer & Hill	02/26/1997	41.892871
27	L-209	Owendolyn Brooks House	7428 S. Evans Ave	1890	Unknown	02-10-10	41.799501
28	L-302	Spiegel Administration Building	1038 W. 35th Street	1936, 1941	Battery & Kipp (1936), A. Epstein (1941-1942)	05-04-11	41.830931
29	L-303	Union Park Hotel	1519 West Morgan Blvd	1930	Danston Albrecht Firm	06-00-10	41.863121

OK

Unix Ln 1, Col 25, Ch 25 317 rows. 62 msec

### Step 3: Convert Latitude and longitude coordinates to points that are readable by Post GIS

SQL Editor Graphical Query Builder

Previous queries

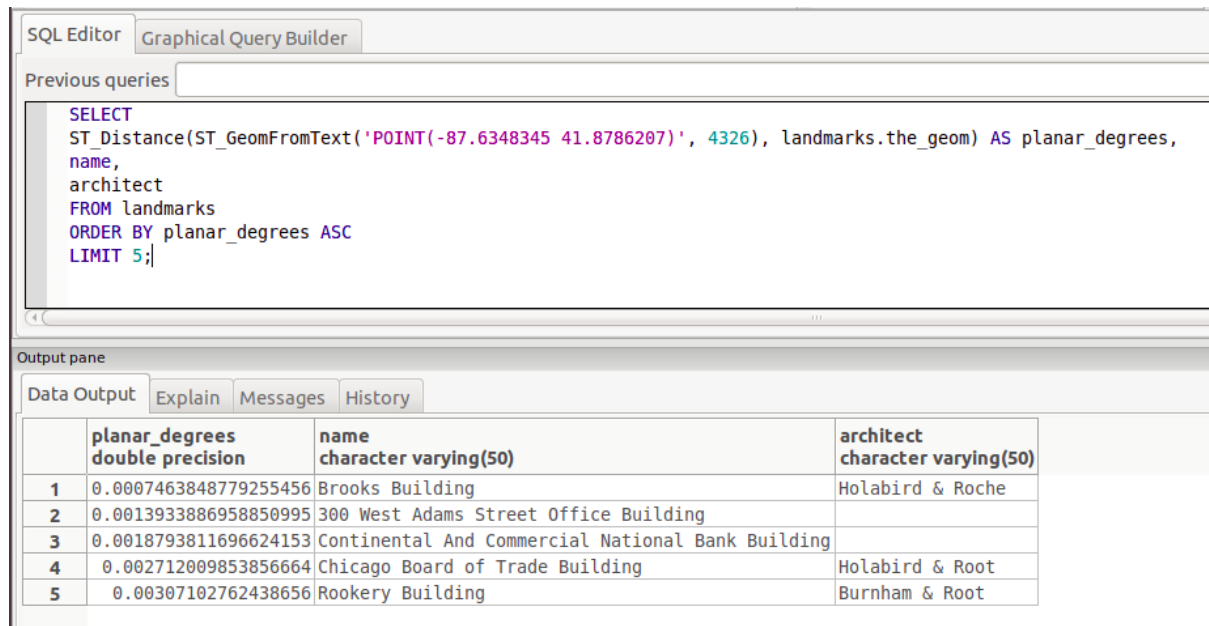
```
UPDATE landmarks
SET the_geom = ST_GeomFromText('POINT(' || longitude || ' ' || latitude || ' )',4326);
```

Output pane

Data Output Explain Messages History

Query returned successfully: 317 rows affected, 11 msec execution time.

**Step 4:** Write a PostGIS query to display the nearest 5 locations for the given latitude and longitude



The screenshot shows a SQL Editor window with a query that finds the 5 nearest landmarks to a specific point. The query is as follows:

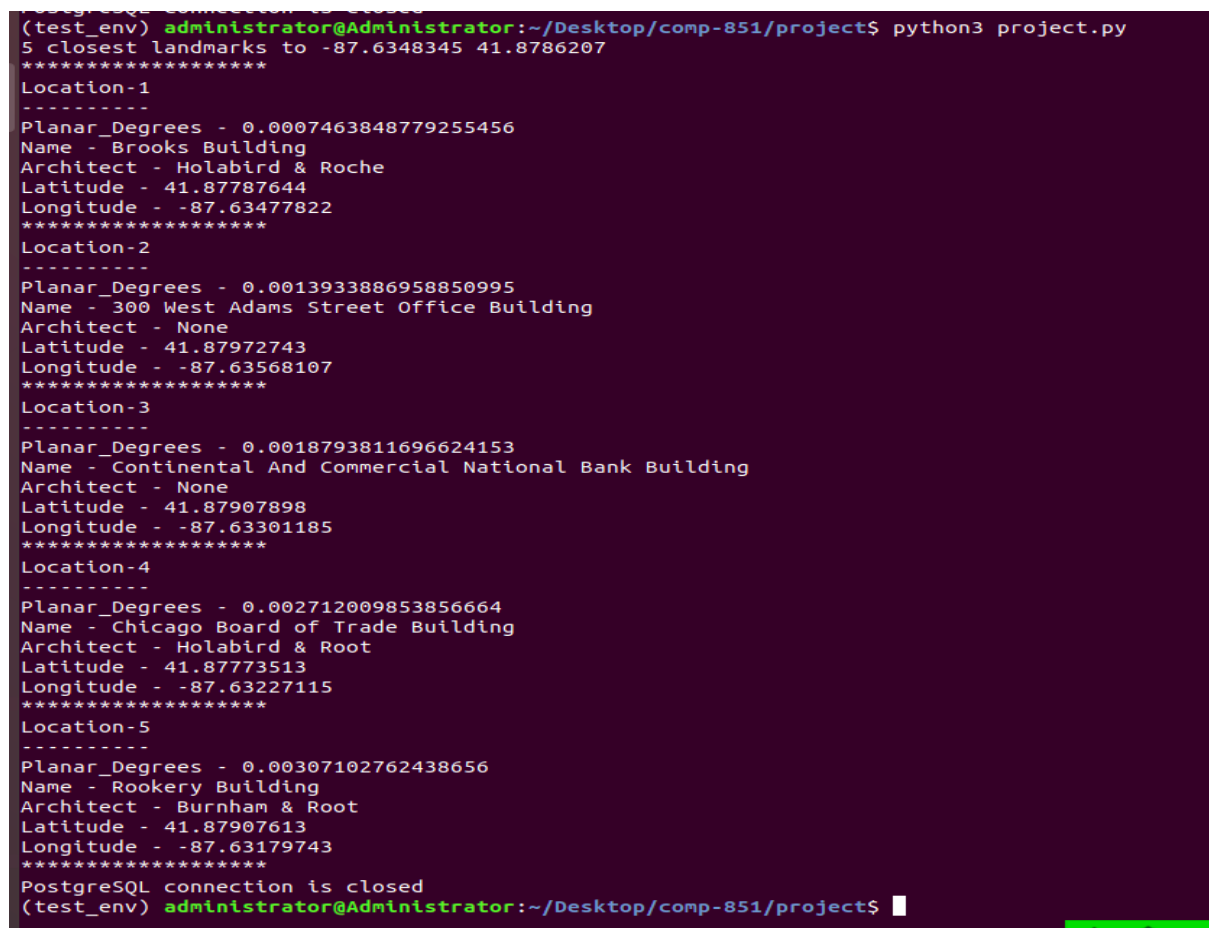
```
SELECT
ST_Distance(ST_GeomFromText('POINT(-87.6348345 41.8786207)', 4326), landmarks.the_geom) AS planar_degrees,
name,
architect
FROM landmarks
ORDER BY planar_degrees ASC
LIMIT 5;
```

The Output pane displays the results in a table with the following columns: **planar\_degrees double precision**, **name character varying(50)**, and **architect character varying(50)**. The results are as follows:

	planar_degrees double precision	name character varying(50)	architect character varying(50)
1	0.0007463848779255456	Brooks Building	Holabird & Roche
2	0.0013933886958850995	300 West Adams Street Office Building	
3	0.0018793811696624153	Continental And Commercial National Bank Building	
4	0.002712009853856664	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 in the zip folder in my courses.



```
(test_env) administrator@Administrator:~/Desktop/comp-851/project$ python3 project.py
5 closest landmarks to -87.6348345 41.8786207
*****
Location-1
-----
Planar_Degrees - 0.0007463848779255456
Name - Brooks Building
Architect - Holabird & Roche
Latitude - 41.87787644
Longitude - -87.63477822
*****
Location-2
-----
Planar_Degrees - 0.0013933886958850995
Name - 300 West Adams Street Office Building
Architect - None
Latitude - 41.87972743
Longitude - -87.63568107
*****
Location-3
-----
Planar_Degrees - 0.0018793811696624153
Name - Continental And Commercial National Bank Building
Architect - None
Latitude - 41.87907898
Longitude - -87.63301185
*****
Location-4
-----
Planar_Degrees - 0.002712009853856664
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
Latitude - 41.87907613
Longitude - -87.63179743
*****
PostgreSQL connection is closed
(test_env) administrator@Administrator:~/Desktop/comp-851/project$
```