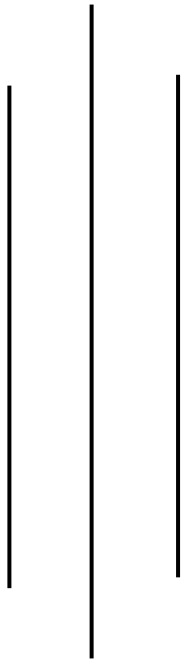
Assignment-1
DESIGN AND IMPLEMENTATION OF GEOSPATIAL INFORMATION SYSTEM



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1. **Use taxi_sample.csv**

1	id	time	lat	lon
2	10011311	12/15/2013 0:16	13.8138	100.71877
3	10011311	12/15/2013 0:27	13.77372	100.73895
4	10011311	12/15/2013 7:28	13.84845	100.72113
5	10011311	12/15/2013 7:29	13.84282	100.72067
6	10011311	12/15/2013 7:42	13.83428	100.69783
7	10011311	12/15/2013 7:52	13.86047	100.7222
8	10011311	12/15/2013 7:58	13.85935	100.69582
9	10011311	12/15/2013 8:31	13.75467	100.52783
10	10011311	12/15/2013 8:42	13.76397	100.53787
11	10011311	12/15/2013 8:42	13.76415	100.53813
12	10011311	12/15/2013 8:42	13.76317	100.53743
13	10011311	12/15/2013 9:03	13.77122	100.48398
14	10011311	12/15/2013 9:04	13.77088	100.48422
15	10011311	12/15/2013 9:45	13.71368	100.59847
16	10011311	12/15/2013 9:46	13.714	100.59748
17	10011311	12/15/2013 9:58	13.74647	100.60762
18	10011311	12/15/2013 10:02	13.74263	100.63355
19	10011311	12/15/2013 10:07	13.73817	100.64393
20	10011311	12/15/2013 10:57	13.75395	100.65338
21	10011311	12/15/2013 11:10	13.76715	100.64282
22	10011311	12/15/2013 14:11	13.84937	100.72122
23	10011311	12/15/2013 14:24	13.81267	100.72547
24	10011311	12/15/2013 14:25	13.81263	100.7264
25	10011311	12/15/2013 14:39	13.85905	100.69407
26	10011311	12/15/2013 14:42	13.85422	100.67485
27	10011311	12/15/2013 15:24	13.99015	100.61547
28	10011311	12/15/2013 15:26	13.9887	100.61598

12868	10008935	12/15/2013 3:56	13.67023	100.51915
12869	10008935	12/15/2013 4:01	13.65772	100.51945
12870	10008935	12/15/2013 4:10	13.6503	100.52315
12871	10008935	12/15/2013 4:30	13.67988	100.49675
12872	10008935	12/15/2013 4:56	13.67028	100.51108
12873	10008935	12/15/2013 5:05	13.64642	100.48902
12874	10008935	12/15/2013 5:05	13.64642	100.48902
12875	10008935	12/15/2013 5:05	13.64642	100.48902
12876	10008935	12/15/2013 5:11	13.6478	100.49613
12877	10008935	12/15/2013 5:38	13.76163	100.55758
12878	10008935	12/15/2013 5:52	13.77833	100.57322
12879	10008935	12/15/2013 6:09	13.73125	100.59555
12880	10008935	12/15/2013 6:10	13.7328	100.59718
12881	10008935	12/15/2013 6:16	13.74263	100.60797
12882	10008935	12/15/2013 6:17	13.74413	100.60767
12883	10008935	12/15/2013 6:26	13.75843	100.55675
12884	10008935	12/15/2013 6:26	13.75843	100.55675
12885	10008935	12/15/2013 6:26	13.75843	100.55675
12886	10008935	12/15/2013 6:27	13.76017	100.5555
12887	10008935	12/15/2013 6:31	13.75687	100.5384
12888	10008935	12/15/2013 6:43	13.76458	100.53925
12889	10008935	12/15/2013 7:12	13.81028	100.64902
12890	10008935	12/15/2013 7:47	13.72982	100.55995
12891	10008935	12/15/2013 7:47	13.72982	100.55995
12892	10008935	12/15/2013 8:00	13.66683	100.52408
12893				
12894				

2. Create table taxi and import data from taxi_sample.csv to table.

Bangkok/postgres@PostgreSQL 12

Query Editor | Query History

```
1  CREATE TABLE public.taxi_sample
2  (
3     id BIGINT,
4     time TIMESTAMP WITHOUT TIME ZONE,
5     lat DOUBLE PRECISION,
6     lon DOUBLE PRECISION
7  );
```

Data Output | Explain | Messages | Notifications

```
CREATE TABLE

Query returned successfully in 55 msec.
```

public.taxi_sample/Bangkok/postgres@PostgreSQL 12

Query Editor | Query History

```
1  SELECT * FROM public.taxi_sample
2
```

Data Output | Explain | Messages | Notifications

id bigint	time timestamp without time zone	lat double precision	lon double precision

public.taxi_sample/Bangkok/postgres@PostgreSQL 12

Query Editor | Query History

```
1  SELECT * FROM public.taxi_sample
2
```

Data Output | Explain | Messages | Notifications

	id bigint	time timestamp without time zone	lat double precision	lon double precision
1	10011311	2013-12-15 00:16:00	13.8138	100.71877
2	10011311	2013-12-15 00:27:00	13.77372	100.73895
3	10011311	2013-12-15 07:28:00	13.84845	100.72113
4	10011311	2013-12-15 07:29:00	13.84282	100.72067
5	10011311	2013-12-15 07:42:00	13.83428	100.69783
6	10011311	2013-12-15 07:52:00	13.86047	100.7222
7	10011311	2013-12-15 07:58:00	13.85935	100.69582
8	10011311	2013-12-15 08:31:00	13.75467	100.52783
9	10011311	2013-12-15 08:42:00	13.76397	100.53787
10	10011311	2013-12-15 08:42:00	13.76415	100.53813
11	10011311	2013-12-15 08:42:00	13.76317	100.53743
12	10011311	2013-12-15 09:03:00	13.77122	100.48398
13	10011311	2013-12-15 09:04:00	13.77088	100.48422
14	10011311	2013-12-15 09:45:00	13.71368	100.59847
15	10011311	2013-12-15 09:46:00	13.714	100.59748
16	10011311	2013-12-15 09:58:00	13.74647	100.60762
17	10011311	2013-12-15 10:02:00	13.74263	100.63355
18	10011311	2013-12-15 10:07:00	13.73817	100.64393
19	10011311	2013-12-15 10:57:00	13.75395	100.65338
20	10011311	2013-12-15 11:10:00	13.76715	100.64282

3. **Add geometry column named “the_geom” on the table taxi for point data.**

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Query Editor | Query History

```
1  -- Add geometry column named 'the_geom'
2  ALTER TABLE taxi_sample ADD COLUMN the_geom geometry(Point ,4326);
3  SELECT * FROM taxi_sample;
```

Data Output | Explain | Messages | Notifications

	id bigint	time timestamp without time zone	lat double precision	lon double precision	the_geom geometry
1	10011311	2013-12-15 00:16:00	13.8138	100.71877	
2	10011311	2013-12-15 00:27:00	13.77372	100.73895	
3	10011311	2013-12-15 07:28:00	13.84845	100.72113	
4	10011311	2013-12-15 07:29:00	13.84282	100.72067	
5	10011311	2013-12-15 07:42:00	13.83428	100.69783	
6	10011311	2013-12-15 07:52:00	13.86047	100.7222	
7	10011311	2013-12-15 07:58:00	13.85935	100.69582	
8	10011311	2013-12-15 08:31:00	13.75467	100.52783	
9	10011311	2013-12-15 08:42:00	13.76397	100.53787	
10	10011311	2013-12-15 08:42:00	13.76415	100.53813	
11	10011311	2013-12-15 08:42:00	13.76317	100.53743	
12	10011311	2013-12-15 09:03:00	13.77122	100.48398	
13	10011311	2013-12-15 09:04:00	13.77088	100.48422	
14	10011311	2013-12-15 09:45:00	13.71368	100.59847	
15	10011311	2013-12-15 09:46:00	13.714	100.59748	
16	10011311	2013-12-15 09:58:00	13.74647	100.60762	
17	10011311	2013-12-15 10:02:00	13.74263	100.63355	
18	10011311	2013-12-15 10:07:00	13.73817	100.64393	
19	10011311	2013-12-15 10:57:00	13.75395	100.65338	

4. **Update geometry column with Point Geometry from lat, lon.**

Bangkok/postgres@PostgreSQL 12

Query Editor | Query History

```
1  -- Update geometry column with Point Geometry from lat, lon
2  UPDATE taxi_sample SET the_geom = ST_MakePoint(lon, lat);
3  SELECT * FROM taxi_sample;
```

Data Output | Explain | Messages | Notifications

	id bigint	time timestamp without time zone	lat double precision	lon double precision	the_geom geometry
1	10011311	2013-12-15 00:16:00	13.8138	100.71877	0101000020E6100...
2	10011311	2013-12-15 00:27:00	13.77372	100.73895	0101000020E6100...
3	10011311	2013-12-15 07:28:00	13.84845	100.72113	0101000020E6100...
4	10011311	2013-12-15 07:29:00	13.84282	100.72067	0101000020E6100...
5	10011311	2013-12-15 07:42:00	13.83428	100.69783	0101000020E6100...
6	10011311	2013-12-15 07:52:00	13.86047	100.7222	0101000020E6100...
7	10011311	2013-12-15 07:58:00	13.85935	100.69582	0101000020E6100...
8	10011311	2013-12-15 08:31:00	13.75467	100.52783	0101000020E6100...
9	10011311	2013-12-15 08:42:00	13.76397	100.53787	0101000020E6100...
10	10011311	2013-12-15 08:42:00	13.76415	100.53813	0101000020E6100...
11	10011311	2013-12-15 08:42:00	13.76317	100.53743	0101000020E6100...
12	10011311	2013-12-15 09:03:00	13.77122	100.48398	0101000020E6100...
13	10011311	2013-12-15 09:04:00	13.77088	100.48422	0101000020E6100...
14	10011311	2013-12-15 09:45:00	13.71368	100.59847	0101000020E6100...
15	10011311	2013-12-15 09:46:00	13.714	100.59748	0101000020E6100...
16	10011311	2013-12-15 09:58:00	13.74647	100.60762	0101000020E6100...
17	10011311	2013-12-15 10:02:00	13.74263	100.63355	0101000020E6100...
18	10011311	2013-12-15 10:07:00	13.73817	100.64393	0101000020E6100...
19	10011311	2013-12-15 10:57:00	13.75395	100.65338	0101000020E6100...

After importing the geometry, we can visualize the imported points on map using geometry viewer.

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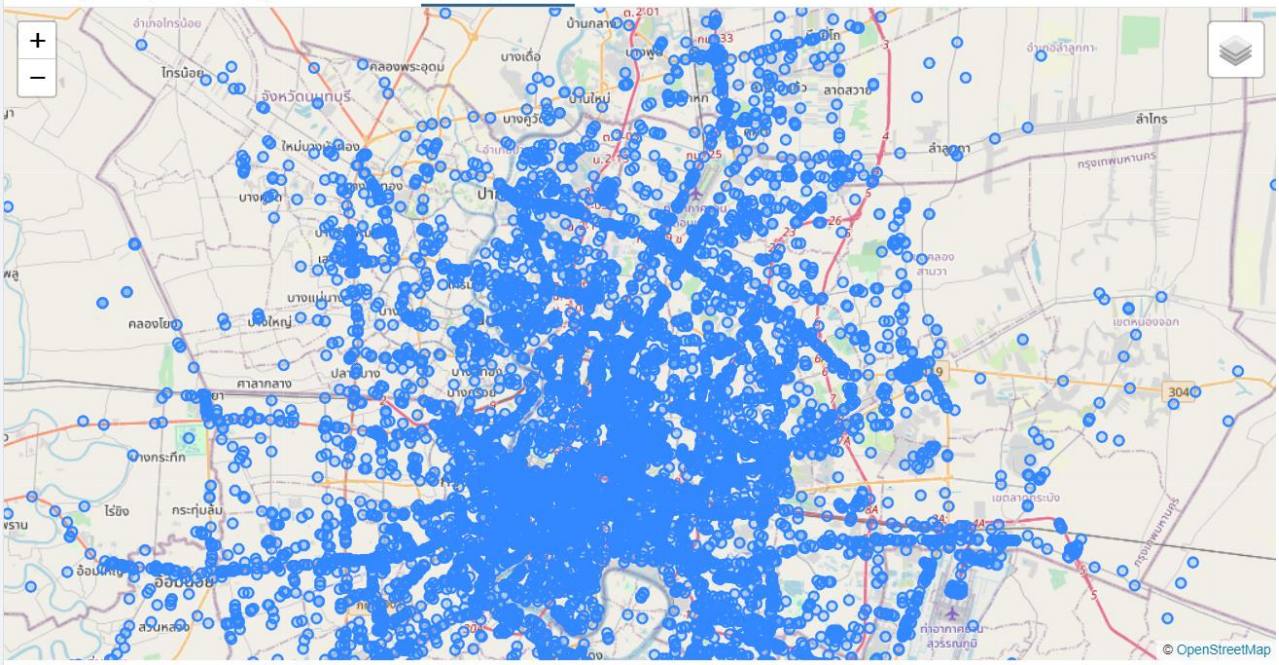
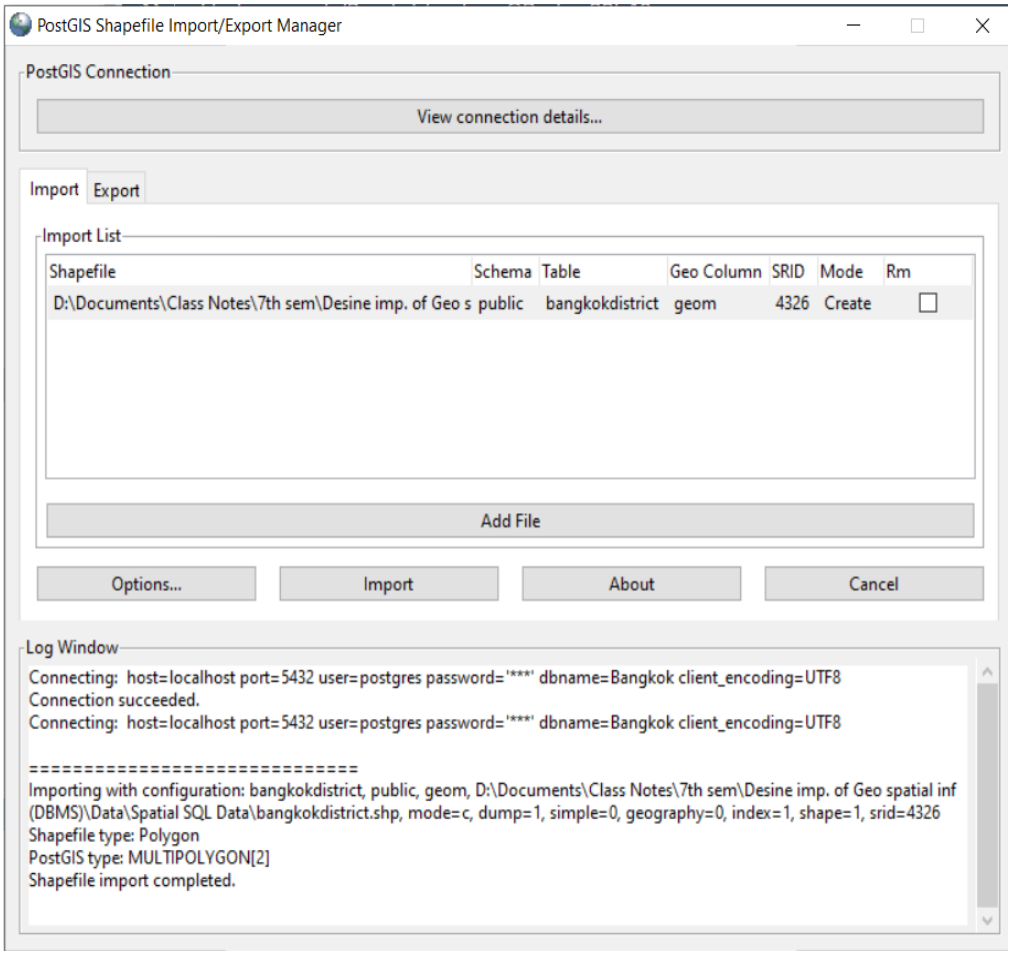
Query Editor | Query History

```
1  -- Update geometry column with Point Geometry from lat, lon
2  UPDATE taxi_sample SET the_geom = ST_MakePoint(lon, lat);
3  SELECT * FROM taxi_sample;
```

Data Output | Explain | Messages | Notifications | Geometry Viewer



5. **Import polygon data of districts in Bangkok to database dbtutorial (bangkokdistrict.shp)**



Data in bangkokdistrict.shp file:

Bangkok/postgres@PostgreSQL 12

Query Editor | Query History

```
1  SELECT * FROM bangkokdistrict;
2
3
```

Data Output | Explain | Messages | Notifications | Geometry Viewer

	gid [PK] integer	objectid character varying (10)	area numeric	dcode character varying (4)	dname_e character varying (40)	pcode character varying (2)	no_female character varying (10)	pname character varying
1	1	29	11804564.00000000	1025	Bang Phlat	10	53750	Bangkok
2	2	30	16319268.00000000	1017	Huai Khwang	10	42026	Bangkok
3	3	31	17075578.00000000	1045	Wang Thong Lang	10	62158	Bangkok
4	4	32	51732144.00000000	1048	Thawi Watthana	10	40264	Bangkok
5	5	33	128628048.00000000	1011	Lat Krabang	10	83816	Bangkok
6	6	34	8465891.00000000	1026	Din Daeng	10	70163	Bangkok
7	7	35	35767720.00000000	1019	Taling Chan	10	56372	Bangkok
8	8	36	11329900.00000000	1002	Dusit	10	51302	Bangkok
9	9	37	28068656.00000000	1044	Saphan Sung	10	47694	Bangkok
10	10	39	9214668.00000000	1014	Phaya Thai	10	36894	Bangkok
11	11	40	12323945.00000000	1020	Bangkok Noi	10	62888	Bangkok
12	12	41	7167652.00000000	1037	Ratchathewi	10	38014	Bangkok
13	13	42	5361067.00000000	1001	Phra Nakhon	10	30548	Bangkok
14	14	43	2504113.00000000	1008	Pom Prap Sattru Phai	10	26781	Bangkok
15	15	44	8032768.00000000	1007	Parthum Wan	10	29559	Bangkok
16	16	45	47890656.00000000	1040	Bang Khae	10	101978	Bangkok
17	17	46	24113560.00000000	1034	Suanluang	10	61730	Bangkok
18	18	47	12996544.00000000	1039	Vadhana	10	42694	Bangkok
19	19	48	6298272.00000000	1016	Bangkok Yai	10	38845	Bangkok

6. Add new column named “dcode” (districts code) with character varying(4)

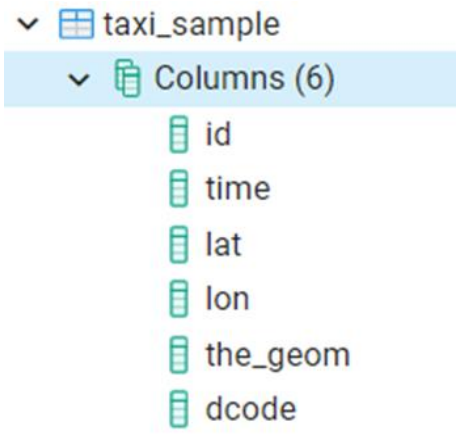
Bangkok/postgres@PostgreSQL 12

Query Editor | Query History

```
1  -- Add new column "dcode" (districts code)
2  ALTER TABLE taxi_sample ADD COLUMN dcode VARCHAR(4);
3  SELECT * FROM taxi_sample;
```

Data Output | Explain | Messages | Notifications | Geometry Viewer

	id bigint	time timestamp without time zone	lat double precision	lon double precision	the_geom geometry	dcode character varying (4)
1	10011311	2013-12-15 11:10:00	13.76715	100.64282	0101000020E6100...	[null]
2	10011311	2013-12-15 14:11:00	13.84937	100.72122	0101000020E6100...	[null]
3	10011311	2013-12-15 14:24:00	13.81267	100.72547	0101000020E6100...	[null]
4	10011311	2013-12-15 14:25:00	13.81263	100.7264	0101000020E6100...	[null]
5	10011311	2013-12-15 14:39:00	13.85905	100.69407	0101000020E6100...	[null]
6	10011311	2013-12-15 14:42:00	13.85422	100.67485	0101000020E6100...	[null]
7	10011311	2013-12-15 15:24:00	13.99015	100.61547	0101000020E6100...	[null]
8	10011311	2013-12-15 15:26:00	13.9887	100.61598	0101000020E6100...	[null]
9	10011311	2013-12-15 15:53:00	13.96213	100.58868	0101000020E6100...	[null]
10	10011311	2013-12-15 16:01:00	13.96538	100.5961	0101000020E6100...	[null]
11	10011311	2013-12-15 16:24:00	13.95875	100.62105	0101000020E6100...	[null]
12	10011311	2013-12-15 17:45:00	13.83723	100.73973	0101000020E6100...	[null]
13	10011311	2013-12-15 17:45:00	13.83727	100.73993	0101000020E6100...	[null]
14	10011311	2013-12-15 17:45:00	13.83722	100.73953	0101000020E6100...	[null]
15	10011311	2013-12-15 17:54:00	13.81058	100.76463	0101000020E6100...	[null]
16	10011326	2013-12-15 18:41:00	13.91272	100.52073	0101000020E6100...	[null]
17	10011326	2013-12-15 19:32:00	13.85507	100.50937	0101000020E6100...	[null]
18	10011326	2013-12-15 19:59:00	13.87897	100.50913	0101000020E6100...	[null]
19	10011623	2013-12-15 00:00:00	13.81002	100.53192	0101000020E6100...	[null]
20	10011623	2013-12-15 04:59:00	13.80997	100.532	0101000020E6100...	[null]



7. For each GPS records of taxi, find dcode of each point and update to decode.

Bangkok/postgres@PostgreSQL 12

Query Editor | Query History | Scratch Pad

```
1  UPDATE taxi_sample SET dcode = bangkokdistrict.dcode
2  FROM bangkokdistrict
3  WHERE ST_Within(taxi_sample.the_geom, bangkokdistrict.geom);
4  SELECT * FROM taxi_sample ORDER BY dcode ASC;
```

Data Output | Explain | Messages | Notifications | Geometry Viewer

	id bigint	time timestamp without time zone	lat double precision	lon double precision	the_geom geometry	dcode character varying (4)
1	10012955	2013-12-15 01:07:00	13.76022	100.50683	0101000020E6100...	1001
2	)036145642	2013-12-15 20:15:00	13.75975	100.49577	0101000020E6100...	1001
3	10012346	2013-12-15 19:00:00	13.74732	100.49423	0101000020E6100...	1001
4	)036160039	2013-12-15 20:13:00	13.76026	100.49623	0101000020E6100...	1001
5	10013534	2013-12-15 21:29:00	13.76647	100.4976	0101000020E6100...	1001
6	10016363	2013-12-15 13:46:00	13.76267	100.50442	0101000020E6100...	1001
7	10012346	2013-12-15 19:01:00	13.74815	100.49407	0101000020E6100...	1001
8	10012496	2013-12-15 10:15:00	13.75187	100.49353	0101000020E6100...	1001
9	10012955	2013-12-15 14:48:00	13.75798	100.50515	0101000020E6100...	1001
10	10011935	2013-12-15 10:49:00	13.75738	100.4974	0101000020E6100...	1001
11	10015418	2013-12-15 11:55:00	13.74518	100.49883	0101000020E6100...	1001
12	10015418	2013-12-15 11:50:00	13.75723	100.49837	0101000020E6100...	1001
13	)036162829	2013-12-15 16:17:00	13.74516	100.50049	0101000020E6100...	1001
14	10013177	2013-12-15 18:42:00	13.756	100.48963	0101000020E6100...	1001

8. **Count number of GPS data in each district**
[show dname_e and total with order by total discending]

Bangkok/postgres@PostgreSQL 12

Query Editor | Query History

```
1  --Number of GPS data in each district
2
3  SELECT dcode, COUNT(*)
4  FROM taxi_sample GROUP BY dcode
5  ORDER BY COUNT DESC;
```

Data Output | Explain | Messages | Notifications | Geometry Viewer

	dcode character varying (4)	count bigint
1	[null]	3538
2	1030	700
3	1039	462
4	1006	428
5	1033	373
6	1037	336
7	1007	321
8	1026	299
9	1017	280
10	1005	276
11	1034	261
12	1045	257
13	1022	247
14	1038	223
15	1032	220
16	1001	219
17	1021	211
18	1027	209

Show “dname_e” and total with order by total descending

Bangkok/postgres@PostgreSQL 12

Query Editor | Query History

```
1  -- Show dname_e and total with order by total descending
2  SELECT bangkokdistrict.dname_e, taxi_sample.dcode, COUNT(*) FROM bangkokdistrict
3  INNER JOIN taxi_sample ON taxi_sample.dcode = bangkokdistrict.dcode
4  GROUP BY bangkokdistrict.dname_e, taxi_sample.dcode ORDER BY COUNT DESC;
```

Data Output | Explain | Messages | Notifications | Geometry Viewer

	dname_e character varying (40)	dcode character varying (4)	count bigint
1	Chatu Chak	1030	700
2	Vadhana	1039	462
3	Bang Kapi	1006	428
4	Khlong Toei	1033	373
5	Ratchathewi	1037	336
6	Parthum Wan	1007	321
7	Din Daeng	1026	299
8	Huai Khwang	1017	280
9	Bang Khen	1005	276
10	Suanluang	1034	261
11	Wang Thong Lang	1045	257
12	Phasi Charoen	1022	247
13	Lat Phrao	1038	223
14	Pra Wet	1032	220
15	Phra Nakhon	1001	219
16	Bang Khun thain	1021	211
17	Bueng Kum	1027	209
18	Bang Na	1047	206
19	Phaya Thai	1014	189