As electronic vehicles (EVs) become more popular, there is an increasing need for access to charging stations, also known as ports. To that end, many modern apartment buildings have begun retrofitting their parking garages to include shared charging stations. A charging station is shared if it is accessible by anyone in the building.

But with increasing demand comes competition for these ports — nothing is more frustrating than coming home to find no charging stations available! In this project, you will use a dataset to help apartment building managers better understand their tenants' EV charging habits.

The data has been loaded into a PostgreSQL database with a table named `charging_sessions` with the following columns:

charging_sessions

Column	Definition	Data type
`garage_id`	Identifier for the garage/building	`VARCHAR`
`user_id`	Identifier for the individual user	`VARCHAR`
`user_type`	Indicating whether the station is `Shared` or `Private`	`VARCHAR`
`start_plugin`	The date and time the session started	`DATETIME`
`start_plugin_hour`	The hour (in military time) that the session started	`NUMERIC`
`end_plugout`	The date and time the session ended	`DATETIME`
`end_plugout_hour`	The hour (in military time) that the session ended	`NUMERIC`
`duration_hours`	The length of the session, in hours	`NUMERIC`
`el_kwh`	Amount of electricity used (in Kilowatt hours)	`NUMERIC`
`month_plugin`	The month that the session started	`VARCHAR`
`weekdays_plugin`	The day of the week that the session started	`VARCHAR`

Let's get started!

Sources

- **Data:** CC BY 4.0, via Kaggle,
- **Image:** Julian Herzog, CC BY 4.0, via Wikimedia Commons

Projects Data DataFrame as `df`

```
SELECT *
FROM charging_sessions
LIMIT 50;
```

	g		u	start_plugin	start_plugin_...	end_plugout	end_plu
0	AdO3	AdO3-4	Private	2018-12-21T10:20:00.000	10	2018-12-21T10:23:00.000	
1	AdO3	AdO3-4	Private	2018-12-21T10:24:00.000	10	2018-12-21T10:32:00.000	
2	AdO3	AdO3-4	Private	2018-12-21T11:33:00.000	11	2018-12-21T19:46:00.000	
3	AdO3	AdO3-2	Private	2018-12-22T16:15:00.000	16	2018-12-23T16:40:00.000	
4	AdO3	AdO3-2	Private	2018-12-24T22:03:00.000	22	2018-12-24T23:02:00.000	
5	AdO3	AdO3-2	Private	2018-12-24T23:32:00.000	23	2018-12-25T17:37:00.000	
6	AdO3	AdO3-2	Private	2018-12-25T18:25:00.000	18	2018-12-26T16:08:00.000	
7	AdO3	AdO3-4	Private	2018-12-26T10:41:00.000	10	2018-12-26T16:52:00.000	
8	AdO3	AdO3-2	Private	2018-12-26T18:46:00.000	18	2018-12-26T21:08:00.000	
9	AdO3	AdO3-2	Private	2018-12-29T16:04:00.000	16	2018-12-29T20:55:00.000	
10	AdO3	AdO3-2	Private	2018-12-29T23:48:00.000	23	2018-12-30T15:13:00.000	
11	AdO3	AdO3-2	Private	2018-12-30T16:24:00.000	16	2018-12-30T17:23:00.000	
12	AdO3	AdO3-2	Private	2018-12-30T22:00:00.000	22	2018-12-31T11:28:00.000	
13	AdO3	AdO3-4	Private	2019-01-02T08:39:00.000	8	2019-01-03T09:11:00.000	
14	Bl2	Bl2-4	Private	2019-01-02T19:59:00.000	19	2019-01-03T00:52:00.000	
15	AdO3	AdO3-2	Private	2019-01-04T15:44:00.000	15	2019-01-05T08:06:00.000	

Rows: 50 Expand

Projects Data DataFrame as unique_users_per_garage

```sql
-- unique_users_per_garage
-- Modify the code below
SELECT
    garage_id,
    COUNT(DISTINCT user_id) AS num_unique_users
FROM charging_sessions
WHERE user_type = 'Shared'
GROUP BY garage_id
ORDER BY num_unique_users DESC
```

index	garage_id	num_unique_users
0	Bl2	
1	AsO2	
2	UT9	
3	AdO3	
4	MS1	
5	SR2	
6	AdA1	
7	Ris	

Rows: 8 Expand

Projects Data DataFrame as most_popular_shared_start_times

```sql
-- most_popular_shared_start_times
SELECT
    weekdays_plugin,
    start_plugin_hour,
    COUNT(*) as num_charging_sessions
FROM charging_sessions
WHERE user_type = 'Shared'
GROUP BY
    weekdays_plugin,
    start_plugin_hour
ORDER BY num_charging_sessions DESC
LIMIT 10
```

index	weekdays_plugin	start_plugin_hour	nu
0	Sunday	17	
1	Friday	15	
2	Thursday	19	
3	Thursday	16	
4	Wednesday	19	
5	Sunday	18	
6	Sunday	15	
7	Monday	15	
8	Friday	16	
9	Tuesday	16	

Rows: 10 Expand

Projects Data DataFrame as long

```sql
-- long_duration_shared_users
SELECT
    user_id,
    AVG(duration_hours) AS avg_charging_duration
FROM charging_sessions
WHERE user_type = 'Shared'
GROUP BY user_id
HAVING AVG(duration_hours) > 10
ORDER BY avg_charging_duration DESC
```

		avg_charging_durati...
0	Share-9	16.845833335
1	Share-17	12.8945555511
2	Share-25	12.2144747466
3	Share-18	12.0888071898
4	Share-8	11.5504308392
5	AdO3-1	10.3693869729

Rows: 6

Expand