

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
<code>garage_id</code>	Identifier for the garage/building	VARCHAR
<code>user_id</code>	Identifier for the individual user	VARCHAR
<code>user_type</code>	Indicating whether the station is <code>Shared</code> or <code>Private</code>	VARCHAR
<code>start_plugin</code>	The date and time the session started	DATETIME
<code>start_plugin_hour</code>	The hour (in military time) that the session started	NUMERIC
<code>end_plugout</code>	The date and time the session ended	DATETIME
<code>end_plugout_hour</code>	The hour (in military time) that the session ended	NUMERIC
<code>duration_hours</code>	The length of the session, in hours	NUMERIC
<code>el_kwh</code>	Amount of electricity used (in Kilowatt hours)	NUMERIC
<code>month_plugin</code>	The month that the session started	VARCHAR
<code>weekdays_plugin</code>	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 5;
```

...	↑↓	g	...	↑↓	...	↑↓	u	...	↑↓	start_plugin	...	↑↓	start_plugin_...	...	↑↓	end_plugout	...	↑↓	end_plugou...
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			

Rows: 5

Projects Data DataFrame as `unique_user`

```
-- unique_users_per_garage
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			BI2
			1			AsO2
			2			UT9
			3			AdO3
			4			MS1
			5			SR2
			6			AdA1
			7			Ris


Rows: 8

Projects Data DataFrame as `most_`

```
-- 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;
```

...	↑↓	weekdays...	...	↑↓	start_plugin_...	...	↑↓	num_charging_sessi...	...	↑↓
0		Sunday						17		30
1		Friday						15		28
2		Thursday						19		26
3		Thursday						16		26
4		Wednesday						19		25
5		Sunday						18		25
6		Sunday						15		25
7		Monday						15		24
8		Friday						16		24
9		Tuesday						16		23

Rows: 10

 Projects Data

DataFrame as 1

```
-- 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