Intro to spatial data

About Me

- **Lead Data Engineer @Baania**

- **Fought with many types of data**

- **Spatial data has a lot of quirks 😐**
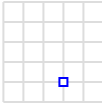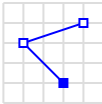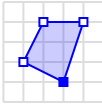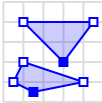
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What is spatial data

Type	Example
Point	
LineString	
Polygon	
MultiPolygon	

There's more, but enough for now 🧋

Image credits: M. W. Taves

Question

Thailand province uses which spatial data type?

Sample data

Point

```json
{
  "type": "Point",
  "coordinates": [30.0, 10.0]
}
```

LineString

```json
{
    "type": "LineString",
    "coordinates": [
        [30.0, 10.0], [10.0, 30.0], [40.0, 40.0]
    ]
}
```

Sample data (cont)

Polygon

```
{
    "type": "Polygon",
    "coordinates": [
        [[30.0, 10.0], [40.0, 40.0], [20.0, 40.0], [10.0, 20.0], [30.0, 10.0]]
    ]
}
```

MultiPolygon
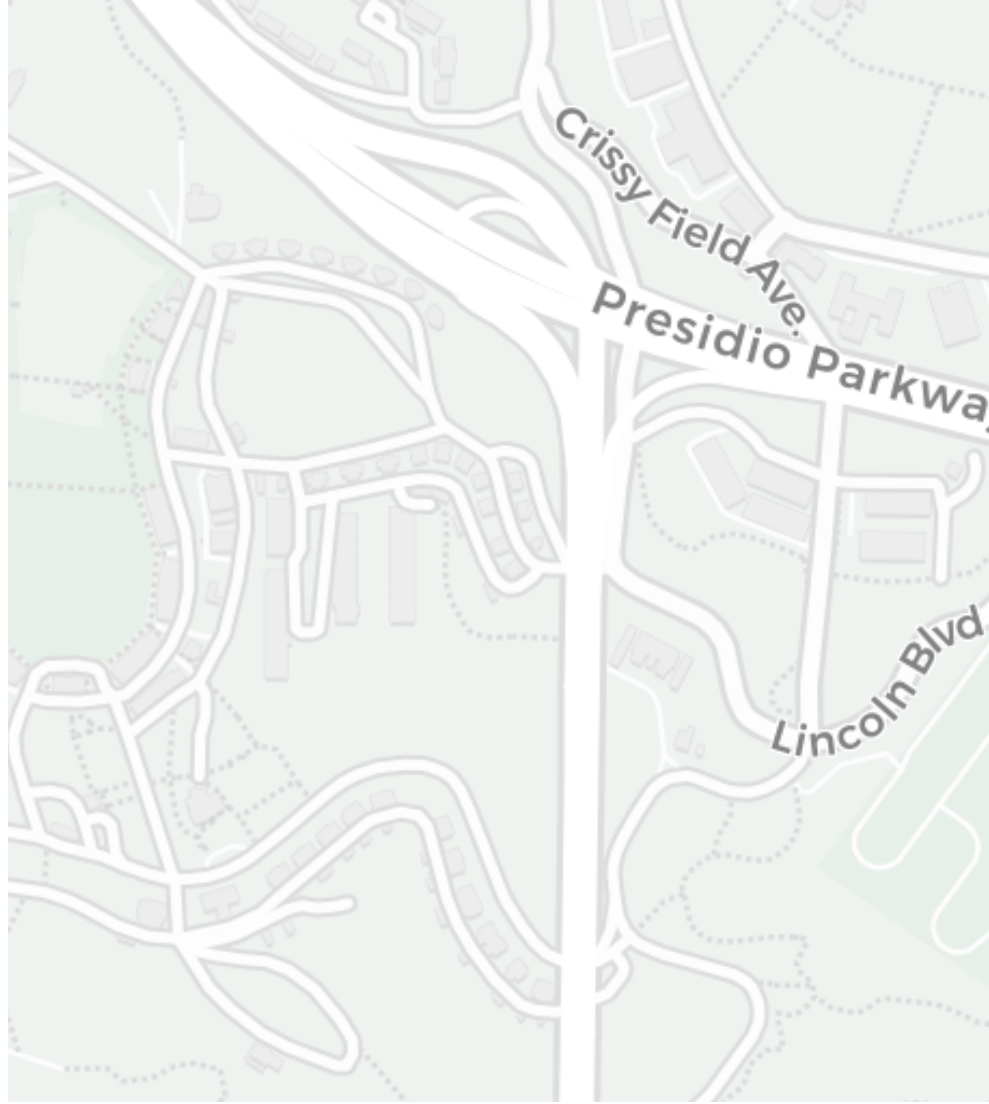
```
{
    "type": "MultiPolygon",
    "coordinates": [
        [
            [[30.0, 20.0], [45.0, 40.0], [10.0, 40.0], [30.0, 20.0]]
        ],
        [
            [[15.0, 5.0], [40.0, 10.0], [10.0, 20.0], [5.0, 10.0], [15.0, 5.0]]
        ]
    ]
}
```

Map tile

Example url:
https://tile.openstreetmap.org/${z}/${x}/${y}.png

Variable	Description
x	x tile number
y	y tile number
z	zoom level

Technical stuff

Map projection

ESPG Code	Projection	Unit
ESPG:4240	THAILAND	Degree
ESPG:4326	WGS84	Degree
EPSG:3857	GOOGLE	Meter
ESPG:32647	WGS84 / UTM zone 47N - THAILAND	Meter

Standard projection: `ESPG:4326`

Degree / meter conversion

```
KM = DEGREE * 111.319
DEGREE = KM / 111.319
```

Sample spatial applications

Find polygon from point

Which province does a listing belong to?

```sql
SELECT *
FROM listing JOIN province
ON ST_WITHIN(listing.geom, province.geom);
```

Find distance between A to B

```sql
SELECT ST_DISTANCE(
        GEOGRAPHY(project.geom),
        GEOGRAPHY(train_station.geom)
    )
```

Count points in polygon

How many listings are in a single province?

```sql
SELECT province.name, count(listing.geom)
FROM province LEFT JOIN listing
```