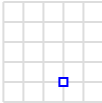
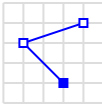
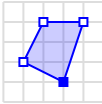
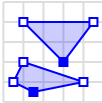


A photograph of a young child with blonde hair, seen from behind, holding a large, unfolded map. The child is wearing a dark jacket with teal-colored sleeves. They are standing in a field of tall, dry grass or reeds. The text "Intro to spatial data" is overlaid in white serif font across the center of the image.

# Intro to spatial data

# 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

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

## LineString

```
{  
  "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

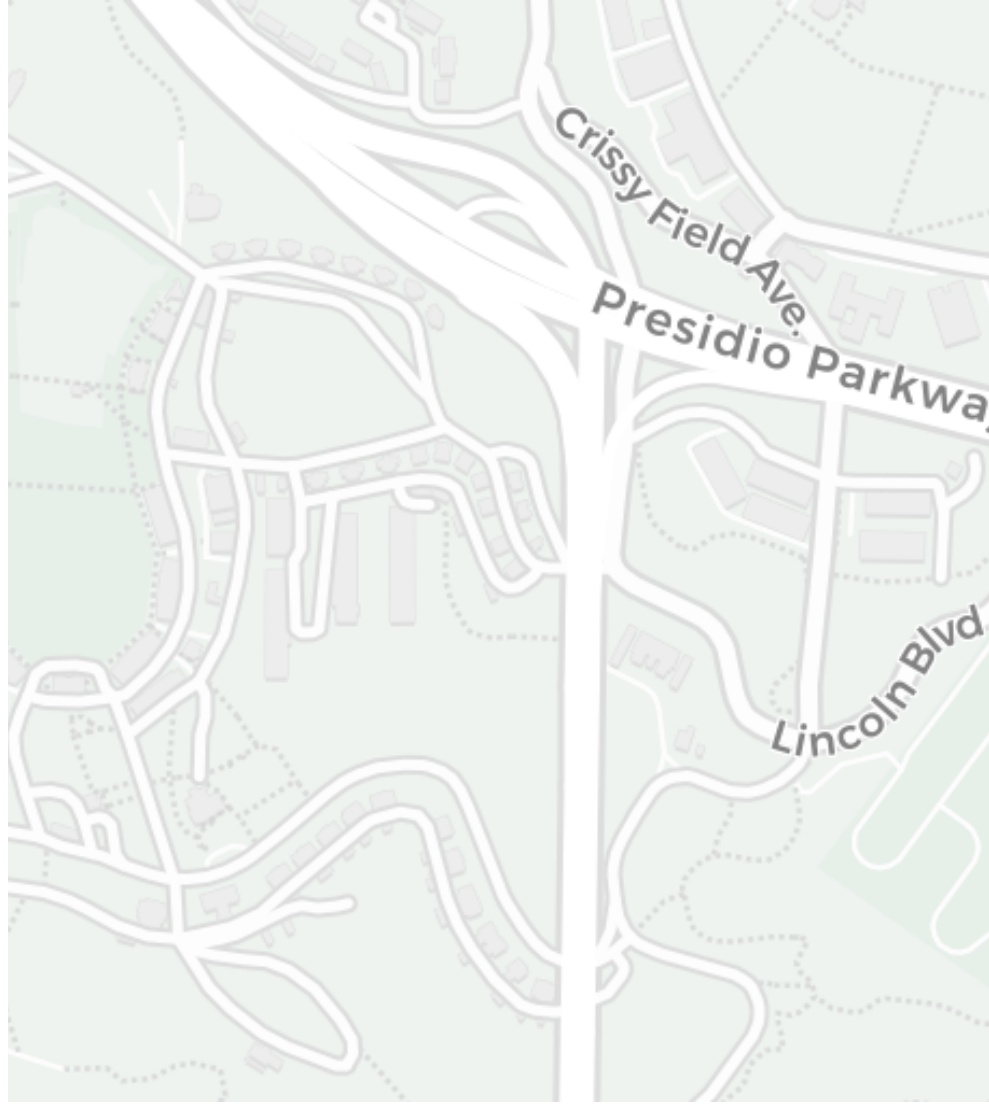
```
{  
  "type": "MultiPolygon",  
  "coordinates": [  
    [  
      [[30.0, 20.0], [45.0, 40.0], [10.0, 40.0], [30.0, 20.0]]  
    ],  
    [  
      [[15.0, 5.0], [40.0, 10.0], [10.0, 20.0], [5.0, 10.0], [15.0, 5.0]]  
    ]  
  ]  
}
```

# Map tile

Example url:

[https://tile.openstreetmap.org/\\${z}/\\${x}/\\${y}.png](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?

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

## Find distance between A to B

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

## Count points in polygon

How many listings are in a single province?

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