Lech Cieślik
Oracle APEX Developer

Maps in Oracle APEX: From Basic Skills to Advanced Techniques

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Agenda

Basic

- Spatial data types
- Map region from scratch
- Layers
- Map region attributes
- Dynamic actions
- Geocoding and Geolocation

Advanced

- Coordinate Systems
- Performance problems (Spatial Indexes, Clusters, Faceted Search)
- WMS, WFS, Background Maps
- MapLibre (Drawing Component, Custom Layers)

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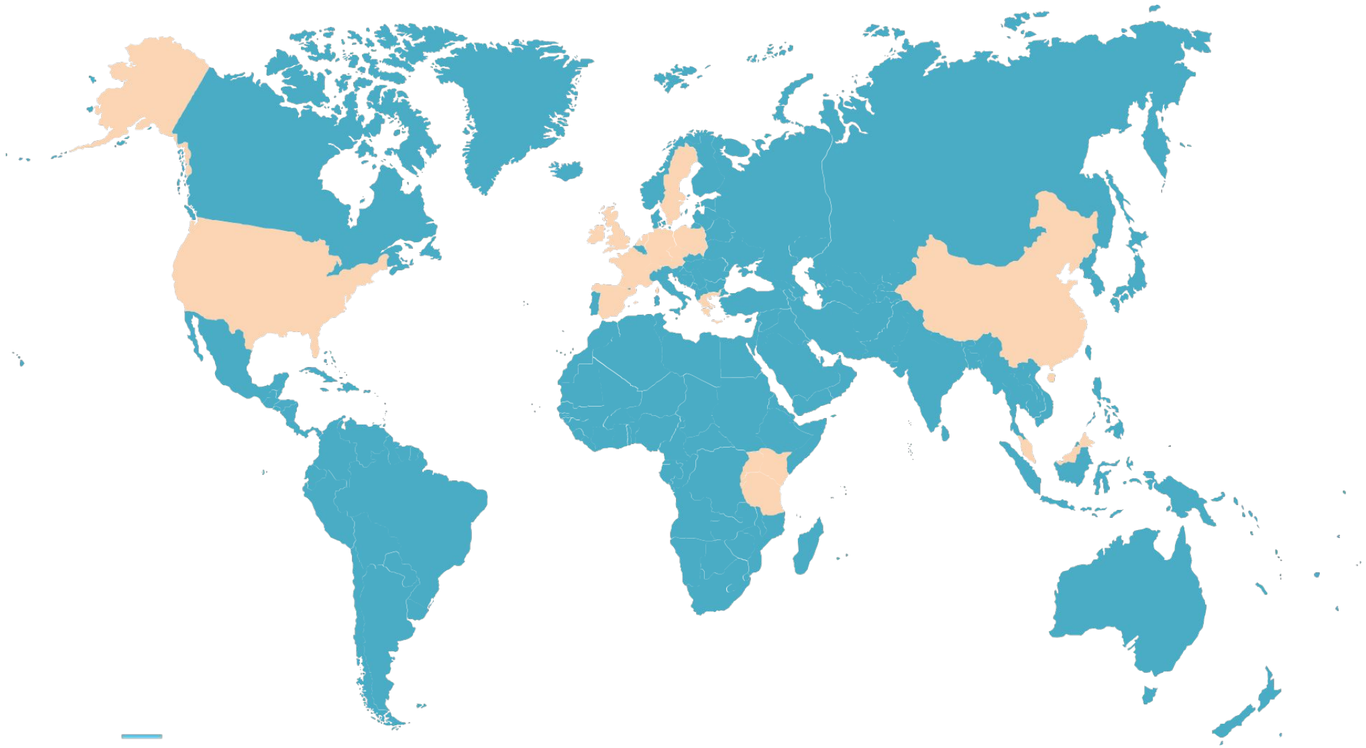
60+
APEX Devs

5
Oracle
ACEs

4
Continents

2
Warsaw, PL
London, UK



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Part 1: Basics skills

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Map? What's that?

"A geographic map is a symbolic depiction of selected characteristics of a place, usually drawn on a flat surface. It presents information about the world in a simple, visual way, showing sizes and shapes of countries, locations of features, and distances between places."

https://education.nationalgeographic.org/resource/map/

"A map is a symbolic depiction of interrelationships, commonly spatial, between things within a space."

https://en.wikipedia.org/wiki/Map

"A document used to display and work with geographic data. A map contains one or more layers and various supporting map elements, such as a scale bar."

https://support.esri.com/en-us/gis-dictionary/map

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Sioux Lake
James Bay
UPPER LAKE
HURON LAKE
CANADA
NEW FRANCE
Mozemleck Country
PARTS UNKNOWN
GREAT TEGUAIO
NEW ALBION
CALIFORNIA
GULF of CALIFORNIA or RED SEA
NEW MEXICO
LOUISIANA
Bermudas Eng
WEST
AZORE
LUCAYOS or BAHAMA Is
The ANTILLES Is
GULF of MEXICO
The Tropick of Cancer
Trinidad I
TERRA FIRMA
GUIANA
Venezuela
THE GALLAPAGOS ISLANDS
The Equator or Equinoctial Line

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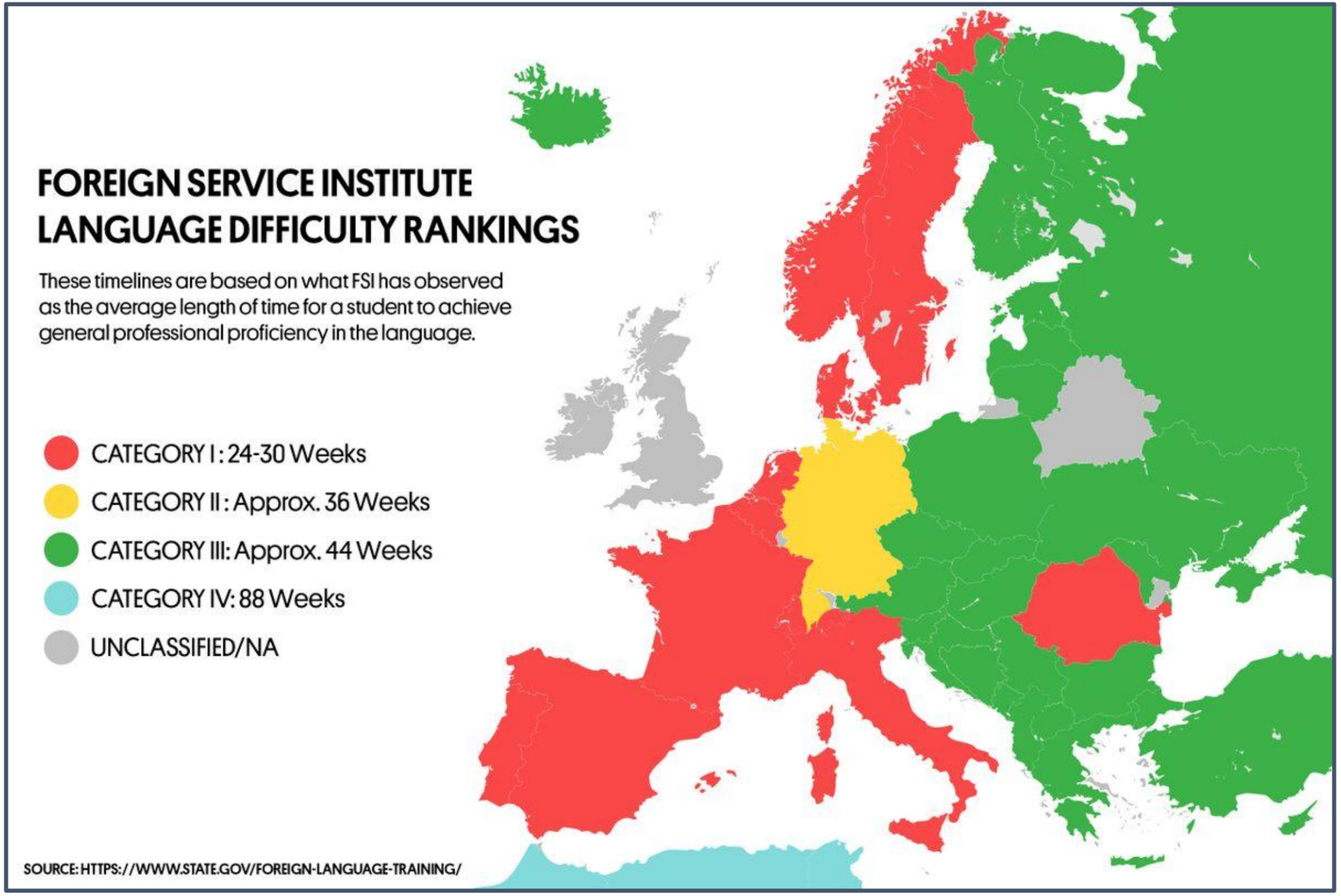
FOREIGN SERVICE INSTITUTE
LANGUAGE DIFFICULTY RANKINGS
These timelines are based on what FSI has observed as the average length of time for a student to achieve general professional proficiency in the language.
CATEGORY I : 24-30 Weeks
CATEGORY II : Approx. 36 Weeks
CATEGORY III: Approx. 44 Weeks
CATEGORY IV: 88 Weeks
UNCLASSIFIED/NA
SOURCE: HTTPS://WWW.STATE.GOV/FOREIGN-LANGUAGE-TRAINING/

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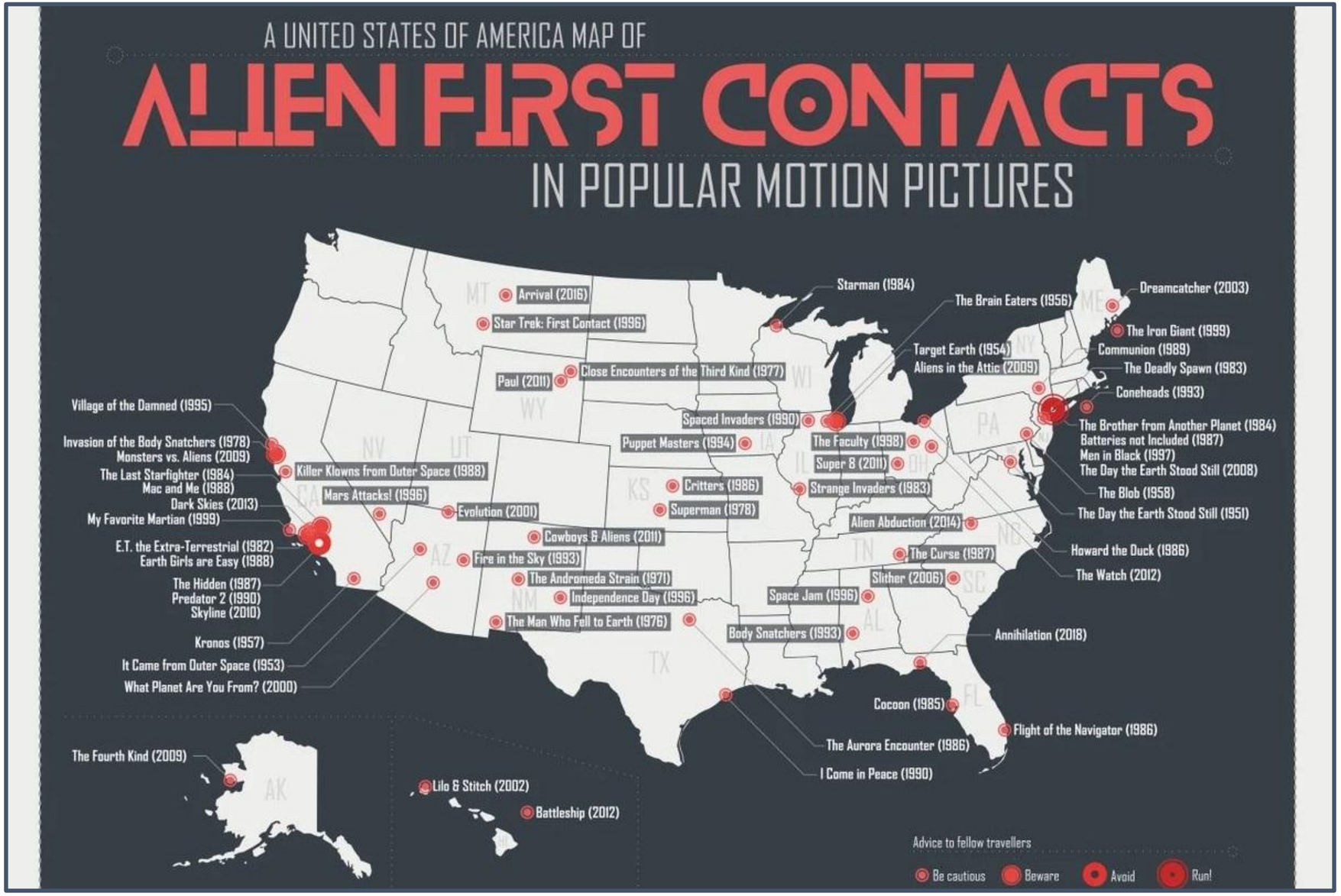
A UNITED STATES OF AMERICA MAP OF
ALIEN FIRST CONTACTS
IN POPULAR MOTION PICTURES
Arrival (2016)
Star Trek: First Contact (1996)
Paul (2011)
Close Encounters of the Third Kind (1977)
Starman (1984)
The Brain Eaters (1956)
Target Earth (1954)
Aliens in the Attic (2009)
Dreamcatcher (2003)
The Iron Giant (1999)
Communion (1989)
The Deadly Spawn (1983)
Coneheads (1993)
The Brother from Another Planet (1984)
Batteries not Included (1987)
Men in Black (1997)
The Day the Earth Stood Still (2008)
The Blob (1958)
The Day the Earth Stood Still (1951)
Howard the Duck (1986)
The Watch (2012)
Village of the Damned (1995)
Invasion of the Body Snatchers (1978)
Monsters vs. Aliens (2009)
The Last Starfighter (1984)
Mac and Me (1988)
Dark Skies (2013)
My Favorite Martian (1999)
E.T. the Extra-Terrestrial (1982)
Earth Girls are Easy (1988)
The Hidden (1987)
Predator 2 (1990)
Skyline (2010)
Kronos (1957)
It Came from Outer Space (1953)
What Planet Are You From? (2000)
Killer Klowns from Outer Space (1988)
Mars Attacks! (1996)
Evolution (2001)
Cowboys & Aliens (2011)
Fire in the Sky (1993)
The Andromeda Strain (1971)
Independence Day (1996)
The Man Who Fell to Earth (1976)
Spaced Invaders (1990)
Puppet Masters (1994)
Critters (1986)
Superman (1978)
The Faculty (1998)
Super 8 (2011)
Strange Invaders (1983)
Alien Abduction (2014)
The Curse (1987)
Slither (2006)
Space Jam (1996)
Body Snatchers (1993)
Annihilation (2018)
Cocoon (1985)
Flight of the Navigator (1986)
The Aurora Encounter (1986)
I Come in Peace (1990)
The Fourth Kind (2009)
Lilo & Stitch (2002)
Battleship (2012)
Advice to fellow travellers
Be cautious
Beware
Avoid
Run!

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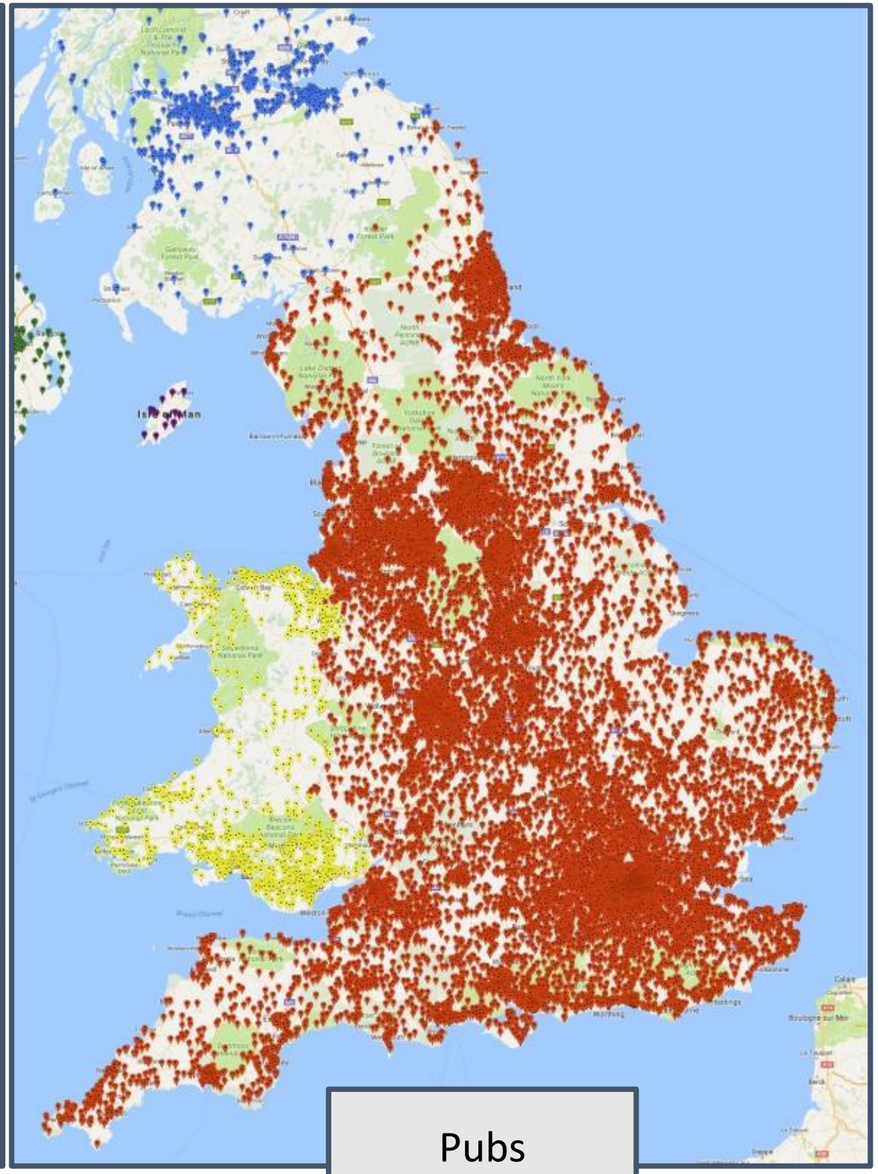
Football Clubs



Pubs

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“A map is a visual representation of spatial data.”

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Where to look for spatial data?

- government agencies;
- open data portals (cities, states, and countries have open data portals where you can access a wide range of spatial data for free);
- gis data repositories,
- academic institutions,
- commercial providers,
- non profit organizations and online communities

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London calling!

- https://gis-tfl.opendata.arcgis.com
- 33 districts
- 675 bus routes
- 8,700 buses
- the total length of bus routes is not known (probably several thousand kilometres)
- 39,000 pubs in England (over 3,500 in London)
- **ONE TRUE** football club: **ARSENAL LONDON**

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Spatial data types in Oracle APEX

Longitude and latitude (geographic coordinates)	GeoJSON	SDO_GEOMETRY

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51.577878487755726
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		0.186129663425001 53,
		51.577878487755726,
		NULL),
		NULL,
		NULL
		)

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SDO_GEOMETRY - Point

SDO_GTYPE - determine the type of the geometry (point, line, polygon, ...)
2001 – 2 dimensions/point

SDO_SRID - coordinate system
4326 – WGS 84 (World Geodetic System '84) latitude/longitude

SDO_POINT – point with X,Y,Z attributes

```
SDO_GEOMETRY(
2001,
4326,
SDO_POINT_TYPE(
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   NULL),
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)
```

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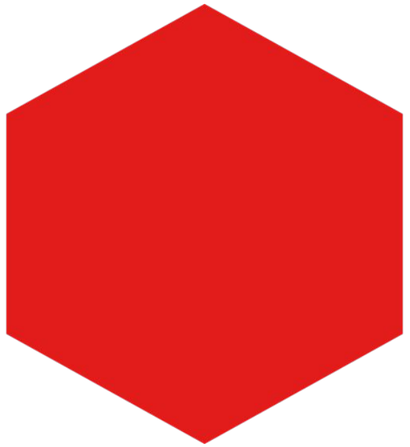
SDO_GEOMETRY - Polygon

SDO_GTYPE
2003 – 2 dimensions/polygon

SDO_ELEM_INFO_ARRAY
geometry description
(1,1003,1)
1 - offset,
1003 - exterior polygon
1 – lines (borders)

SDO_ORDINATE_ARRAY
List of coordinates



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NULL,
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  12.21,41.04,8.39,43.86,
  11.77,43.89
))
```

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Data Workshop

- native APEX functionality
- SQL Workshop/Utilities/Data Workshop
- Load Data from various file formats such as XLSX, CSV, XML, and JSON
- Unload Data data in text or XML
- no need to implement an ETL process
- supports table creation and much more

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SQL Workshop - Utilities - Data Workshop - Load Data


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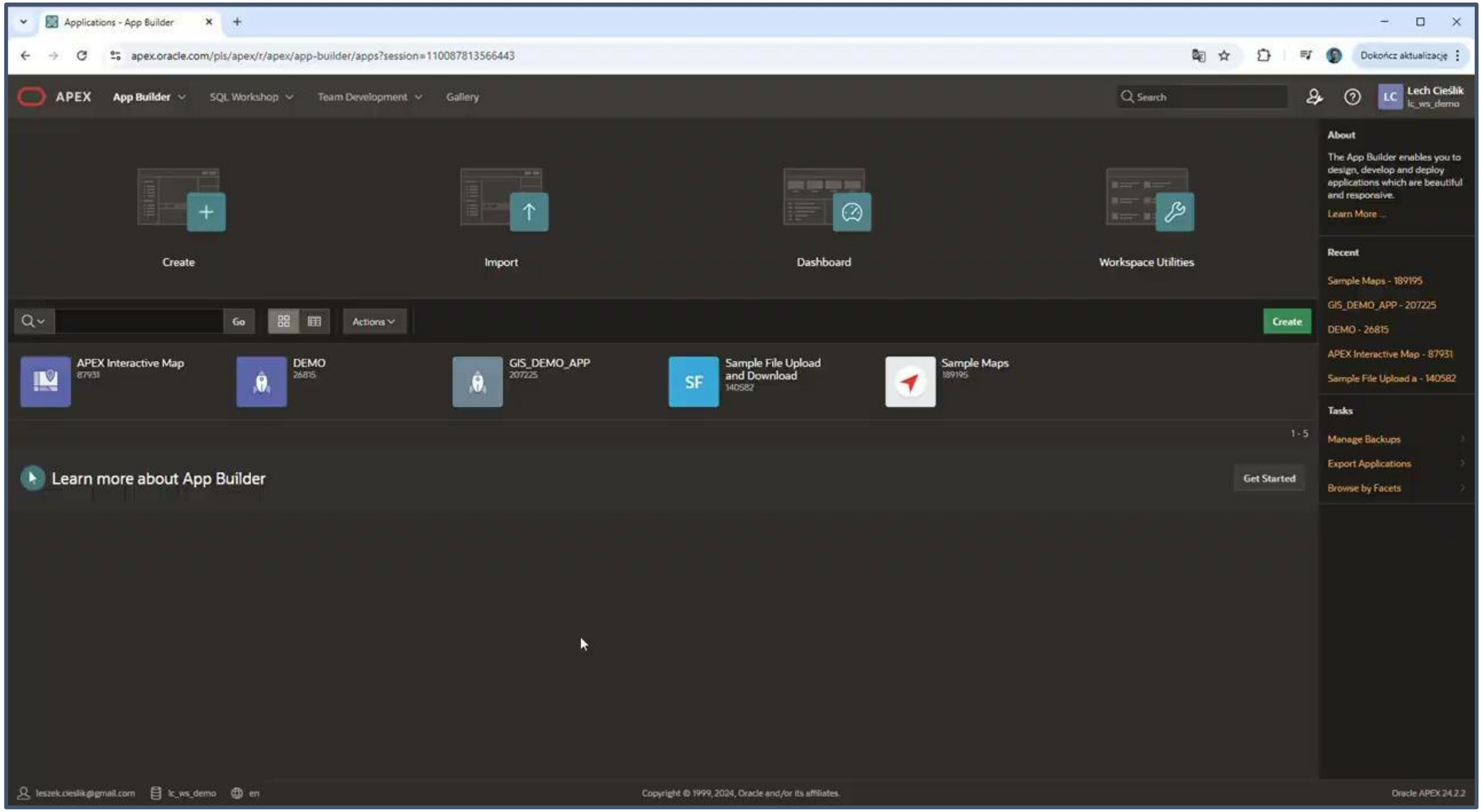
Applications - App Builder
apex.oracle.com/pls/apex/r/apex/app-builder/apps?session=110087813566443
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Spatial in APEX

		Map region	Geocoding Map Items		Geolocation		Background Maps	
20.2	21.1	21.2	22.1	22.2	23.1	23.2	24.1
October 2020	May 2021	November 2021	May 2022	November 2022	May 2023	November 2023	June 2024

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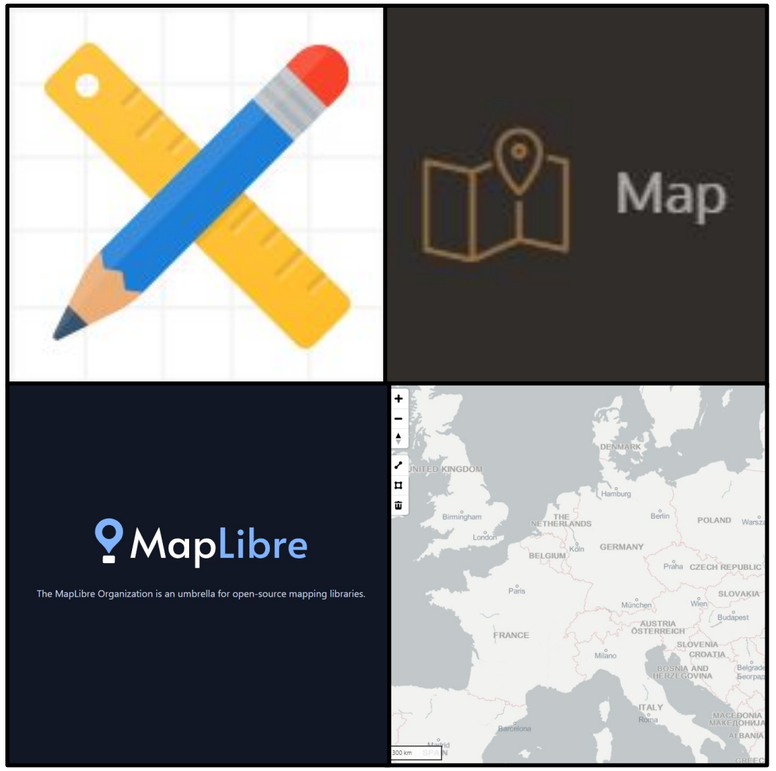
Oracle APEX Map region? What's that?

- native Map component for displaying spatial data
- introduced in Oracle APEX version 21.1
- powered by Oracle eLocation Service
- based on the MapLibre JavaScript library
- supports Oracle Spatial features as Spatial SQL functions
- allows to create layers, customization, use of dedicated dynamic actions and much more to build GIS apps in a low code way



Default layers

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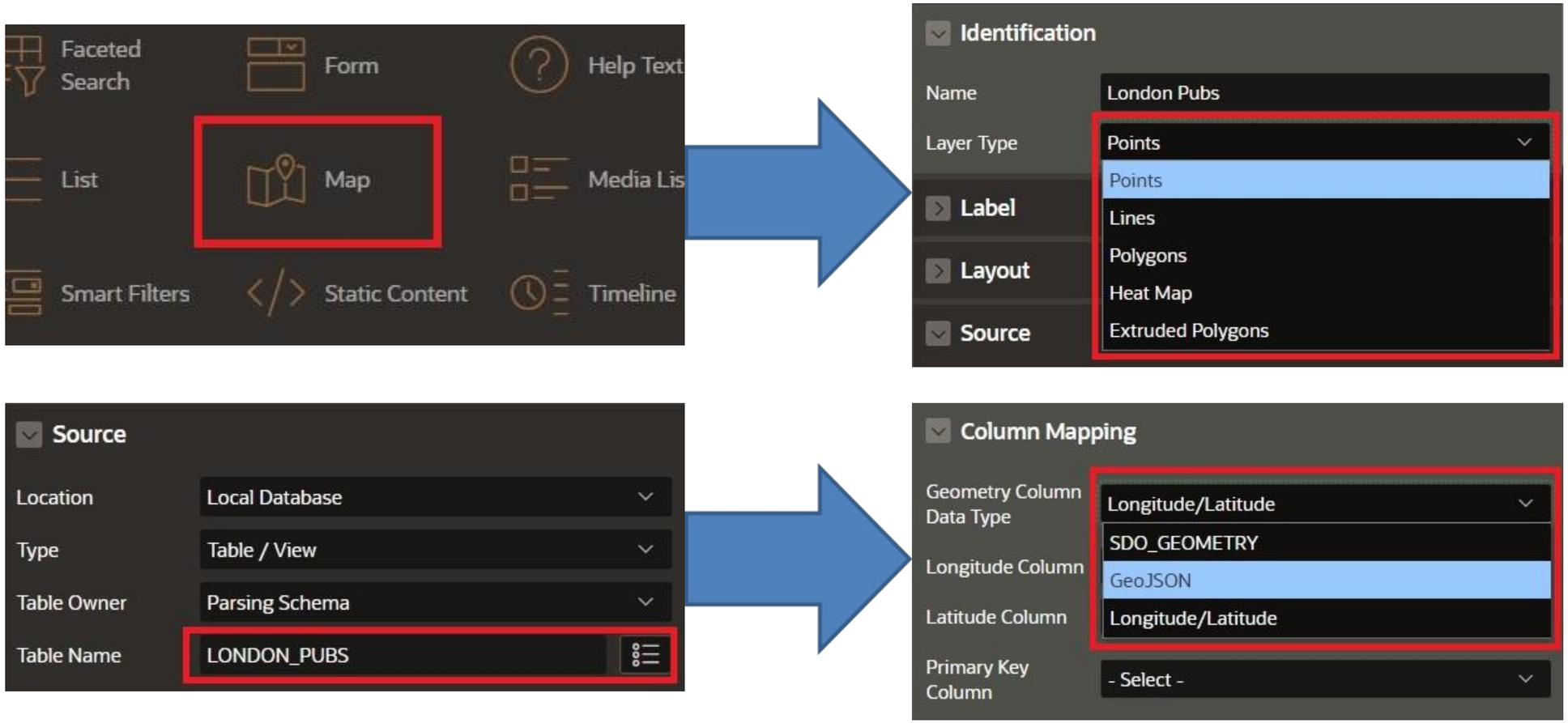
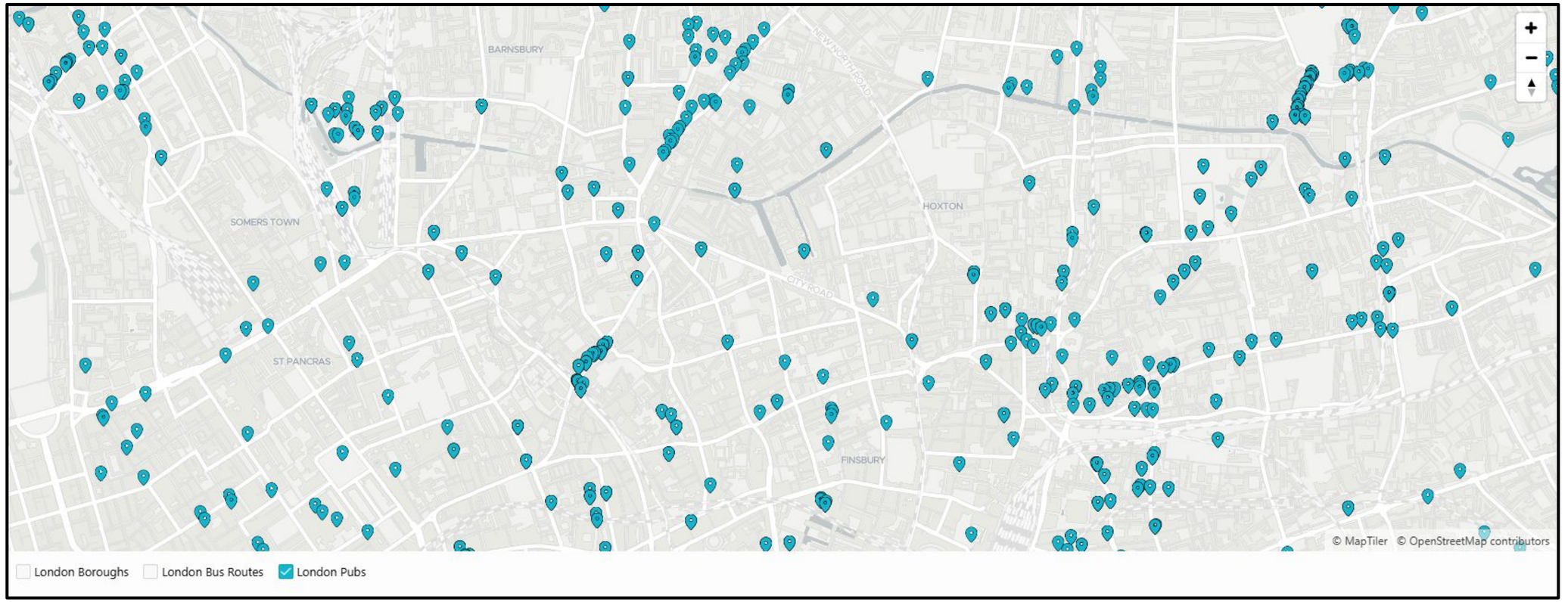
Oracle APEX Map region - first steps

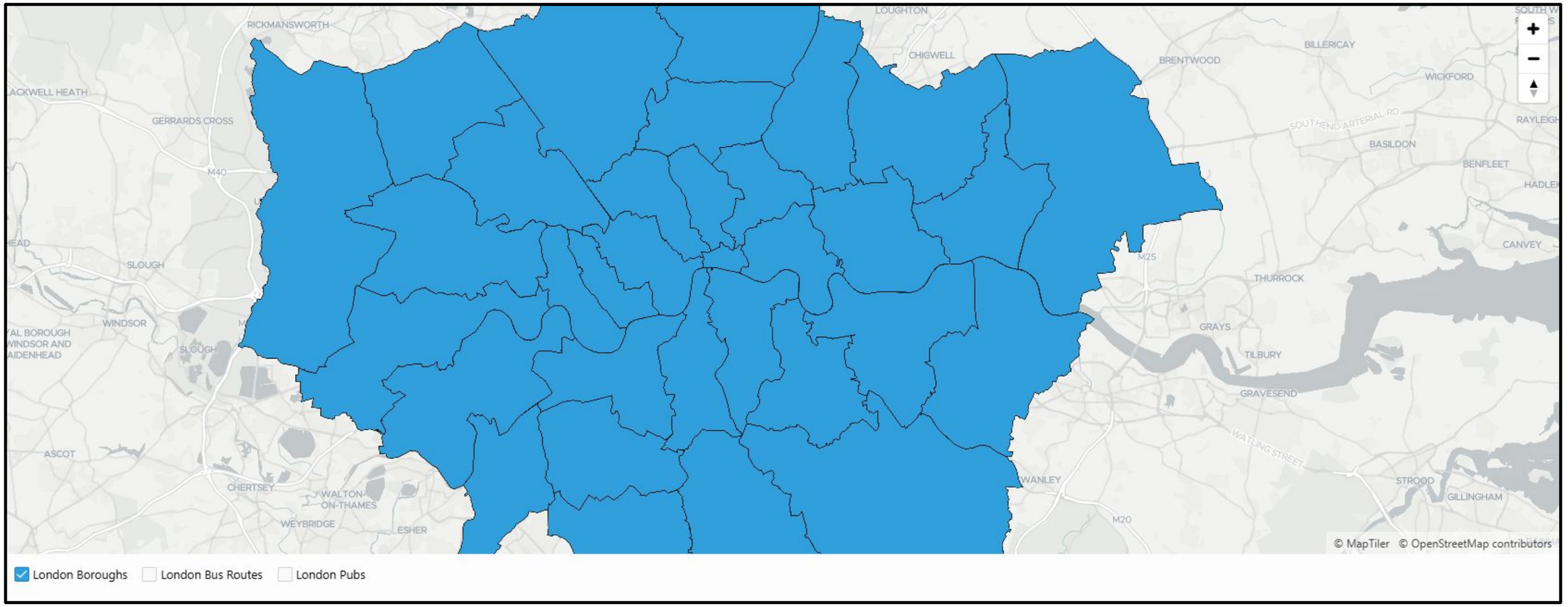


Points layer (Pubs)

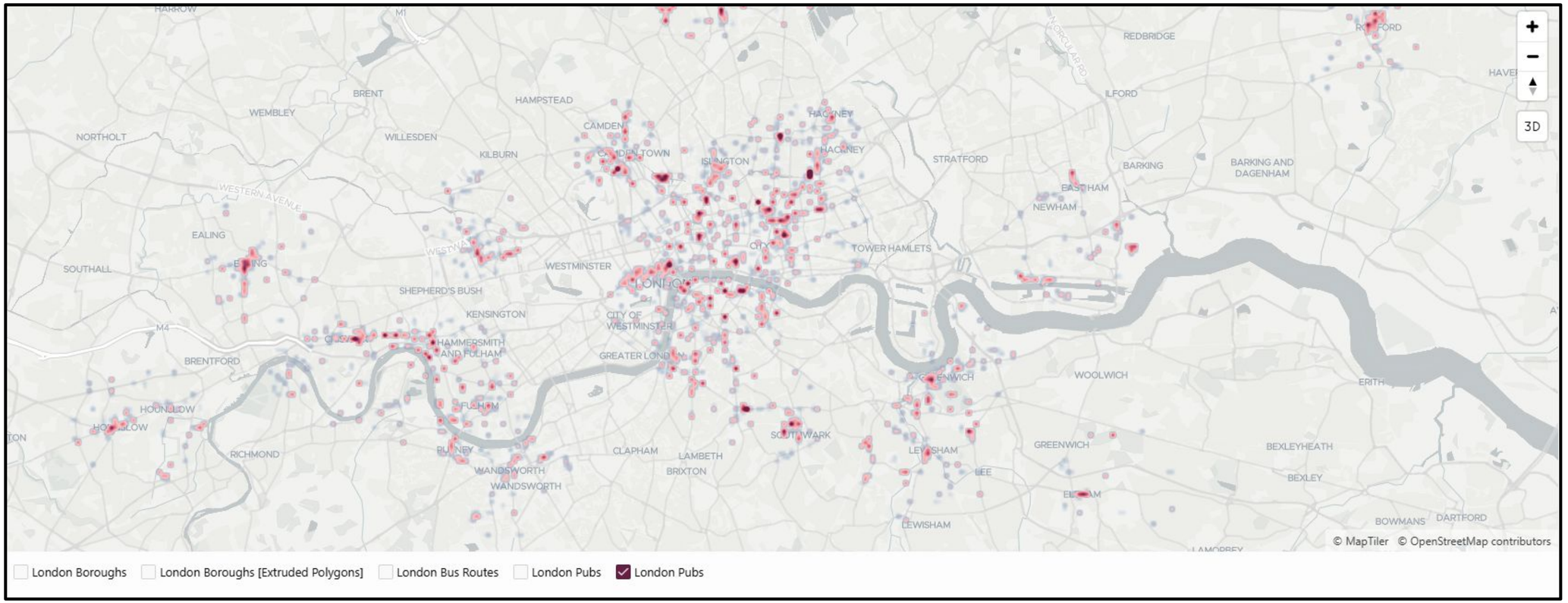


Lines (Bus Routes)

Polygons (Districts)



Heat map (Pubs)



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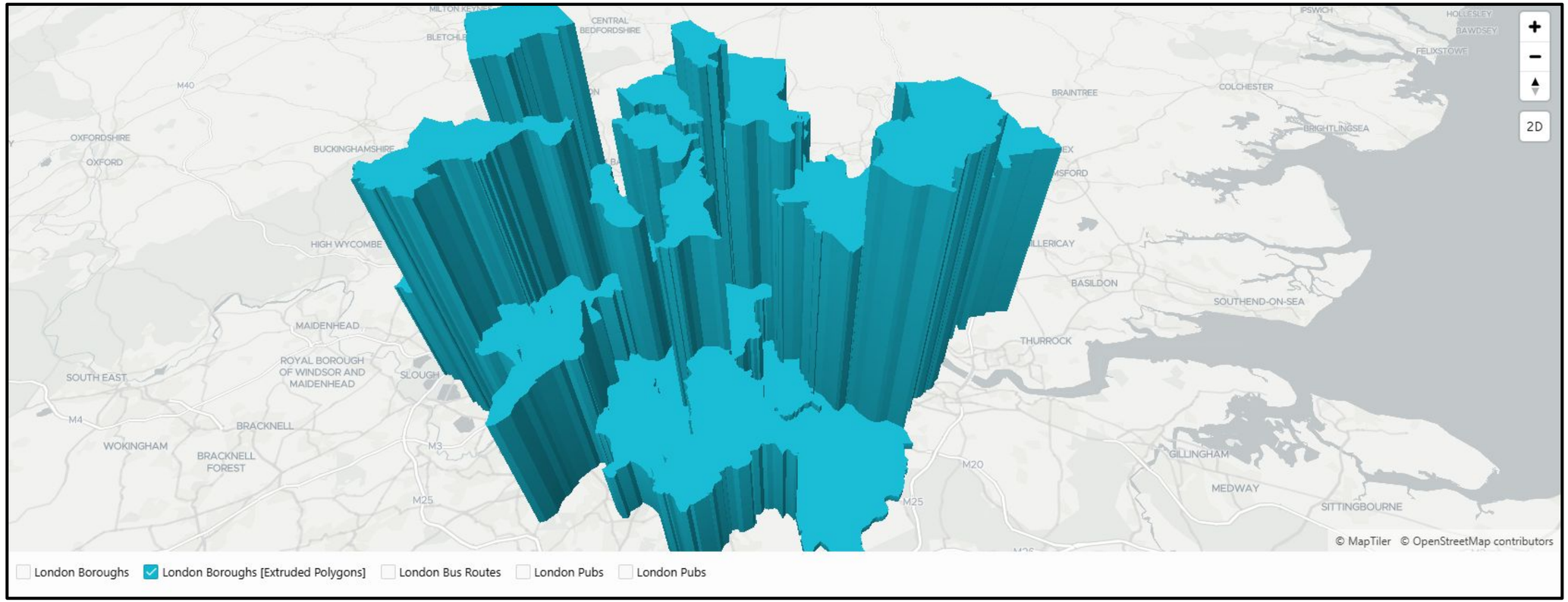
Extruded polygons (Districts)



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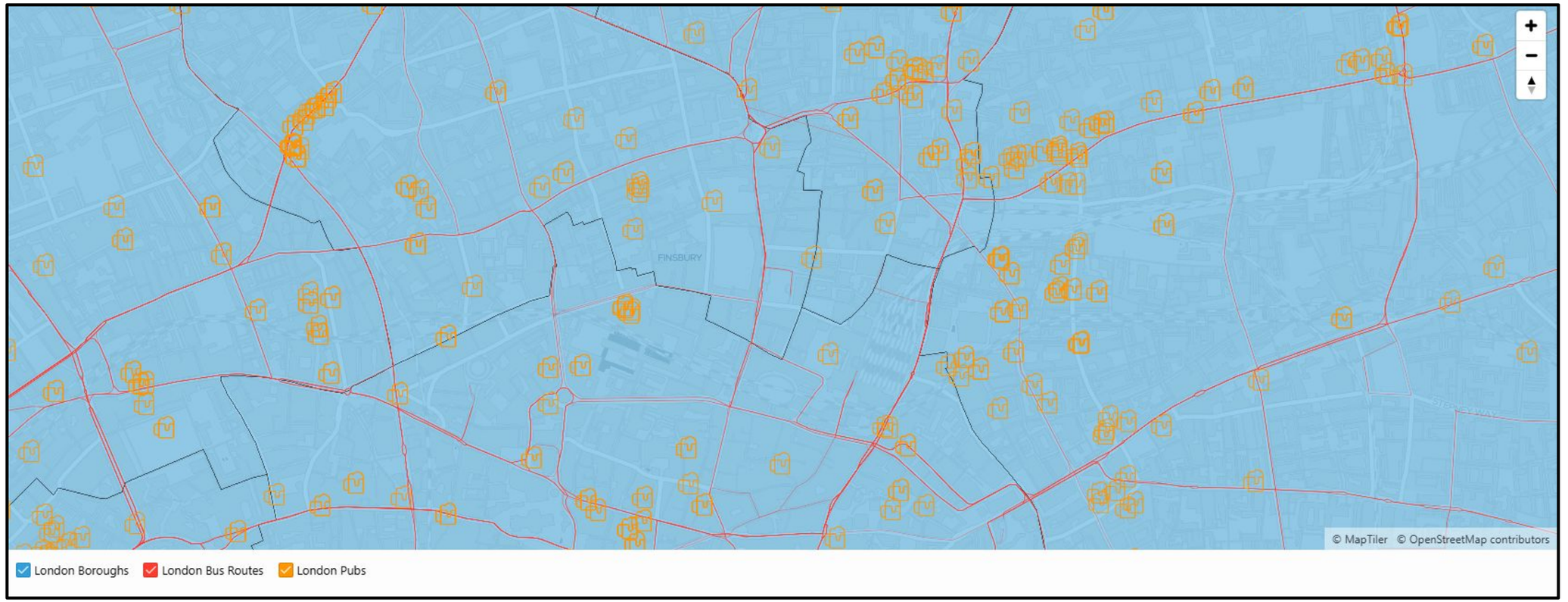
Layers and customization



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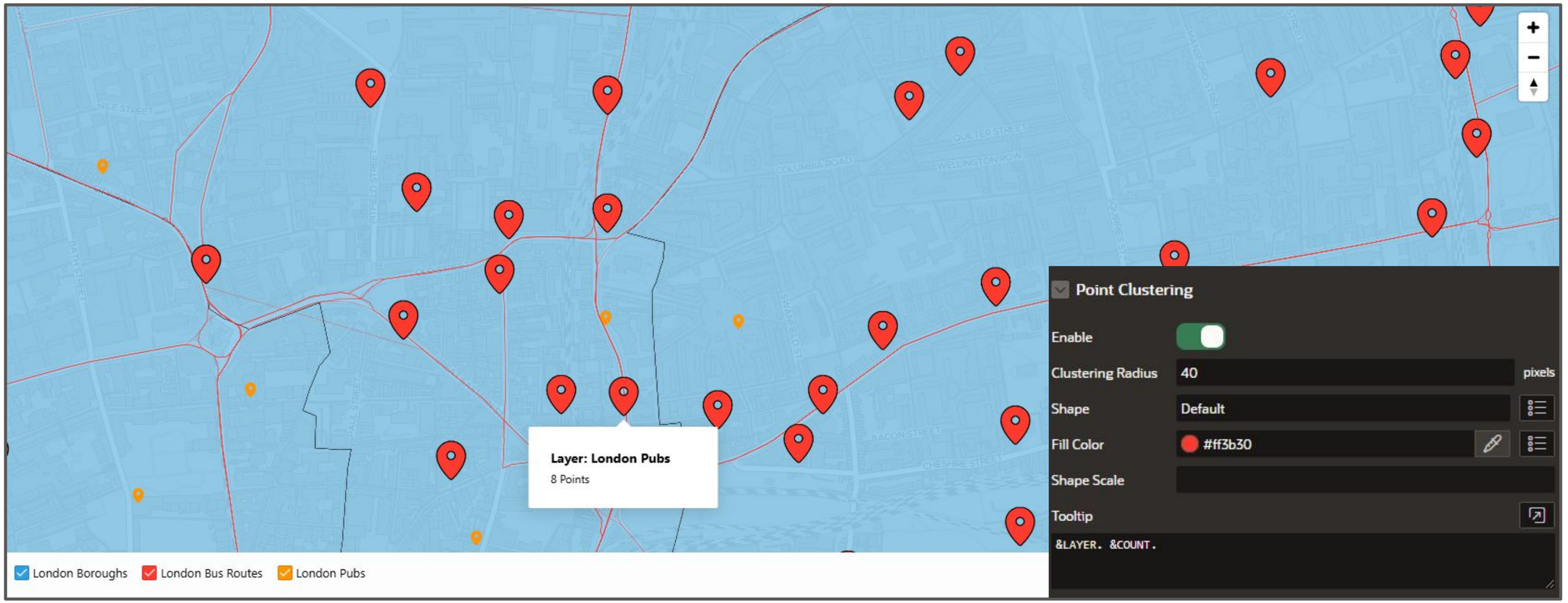
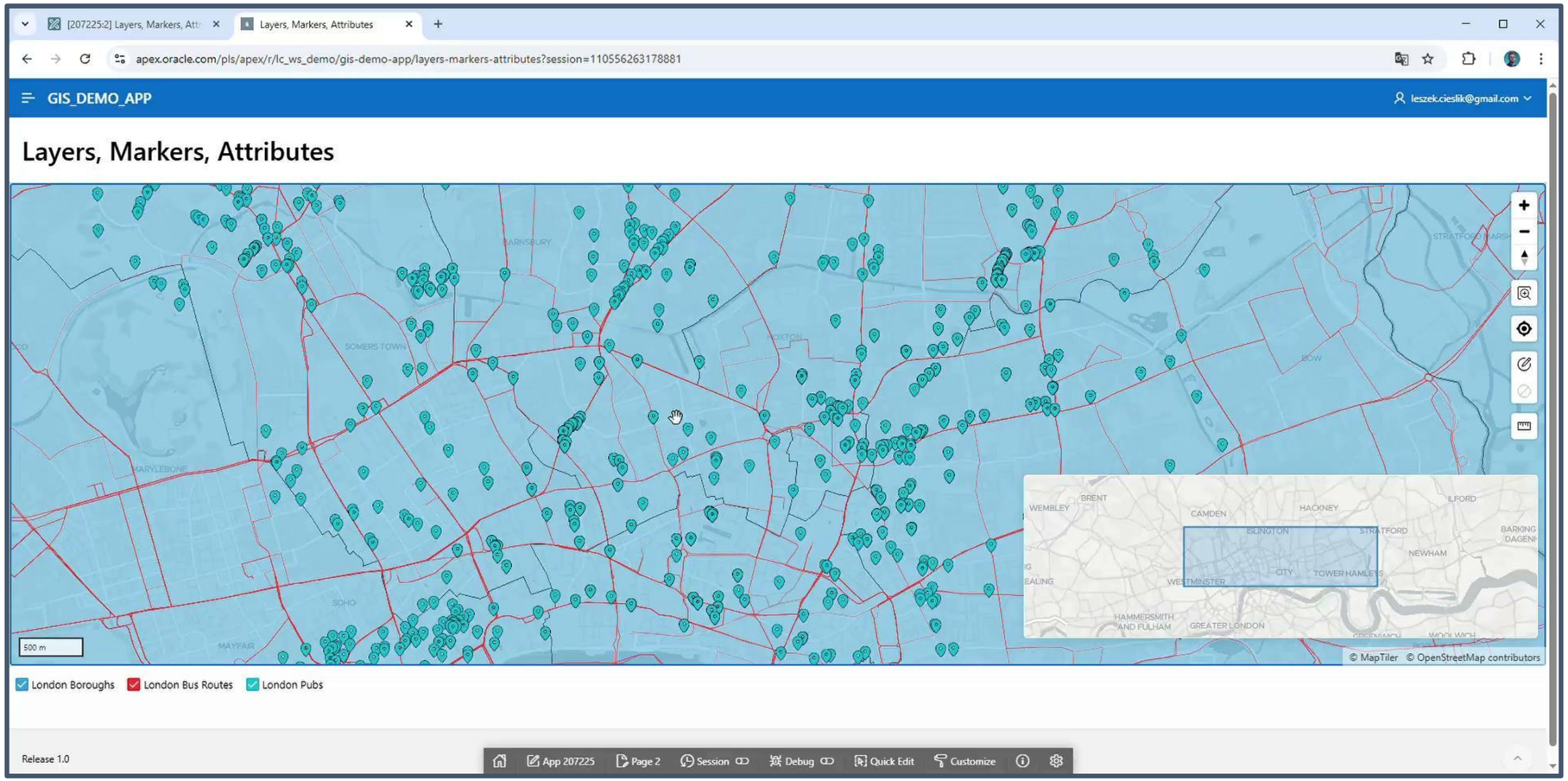
Points and clusters



Map region attributes

Attributes - Mousewheel Zoom



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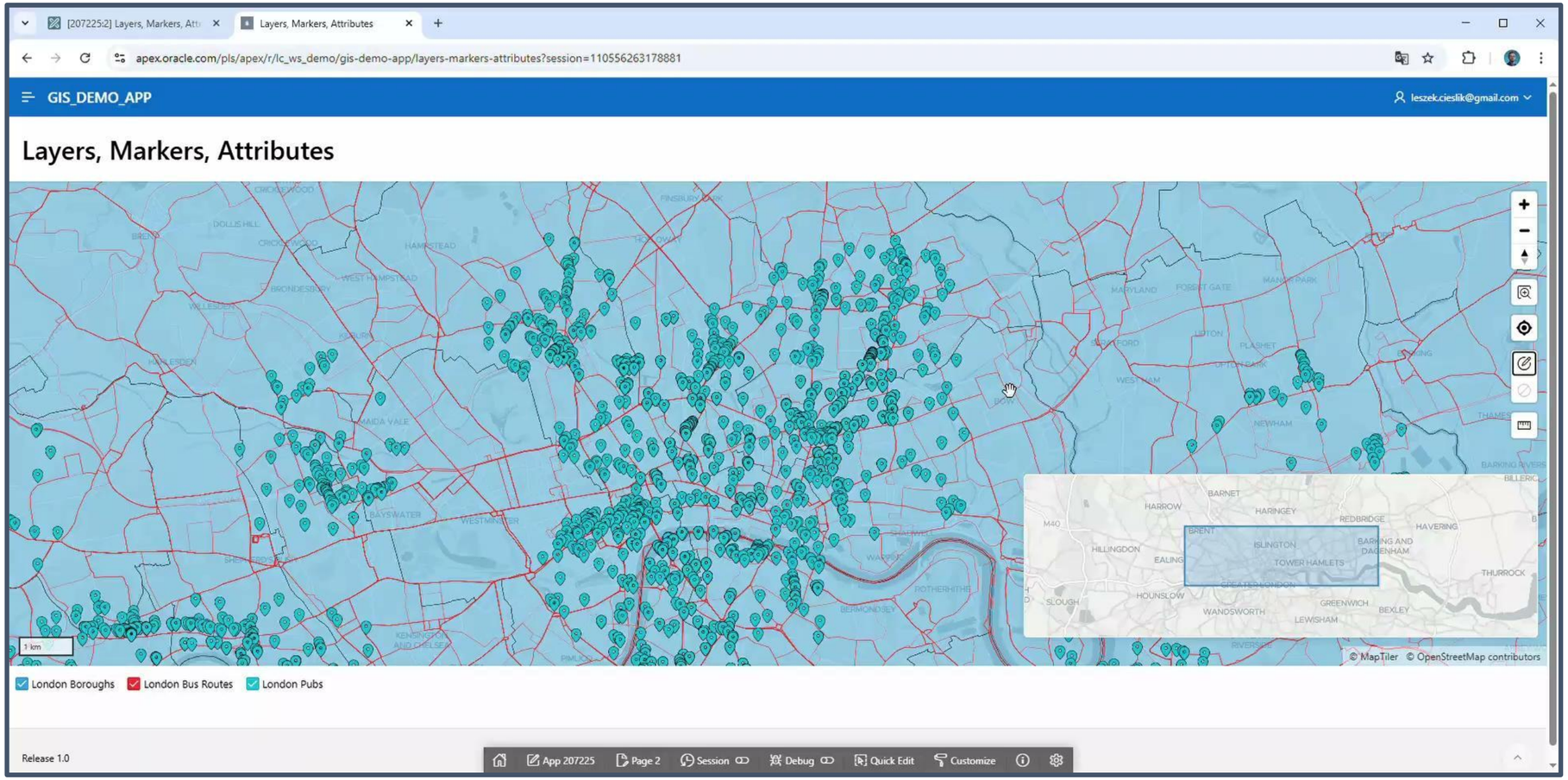
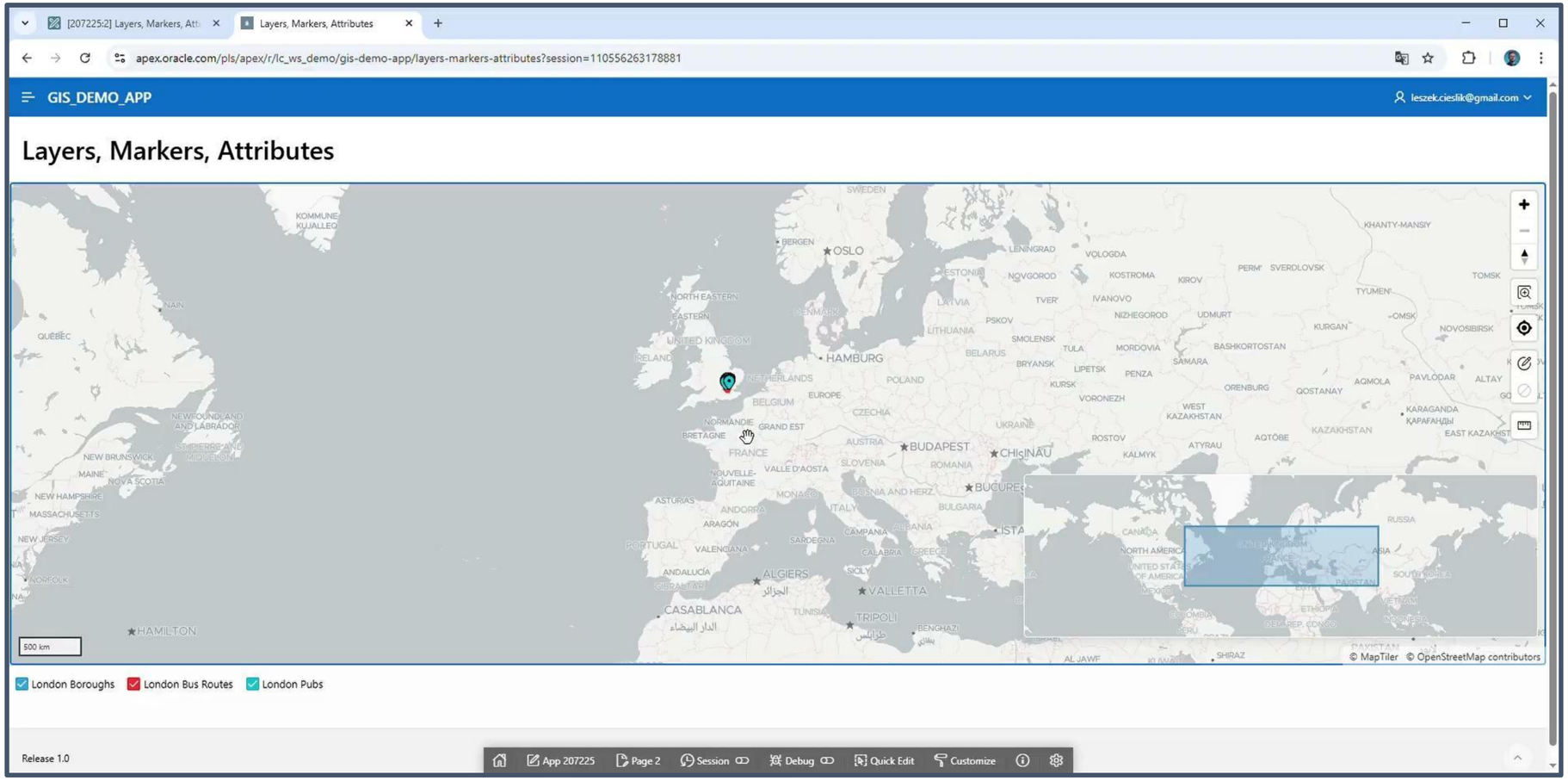
Attributes - Rectangle Zoom



Attributes - Infinite Map



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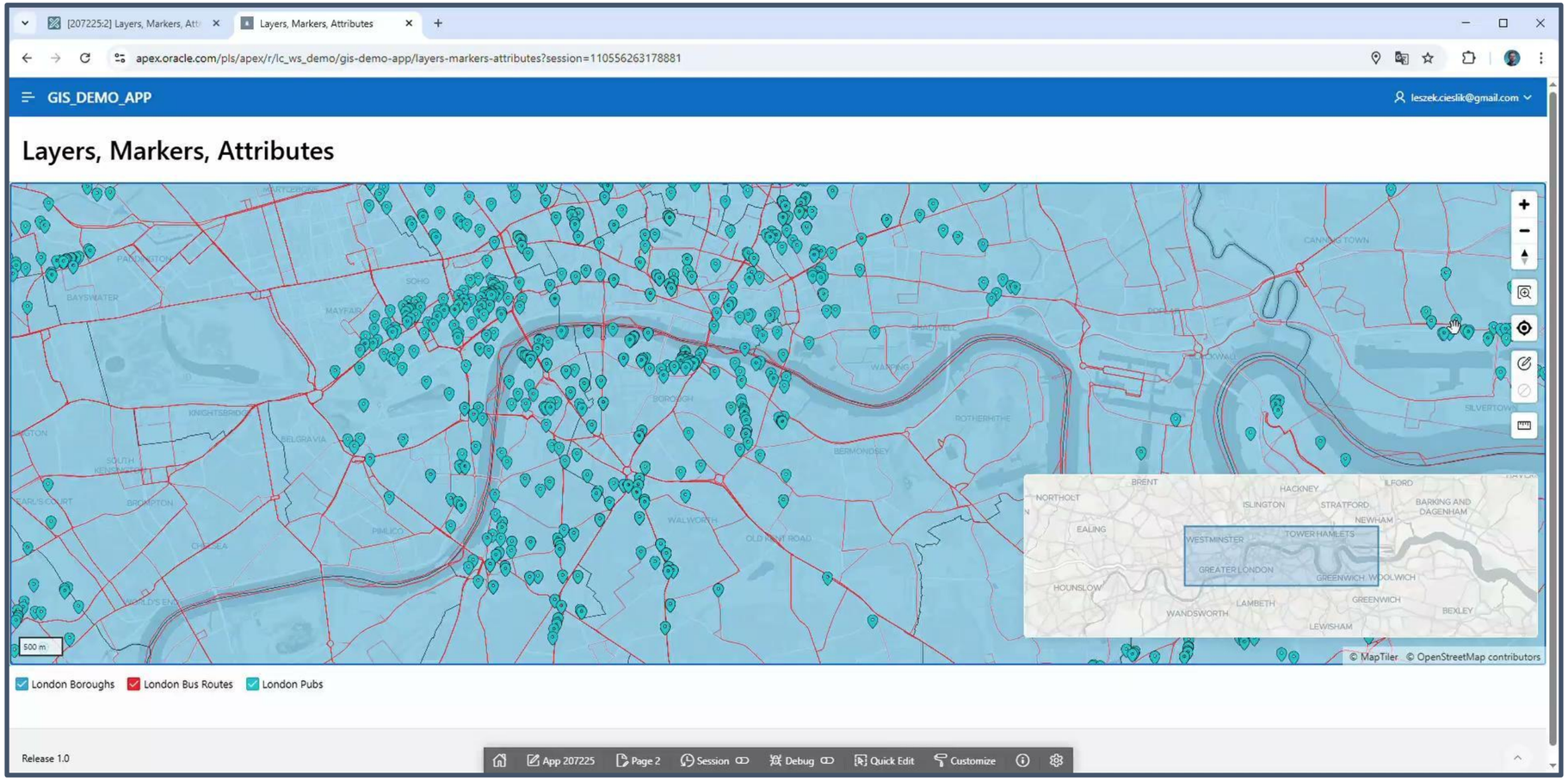
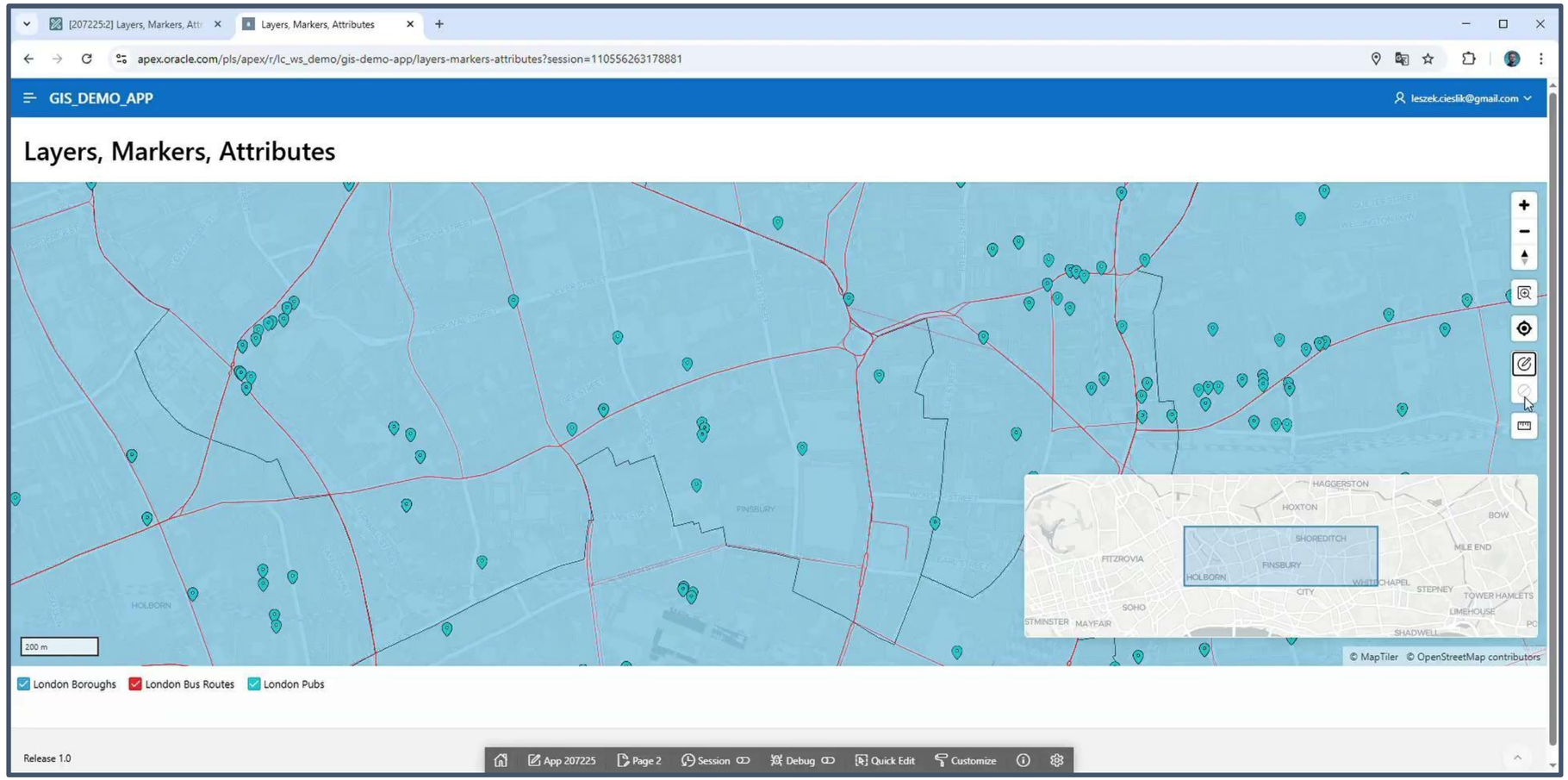
Attributes - Get Browser Location



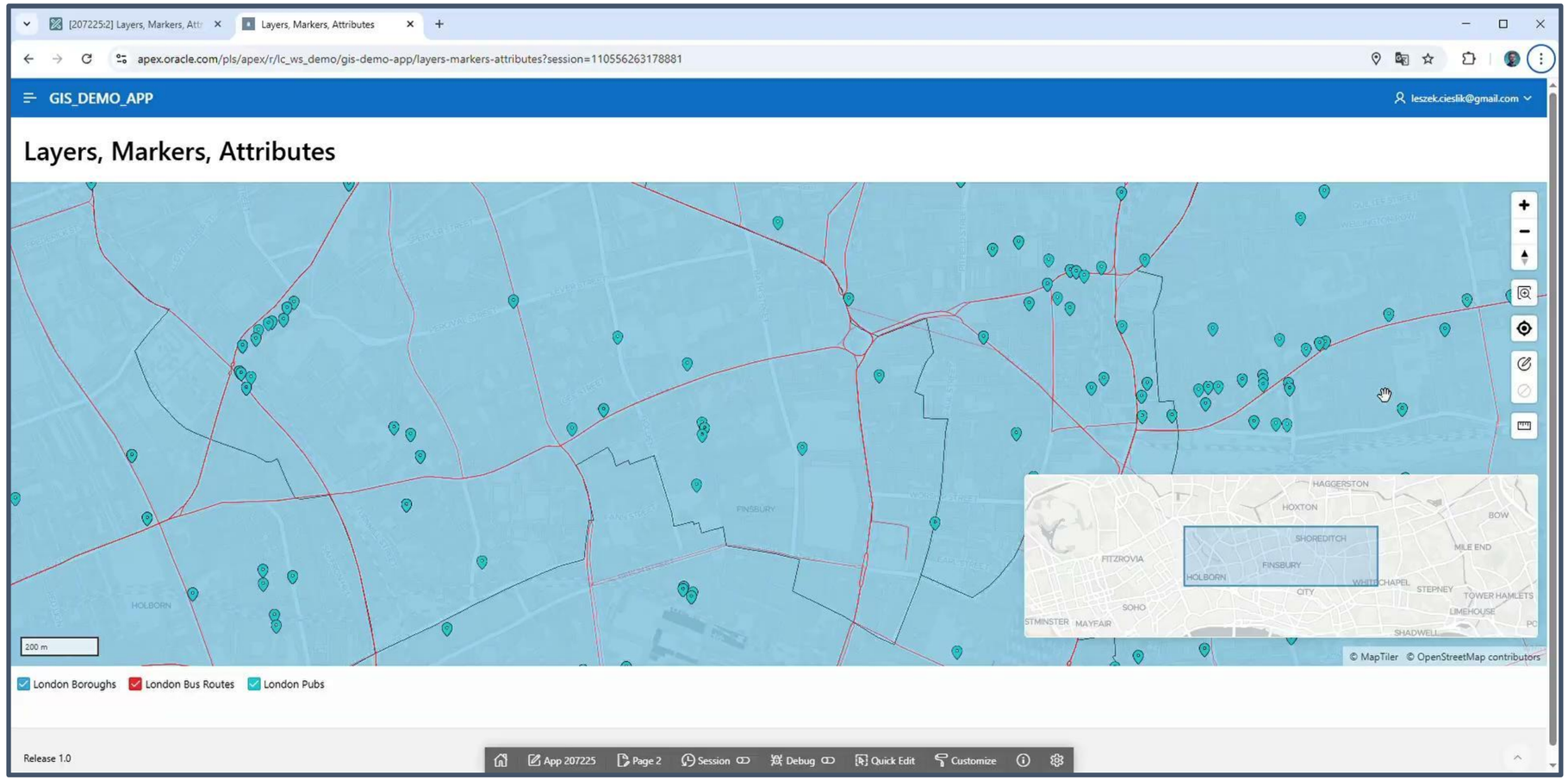
pretius

Attributes - Distance Tool

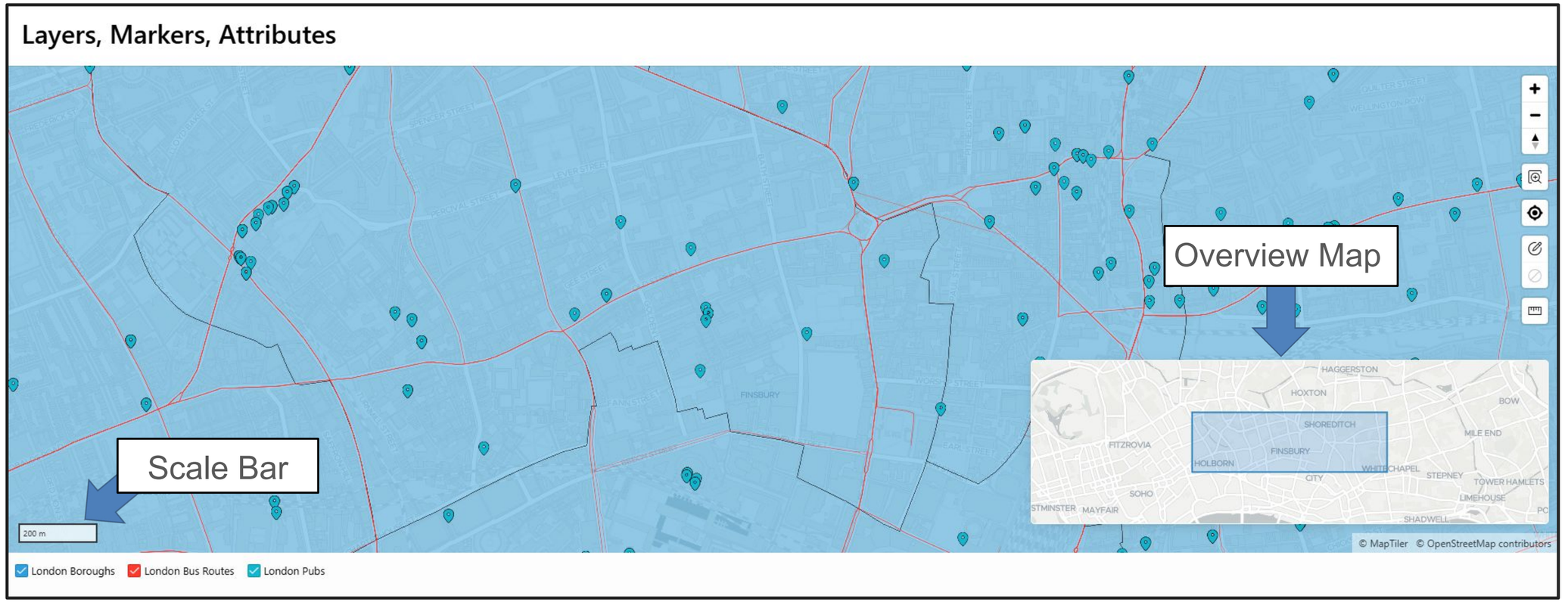


pretius

Attributes - Circle Tool



Attributes - Scale Bar and Overview Map



Dynamic actions

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Dynamic action? What's that?

Dynamic actions provide a way to **define complex client-side behavior** declaratively without the need for JavaScript. Using the Dynamic Action Create wizard, you **specify an action that is performed when a defined set of conditions occur.** You can also specify which elements are affected by the action, and when and how they are affected. (*https://docs.oracle.com)*

Two steps:

1. Specify the **event** that causes the dynamic action
2. Specify an **action** you want to perform

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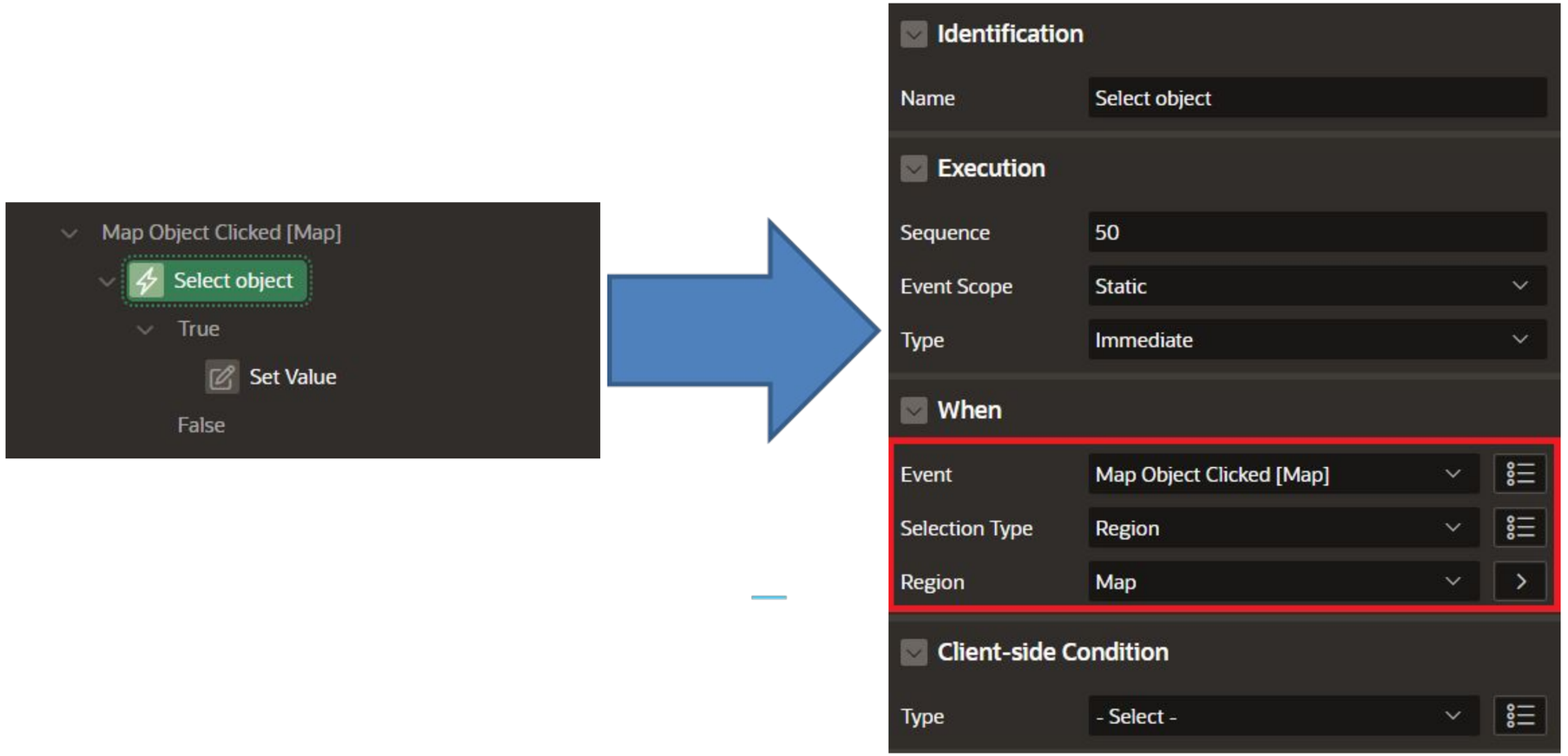
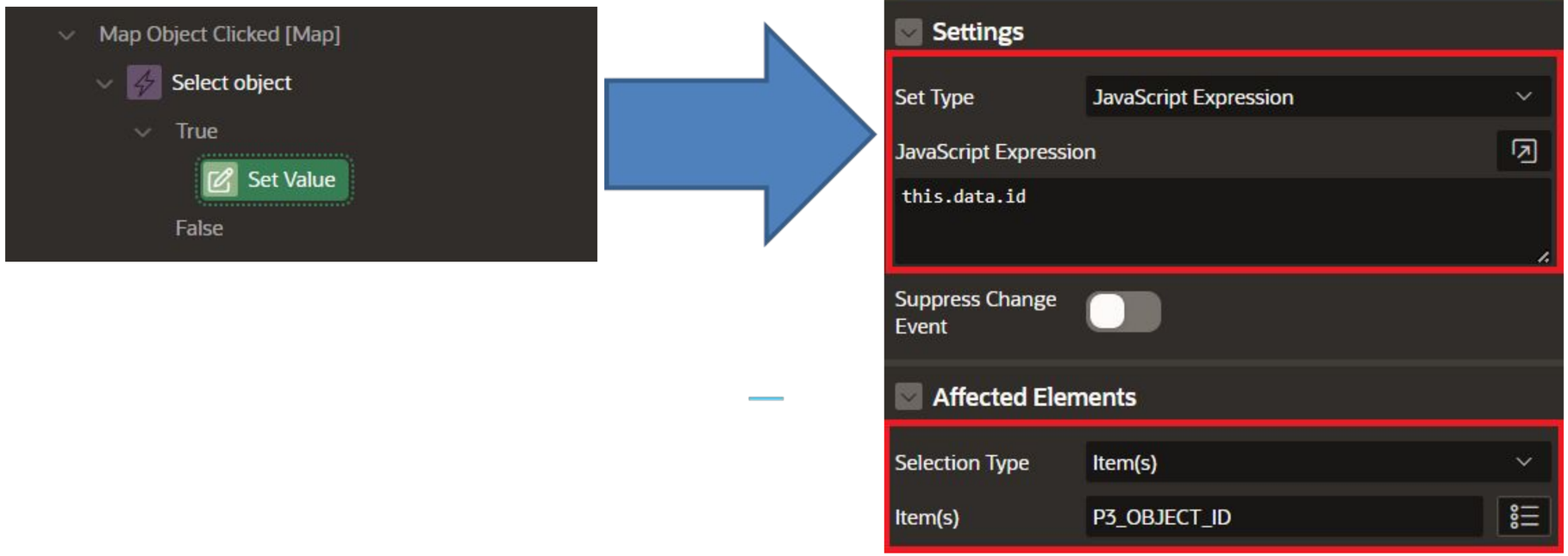
Dynamic actions and Map region

- Event: Map Object Clicked (user clicks on the object icon)
  - Action: get ID of the object
- Event: Map Changed (user draws a circle using the Circle Tool)
  - Action: get GeoJSON of the circle (and think how to use it to select the objects :))
- Event: Map Clicked (user clicks on the map)
  - Action: get coordinates
- Event: Map Initialized (the map has been loaded)
  - Action: Add drawing plugin

Selecting an object - step 1

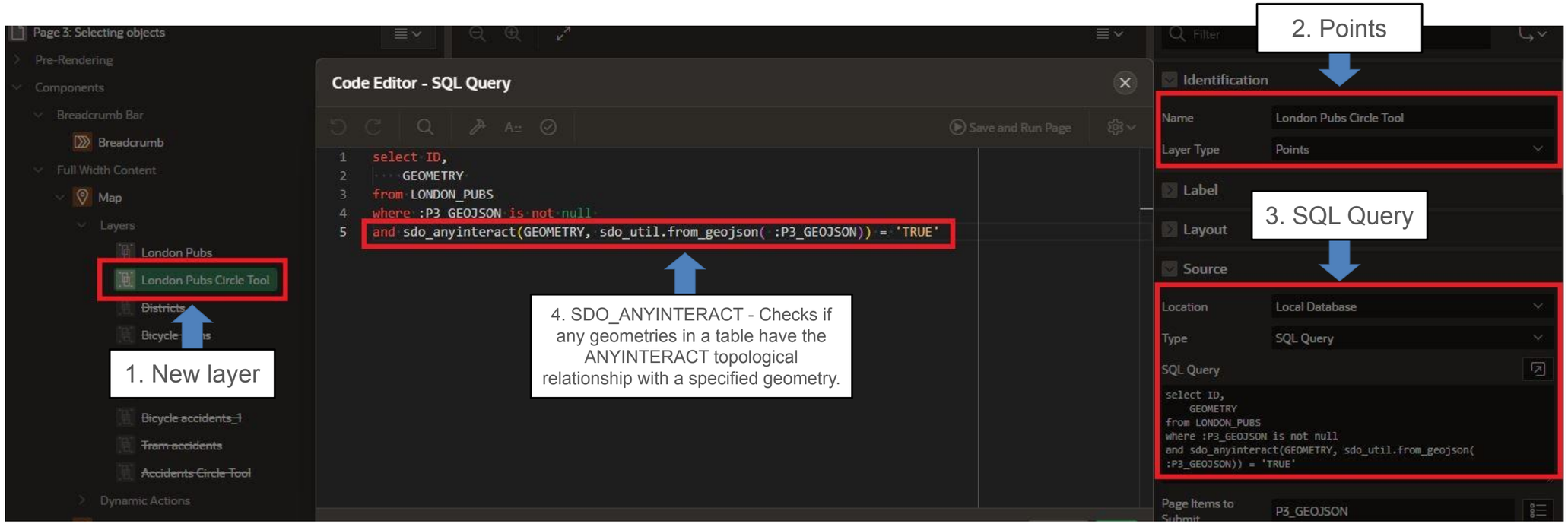


Selecting an object - step 2



Selecting an object with Circle Tool - step 1

Selecting an object with Circle Tool - step 2



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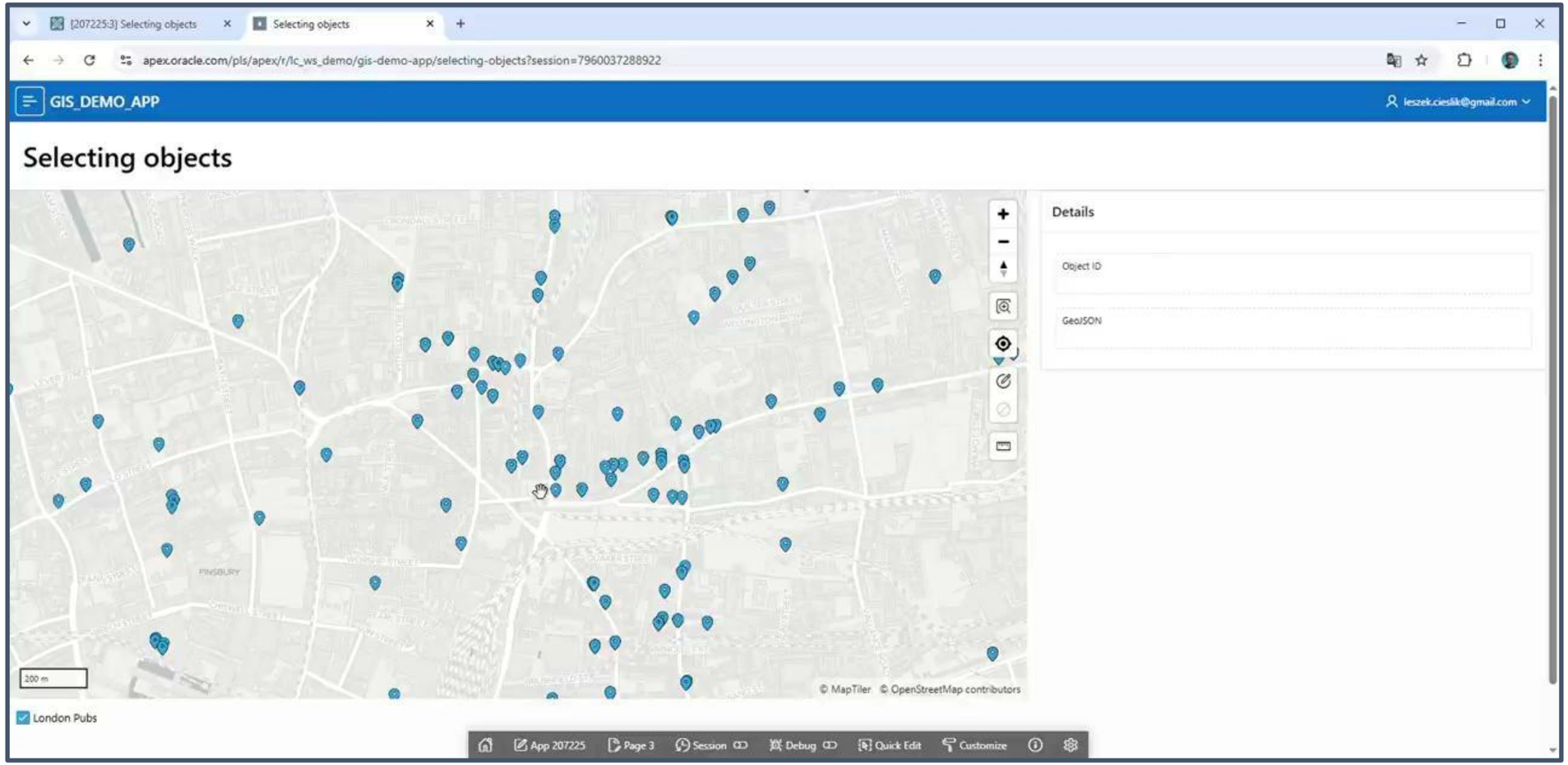
Selecting objects



Geocoding and Geolocation

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Geocoding vs Geolocation

Geocoding is the process of converting addresses into geographic coordinates.

Input: An address or place name.

Output: Geographic coordinates

Use Cases:

- Mapping locations on a map.
- Finding the latitude and longitude for a given address.

Geolocation is the process of determining the geographic location of a device or user.

Input: Signals or data from GPS, IP address, Wi-Fi

Output: Geographic coordinates

Use Cases:

- Finding the current location of a device.
- Location-based services and applications (e.g., navigation, location-based marketing).

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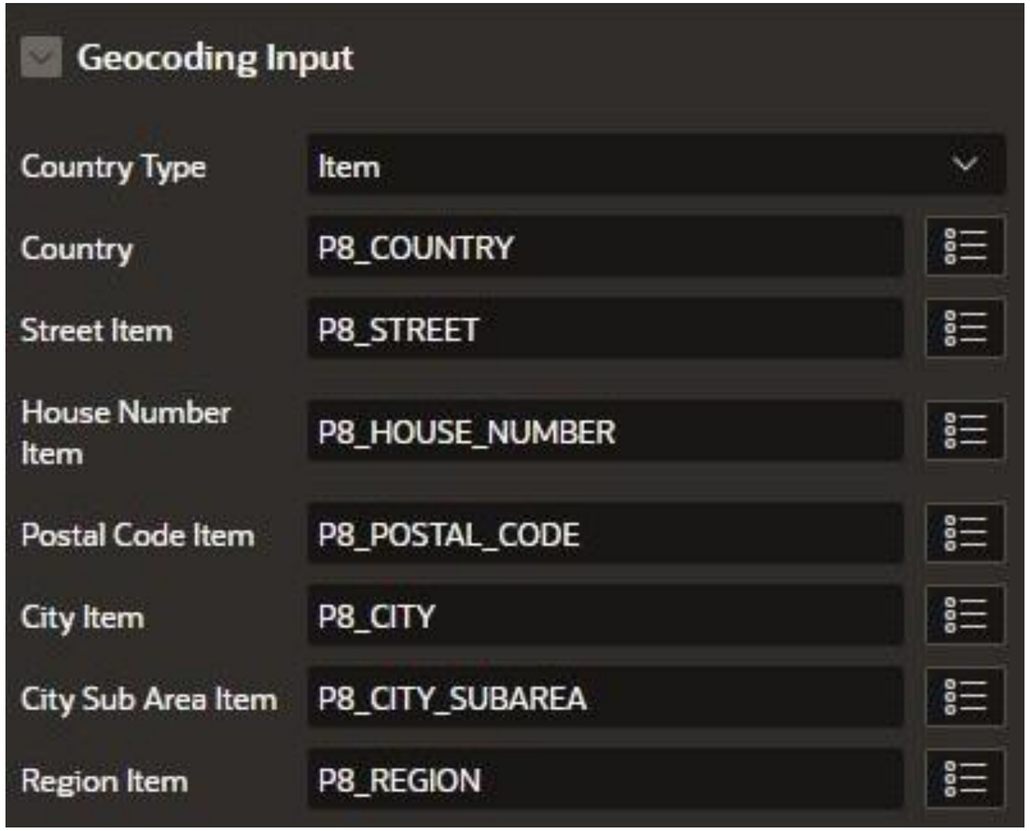
Geocoded Address Item

- Geocoded Address Item provides Geocoding (turning a postal address to a coordinate) functionality.
- Geocoding is performed by the browser doing a REST request to the Oracle eLocation Geocoding Service (elocation.oracle.com).
- Geocoding input data comes from other page items which are mapped to address parts like Street, House Number, Postal Code or City.



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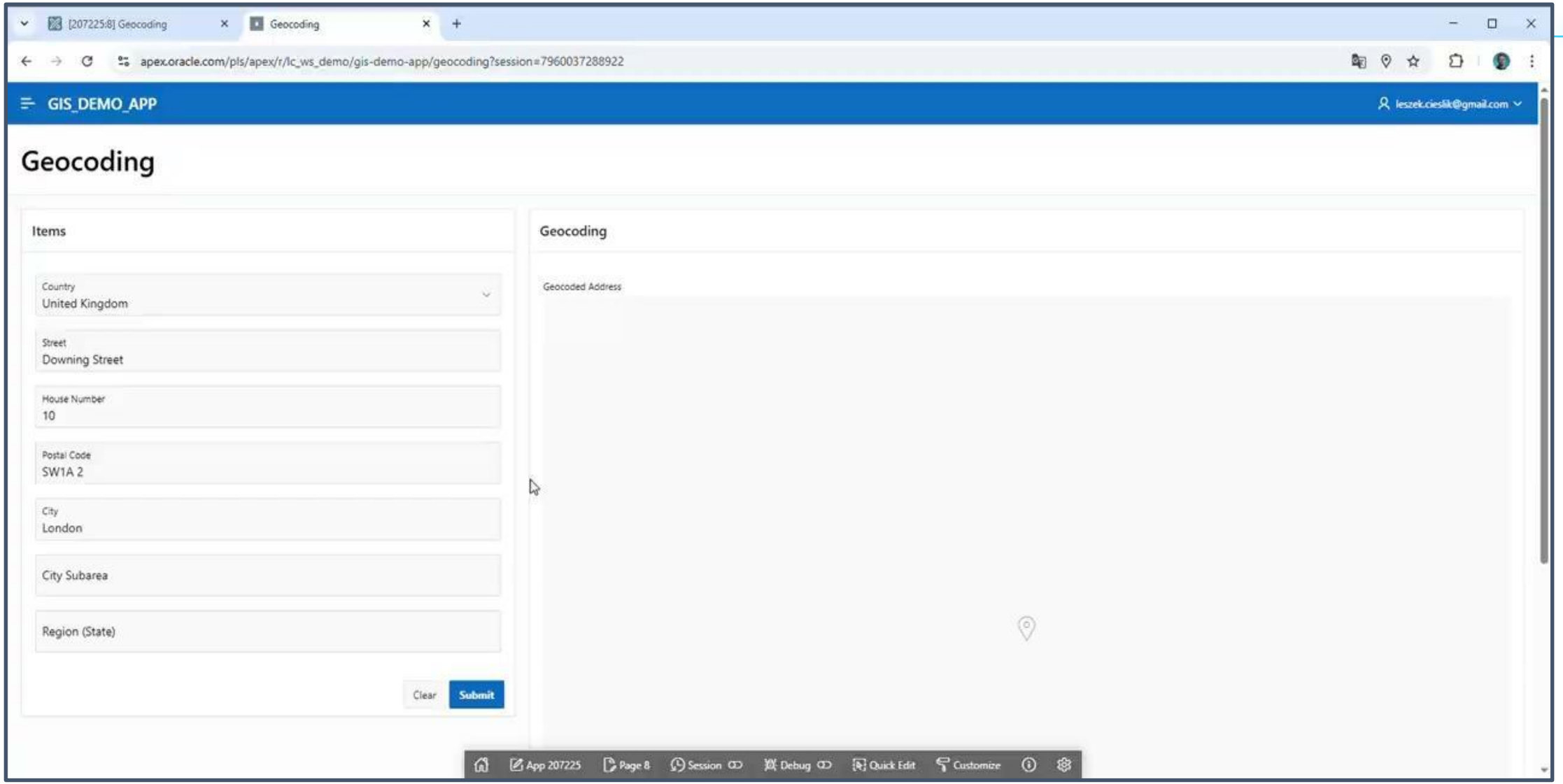
[207225:8] Geocoding
Geocoding
apex.oracle.com/pls/apex/r/lc_ws_demo/gis-demo-app/geocoding?session=7960037288922
GIS_DEMO_APP
leszek.cieslik@gmail.com
Geocoding
Items
Country
United Kingdom
Street
Downing Street
House Number
10
Postal Code
SW1A 2
City
London
City Subarea
Region (State)
Clear
Submit
Geocoding
Geocoded Address
App 207225
Page 8
Session
Debug
Quick Edit
Customize

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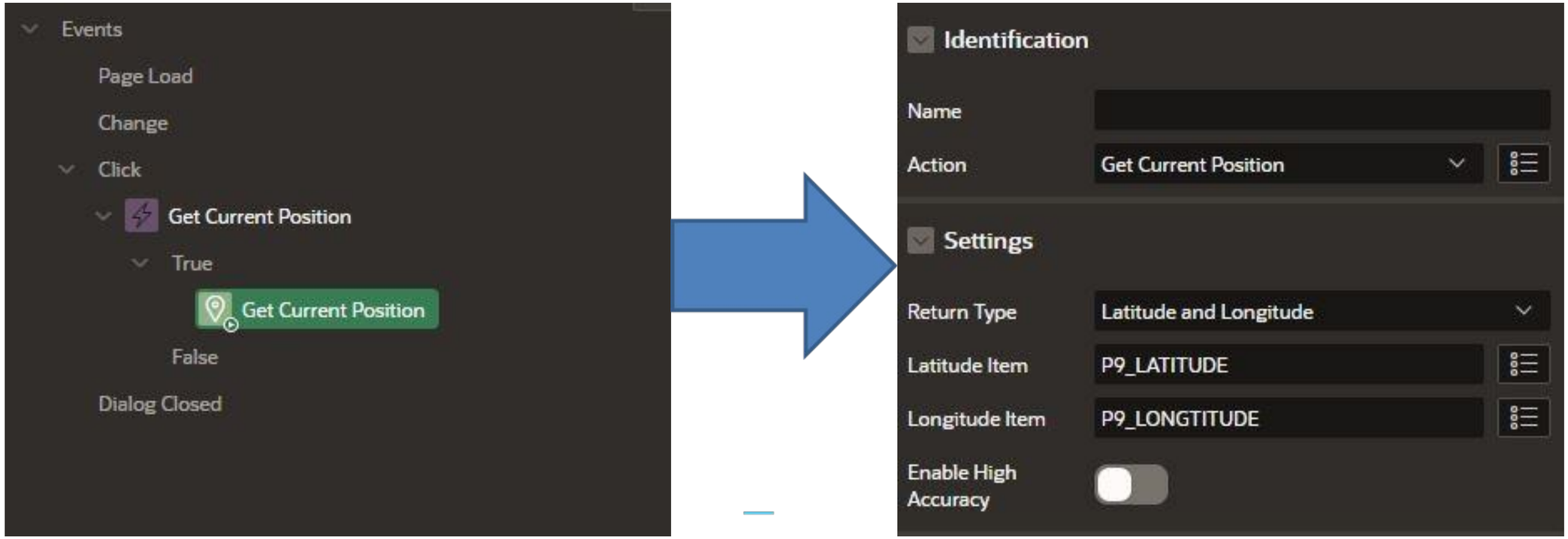
Get Current Position



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Part 1: Summary

SDO_GEOMETRY, GeoJSON, VARCHAR

Map region

Layers: Points, Lines, Polygons, Heat maps, Extruded polygons

Get Browser Location, Distance Tool, Circle Tool, Scale Bar...

Clusters

Map Dynamic Action

Geocoding and Geolocation

Part 2: Advanced Techniques

CRS

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Coordinate Reference Systems? What's that?

- A **Coordinate Reference System (CRS)** is used to define how spatial data is represented in a geographic space. It provides a standardized way to interpret coordinates (such as latitude and longitude) by relating them to a specific location on the Earth's surface.
- **over 6000** different coordinate reference systems!
- examples: EPSG:4326 – WGS 84 (World Geodetic System 1984); EPSG:3857 – Web Mercator; EPSG:32633 / EPSG:25832 – UTM Zone 33N (WGS 84 / ETRS89); EPSG:28992 – Amersfoort / RD New; EPSG:2180 – ETRS89 / Poland CS92

Why are there so many CRS? It's a nightmare!

- The Earth is round, but maps are flat
- Different country needs
  - Netherlands (EPSG:28992) – optimized for a small, flat landscape
  - Poland (EPSG:2180) – adapted to its specific shape.
- Legacy systems vs. modern standards
- Higher accuracy
- Legal regulations

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SDO_GEOMETRY - Point

SDO_GTYPE - determine the type of the geometry (point, line, polygon, ...)
2001 – 2 dimensions/point

SDO_SRID - coordinate system
4326 – WGS 84 (World Geodetic System '84) latitude/longitude

SDO_POINT – point with X,Y,Z attributes

```
SDO_GEOMETRY(
2001,
4326,
SDO_POINT_TYPE(
   0.18612966342500153,
   51.577878487755726,
   NULL),
NULL,
NULL
)
```

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Coordinate Reference Systems

CRS Code = **4326**

Name: **WGS84**

Geometry: POLYGON ((

20.7533776504406 52.3973224996299,

20.7533776504406 52.0959234112862,

21.3046961460238 52.0959234112862,

21.3046961460238 52.3973224996299,

20.7533776504406 52.3973224996299

))

CRS Code = **28992**

Name: **Amersfoort / RD New**

Geometry: POLYGON ((

1195334.93117735 600956.467056177,

1202452.02410556 567953.574939523,

1239613.12367566 576107.860486178,

1232239.92224748 609071.503559281,

1195334.93117735 600956.467056177

))

Coordinate Reference Systems

APEX **automatically transforms** the CRS in SDO_GEOMETRY **to WGS84**

Readability and performance

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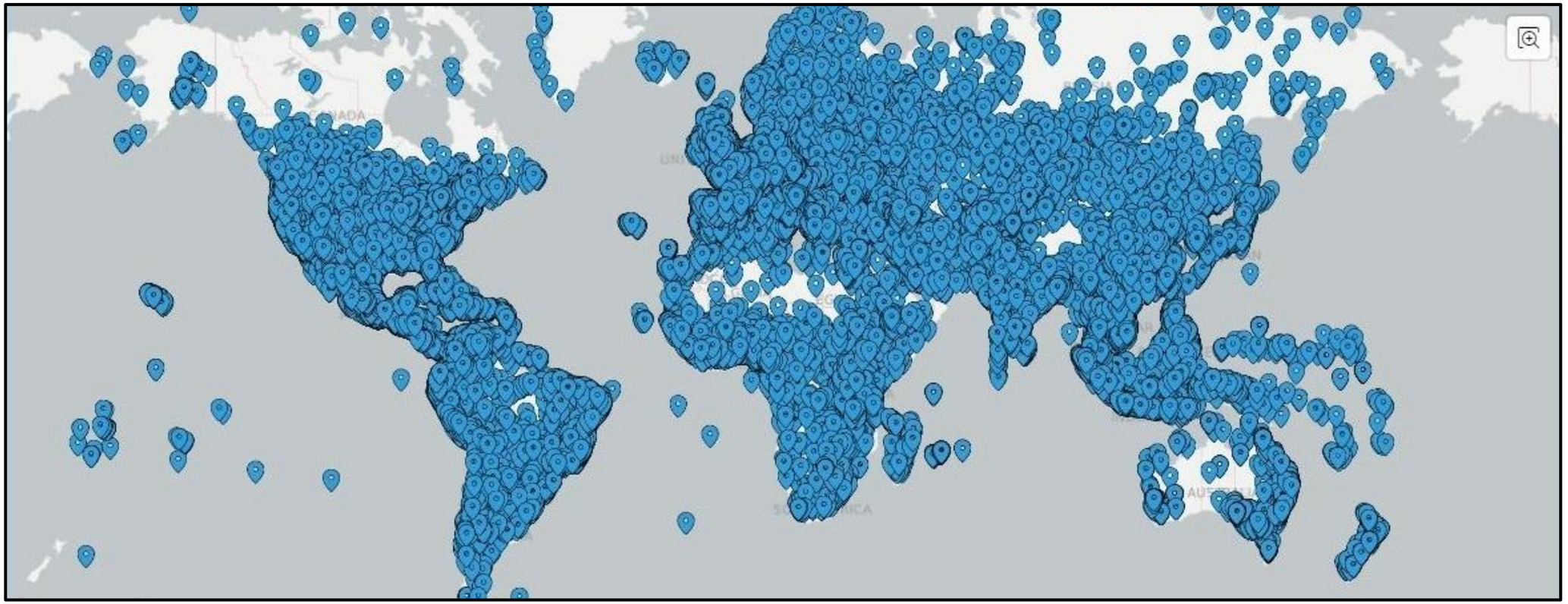
Readability and performance (140 000 cities)



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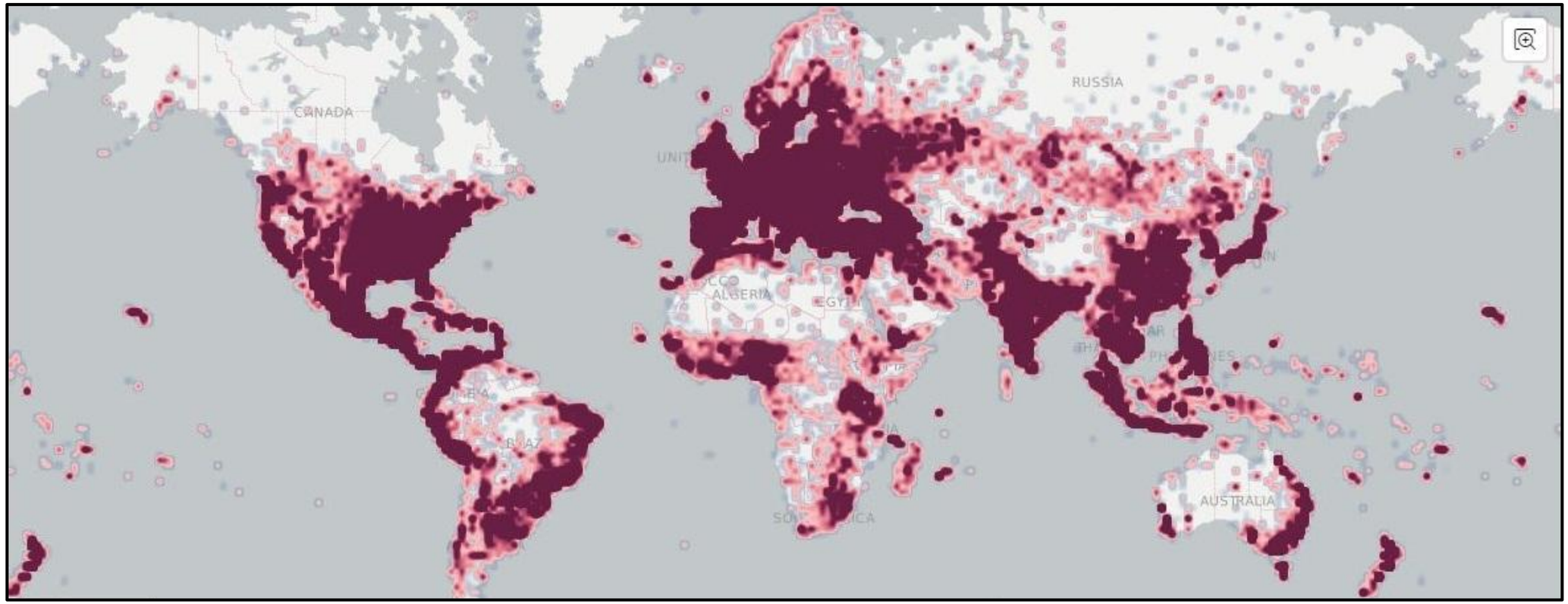
Readability and performance (Heat map)



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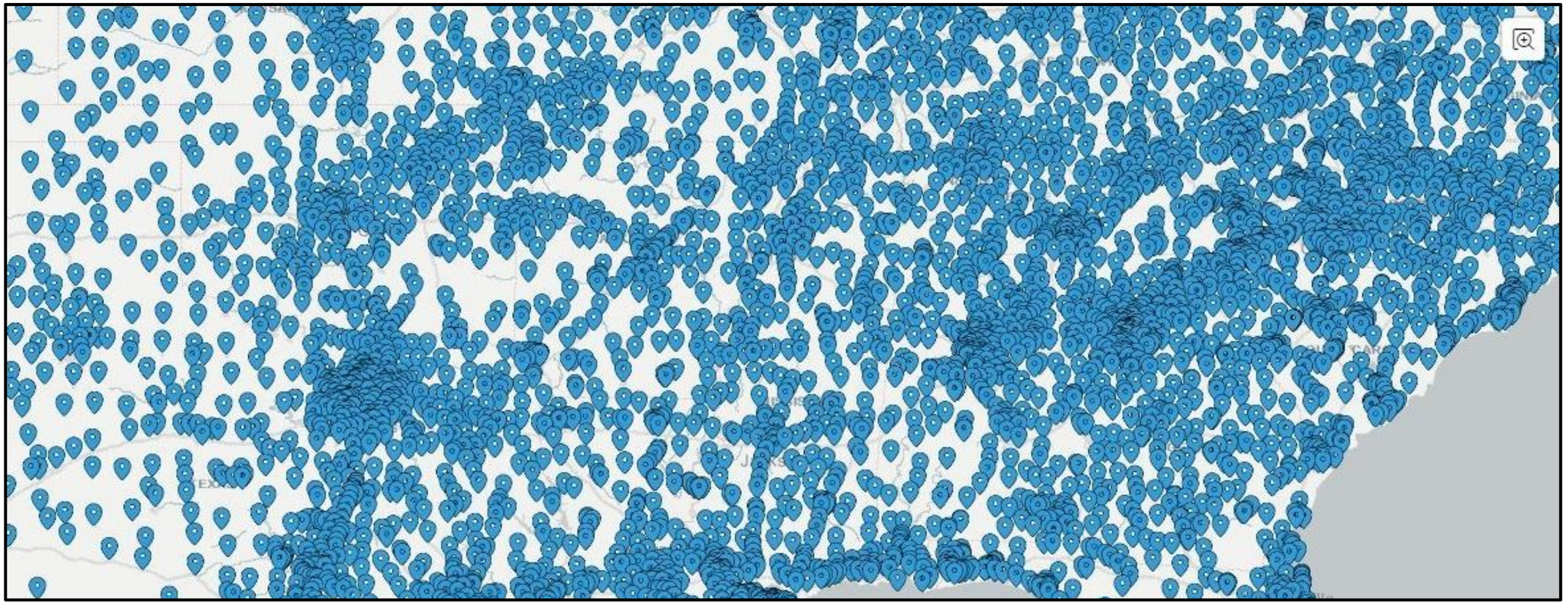
Readability and performance (Part of the map)



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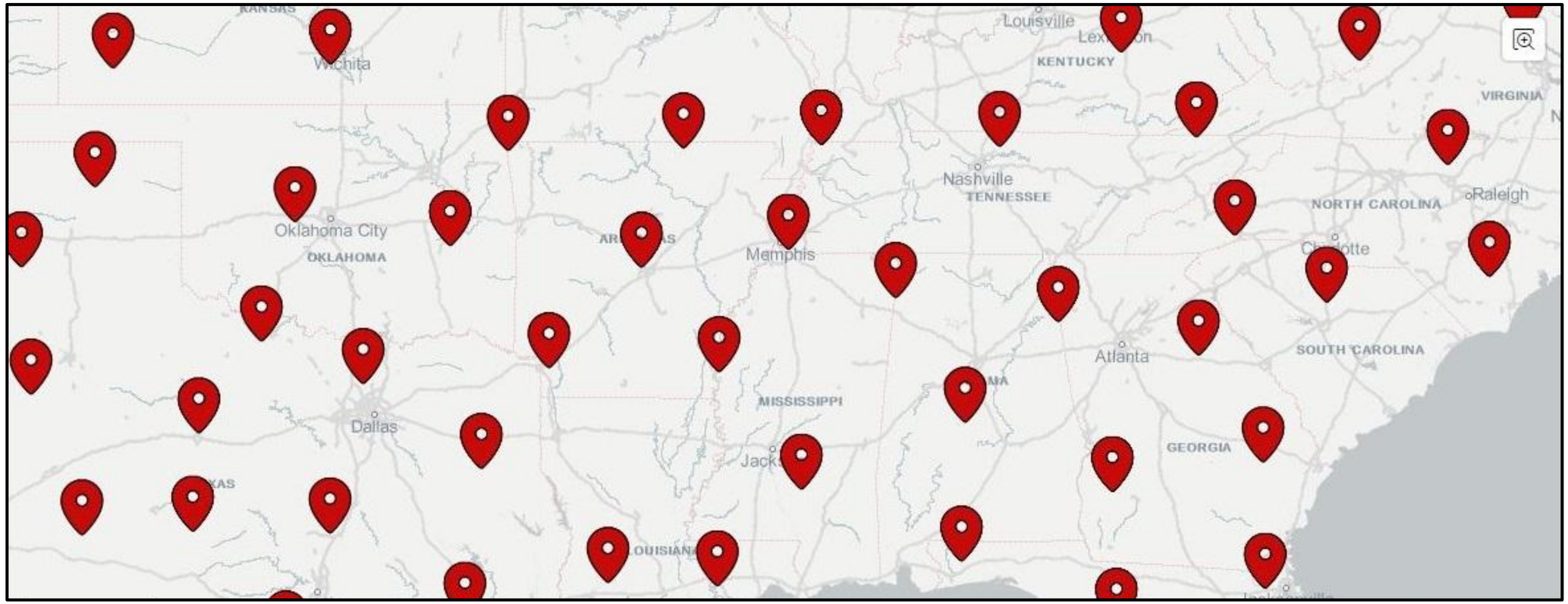
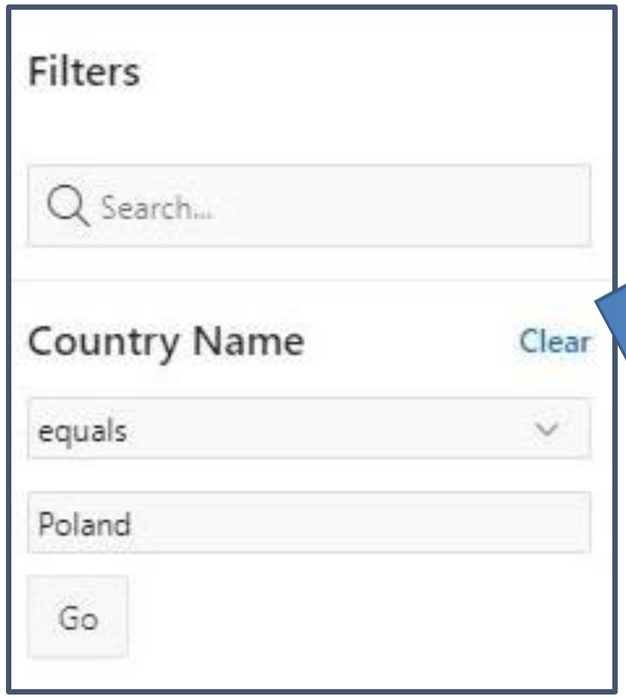
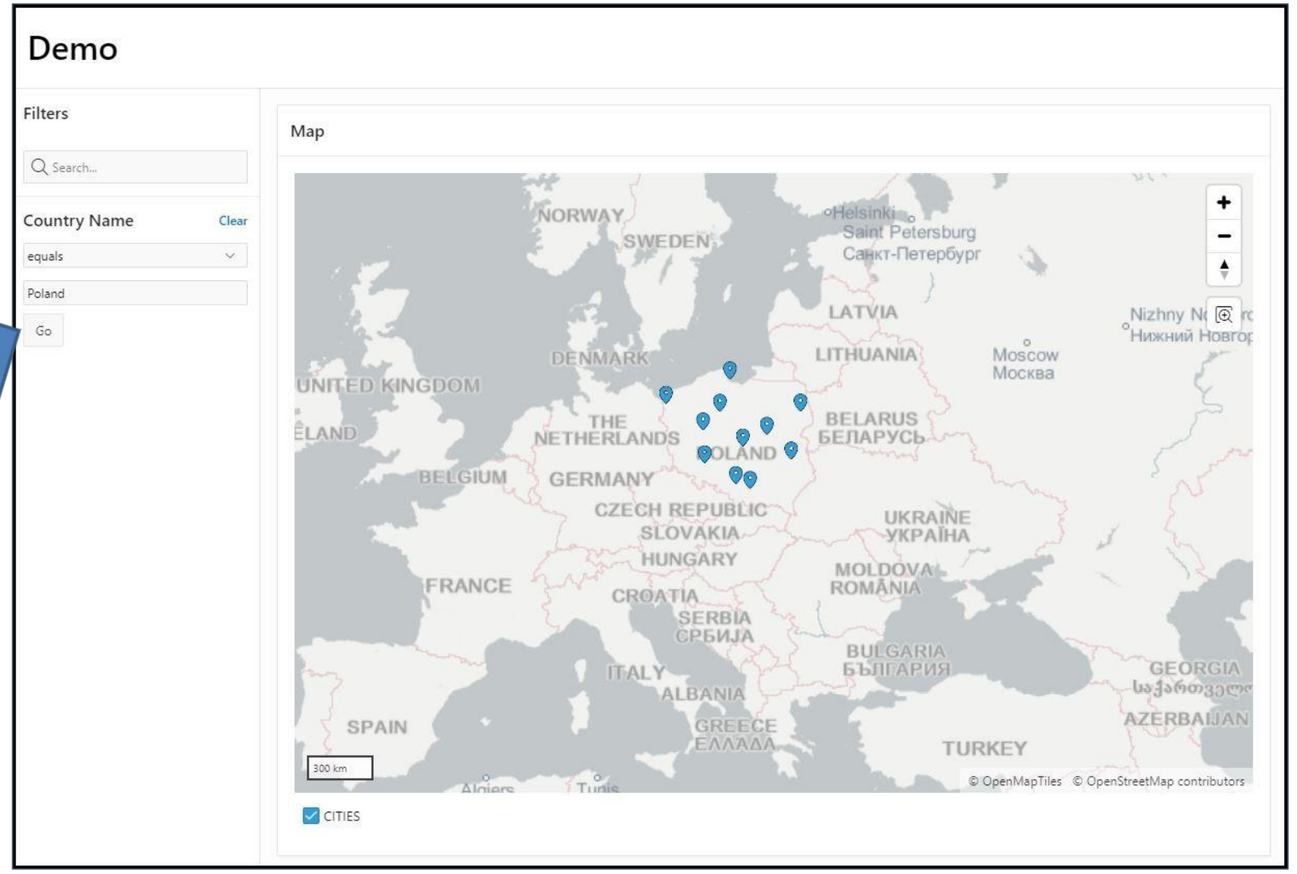
Readability and performance (Clusters)

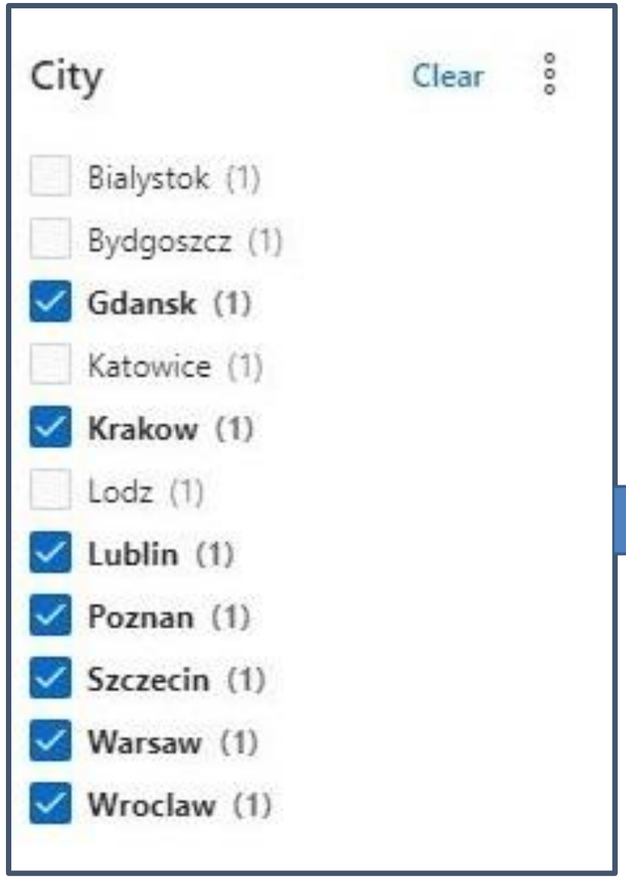


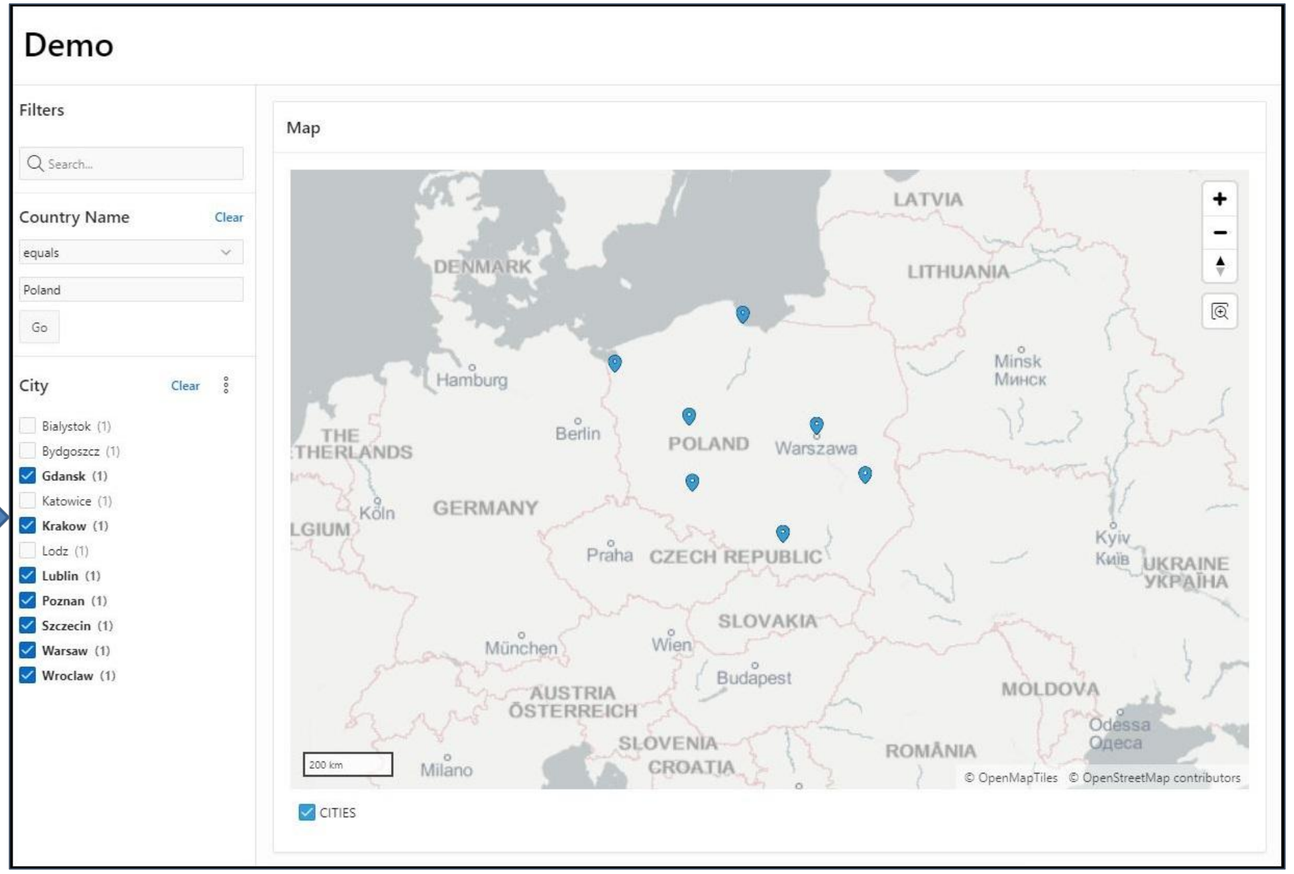
Readability and performance (Faceted Search)



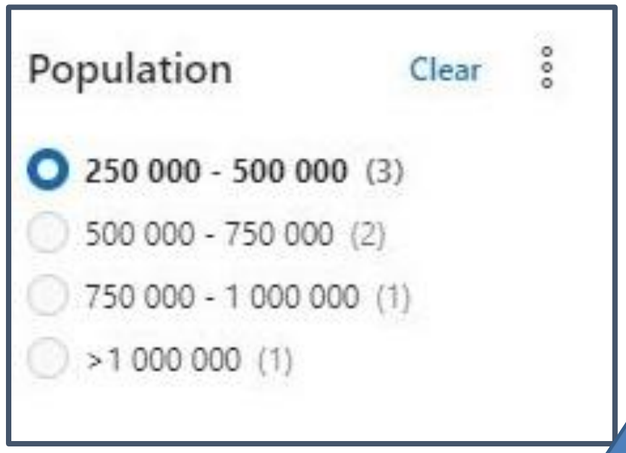


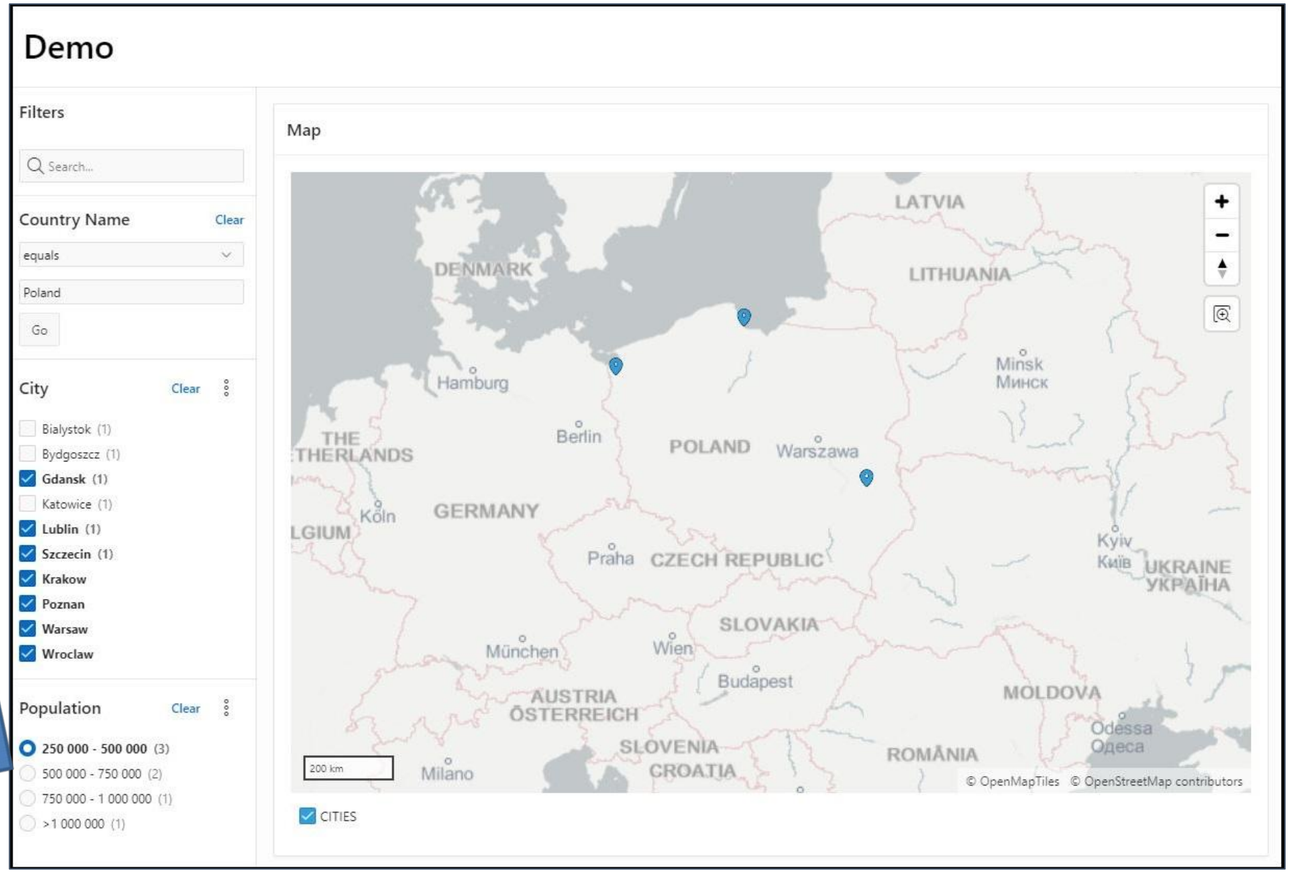
Readability and performance (Faceted Search)





Readability and performance (Faceted Search)





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Readability and performance (Spatial Indexes)

A **spatial index** in Oracle Database helps **speed up** searches for location-based data, such as maps or shapes (points, lines, and areas). It makes finding and retrieving this data faster by organizing it in a way that is easy to search. Such an index **can be created on** a column of the **SDO_GEOMETRY** type, so we will **have to convert** our geographic data stored in the Longitude and Latitude columns of the VARCHAR2 type.

```
CREATE INDEX index_name ON table_name (column_name)
INDEXTYPE IS MDSYS.SPATIAL_INDEX;
```

Readability and performance (Spatial Indexes)

Note that a **Spatial Index will not be used** in the following situations:

- **More than one layer** references the Region Source as their data source.
- The **map window is too large**; that is the case when it spans more than half of the world.

WMS and WFS

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WMS vs WFS

Web Map Service (WMS) is a standard protocol developed by the Open Geospatial Consortium (OGC) that allows users to request and display maps generated by a server from spatial data. WMS delivers **map images** in various formats (such as PNG, JPEG, or SVG), making it easy to integrate and display in web applications.

Web Feature Service (WFS) is a standard protocol developed by the Open Geospatial Consortium (OGC) for serving geospatial data over the internet. The key difference is that while WMS provides rendered map images, WFS offers **vector data - features with geometry and attributes**.

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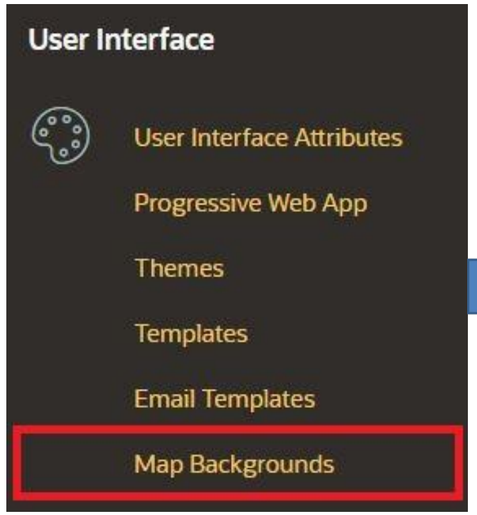
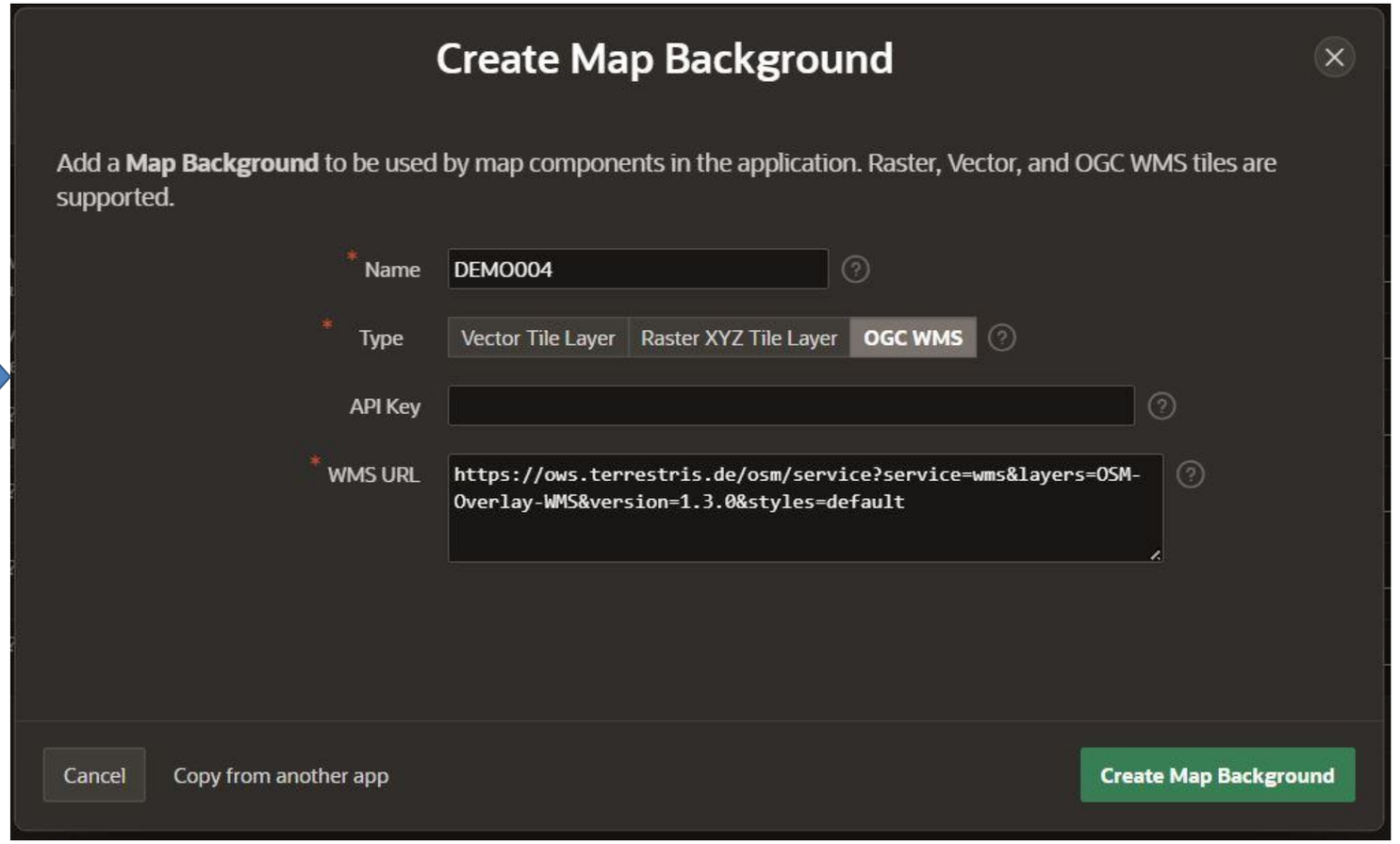
Map Backgrounds - new 23.2 APEX feature





WMS as Map Background

https://ows.terrestris.de/osm/service?

What we have:

- BBOX
- WIDTH
- HEIGHT
- REQUEST
- FORMAT
- SRS / CRS

What we need:

- LAYERS
- STYLES
- VERSION

3.2.2. GetMap

Standard parameters for the **GetMap** request according to the OGC WMS 1.1.1 and 1.3.0 specifications:

Parameter	Required	Description
SERVICE	Yes	Name of the service (**WMS**)
REQUEST	Yes	Name of the request (**GetMap**)
VERSION	Yes	Version of the service
LAYERS	No	Layers to display
STYLES	No	Layers' style
SRS / CRS	Yes	Coordinate reference system
BBOX	Yes	Map extent
WIDTH	Yes	Width of the image in pixels
HEIGHT	Yes	Height of the image in pixels
FORMAT	No	Image format
TRANSPARENT	No	Transparent background
SLD	No	URL of an SLD to be used for styling
SLD_BODY	No	In-line SLD (XML) to be used for styling

WMS as Map Background

3.2.1. GetCapabilities

Standard parameters for the **GetCapabilities** request according to the OGC WMS 1.1.1 and 1.3.0 specifications:

Parameter	Required	Description
SERVICE	Yes	Name of the service (**WMS**)
REQUEST	Yes	Name of the request (**GetCapabilities**)
VERSION	No	Version of the service

https://ows.terrestris.de/osm/service?service=WMS&request=GetCapabilities&version=1.3.0

```
<Layer queryable="1">
    <Name>OSM-Overlay-WMS</Name>
    <Title>OSM Overlay WMS - by terrestris</Title>
    <LatLonBoundingBox minx="-180" miny="-88" maxx="180" maxy="88" />
    <BoundingBox SRS="EPSG:900913" minx="-20037508.3428" miny="-25819498.5135" maxx="20037508.3428" maxy="25819498.5135" />
    <BoundingBox SRS="EPSG:4326" minx="-180" miny="-88" maxx="180" maxy="88" />
    <BoundingBox SRS="EPSG:3857" minx="-20037508.3428" miny="-25819498.5135" maxx="20037508.3428" maxy="25819498.5135" />
    <Style>
      <Name>default</Name>
          ...
    </Style>
</Layer>
```

LAYERS

STYLES

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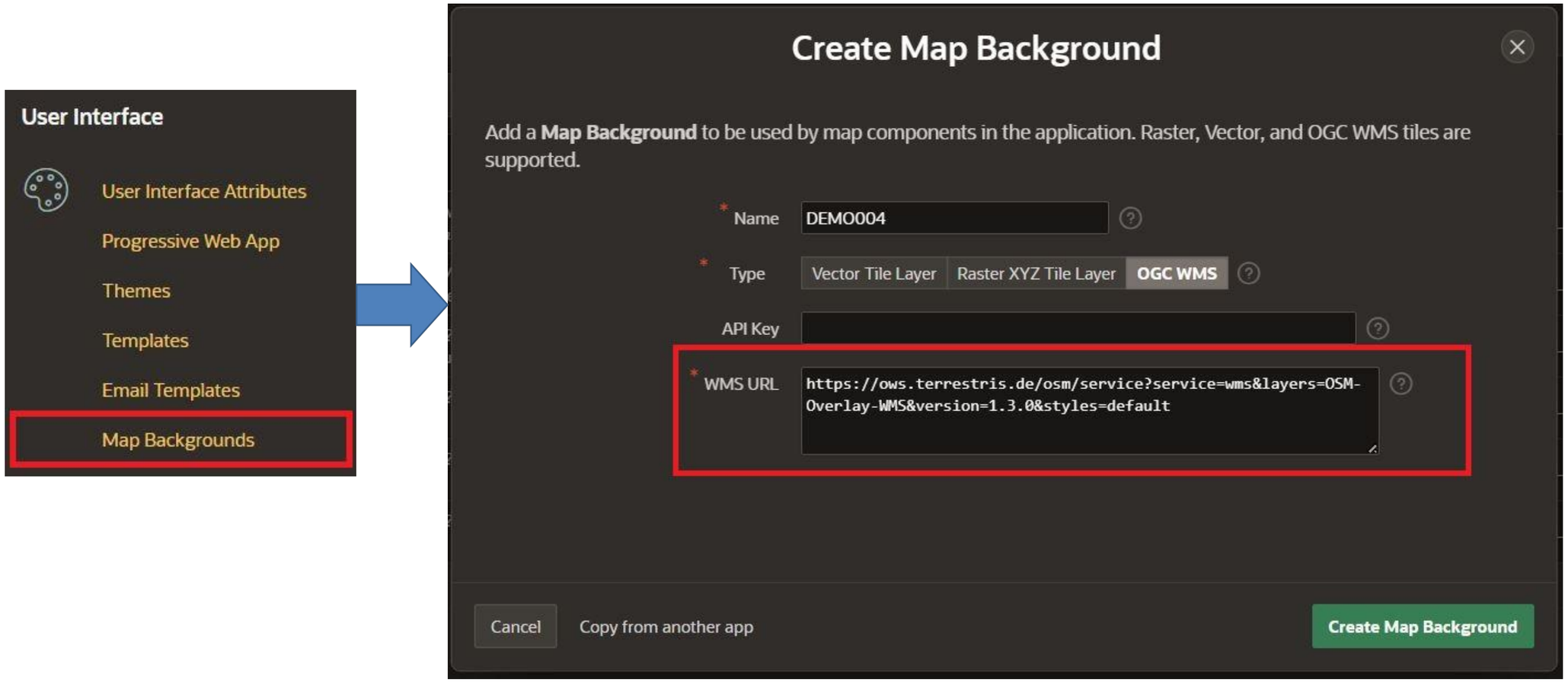
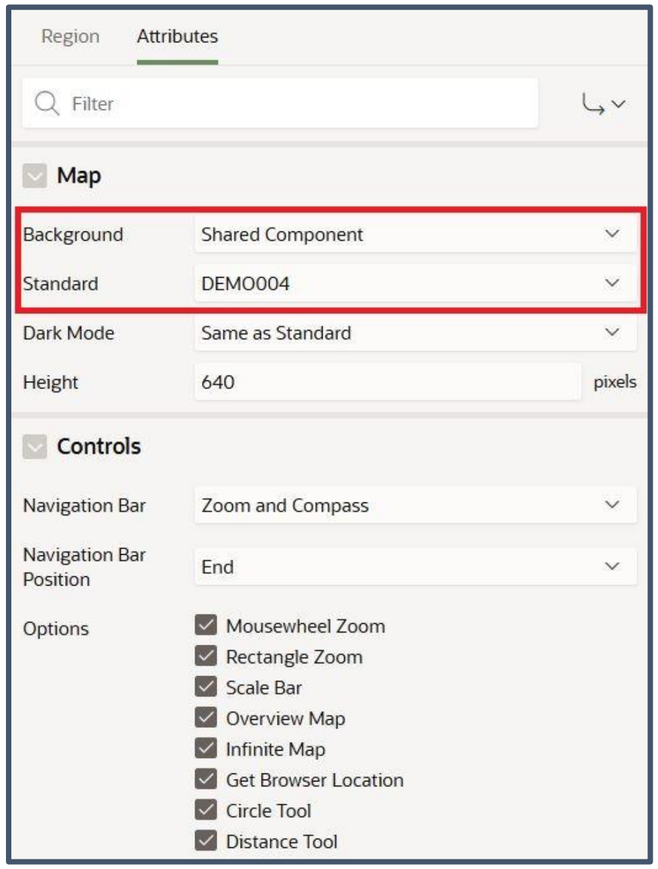
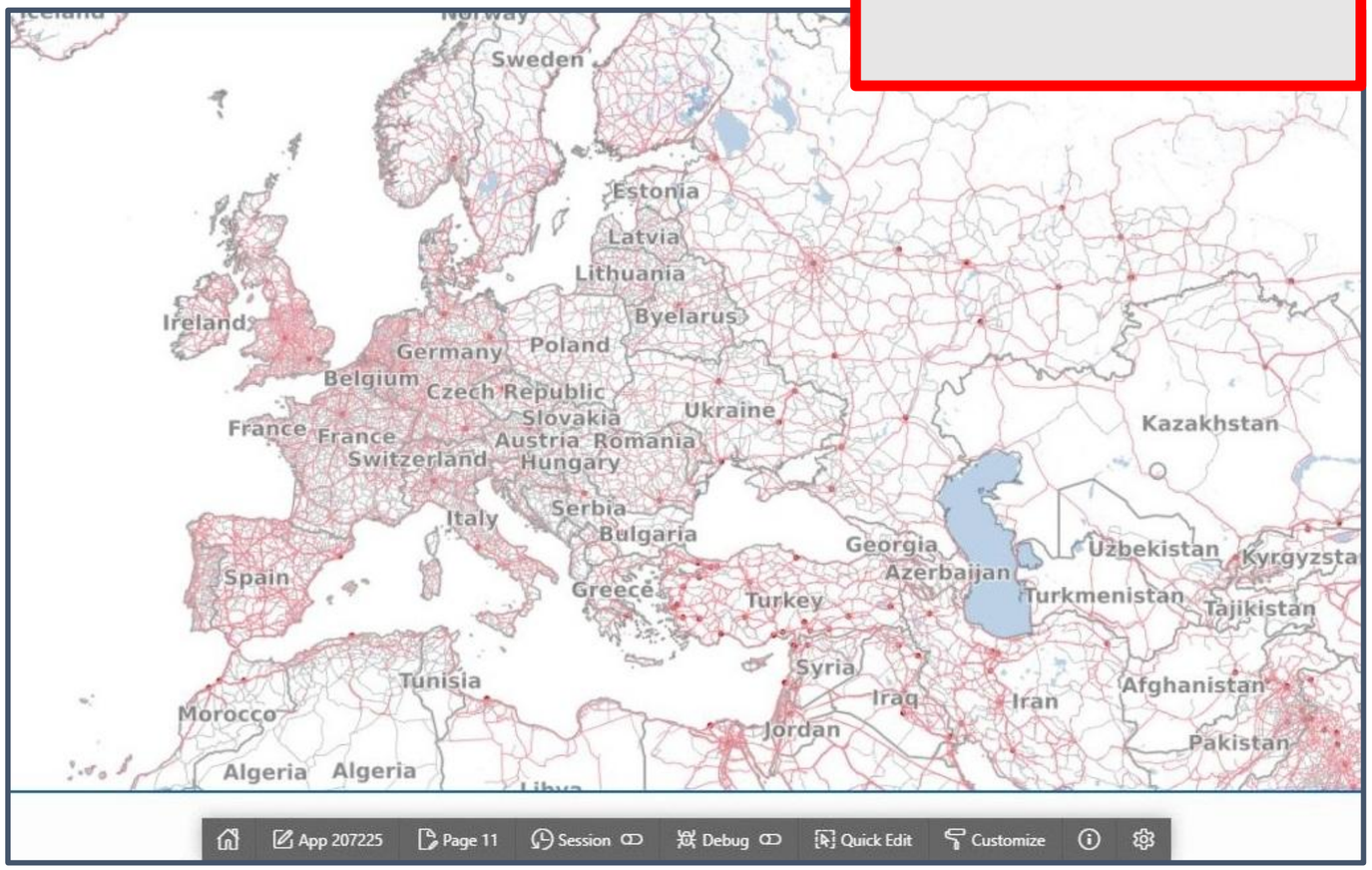
WMS as Map Background



WMS as Map Background

Parameter names should be lowercase!





WFS as new layer

https://demo.mapserver.org/cgi-bin/wfs?

What we need:

- SERVICE
- VERSION
- REQUEST
- TYPENAMES
- OUTPUTFORMAT

3.3.2. GetFeature

Standard parameters for the **GetFeature** request according to the OGC WFS 1.0.0 and 1.1.0 specifications:

Parameter	Required	Description
SERVICE	Yes	Name of the service (**WFS**)
REQUEST	Yes	Name of the request (**GetFeature**)
VERSION	No	Version of the service
TYPENAME	No	Name of layers
FEATUREID	No	Filter the features by ids
OUTPUTFORMAT	No	Output Format
RESULTTYPE	No	Type of the result
PROPERTYNAME	No	Name of properties to return
MAXFEATURES	No	Maximum number of features to return
SRSNAME	No	Coordinate reference system
FILTER	No	OGC Filter Encoding
BBOX	No	Map Extent
SORTBY	No	Sort the results

WFS as new layer

3.3.1. GetCapabilities

Standard parameters for the **GetCapabilities** request according to the OGC WFS 1.0.0 and 1.1.0 specifications:

Parameter	Required	Description
SERVICE	Yes	Name of the service (**WFS**)
REQUEST	Yes	Name of the request (**GetCapabilities**)
VERSION	No	Version of the service

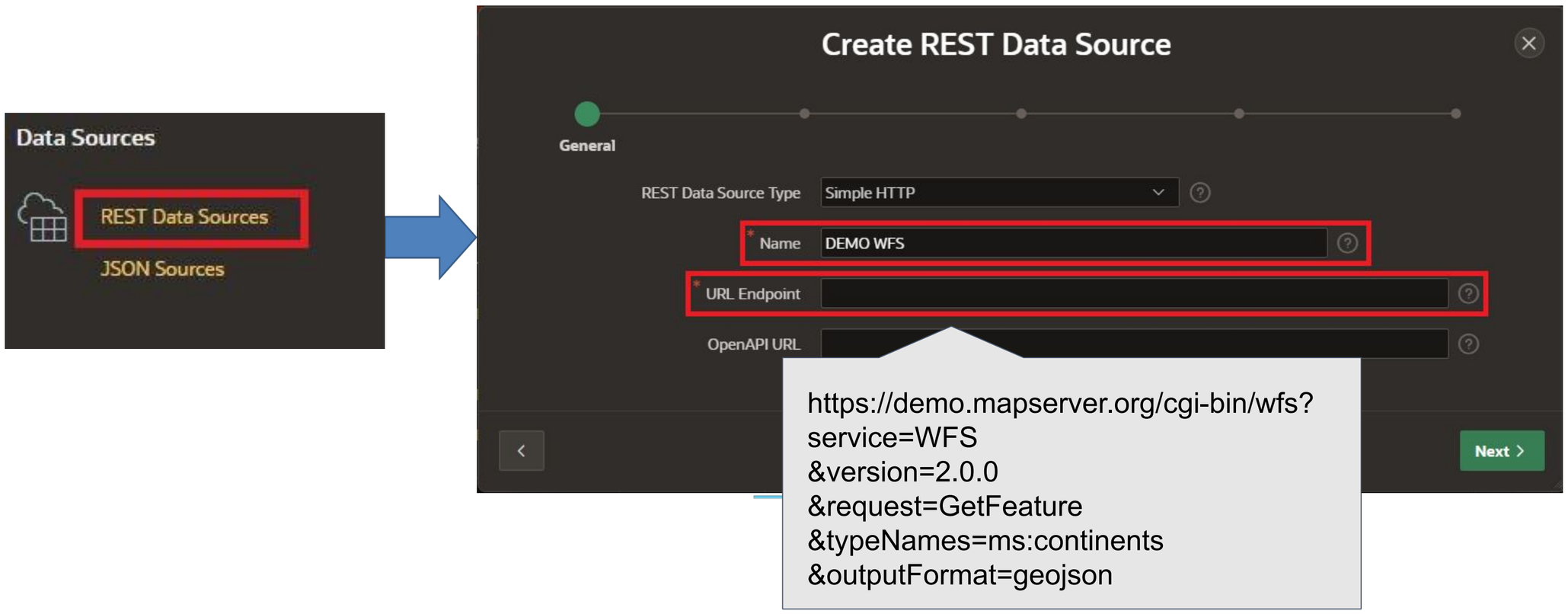
https://demo.mapserver.org/cgi-bin/wfs
?service=WFS
&request=getCapabilities
&version=2.0.0

```
<FeatureType>
  <Name>ms:continents</Name>
  <Title>World continents</Title>
  <DefaultCRS>urn:ogc:def:crs:EPSG::4326</DefaultCRS>
  ...
  <OutputFormats>
          ...
    <Format>application/json; subtype=geojson</Format>
  </OutputFormats>
     ...
</FeatureType>
```

TYPENAMES

OUTPUTFORMAT

WFS as new layer



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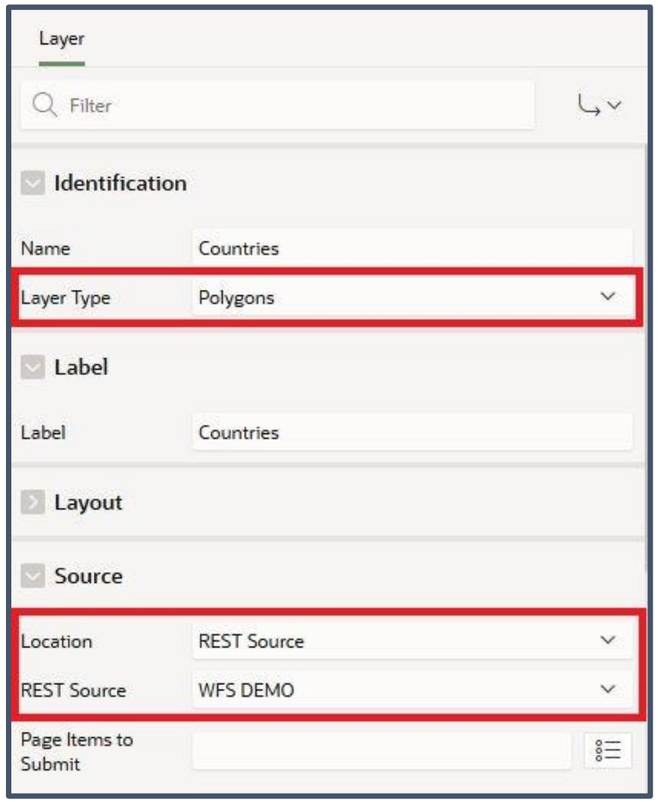
WFS as new layer



MapLibre: Drawing component

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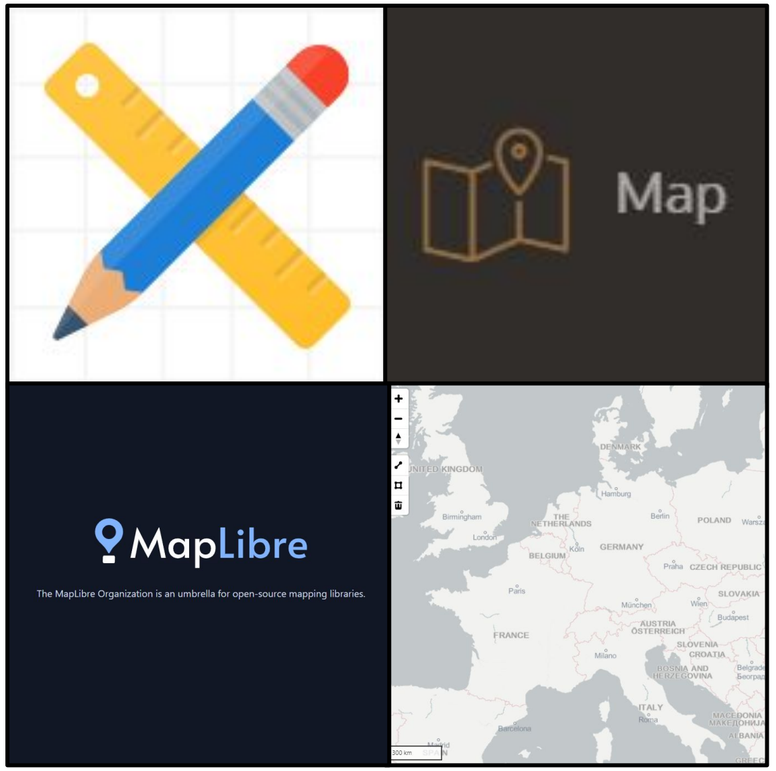
Map region and MapLibre GL JS

- Based on MapLibre GL JS library **(open-source)**
- Interface exposed via **mapRegion#getMapObject** method
- Access to the mapRegion interface with the **apex.region** function
- **Plugins** and ready-made **examples**
- https://maplibre.org/maplibre-gl-js-docs/api/
- https://maplibre.org/maplibre-gl-js/docs/plugins/



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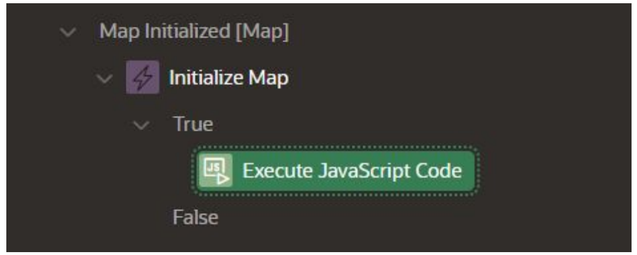
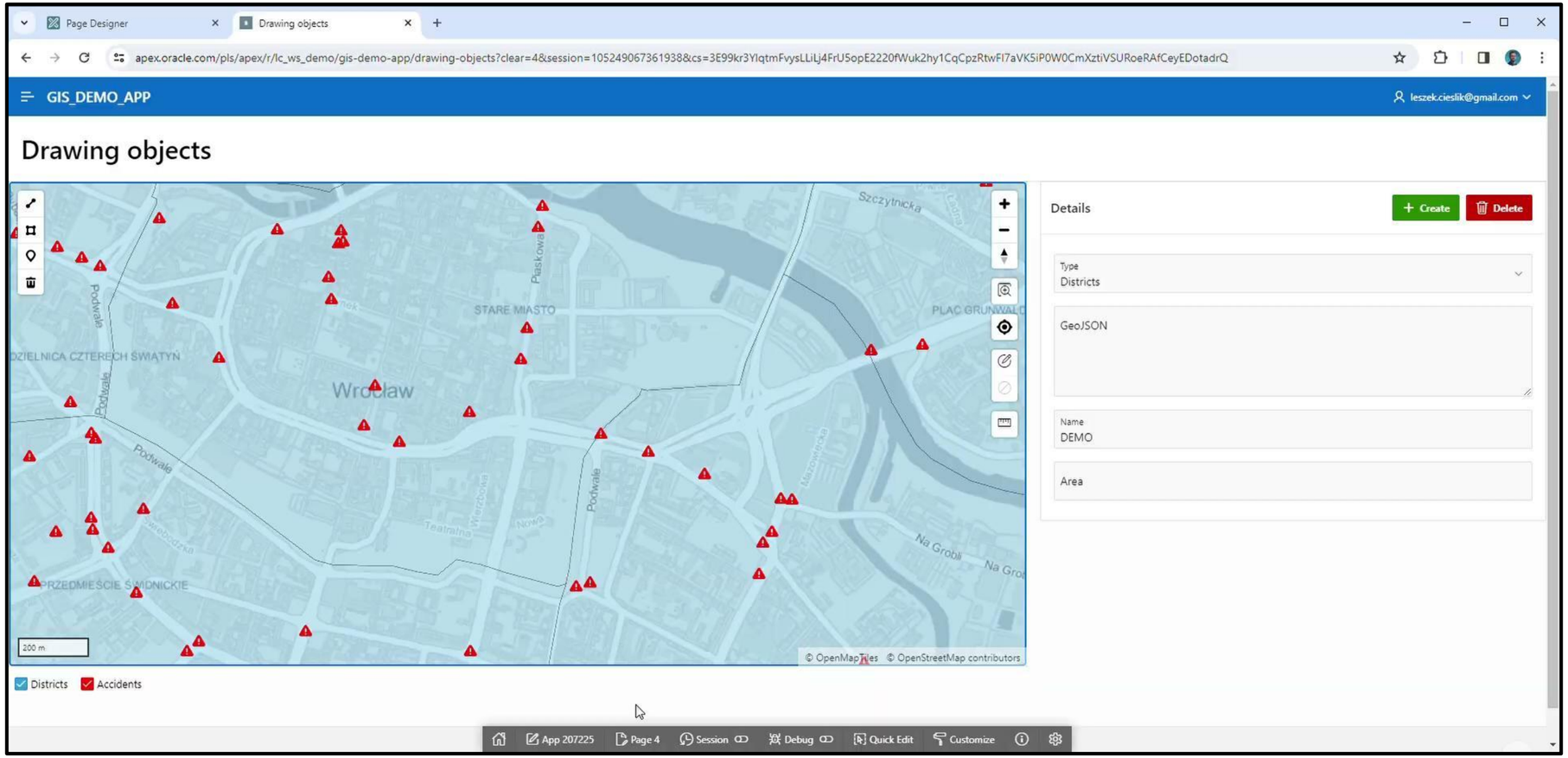
Drawing objects




```javascript
//Get MapLibre GL JS map object
var map = apex.region('map_id').getMapObject();

//Add Draw plug-in.
var draw = new MapboxDraw({
    displayControlsDefault: false,
    controls: {
        point: true,
        line_string: true,
        polygon: true,
        trash: true
    }
});

//Add Control to map
map.addControl(draw, 'top-left');

//Fix MapBox - MapLibre issue
$('.maplibregl-ctrl-top-left').children().attr(
    'class', 'maplibregl-ctrl maplibregl-ctrl-group mapboxgl-ctrl mapboxgl-ctrl-group'
    );

//Get GeoJSON
map.on('draw.create', function(e) {
    apex.items.P4_GEOMETRY.setValue(JSON.stringify(e.features[0].geometry));
});
```

Drawing objects



MapLibre: Custom layers

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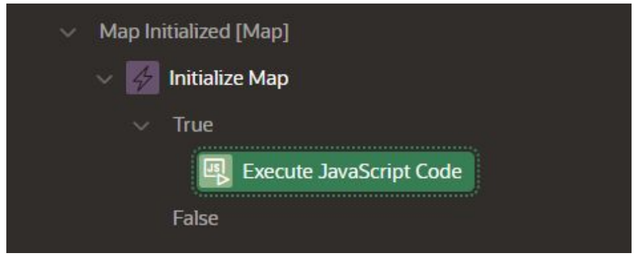
Custom layers - GeoJSON




```
//Get MapLibre GL JS map object (use your Map region static ID)
var map = apex.region('map_id').getMapObject();
//Create GeoJSON source
map.addSource('GeoJSON Source', {
    'type': 'geojson',
    'data':
        {"type": "FeatureCollection","features": [
        {"type": "Feature","properties": {},"geometry":
            {"coordinates": [17.031886060772507,51.10959056655955],"type": "Point"}},
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        {"type": "Feature","properties": {},"geometry":
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        {"type": "Feature","properties": {},"geometry":
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        {"type": "Feature","properties": {},"geometry":
            {"coordinates": [17.005245052243396,51.098923052364825],"type": "Point"}}
        ]}
});
//Create GeoJSON layer
map.addLayer({
    'id': 'wroclaw_geojson_layer_id',
    'type': 'circle',
    'source': 'GeoJSON Source', //Previously created source (lines 5-15)
    'paint': {
        'circle-radius': 10,
        'circle-color': '#B42222'
        }
    }
);
```
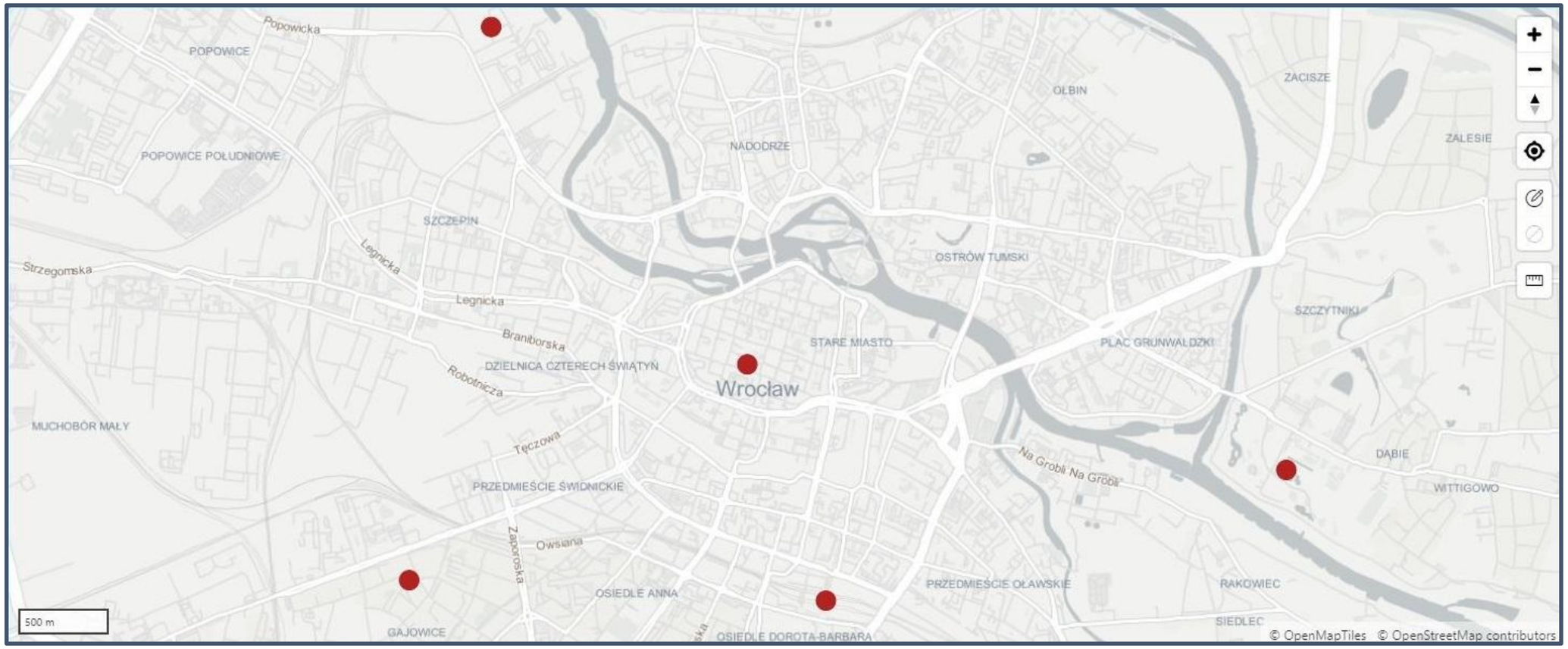
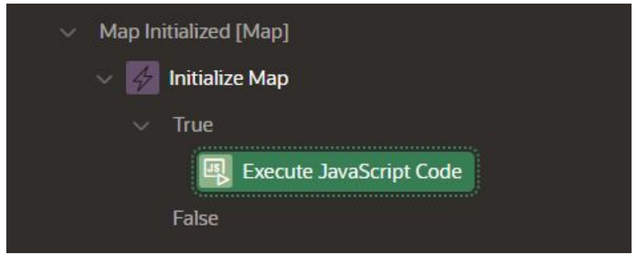

Custom layers - GeoJSON



Custom layers - WMS - Web Map Service




```
//Get MapLibre GL JS map object
var map = apex.region('map_id').getMapObject();

//Add Source
map.addSource('wroclaw', {
    'type': 'raster',
    'tiles': [
        'https://gis1.um.wroc.pl/arcgis/services/ogc/OGC_ortofoto_2022/MapServer/WMSServer?'.
        concat('service=WMS&',
        'layers=1&',
        'styles=&',
        'version=1.1.1&',
        'request=GetMap&',
        'bbox={bbox-epsg-3857}&',
        'format=image/png&',
        'srs=EPSG:3857&',
        'transparent=true&',
        'width=256&',
        'height=256')
    ],
'tileSize': 256
});

//Add new layer
map.addLayer(
    {
        'id': 'wroclaw_id',
        'type': 'raster',
        'source': 'wroclaw',
        'paint': {}
    }
);
```

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Custom layers - WMS - Web Map Service

MapLibre: Dynamic Legend

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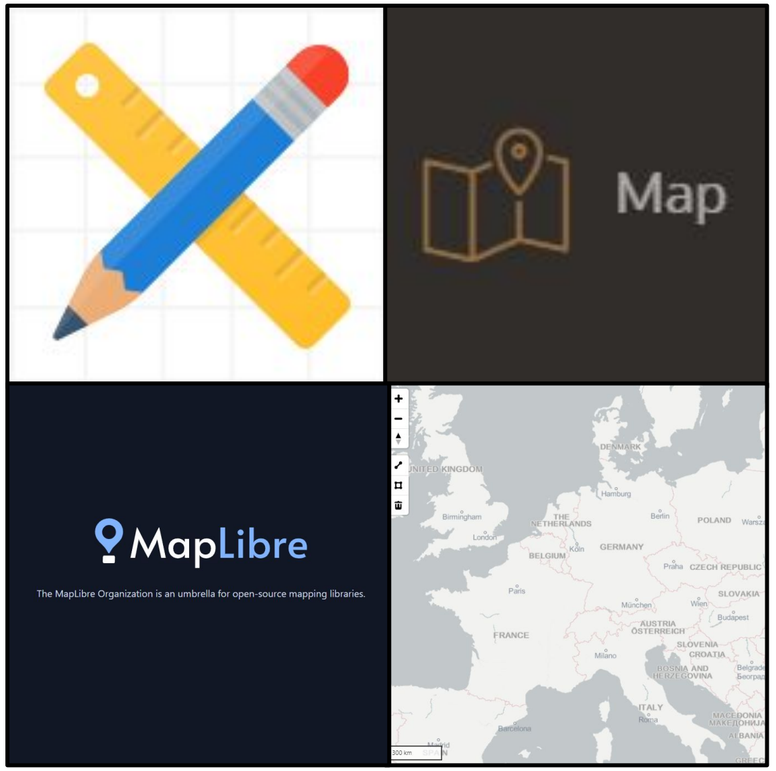
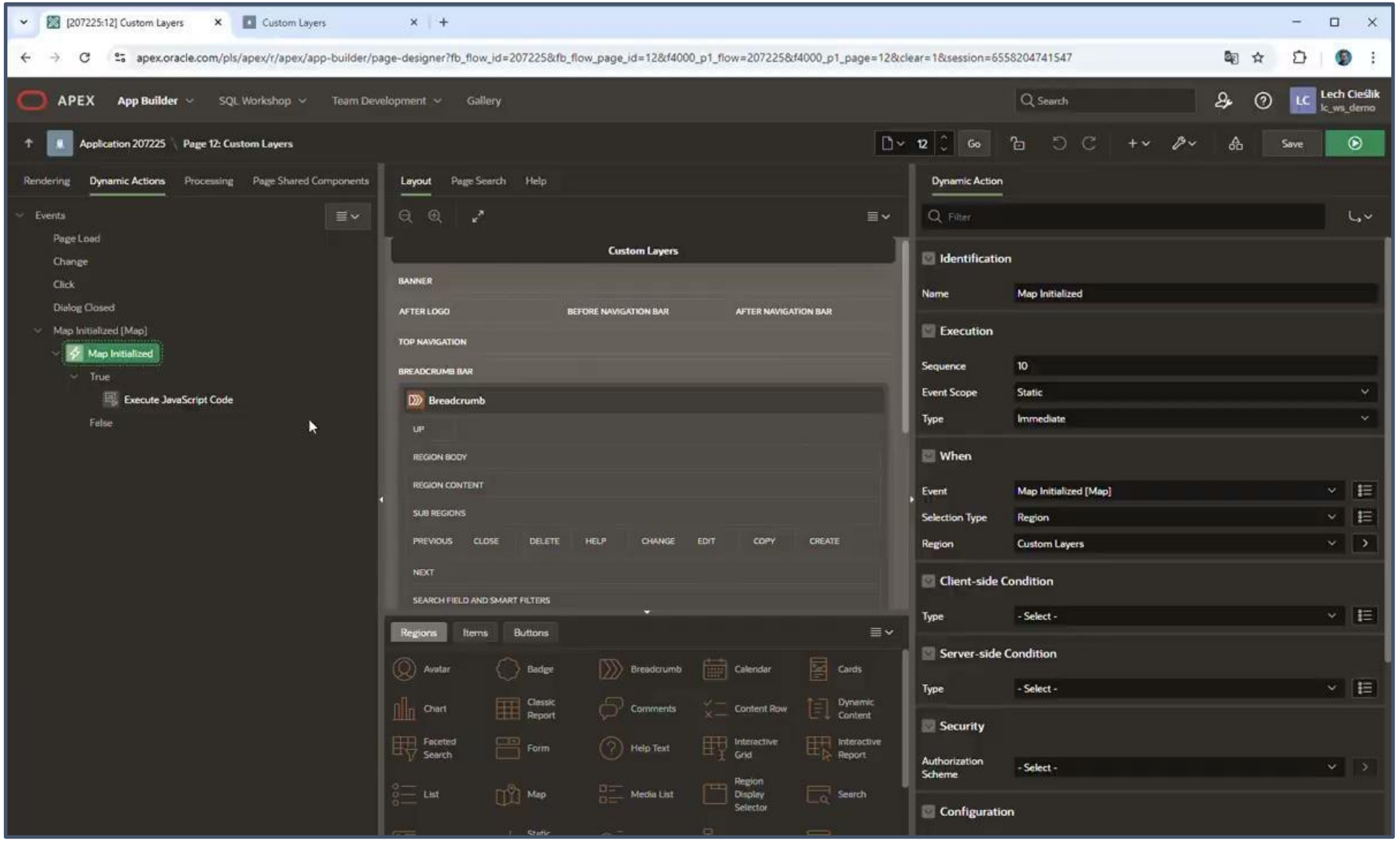
Map region and Dynamic Legend

- https://maplibre.org/maplibre-gl-js/docs/plugins/
- Event: Map Initialized [Map]
- Action: Execute JavaScript Code
- var map = apex.region('static_id').getMapObject();
- map.addSource & map.addLayer
- map.addControl(new MapboxLegendControl(

  {'LAYER_ID':'LAYER NAME'}), 'bottom-left');




[207225:12] Custom Layers
Custom Layers
apex.oracle.com/pls/apex/r/apex/app-builder/page-designer?fb_flow_id=207225&fb_flow_page_id=12&f4000_p1_flow=207225&f4000_p1_page=12&clear=1&session=6558204741547
APEX
App Builder
SQL Workshop
Team Development
Gallery
Search
Lech Cieślik
lc_ws_demo
Application 207225
Page 12: Custom Layers
Go
Save
Rendering
Dynamic Actions
Processing
Page Shared Components
Events
Page Load
Change
Click
Dialog Closed
Map Initialized [Map]
Map Initialized
True
Execute JavaScript Code
False
Layout
Page Search
Help
Custom Layers
BANNER
AFTER LOGO
BEFORE NAVIGATION BAR
AFTER NAVIGATION BAR
TOP NAVIGATION
BREADCRUMB BAR
Breadcrumb
UP
REGION BODY
REGION CONTENT
SUB REGIONS
PREVIOUS
CLOSE
DELETE
HELP
CHANGE
EDIT
COPY
CREATE
NEXT
SEARCH FIELD AND SMART FILTERS
Regions
Items
Buttons
Avatar
Badge
Breadcrumb
Calendar
Cards
Chart
Classic Report
Comments
Content Row
Dynamic Content
Faceted Search
Form
Help Text
Interactive Grid
Interactive Report
List
Map
Media List
Region Display Selector
Search
Dynamic Action
Filter
Identification
Name
Map Initialized
Execution
Sequence
10
Event Scope
Static
Type
Immediate
When
Event
Map Initialized [Map]
Selection Type
Region
Region
Custom Layers
Client-side Condition
Type
- Select -
Server-side Condition
Type
- Select -
Security
Authorization Scheme
- Select -
Configuration

Something else

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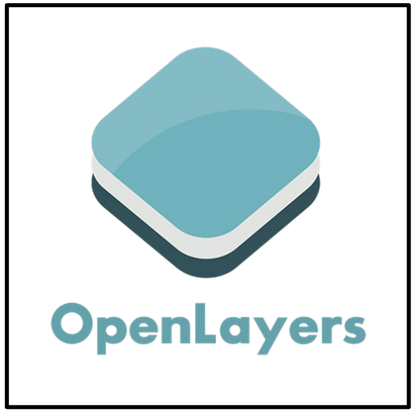
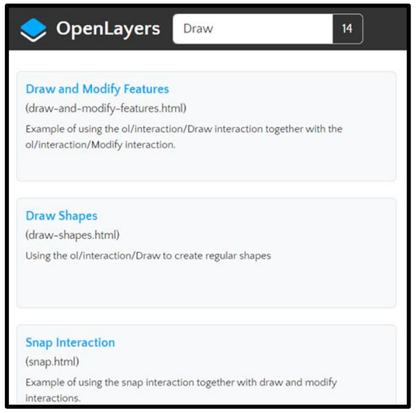
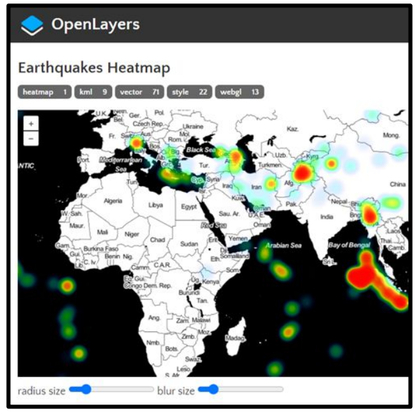
OpenLayers

- *„A high-performance, feature-packed library for all your mapping needs”*
- Open Source, JavaScript library
- Version: 9.2.4
- Maps, layers, markers, customization, API
- 248 ready-made examples on:

  https://openlayers.org/en/latest/examples/







MapLibre vs OpenLayers

```
//Get MapLibre GL JS map object
var map = apex.region('map_id').getMapObject();

//Add Draw plug-in.
var draw = new MapboxDraw({
    displayControlsDefault: false,
    controls: {
        point: true,
        line_string: true,
        polygon: true,
        trash: true
    }
});

//Add Control to map
map.addControl(draw, 'top-left');
```

```
//Create Raster Source
const sourceRaster = new ol.source.OSM();

//Create new layer - Open Street Maps
const raster = new ol.layer.Tile({
  source: sourceRaster
});

//Create Vector Source
const source = new ol.source.Vector({wrapX: false});

//Create new layer - Vector Source
const vector = new ol.layer.Vector ({
  source: source,
});

//Create map
const map = new ol.Map({
    //set layer(s)
    layers: [raster, vector],
    //set container
    target: 'map_id',
    //set view
    view: new ol.View({
        center: ol.proj.fromLonLat([12.48, 41.85]),
        zoom: 8
    })
});

//Add Interaction (Draw object functionality)
var draw = new ol.interaction.Draw({
    source: source,
    type: 'Polygon', //Point //LineString
});

map.addInteraction(draw);
```

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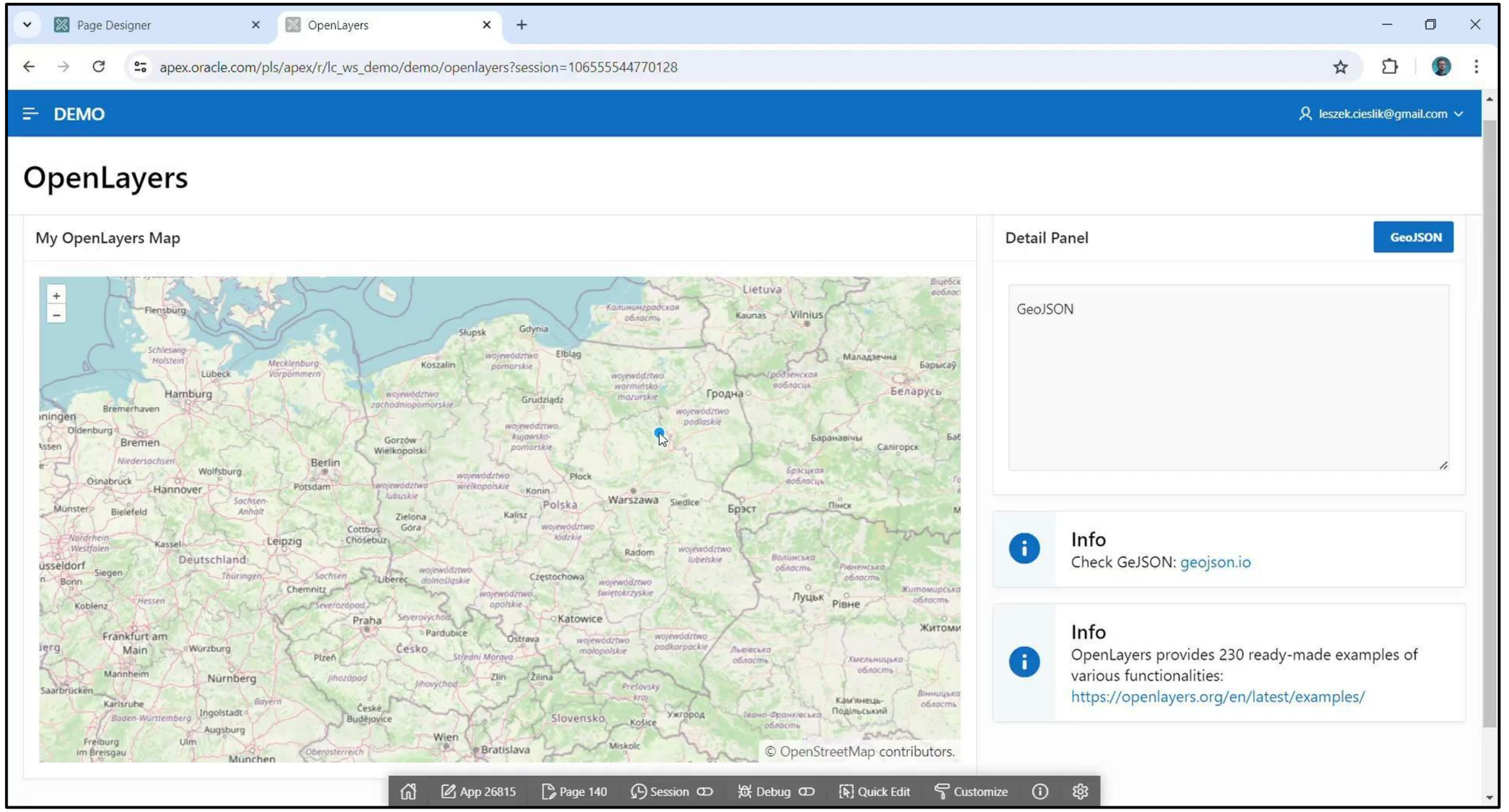
Page Designer
OpenLayers
apex.oracle.com/pls/apex/r/lc_ws_demo/demo/openlayers?session=106555544770128
DEMO
leszek.cieslik@gmail.com
OpenLayers
My OpenLayers Map
Detail Panel
GeoJSON
GeoJSON
Info
Check GeJSON: geojson.io
Info
OpenLayers provides 230 ready-made examples of various functionalities:
https://openlayers.org/en/latest/examples/
© OpenStreetMap contributors.
App 26815
Page 140
Session
Debug
Quick Edit
Customize

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GeoServer

- GeoServer is an open-source server for sharing geospatial data
- Data formats like Shapefiles, CSV, PostGIS…
- Standards: Web Map Service (**WMS**) and Web Feature Service (**WFS**)
- Documentation: https://docs.geoserver.org/

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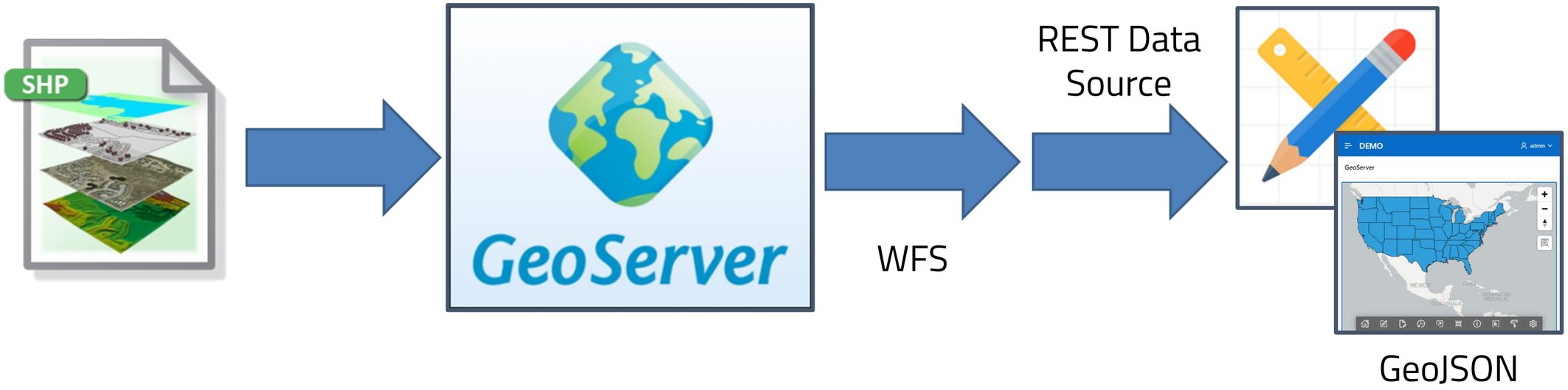
GeoServer



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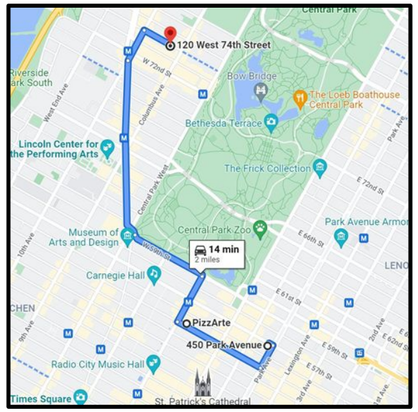
Google Maps

- No introduction needed ☺️
- Google API Key
- Limitations
- Map JavaScript API
- Documentation:

  https://developers.google.com/maps/documentation/javascript



Sample Maps

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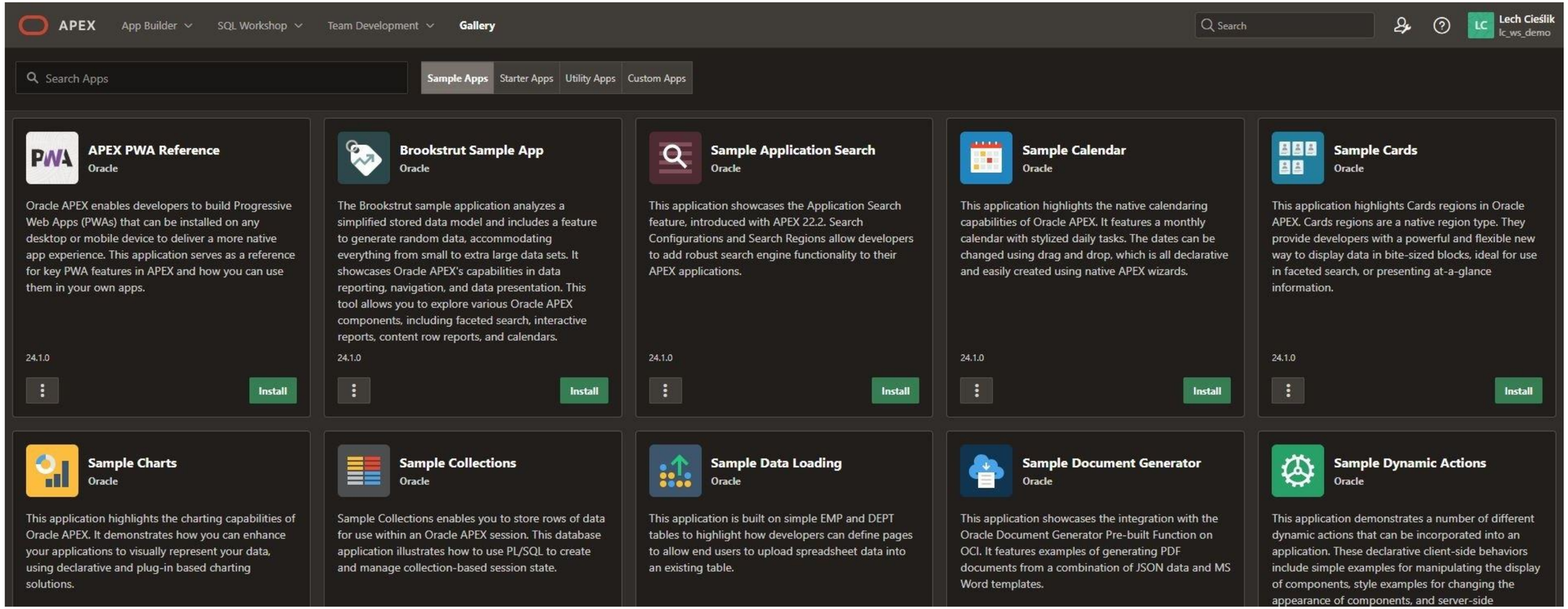
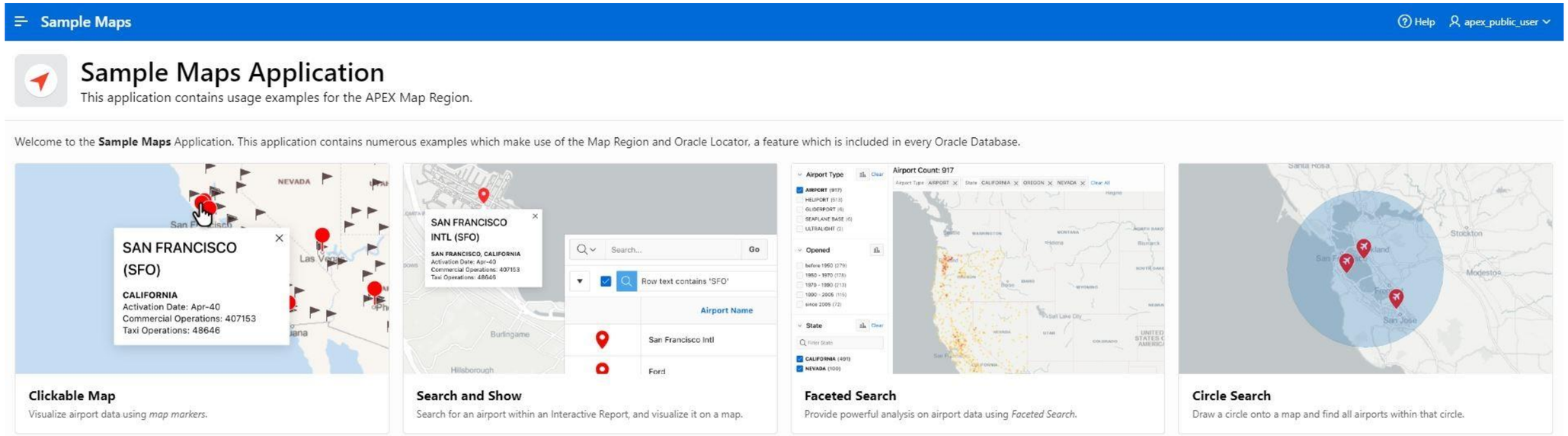
Sample Maps



Sample Maps



- https://apex.oracle.com/pls/apex/r/apex_pm/sample-maps/home
- https://pretius.com/blog/oracle-apex-packaged-apps/

Examples

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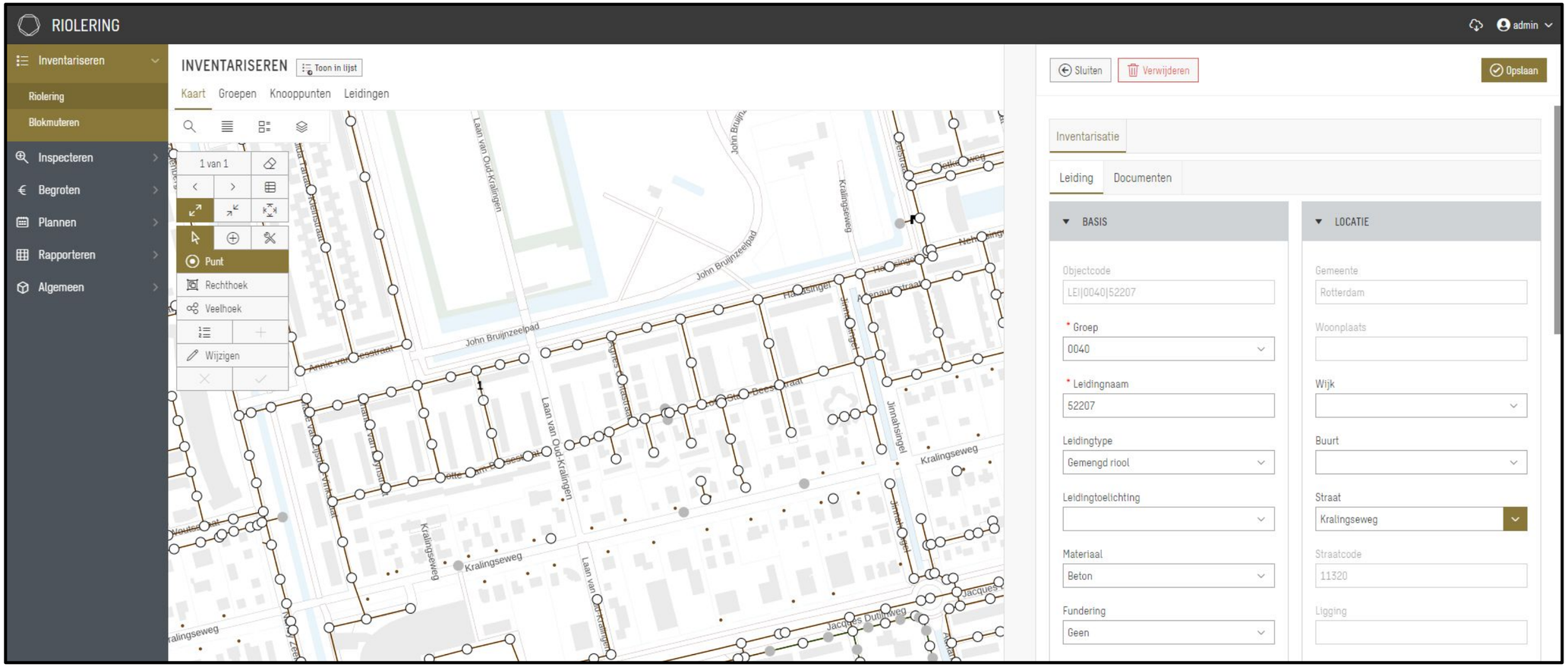
Oracle APEX and Maps - it's happening!

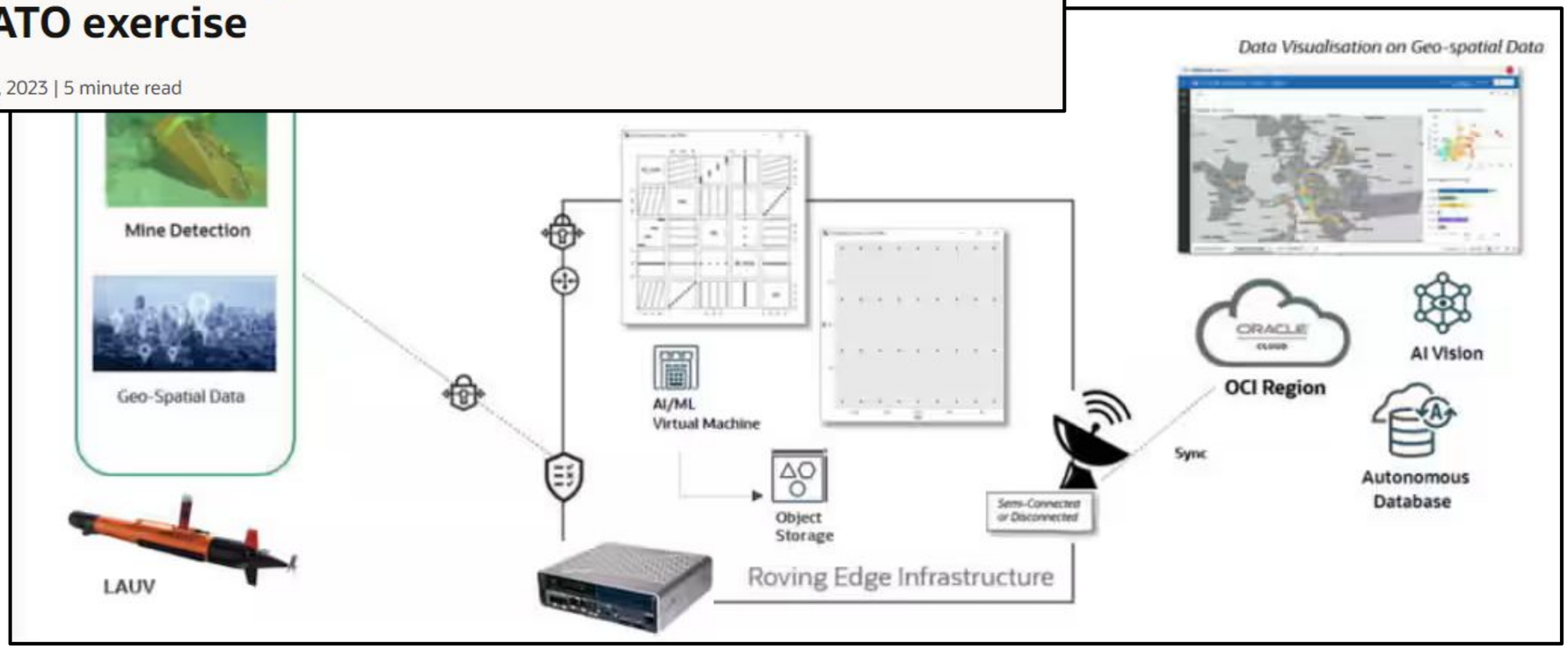


Oracle APEX and Maps - it's happening!

Product News

Oracle successfully demonstrates tactical solutions in NATO exercise

October 18, 2023 | 5 minute read



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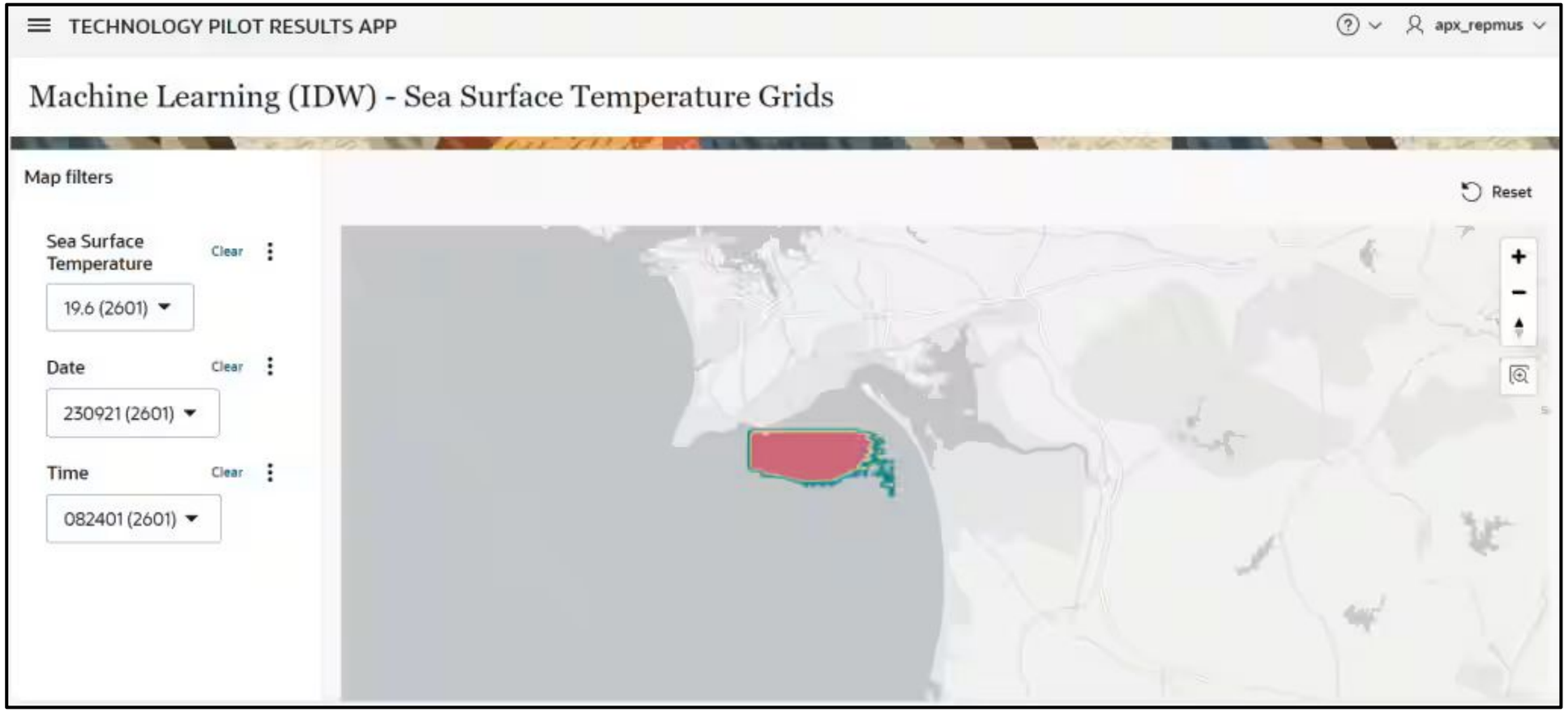
Oracle APEX and Maps - it's happening!



… there is still one minute left

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Map Region (Layers; Dynamic Actions; Geocoding; GeoLocation; Plugins; Customization) Faceted Search

Google Maps

here

API

MapLibre

Oracle APEX

OpenLayers

WFS/ WMS

GeoServer

MapServer

open source web mapping

Data Workshop

CSV

GeoJSON

SHP

ORACLE

ORACLE

ORACLE

GeoJSON SDO_GEOMETRY VARCHAR2

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… there is still one minute left

1. Sample Maps Application
2. https://docs.oracle.com/en/database/oracle/oracle-database/19/spatl/spatial-reference-information.html
3. https://docs.oracle.com/en/database/oracle/application-express/21.2/aexjs/mapRegion.html
4. https://maplibre.org/maplibre-gl-js-docs/api/
5. https://lcieslik.hashnode.dev/

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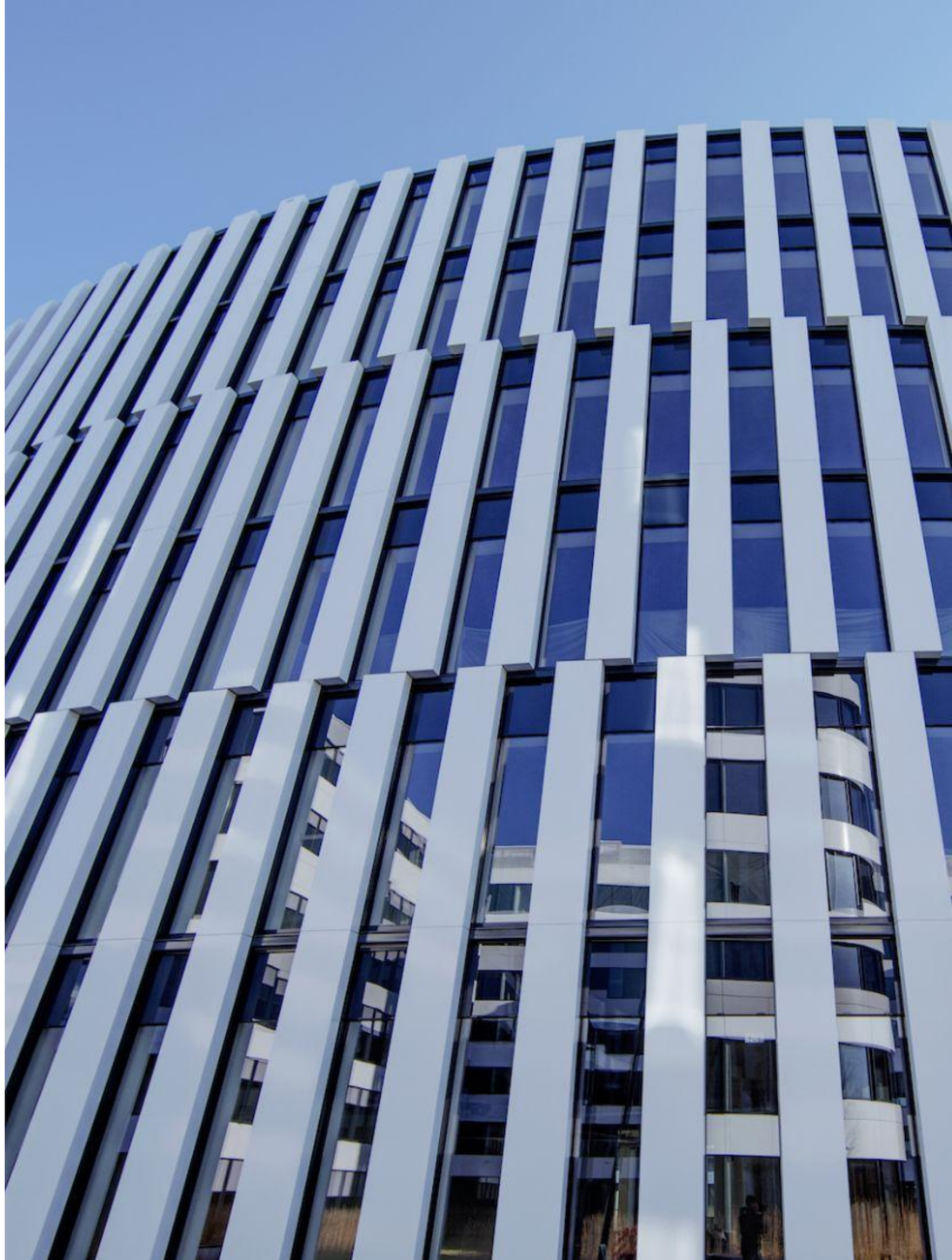
Thank you and feel free to reach me at the event or online!

Lech Cieślik
Oracle APEX Developer
lcieslik@pretius.com
@cieslik_l
lcieslik.hashnode.dev



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