

ORACLE  
University

## Oracle Cloud Infrastructure

# Developing on Oracle Autonomous Database

# Objectives

An illustration on the left side of the slide. It shows a person in a red shirt and dark pants climbing a ladder that is made of a series of white, rounded rectangular shapes, resembling code blocks or data points. The ladder extends from a green, rocky base at the bottom left towards a colorful, abstract mountain peak in the upper left. The mountain has various shades of brown, orange, and purple. The background is a light, textured grey.

Learn how Autonomous Database supports spatial data management

Develop spatial applications with ADB using developer languages and APIs

Use the spatial features of ADB with Spatial Studio no-code tools



# Spatial Data Management in ADB

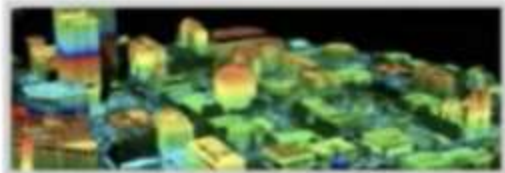
- What is Spatial Data?
- How is it used?



# What is Spatial Data?



Locations based on GPS, addresses, commercial map data, sensor readings, and so on. These are represented as geometries like points, lines, polygons, circles, and arcs.



Satellite imagery and sensor-based (LiDAR) models



Networks that model road systems, telco, energy, transportation, and other infrastructure

**Location is a “universal key” relating otherwise unrelated entities**



# Spatial: It is About Location and Spatial Relationships



Are things in the same location? Who is the nearest?  
What tax zone is this in? **Where can I deliver in 35 minutes?**  
What is in my sales territory? Is this built in a flood zone?  
Do I have a clear **Line of Sight?**  
Which part of the road has the most accidents?



100



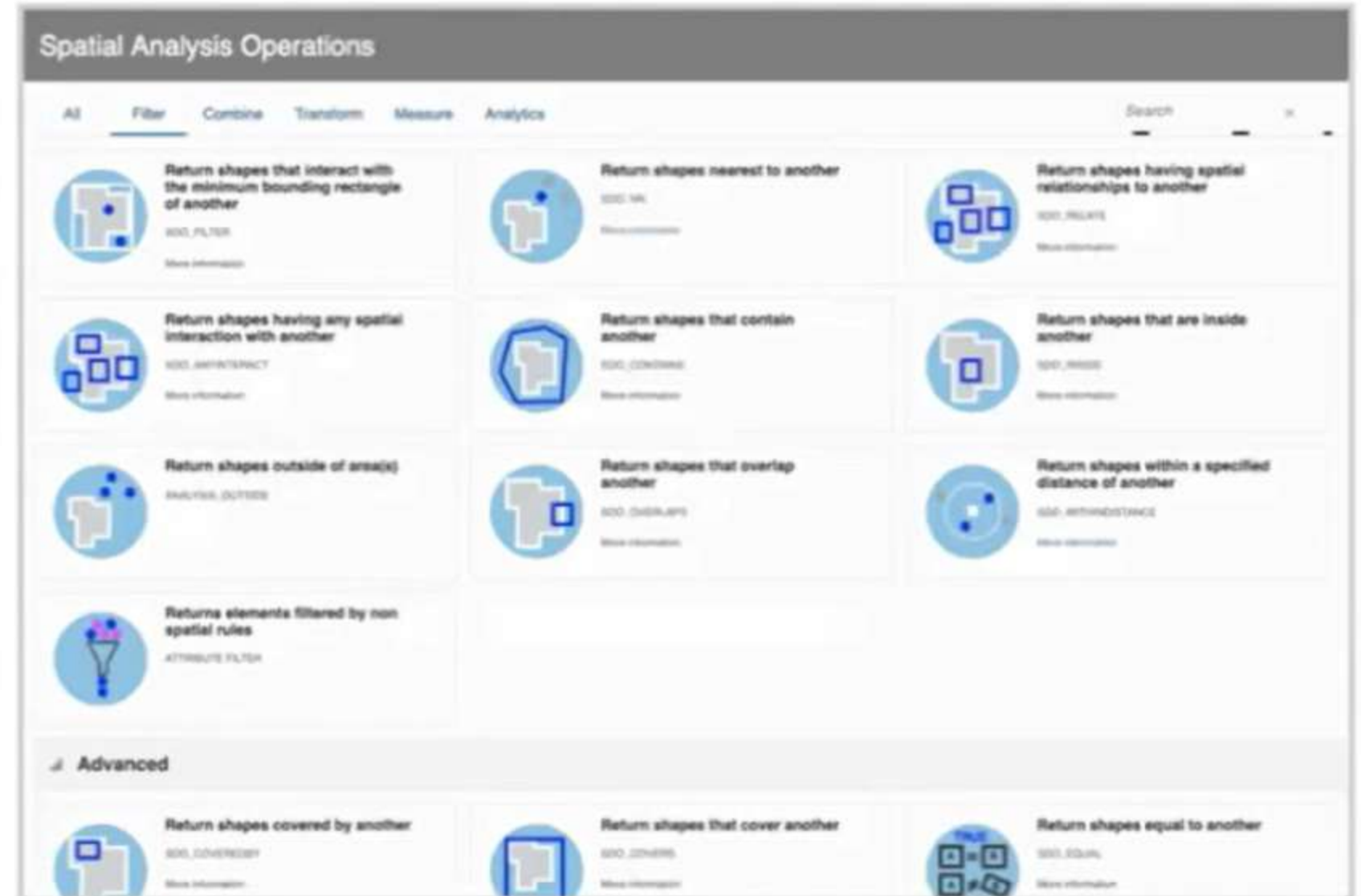
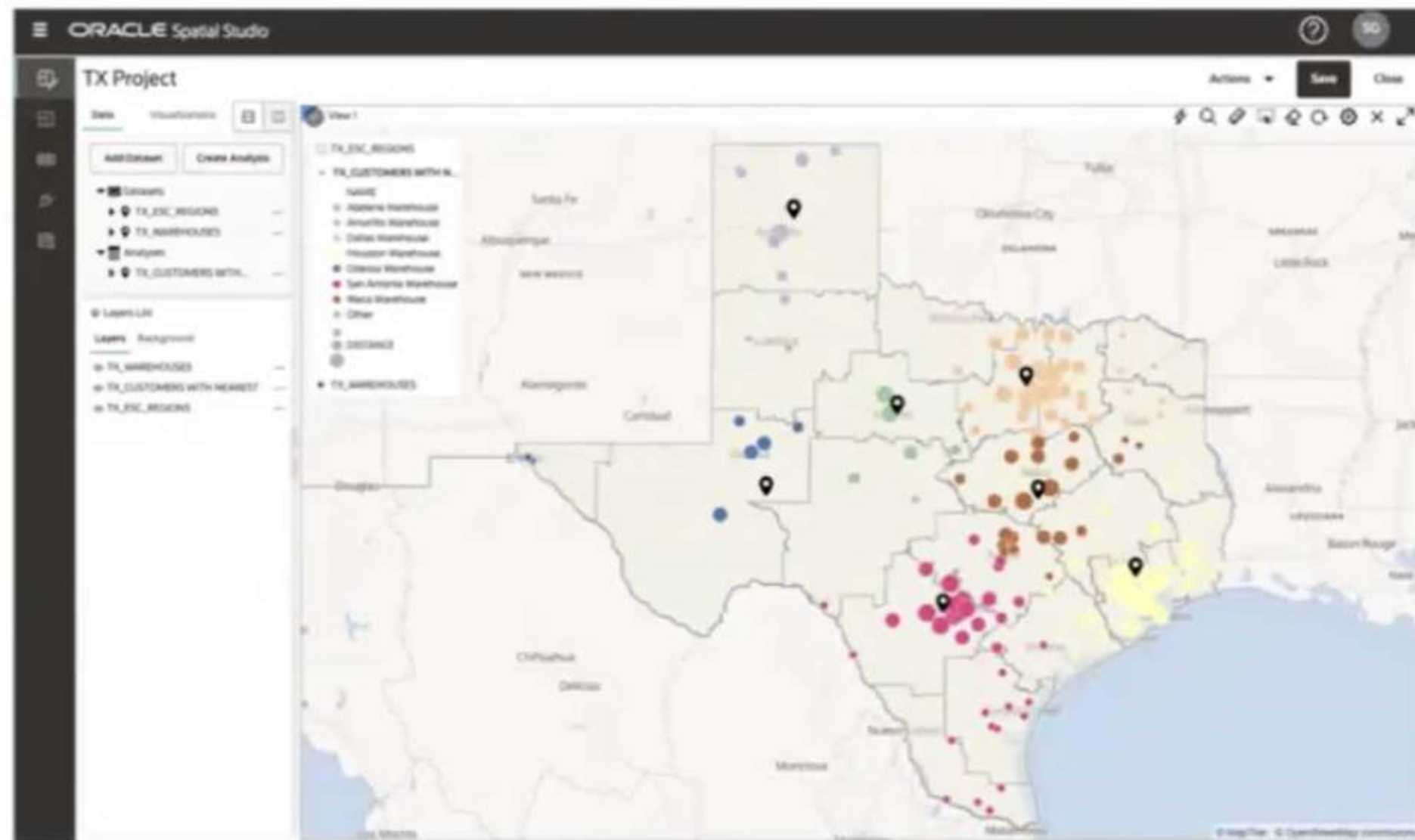
```
SELECT a.customer_name, a.phone_number  
FROM policy_holders a  
WHERE sdo_within_distance( a.geom, hurricane_path_geom,  
    'distance = 10 unit = mile') = 'TRUE';
```



# What is Spatial Studio?

It is a self-service application, to create interactive maps and perform spatial analysis on business data quickly and easily.

Users can visualize, explore, and analyze geospatial data stored in and managed by Oracle in the cloud or on-premises.



# How to Get Spatial Studio with ADB

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Included at no additional cost with Oracle Autonomous Database

However, requires additional compute resources to deploy



Available as a deployable JEE application and self-contained Quickstart



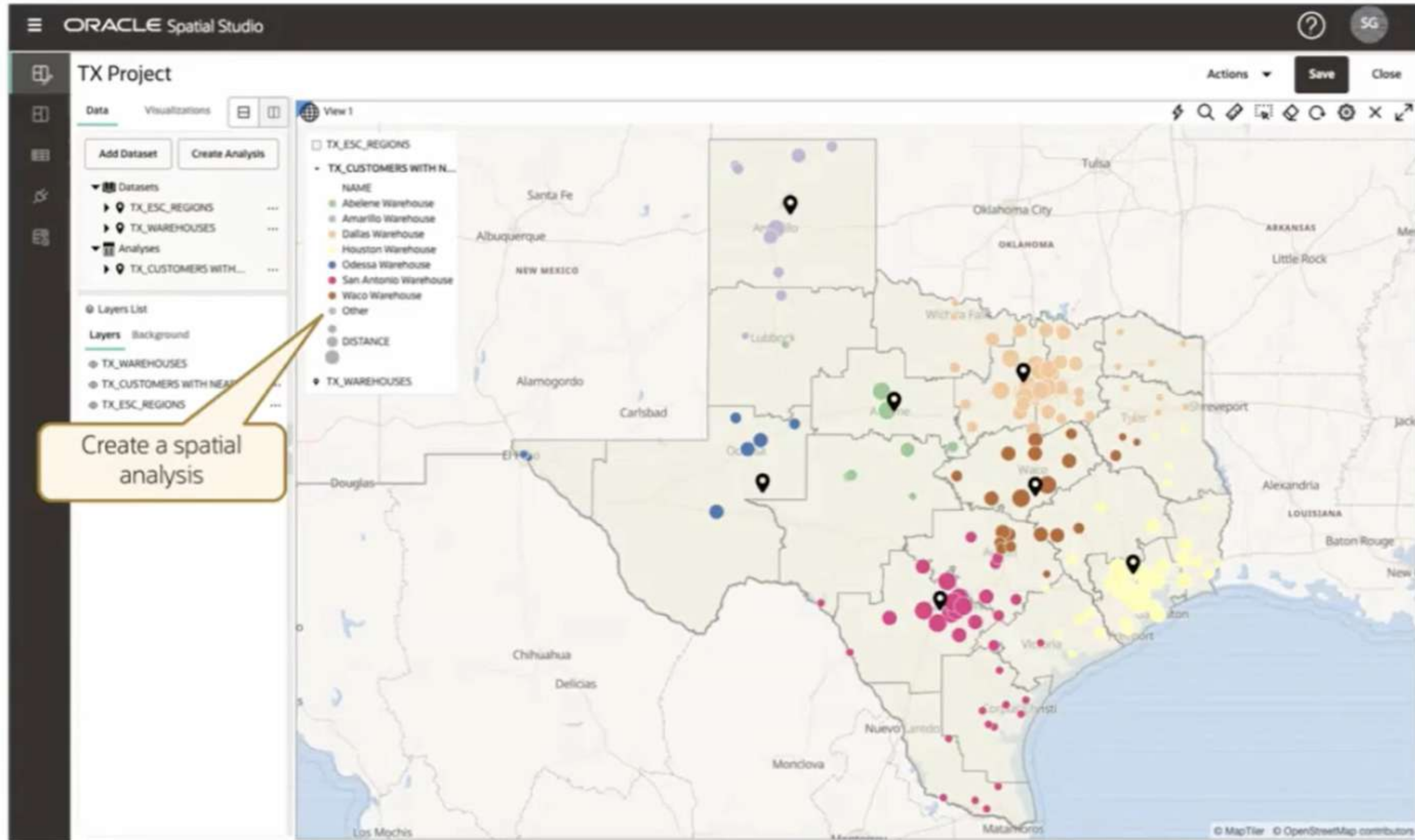
On the Oracle Cloud Marketplace



Step-by-step instructions can be found on Oracle LiveLabs at:  
<https://developer.oracle.com/livelabs> Search for: Spatial Studio



# Performing Spatial Analysis



# Performing Spatial Analysis

The screenshot displays the Oracle Spatial Studio interface. The main map shows a geographical area with labels for Santa Fe, Albuquerque, Alamogordo, Carlsbad, Douglas, Ely, Chihuahua, Delicias, and Los Mochis. The interface includes a sidebar with a 'TX Project' section, a 'Data' tab, and a 'Visualizations' tab. A 'Create Analysis' button is highlighted with a yellow callout box containing the text 'Create a spatial analysis'. The 'Spatial Analysis Operations' panel is open, showing various analysis tools categorized by 'All', 'Filter', 'Combine', 'Transform', 'Measure', and 'Analytics'. The 'Filter' category is selected, showing operations like 'Return shapes that interact with the minimum bounding rectangle of another' (SDO\_FILTER), 'Return shapes having any spatial interaction with another' (SDO\_ANYINTERACT), 'Return shapes outside of area(s)' (ANALYSIS\_OUTSIDE), and 'Returns elements filtered by non spatial rules' (ATTRIBUTE\_FILTER). The 'Combine' category shows 'Return shapes nearest to another' (SDO\_NN), 'Return shapes having spatial relationships to another' (SDO\_RELATE), 'Return shapes that contain another' (SDO\_CONTAINS), 'Return shapes that are inside another' (SDO\_INSIDE), 'Return shapes that overlap another' (SDO\_OVERLAPS), and 'Return shapes within a specified distance of another' (SDO\_WITHINDISTANCE). The 'Measure' category shows 'Return shapes outside of area(s)' (ANALYSIS\_OUTSIDE). The 'Analytics' category shows 'Returns elements filtered by non spatial rules' (ATTRIBUTE\_FILTER). The 'Advanced' section is also visible at the bottom of the panel.

ORACLE Spatial Studio

TX Project

Data Visualizations View 1

Add Dataset Create Analysis

Datasets

- TX\_ESC\_REGIONS
- TX\_WAREHOUSES
- Analyses
- TX\_CUSTOMERS WITH N...

Layers List

Layers Background

- TX\_WAREHOUSES
- TX\_CUSTOMERS WITH NEAR
- TX\_ESC\_REGIONS

TX\_ESC\_REGIONS

- TX\_CUSTOMERS WITH N...
- NAME
- Abelene Warehouse
- Amarillo Warehouse
- Dallas Warehouse
- Houston Warehouse
- Odessa Warehouse
- San Antonio Warehouse
- Waco Warehouse
- Other
- DISTANCE
- TX\_WAREHOUSES

Spatial Analysis Operations

All Filter Combine Transform Measure Analytics

Search

Return shapes that interact with the minimum bounding rectangle of another

SDO\_FILTER

More information

Return shapes nearest to another

SDO\_NN

More information

Return shapes having spatial relationships to another

SDO\_RELATE

More information

Return shapes having any spatial interaction with another

SDO\_ANYINTERACT

More information

Return shapes that contain another

SDO\_CONTAINS

More information

Return shapes that are inside another

SDO\_INSIDE

More information

Return shapes outside of area(s)

ANALYSIS\_OUTSIDE

Return shapes that overlap another

SDO\_OVERLAPS

More information

Return shapes within a specified distance of another

SDO\_WITHINDISTANCE

More information

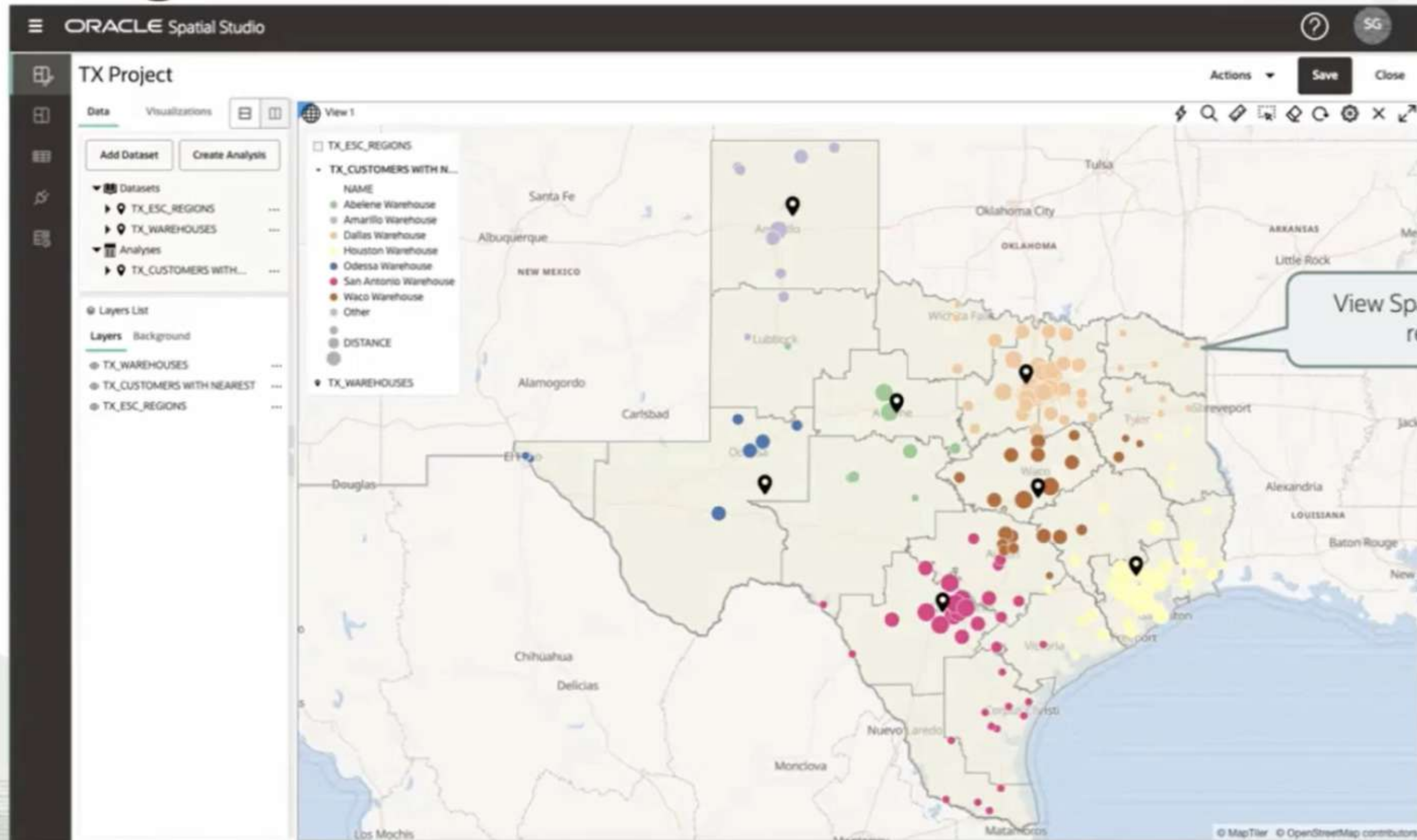
Returns elements filtered by non spatial rules

ATTRIBUTE\_FILTER

Advanced



# Visualizing Results



# Publishing and Sharing

**ORACLE Spatial Studio**

**Projects**

Create Project Import Project

Projects

Previously saved Projects

Boston Project1  
Created by: admin  
A new project

Boston Project2  
Created by: admin  
A new project

Contact Trace  
Created by: admin

TX Project1  
Created by: admin  
A new project

Published projects

Previously saved Published Projects