Oracle Spatial and Graph in Oracle Database 19c: Spatial Features
Multimodel Database

- Oracle Database supports multiple models
  - Relational, In-memory, Sharded
  - Document Store
    - JSON
    - XML
    - Text
    - OLAP
  - Spatial Database
  - Graph Database and Triple Store

- Oracle Database supports multiple languages and access protocols
Spatial Analysis – It is about relationships

- Are things in the same location?  Who is the nearest?  What **tax zone** is this in?  **Where can deliver in 35 minutes?**  What is in my sales territory?  Is this built in a flood zone?
Oracle Spatial and Graph 19c

Three major features

- **Spatial**
- **Property Graph**
- **RDF Graph**
Oracle Spatial and Graph
On Premises, Cloud and in Autonomous Database
Oracle Spatial and Graph

Location and graph analysis with secure storage for enterprise data

Deployable Services

<table>
<thead>
<tr>
<th>Points</th>
<th>Lines</th>
<th>Polygons</th>
<th>Location Tracking (Geofencing)</th>
<th>Networks</th>
<th>RDF Graphs</th>
<th>Property Graphs</th>
<th>Topologies</th>
</tr>
</thead>
</table>

Geocoding

Routing

Web Services (OGC)

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Spatial Processing in Oracle Database

**Native Geometry Data Types**
Points, Lines, Polygons, etc.

**Spatial Indexing**

**Operators and Functions**
Select, within distance, nearest neighbor, intersection, union, centroid, ...

**Geometries in Oracle Tables**

<table>
<thead>
<tr>
<th>RNAME</th>
<th>ID</th>
<th>TYPE</th>
<th>LANES</th>
<th>GEOM1</th>
<th>GEOM2</th>
</tr>
</thead>
<tbody>
<tr>
<td>M40</td>
<td>140</td>
<td>HWY</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M25</td>
<td>141</td>
<td>HWY</td>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SQL Query and Analysis**

```sql
SELECT a.owner_name, a.acquisition_status
FROM properties a, projects b
WHERE sdo_within_distance(a.property_geom1, b.project_geom,
‘distance = .1 unit = mile’) = ‘TRUE’ and b.project_id=189498;
```
Spatial Analysis

- 100’s of SQL spatial analysis operators
  - Filter
  - Combine
  - Transform
  - Measure
Advanced Spatial Data Models

- Spatial networks for roads, transport, pipelines, telcos and other geographically connected analysis

- Topology for mapping, land management and cadastre applications
Raster, 3D, Point Clouds and LiDAR support

Raster

Point Clouds

Solids

Triangular Irregular

3D Coordinate Systems

Raster and 3D Queries

Raster Analysis and Operations

Volumetric Analysis

Visibility queries
Major New Spatial Features

Ease of Use
• JSON and Oracle REST Data Services improvements
• Improved web services user interface, CSW and WFS enhancements
• Self-service development tool

Performance
• Ability to use spatial operators without a spatial index
• Spatial index performance improvements
  – Enhancements to CBTree index to use the data layer directly for Spatial index access.
  – 3x faster query performance for large point data sets.

Improved Database Support
• Spatial support for distributed transactions
• Spatial support for database sharding
Spatial Visualization

Map authoring tool

Self-service spatial analytics

Web-based admin
Summary

By treating spatial and graph data the same as other business data, Oracle Spatial and Graph enables enterprises to realize these benefits:

• Integrate analysis in the IT infrastructure
• Reduce operational costs
• Minimize strategic risk
• Reduce development effort
Resources

Oracle Spatial and Graph – Spatial Features

Product homepage: oracle.com/database/technologies/spatialandgraph.html
Blog: blogs.oracle.com/oraclespatial
Forum: community.oracle.com/community/database/oracle-database-options/spatial
Oracle Spatial and Graph Group: linkedin.com/groups/1848520/
YouTube Channel: youtube.com/c/OracleSpatialandGraph
Twitter: @SpatialHannes