Oracle as a Spatial Database
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 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?
Oracle Converged Database
Multi-Model and Multi-Workload

Converged Database

Multi-Model

Multiple Data Types (models and semantics)
Relational, Document, JSON, XML, OLAP, Spatial, Graph, Object-Oriented, Text, etc.

Multi-Workload

Multiple Application Types (workloads and technologies)
Operational, Analytics, Transactional, IoT, ML, In-Memory, Block-Chain, HTAP, etc.

Oracle runs one Converged Database that supports multiple data types and workloads
Amazon runs many separate Specialized Databases for each data type and workload
Oracle’s Spatial Strategy
Enabling Spatial use cases on every platform

Spatial in Oracle Database
Exadata, Non-Engineered Systems

Oracle Big Data Spatial and Graph
Big Data Appliance, Commodity Hadoop, Spark

Cloud Services
Database Cloud Service, Exadata Cloud Service, Autonomous Database
Spatial
Introduction

- Spatial data is an integral part of almost every database. Any business data that includes location is spatial data:
  - Geographic features (roads, rivers, parks)
  - Assets (pipelines, cables, transformers)
  - Sales data (sales territory, customer registration)
  - Street/postal address (customers, stores, factories)

- Business apps (data warehousing) can benefit from insights from spatial analysis

- Sensors, satellites are generating massive spatial data sets (imagery) – which need to be managed, processed, analyzed

- Make data scientists and developers more productive through spatial analysis of their data

- Oracle Database Spatial features are a great differentiator
Typical Analytical Applications using Oracle Spatial features

- **Public sector**
  Crime mapping, predictive policing, emergency services reachability analysis

- **Retail**
  Location-based marketing, site planning, indoor customer flow analysis

- **Financial services**
  Targeted marketing, risk zone analysis

- **Utilities**
  Outage analytics, field service planning

- **... and many more**
Typical GIS Applications using Oracle Spatial features

- **Public sector**
  Cadastre management, EU agricultural subsidies, 3D city modeling, city planning, hydrographic map production, meteorological data management

- **Telco and utilities**
  Mobile network planning, utilities facilities management

- **Transportation and logistics**
  Railway asset maintenance, airport asset management, waste logistics, air traffic management, parcel delivery

- **Engineering and construction**
  Building information modeling (BIM)

- **... and many more**
Oracle Database Spatial features
Open, interoperable geospatial data management and analysis platform

Deployable Services
- Mapping
- Geocoding
- Routing
- Web Services (OGC)
- Studio

Points
Lines
Polygons
Location Tracking (Geofencing)

Raster
3D / LiDAR
Topologies
Networks

Spatial Analysis Through SQL

```
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';
```
Oracle Database Spatial features
Open, interoperable geospatial data management and analysis platform

Oracle Apps
Oracle Analytics Cloud (Data Viz)
Oracle Spatial & Graph

SQL API
Java API
REST API
Python, node.js drivers

OGC Web Service APIs

Esri GIS
Other GIS/geospatial products
Open Source platforms
Geospatial ETL tools

Based on open standards

OGC
Principal Member
Spatial Studio – Geospatial Analysis Made Simple
Downloadable from www.oracle.com/database/technologies/spatial-studio.html
Oracle as a Spatial Database

- **Extend value of Oracle investment**
  Database, middleware, apps – on prem or cloud

- **Increase value and utilization of geospatial data and analytics**
  Easily enabled for all business workflows and tools

- **Develop spatial applications without special GIS skills**
  SQL, Java, Rest APIs for developers, Spatial Studio for business analysts

- **Enterprise security, scalability, performance for mission critical Spatial data sets**
  Extreme performance, Exadata integration

- **Complements GIS (eg Esri) and supported by partner ecosystem**
  Certified platform while opening data to full potential
Major New Spatial Features

- **Ease of Use Improvements**
  - JSON and Oracle REST Data Services
  - Web services user interface, CSW and WFS enhancements
  - Use spatial operators without a spatial index
  - GeoRaster
  - Map visualization
  - Spatial Studio: New self-service development tool

- **Performance**
  - Spatial index performance improvements
    - 3x faster queries for large point data sets
  - Map visualization dynamic tile layer
    - Faster map rendering, save storage overhead on large, complex queries

- **Expanded Database Support**
  - Spatial support for distributed transactions
  - Spatial support for database sharding
  - Autonomous Database Cloud Support
  - Core spatial features included in Autonomous Data Warehouse and Transaction Processing
Summary

By managing spatial data the same as other business data, Oracle enables enterprises to realize these benefits:

- Integrate analysis in the IT infrastructure
- Reduce operational costs
- Minimize strategic risk
- Reduce development effort
Resources on Spatial

Spatial and Graph features in Oracle Database

In keeping with Oracle's mission to help people see data in new ways, discover insights, analyze and forecast, the database now includes the Machine Learning, Spatial and Graph features. If you have an enterprise license, you can use all three industry-leading features: machine learning, spatial and graph capabilities for development and deployment purposes on premise and in Oracle Cloud Database Services.

www.oracle.com/goto/spatial