

Spatial Technology at Oracle

Oracle provides the industry's leading spatial database management platform. Supporting applications from location enabled business and mapping services, to advanced geospatial systems, Oracle provides comprehensive data types, models, services, and tools for spatial data management, analytics, and visualization – from vector, LiDAR, raster, and networks, to map visualization, geocoding, routing, and a self-service visual analytics tool. The spatial features leverage Oracle enterprise features for scalability, security, and performance. Organizations worldwide rely on Oracle to handle the most demanding, mission-critical spatial requirements.

SPATIAL ANALYSIS

Oracle's mission is to help people see data in new ways, discover insights, and unlock endless possibilities. Spatial analysis is about understanding complex interactions based on geographic relationships – answering questions based on where people, assets, and resources are located. Spatial insights enable you to provide better customer service, optimize your workforce, locate retail and distribution centers, evaluate sales and marketing campaigns, and more.

With Oracle's spatial offerings, developers, database professionals, and analysts can use a comprehensive suite of spatial data management, analytics, and visualization tools to integrate spatial analysis and mapping into applications on enterprise grade data management infrastructure – Oracle Database and Oracle Exadata. Innovative technologies of Oracle Cloud Gen 2 and Oracle Autonomous Database, the industry's only self-driving, self-securing, and self-repairing database, are available to spatial applications.

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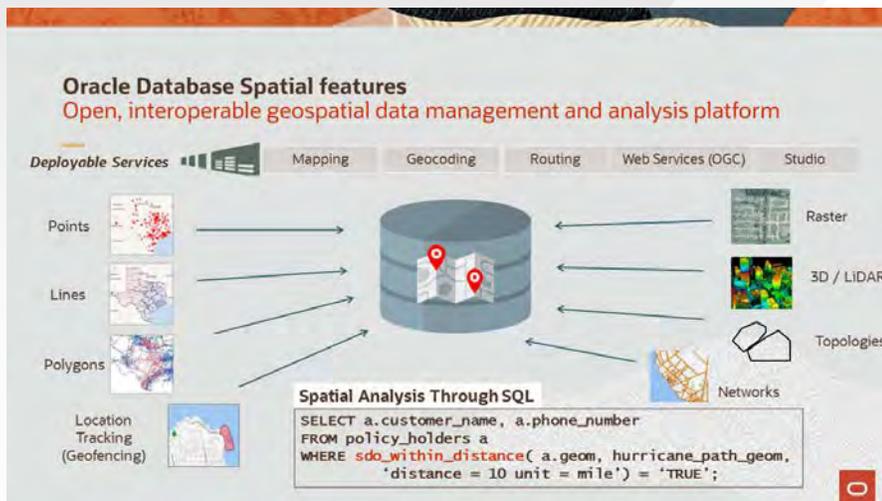
Advanced Spatial Data Management for the Enterprise

Oracle's spatial technology is part of Oracle Database. For more information on licensing and availability, please refer to official Oracle Database licensing documentation.

Key Benefits

- Oracle Database scalability, security and manageability for enterprise spatial and graph applications
- Extreme performance for critical enterprise spatial and graph

ORACLE



SPATIAL FEATURES

Oracle Database includes advanced spatial analysis and processing. It supports all major spatial data types and models, addressing business-critical requirements from many industries, including transportation, utilities, energy, public sector, defense and commercial location intelligence.

Data model and comprehensive analytics for 2D spatial data

You can perform queries based on proximity (how near or far something may be) and containment (whether something within or outside a given region). Hundreds of functions and operations to filter data, measure distance relationships, and combine and/or transform geometries are provided.

High performance spatial processing

Spatial vector acceleration optimizations, and spatial indexes provide fast query performance on massive, complex data sets.

Standards based SQL and Java APIs, native JSON and REST support

Developers can easily add spatial capabilities to applications using modern application frameworks of their choice, without having to learn new languages. Spatial data can be read and published on the web using standard formats.

Support for OGC web services

Oracle Database includes standard Open Geospatial Consortium web services for publishing of spatial data and interoperability with other data sources and applications.

Map visualization component

Using HTML5 and WebGL-based JavaScript APIs, developers can incorporate highly interactive maps and spatial analysis into business applications. Application content can be combined with maps and data from a variety of web services and data formats. This map visualization is deployed in a Java EE container.

Geocoding and Reverse Geocoding

Geocoding is a fundamental process that helps organizations refine and enrich

datasets with Oracle Engineered Systems

- Easily location-enable enterprise applications, processes, and workflows
- Store, manage, and analyze all major geospatial data types and models natively in Oracle Database
- Supported by all leading geospatial vendors

Key Spatial Features

- Virtual Mosaic and image processing with GeoRaster support for imagery and raster data, including Java API
- 3D data model – native support for 3D geometries, surfaces and LiDAR point clouds.
- Support for OGC and ISO geospatial standards – Web Feature Service, Web Map Service, Web Catalog Service, Location Services
- Geocoding and routing engines
- Topology data model; linear referencing system
- Network Data Model Graph– a storage model to represent graphs and networks in link and node tables
- JSON support for spatial data access, REST APIs
- Location data enrichment API with geographic hierarchy and place names data set

existing address and location information found in relational tables. It generates latitude/longitude from existing customer addresses (or site locations) and is usually the first step in location intelligence applications.

Network Data Model, Java APIs and Routing Engine

Developers can model physical and logical networks, and real-world features with a geographic component and analyze them for shortest path, nearest neighbors, within cost and reachability. Loading partitioned networks into memory on demand enables scalable in-memory analysis of very large networks. Directed and undirected graphs with or without costs can be modeled. Network Data Model is used in transportation, utilities, energy and communications.

A routing engine, based on the Network Data Model, provides driving directions along street networks, and can incorporate data feeds such as traffic patterns.

GeoRaster

Oracle Database stores and processes geo-referenced raster data, such as satellite imagery and gridded data. It provides a powerful raster algebra library and supports the creation of virtual mosaics. GeoRaster has an integrated loading tool for easy loading and exporting of raster data and supports on the fly image processing and analytics for real time applications. GeoRaster is commonly used in energy, natural resource management, and national security applications examining landscape changes in urban or rural areas.

3D point clouds and LiDAR

These features manage spatial sensor data used for enterprise 3D GIS and Smart City applications. The 3D support is optimized for point cloud and CityGML workflows. They enable the production and management of seamless 3D point cloud models ranging from small local areas, to large cities and countries.

Topology data model

Topology is used by mapping and land management organizations that require a high degree of feature editing and data integrity across their maps and map layers.

Location data enrichment services

The enrichment process associates authoritative location terms (place names, addresses, and latitude / longitude) to text found in database tables. They allow for better joining and integration of locations with other data in the database or streaming services to perform spatial and text analysis.

Location tracking server

This supports tracking millions of moving objects against thousands of regions of interest in the database, for logistics and IOT applications.

Spatial support for partitioning, distributed transactions and sharding

Spatial applications can now leverage these database features used for high performance on large data sets, in large scale web and cloud-based applications, and for massively scalable and reliable OLTP applications.

Spatial Studio

This web application is a self-service, visual, no-code/low-code map canvas and spatial analysis tool. Analysts using Oracle Database and Autonomous Database

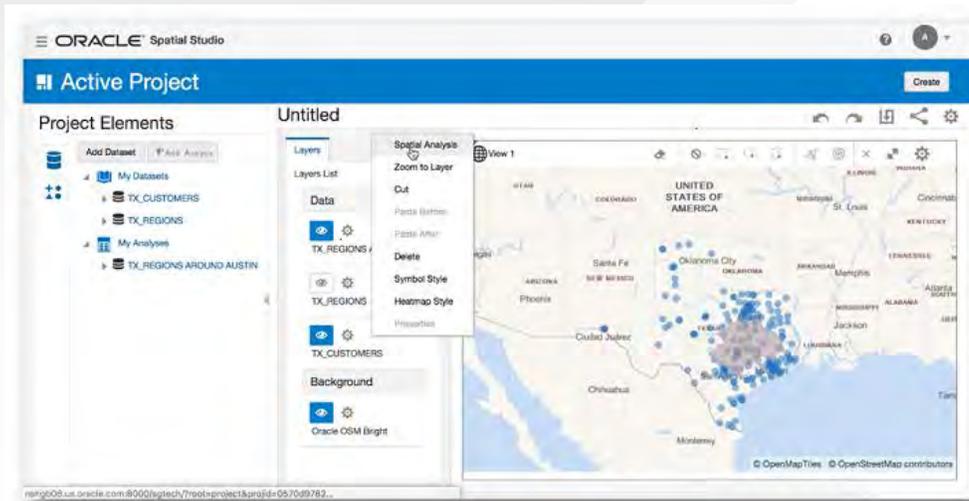
- Spatial index and partitioning
- Map visualization of geographic data
- Location tracking server

New Spatial Features

- Spatial support for distributed transactions
- Spatial support for database sharding
- Improved web services user interface, CSW and WFS enhancements
- Ability to use spatial operators without a spatial index; spatial index performance improvements
- Server side raster loading tool, more image processing and analytics functions
- Spatial Studio – self-service, visual, no code map canvas and spatial analysis tool

Related Products

- Oracle Cloud
- Oracle Database
- Oracle Analytics Cloud Service
- Oracle Advanced Analytics
- Oracle Big Data Spatial and Graph
- Oracle Exadata Database Machine



can now perform spatial analysis and mapping without writing a line of code.

THE WORLD'S LEADING IT PLATFORM FOR SPATIAL DATA

Oracle's spatial features are a native part of Oracle Database – and of the world's leading information technology platform for Oracle Cloud, on premises, and big data deployments. Spatial applications developed with Oracle benefit from the leading performance, scalability and security capabilities of Oracle Database. They can exploit the extreme processing power and bandwidth of Oracle Exadata Database Machine. Developers can easily incorporate these capabilities in their solutions using modern development frameworks. Oracle tools and enterprise applications, and leading vendors support Oracle's spatial features. The largest enterprises worldwide – mapping agencies, transportation, utilities, telcos, insurance, energy, financial services and more – rely on Oracle for their spatial processing needs.

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