Oracle Spatial: Essentials

Duration: 5 Days

What you will learn

The course extensively covers the concepts and usage of the native data types, functions and operators available in Oracle Spatial for implementing geospatial applications and location-based services.

Using the Oracle Application Server MapViewer, students learn how to render maps and view geospatial data managed by Oracle Spatial or Locator. Students also get introduced to basics of geocoding and routing concepts.
Demonstrations and hands-on practice reinforce the fundamental concepts.
The Oracle Spatial: Essentials course is applicable to both 10g and 11g audiences.

Learn to:

Load geometries into spatial layers
Create spatial layers by using the SDO_GEOMETRY data type
Employ spatial operators and functions to generate and access 2D geometries
Setup and demonstrate Oracle Maps
Run spatial queries to perform spatial analysis
Use MapViewer and the Map Builder tool to render maps

Audience

Application Developers
PL/SQL Developer
Technical Administrator
Technical Consultant

Prerequisites

Suggested Prerequisites
Familiarity with SQL (recommended OU course: Introduction to SQL)
Familiarity with Object relational data model
Familiarity with PL/SQL (recommended OU course: Program with PL/SQL)
Familiarity with mathematical geometry concepts

Course Objectives

Create spatial layers by using the SDO_GEOMETRY data type
Load geometries into spatial layers
Employ spatial operators and functions to generate and access 2D geometries
Describe the various types of coordinate systems
Run spatial queries to perform spatial analysis
Enhance and tune spatial indexes for better performance
Describe the linear referencing system
Describe Oracle Spatial geocoding and routing concepts

Setup and demonstrate Oracle Maps
Use MapViewer and the Map Builder tool to render maps
Describe the Oracle Spatial data and query models

Course Topics

Introduction
Oracle Database: Location Features
Oracle Spatial: Spatial Data Management for Enterprise Applications
Oracle Spatial Development History
Oracle Spatial and Locator: art of the Oracle DBMS Kernel
Oracle Spatial Object-Relational Model
Review: Oracle's Object-Relational Model
Common Geographical Terms Used in the Course
Oracle Spatial Documentation and Resources

Overview of Oracle Spatial Concepts
Define Oracle Spatial
Describe Geometric Primitive Types
Describe the Spatial Data Model
Coordinate Systems: Concepts
Explain Spatial Indexing
Describe the Optimized Query Model
Define Linear Referencing System
Define Geocoding and Routing

Creating Spatial Layers
Describe the MDSYS Schema
Spatial Native Data Type: SDO_GEOMETRY
Define different types of geometry elements
Construction of geometries by using the INSERT statement
Manage Spatial metadata

Defining Collection Geometries
Define Collection geometries: Multipoint, Multiline string, and Multipolygon
Describe Oriented point
SDO_GEOMETRY constructors and member methods

Associating Spatial Layers with Coordinate Systems
Define Coordinate systems and their different types
Geodetic coordinate system concepts
Whole earth geometry model and tolerance
Coordinate system transformations
Units supported by Oracle Spatial

Loading Spatial Data
Different ways of loading spatial data
Loading of spatial data by using SQL*Loader
Export and import utilities of the Data Pump technology
Load data using transportable tablespace
Load data using transactional insert

Use the Java shapefile converter

Validating and Debugging Geometries
Validation functions: SDO_GEOM.VALIDATE_GEOMETRY_WITH_CONTEXT and SDO_GEOM.VALIDATE_LAYER_W
Geometry debugging functions: SDO_UTIL.GETVERTICES, SDO_UTIL.RECTIFY_GEOMETRY, and SDO_UTIL.EXTRA
Strategy for Geometry Validation

Using the Oracle Application Server MapViewer
Introduction to MapViewer
Architecture of Oracle Application Server MapViewer
Installation of Oracle Application Server MapViewer
Use MapViewer demos
Edit MapViewer Configuration File

Indexing Spatial Data
Concepts of R-tree indexing
CREATE INDEX and the R-tree parameters
Analyze, drop, and alter operations on the spatial index
Use the Spatial index dictionary views
Estimate R-tree index size and the resources required

Querying Spatial Data
Overview of the Spatial query model
Overview of spatial operators, procedures, and functions
Use the SDO_FILTER operator
Define Spatial topological relationships
Use the SDO_RELATE operator
Use the SDO_GEOM.RELATE function

Using SDO_WITHIN_DISTANCE, SDO_NN, and SDO_JOIN Operators
Spatial queries and operators
Describe the SDO_WITHIN_DISTANCE operator
Describe the SDO_NN operator
Spatial join by using the SDO_JOIN operator

Analyzing Geometries by Using Spatial Operators and Functions
Calculation of the area, length, and distance between geometries
Describe Arc densification and buffering
Use the Spatial Boolean functions
Explicit transformations with spatial functions

Using Spatial Analysis, MBR, Utility, and Aggregate Functions
Describe some of the Spatial analysis functions
Describe some of the Spatial MBR functions
Describe some of the Spatial utility functions
Describe some of the Spatial aggregate functions
Conversion between SDO_GEOMETRY and Geography Markup Language (GML)

Defining Maps by Using the Map Builder Tool
Introduction to Map Builder
Export and import styles
Use of Map Builder to administer style, theme, and map definitions

Use the Sample mapclient.jsp
Define a Sample XML request with elements
Open Geospatial Consortium (OGC) Web Map Service (WMS) and Oracle Workspace Manager support

Leveraging Oracle Maps: The Map Cache and JavaScript API
Oracle Maps concepts
Oracle Maps demo setup
Maps and Faces demo
More Oracle Maps demos

Creating a User-Defined Coordinate System
Coordinate systems concepts: Ellipsoids, Datums, and projections
Geodetic or projected coordinate systems
Define OGC WKT schema and EPSG
Creation of a user-defined coordinate system
Local coordinate system

Implementing a Linear Referencing System
Linear Referencing System (LRS) concepts
Define LRS geometries
Overview of LRS functions
Implementation of an LRS

Managing Spatial Indexes
Oracle Spatial index partitioning
Partition spatial data based on location
Define function-based indexes
Use transportable tablespaces
Embedded spatial geometry

Geocoding Address Data
Geocoding concepts
Oracle Spatial geocoding functions
SDO_KEYWORDARRAY, SDO_GEO_ADDR, and SDO_ADDR_ARRAY types
Examples using geocoding functions
Geocoding service

Using the Spatial Routing Engine
Oracle Spatial Routing architecture
Route request and response
Sample RouteServer JSP