

## Oracle Spatial: Essentials - LVC

**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

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### Audience

Application Developers

PL/SQL Developer

Technical Administrator

Technical Consultant

### Prerequisites

*Required 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.EXTR/
- 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

### **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