Oracle Platform
GIS & Location-Based Services

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Ohio Valley
Overview

- Geospatial Technology Trends
- Oracle’s Spatial Technologies
  - Oracle10g
    - Locator
    - Spatial
  - Oracle Application Server 10g
    - MapViewer
    - Location Based Services
- SDO Partner Support
- Q&A
Challenge of Incorporating Location Based Information

- Specialty GIS/RS servers
  - Data isolation
  - High systems admin
- High training costs
- Complex support problems
- Information not aligned with Business Processes

Real Business Intelligence is almost IMPOSSIBLE!
Spatial Technology Evolution

Past

Monolithic GIS
Proprietary Files

Application

Proprietary Middleware

Traditional Database

Standalone

Today

GIS Software
Application Server

Application

Open APIs

Spatially Enabled Enterprise

Internet Platform
Early Spatial (Hybrid) Systems

- Attributes in database
- Geometries in database - but in proprietary binary format
- Extra middleware and support costs
- IT can access geometries via proprietary interfaces only
- Poor integration
Today’s Open Spatial Databases

- Attributes and geometries fully integrated in the database
- Spatial is native DBMS type
- IT can access geometries via open standard interfaces
- Standard Query Language
- Supported by ALL GIS tools and database applications
Integrating All Information

- Relate associated information to spatial locations
  - Land records and topologies
  - Road Networks
- Satellite Imagery
  - Image map data
  - Legal Documents
- Integrate the business rules and processes
- Location analysis without a GIS!!!
Value Propositions:

- Integrated enterprise data management for LARGE datasets and VLDBs
- Consolidated management of spatial operations
- Greater security and interoperability
- **Enhanced decision support and business intelligence**
- Reduced training requirements
- Spatially enabled applications

**Spatial is a differentiator**
Location-based, GIS data in the Oracle Database
Relational and GIS Data in a Hybrid setup

NO Data Integration

“Show me sales analysis on homes sold by John Doe within five zip codes where the zip codes are less than five miles from the office and…”

Road

<table>
<thead>
<tr>
<th>ROAD_ID</th>
<th>NAME</th>
<th>SURFACE</th>
<th>LANES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Homestead</td>
<td>Asphalt</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Bellomy</td>
<td>Asphalt</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
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Spatial Data in Oracle Tables

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Data type:
- SDO_GEOMETRY
- SDO_GEORASTER
What is a Spatial Database?

- Spatial Analysis
- Spatial Data Types
- Spatial Indexing
- All Location/Spatial Data Stored in the Database
- Fast Access to Spatial Data
- Spatial Access Through SQL

Spatial Database

Oracle 10g
All Spatial Types in Oracle 10g

- Networks (lines)
- Parcels (polygons)
- Locations (points)
- Imagery (raster, grids)
- Addresses (geocoded points)

Business Rules and Validations

Topological Relations (persistent topology)
Spatial Query Via SQL

Find all competitor’s branches within 2 miles of the Northport branch...

```
SELECT c.name, c.location
FROM organizations c,
    bank b
WHERE b.site_id = 1604
AND SDO_WITHIN_DISTANCE(c.location, b.location,
'distance=2 unit=mile') = 'TRUE'
```
Spatial Analytic Functions

- **Discovery based on Spatial Patterns**
  - Explicitly materialize spatial relationships

- **Usage**
  - Insurance risk analysis, crime analysis
  - Demographic analysis, customer profiling
  - Epidemiology, Facility placement
  - Insurance Risk analysis:
    - cluster house-holds based on high risk neighborhoods
  - Identify business prospects across a region:
    - examine the average incomes across different regions of the space
Immediate Business Benefit:
Integrate Any Business Intelligence Platform

OracleBI Discoverer, Oracle Spatial & MapViewer
Utilize Oracle Features and Functionality to enhance GIS Apps.

- Oracle Advanced Security Option
- Oracle Label Security
- Oracle Workspace Manager
- Oracle Data Guard
- Oracle Partitioning
- Oracle Real Application Clusters
- Oracle Advanced Replication
- Oracle Platform openness and extensibility…
Technical Benefits

“If you know how to use relational databases, you know how to manage spatial data with Oracle Spatial.”

**High level of integration with GIS software**

- Same access methods (SQL, XML, and JAVA / CORBA)
  - Select, insert, update, delete
- Same features available
  - Replication, distributed, security, parallel, ...
- Same utilities
  - Load, import, export, backup, OEM, ...
- SAME DATABASE
  - Single database for spatial and non-spatial data
Deploying Location-based, GIS data using the OracleAS 10g
Oracle Application Server 10g
MapViewer

- No cost feature of the Oracle Application Server
- Supports vector and raster data
- Easily publishes spatial data to the web
- Centralized managed symbology, annotation and map definition rules
- Provides an XML API, Java API, JSP Tag library and OGC WMS interface
MapViewer Characteristics

- Scalable. Stateless.
- Makes use of JDBC connection pooling and caching
- Caches Mapping Metadata (basemap/theme/style definitions)
- Caches geometric and image data in the mid-tier.
- All data queried from Oracle database
MapViewer: Map

- Renders from spatial data stored in Oracle database
- Defined as a collection of themes
- May contain a legend, title and footnote
- Users request maps using via a MapRequest
- MapViewer returns a map via a MapResponse
MapViewer: Layer Vectors and Rasters

- Draw intelligence from vectors and rasters on the fly
- Use SVGs to dynamically render movement etc.
OracleAS 10g Location Based Services

- **Java APIs** - ingest online web services: geocoding, routing, mapping, YP, traffic, mobile positioning
- **Region Modeling** - associates services (billing, personalization) by (geographic) “regions”
- **Location Caching** - caches caller’s phone number & location to minimize wireless network pinging.
- **Location Privacy** - manages based on LBS service type, permissions, and subscription.
- **Location Marks** - Manages user defined locations of interest (home, work, PIM addresses)
Immediate Business Benefit:
Integrate Any Enterprise Application Platform
Partner Support
Working with Leading Partners
Oracle Spatial Solution Providers

- Autodesk MapGuide
- Bentley Microstation
- ESRI ArcMap
- Intergraph GeoMedia
- PCI Geomatics
- Skyline Smallworld Laser-Scan
- eSpatial
- Mapinfo MapXtreme

Oracle Spatial/ Locator

Oracle 10g Database
Summary

- Location information is as ubiquitous as attribute and scalar information
  - Oracle Locator, Spatial and MapViewer location-enable the entire enterprise
  - New models to support changing needs and analysis
- Most comprehensive integration with partner tools in GIS and LBS
- And it just keeps going…
http://technet.oracle.com/products/spatial
http://www.oracle.com/database/cm_spatial_new.html
Pro Oracle Spatial – Brand new book on Amazon.com