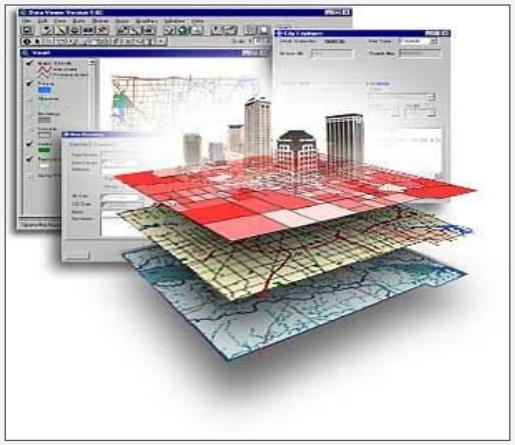
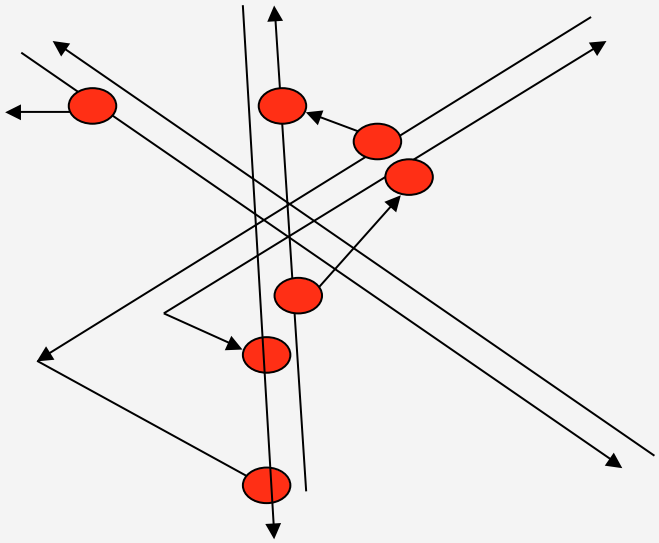
ORACLE

Powering Business Analytics

Xavier Lopez, Senior Director
Product Management,
Oracle Server Technologies





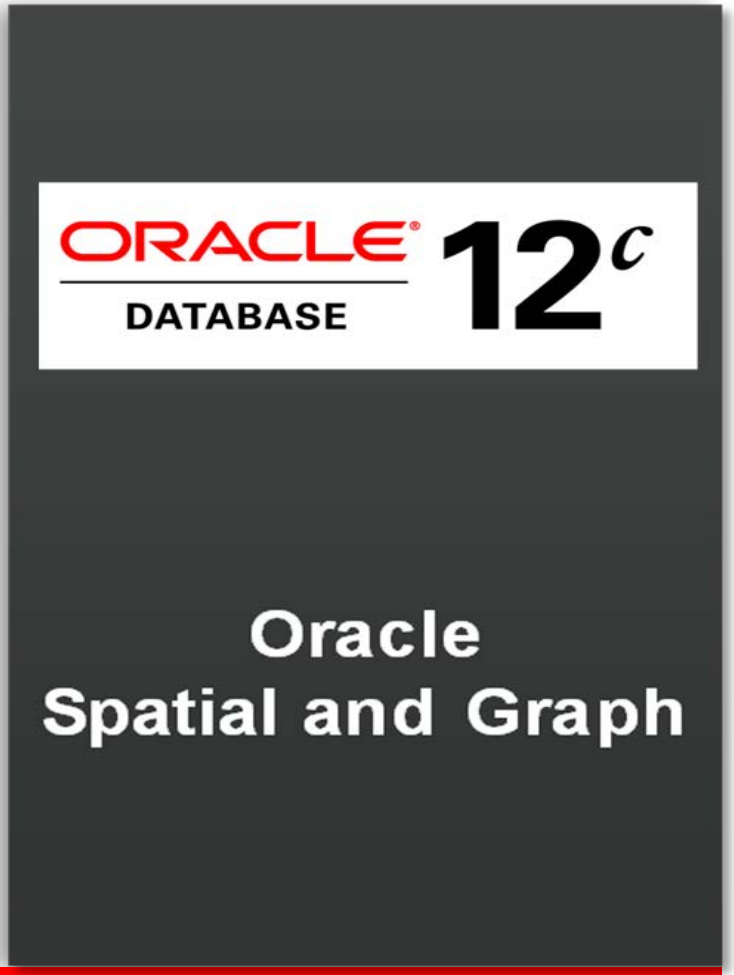
Program Agenda

- Introduce Oracle Spatial and Graph
- Location-enabling Business Intelligence Workflows
- Customer Use Cases
  - Business Intelligence
  - Mobile Tracking
  - Internet of Things

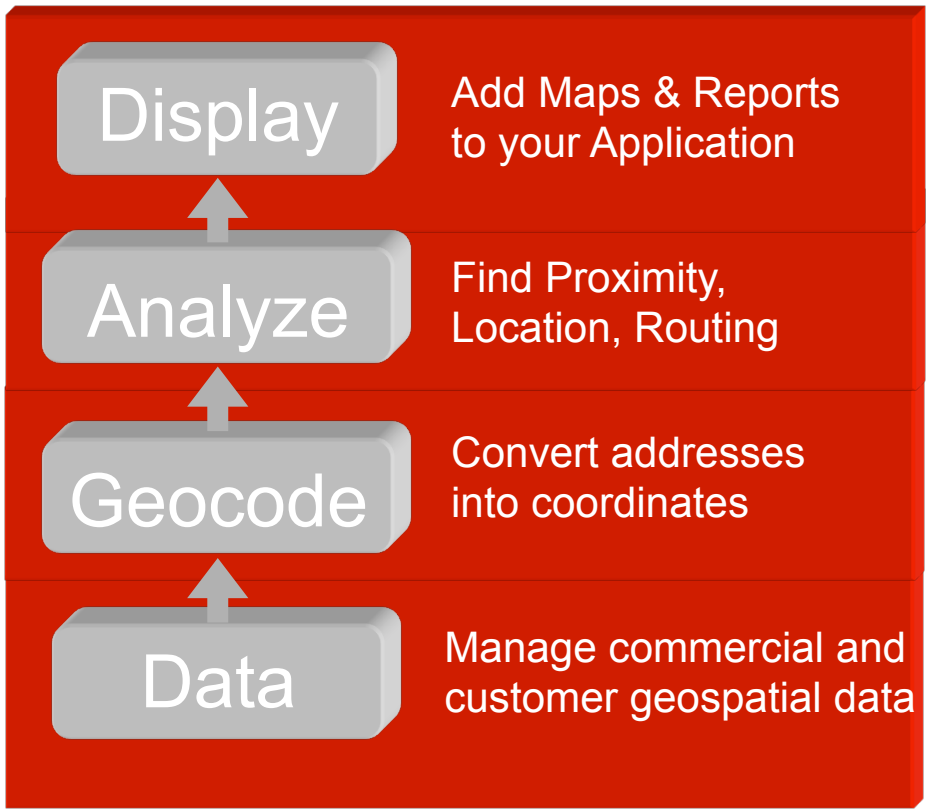
Our Strategy

- Products
  - Oracle Spatial and Graph option
  - Oracle MapViewer
- Partnerships With Leading Spatial Vendors
  - Software vendors
  - Integrators
  - Data suppliers
- Commitment To Standards
  - Open Geospatial Consortium, SQL, ISO TC-211, TC-204
- Part of Oracle applications, tools, engineered systems
  - Exadata, Exalogic, Exalytics
  - Oracle Business Intelligence, CRM, Primavera, Utilities, and more

Location-enabling BI Workflows



How Oracle Spatial Enhances BI Workflows



Technique
Use MapViewer, or 3rd party tools or delivery through web services
400 analysis functions, path analysis, vehicle routing, image & 3D analysis
Includes integrated global address geocoding algorithms
Points, 2D polygons, Imagery, network

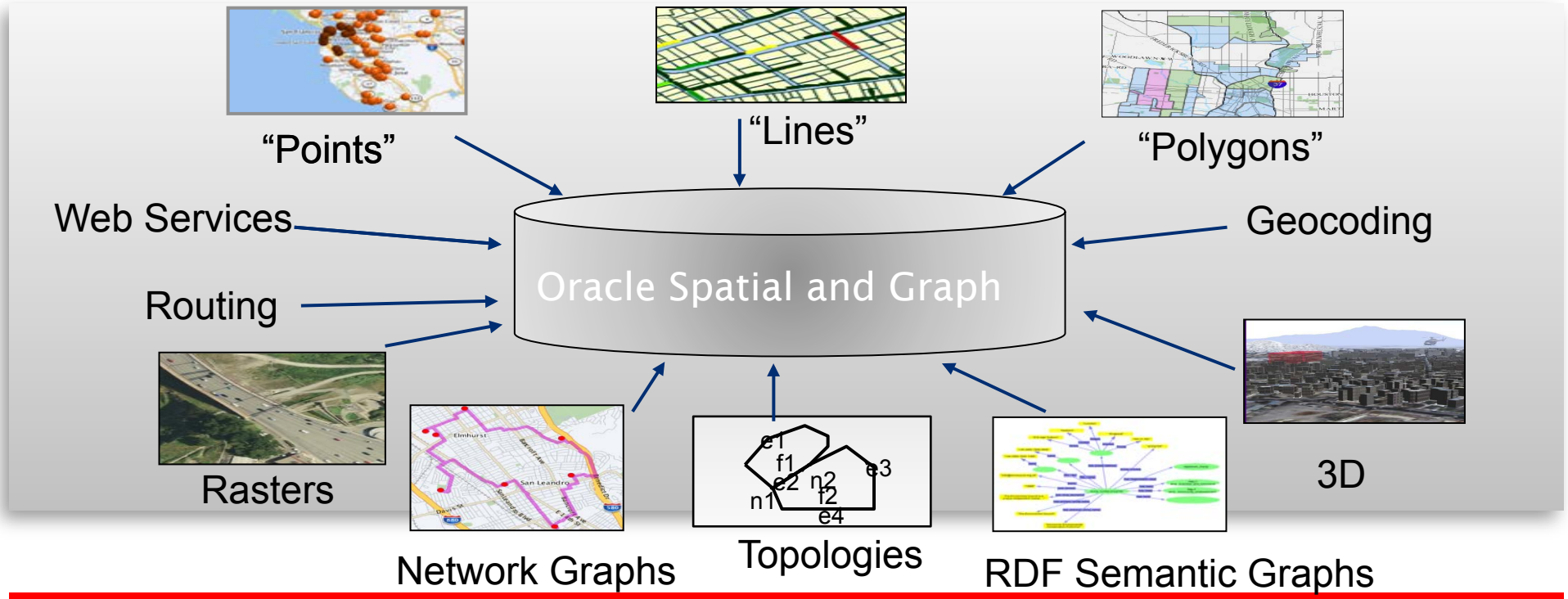
Data

- **Oracle Bundled Map Content**
  - Major roads, admin (city county, state, country boundaries) for whole world

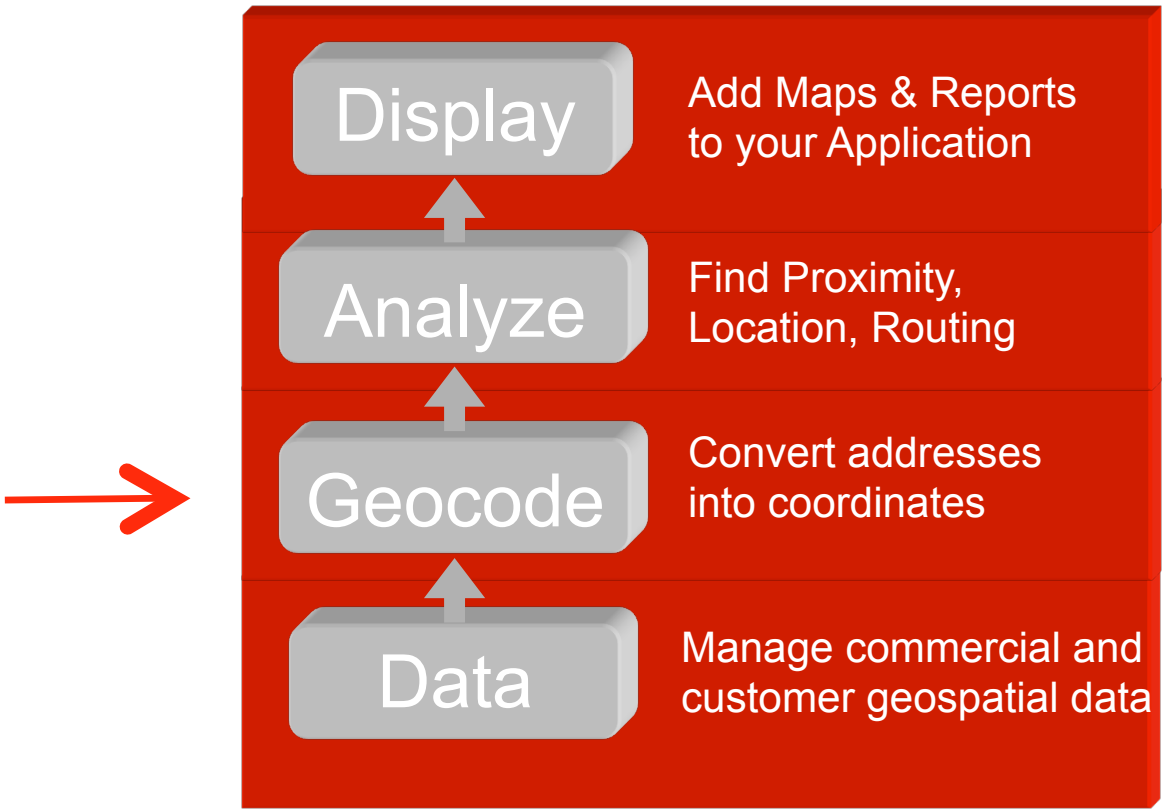
- **3rd Party Specialized Map Data**
  - Here/Nokia
  - TomTom
  - DigitalGlobe
  - Intermap

3rd Party Mapping Services
- Google Maps
- Microsoft Bing
- Nokia

Data: Managing Spatial Data Types



How Oracle Spatial Enhances BI Workflows

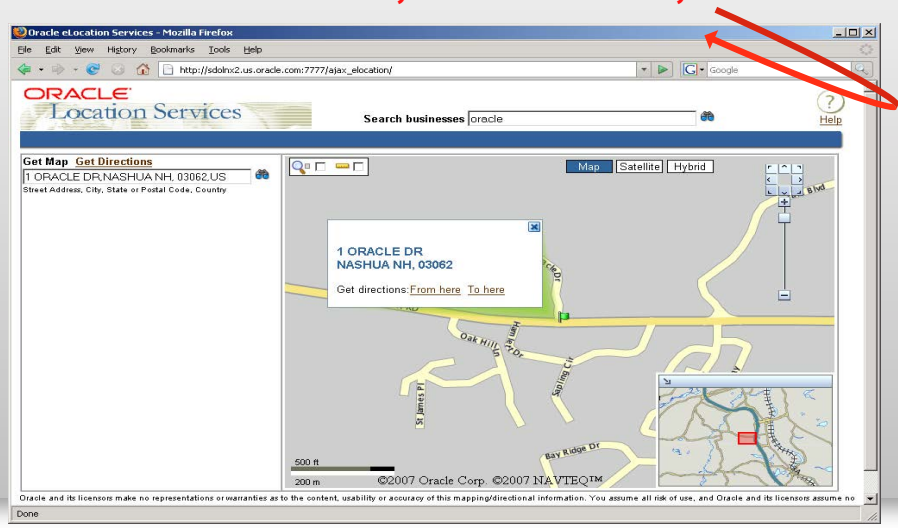


Geocode: Customer Addresses

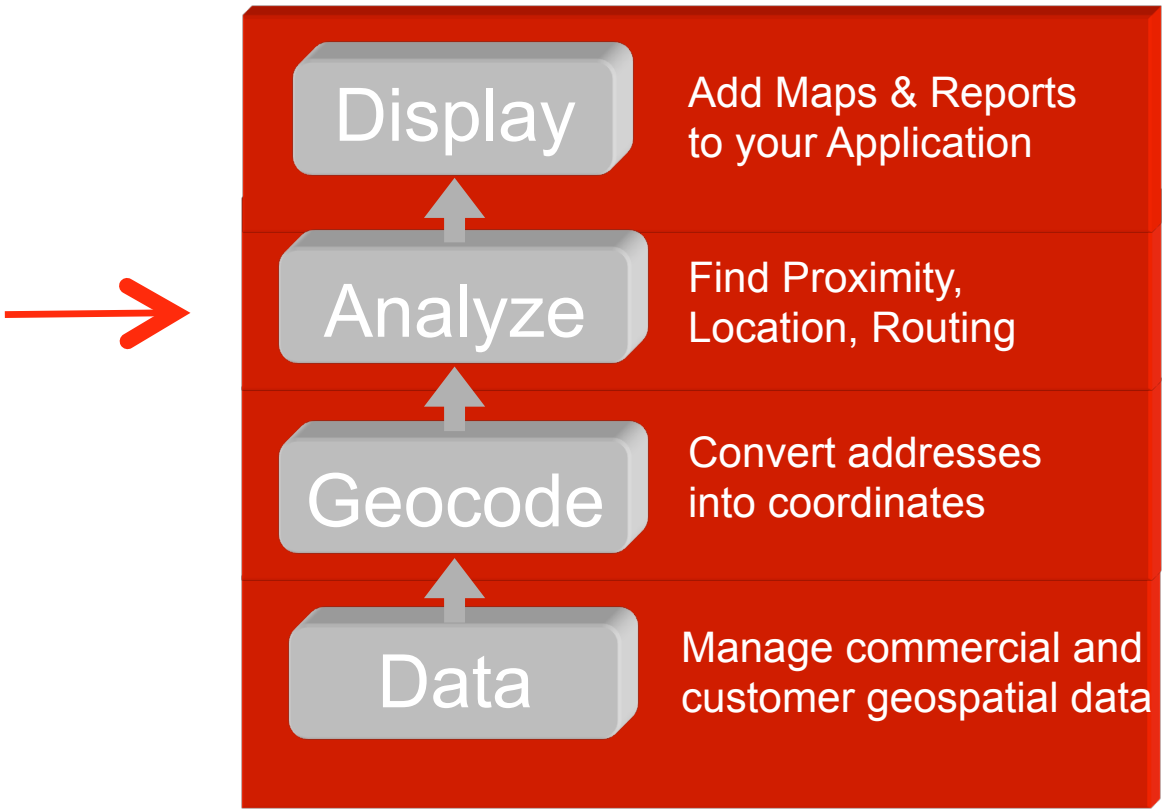
- Convert address to lat/long (points)
- Formatted & unformatted addresses
- Parameters for fuzzy matching
- International addressing standardization
- Record-level and batch processes
- Data provided by HERE, TomTom..
- Parameters for fuzzy matching

Address String:

One Oracle Drive, Nashua NH, 03062

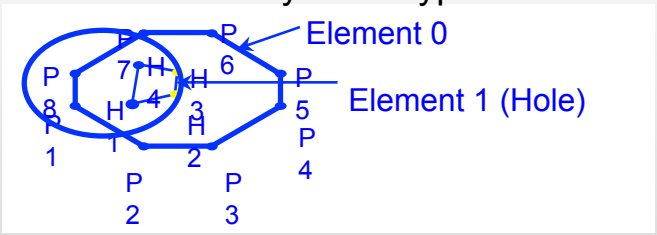


How Oracle Spatial Enhances BI Workflows



Analyze: Spatial Processing in RDBMS

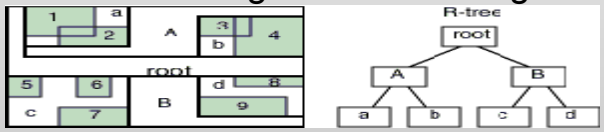
- Native Geometry Data Types



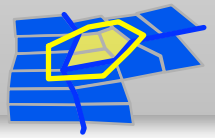
ROADS

RNAME	ID	TYPE	LANES	GEOMETRY
M40	140	HWY	6	
M25	141	HWY	4	

- Self Balancing R-tree Indexing



- Full Query and Analysis



Select, join, buffer, within distance, nearest neighbor, intersection, union, convex hull, centroid, ...

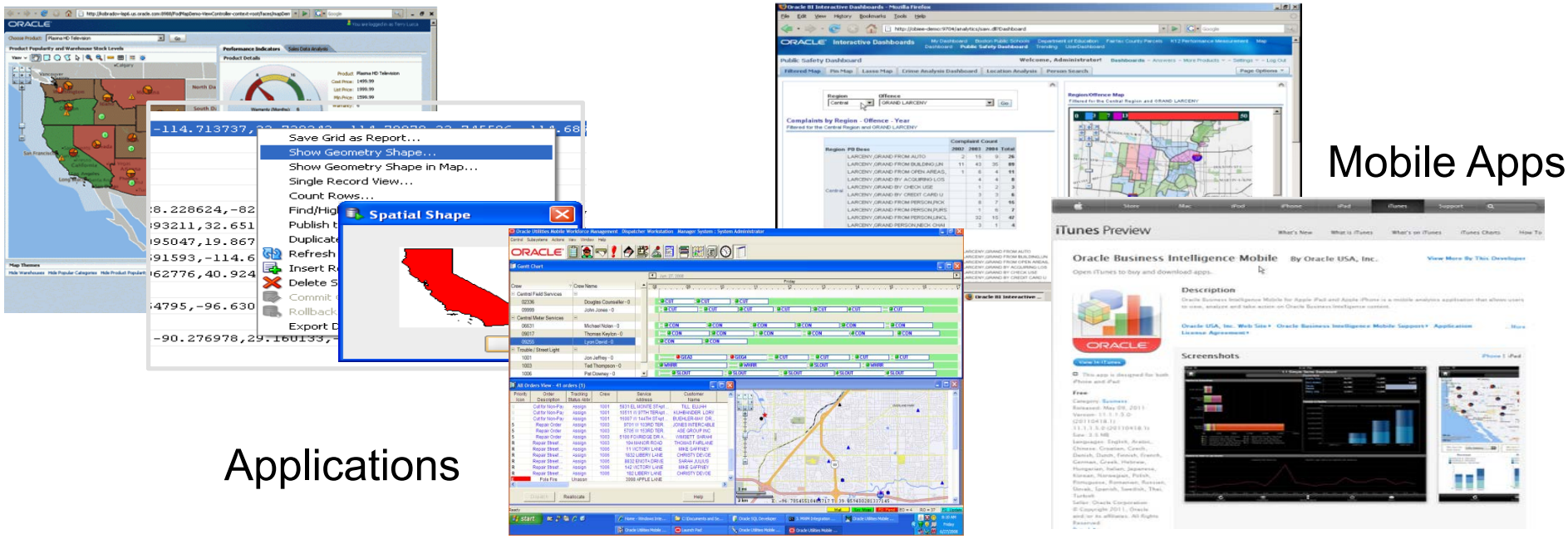
```
SELECT a.owner_name, a.acquisition_status
FROM properties a, projects b
WHERE sdo_within_distance
(a.property_geom, b.project_geom,
        'distance = .1 unit = mile') = 'TRUE'
and b.project_id=189498;
```

Analyze: Enhancing Business Apps & Tools

Development Tools

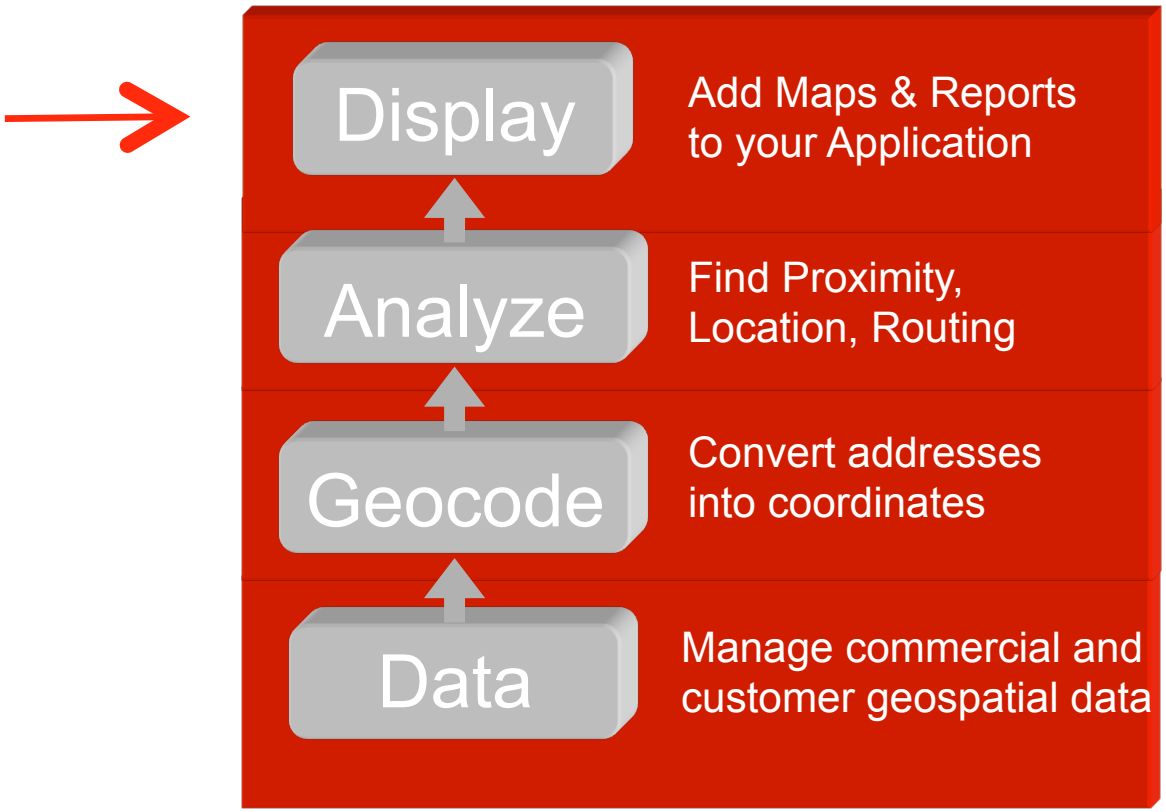
Oracle BI EE

Mobile Apps

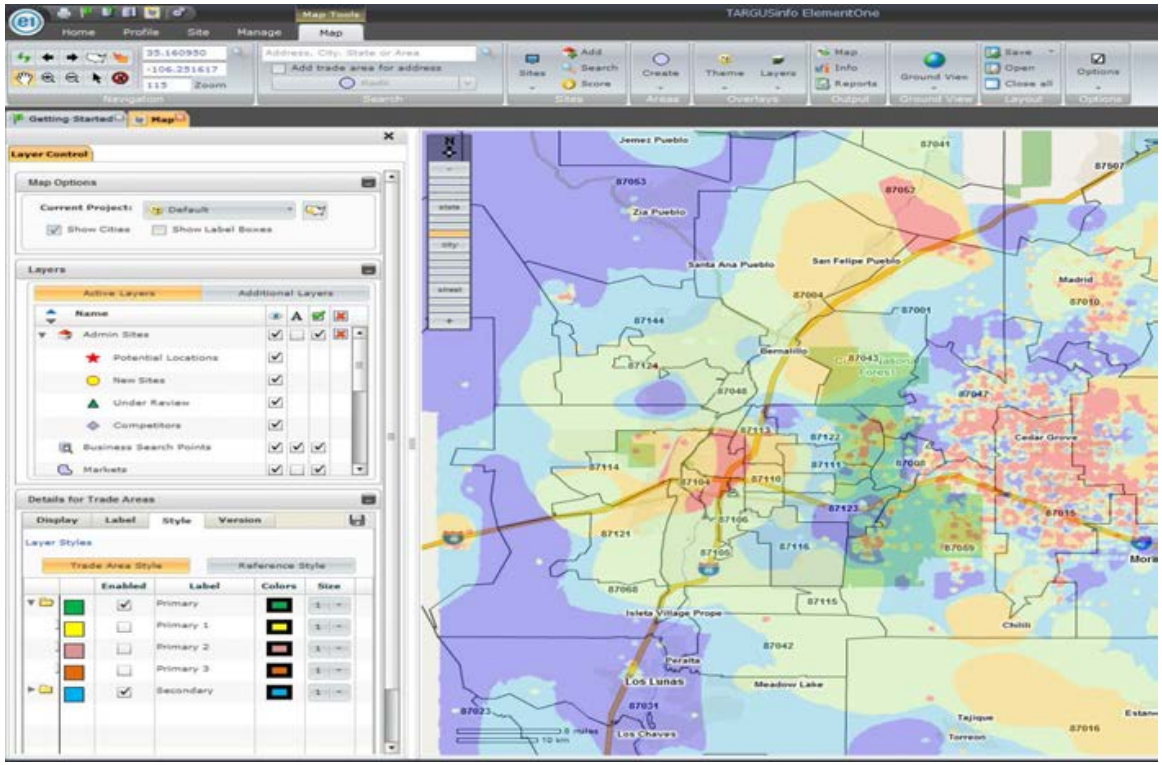


Applications

How Oracle Spatial Enhances BI Workflows



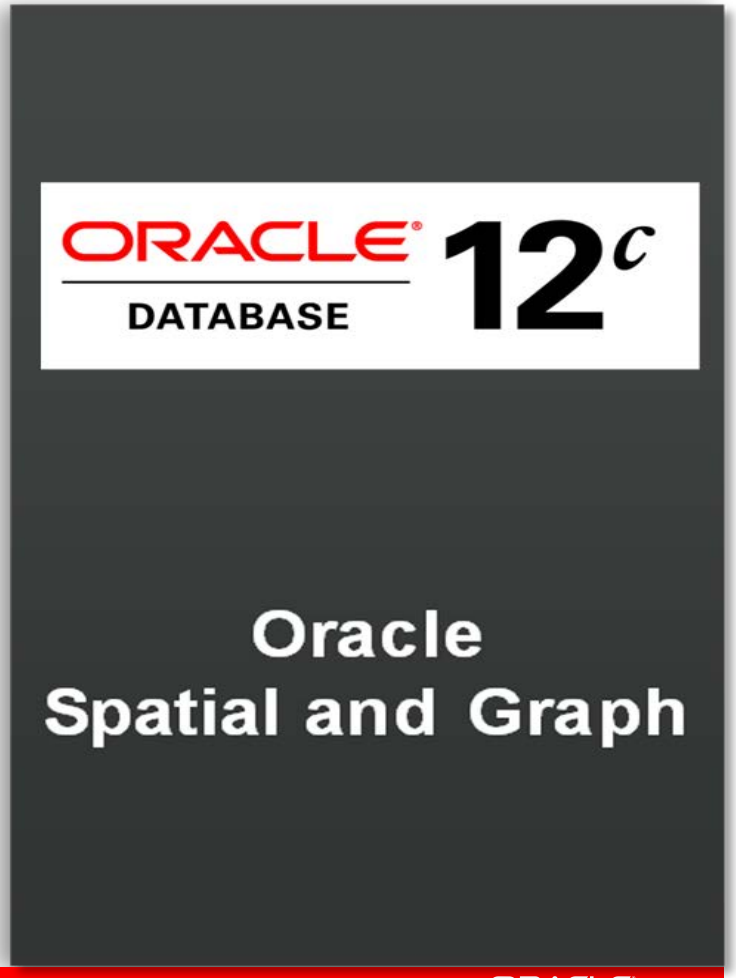
Display: Generating Powerful Maps



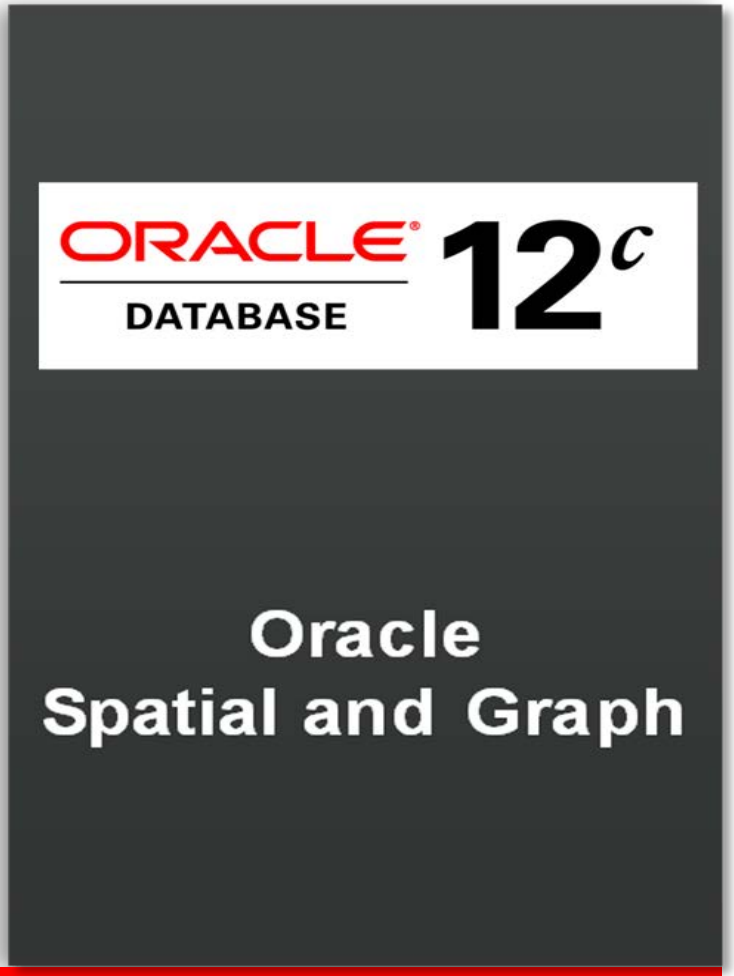
Courtesy, Neustar 2014

3 Use Case Categories:

- Business Intelligence
- Mobile Tracking
- Internet of Things



Business Intelligence



Neustar Information Services

neustar
Real Intelligence. Better Decisions.

Real-time Web, Communications, Retail and Demographic analysis

Objective

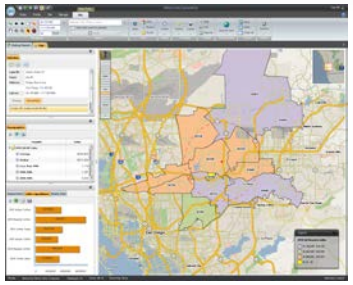
Provide rich data & cutting edge analytics to acquire, retain and grow high value customers

Solution

- Graph analysis of customer locations
- Include rich geo-referenced imagery
- Enterprise wide, role based security
- Timely, transparent data updates

Benefits

- Consolidated .5 TB of spatial data
- Accurate topological relationships
- Improved data precision - 25M+ of ZIP4 data
- 10x performance increase for detailed mapping
- 300% faster, more accurate time-based territory creation



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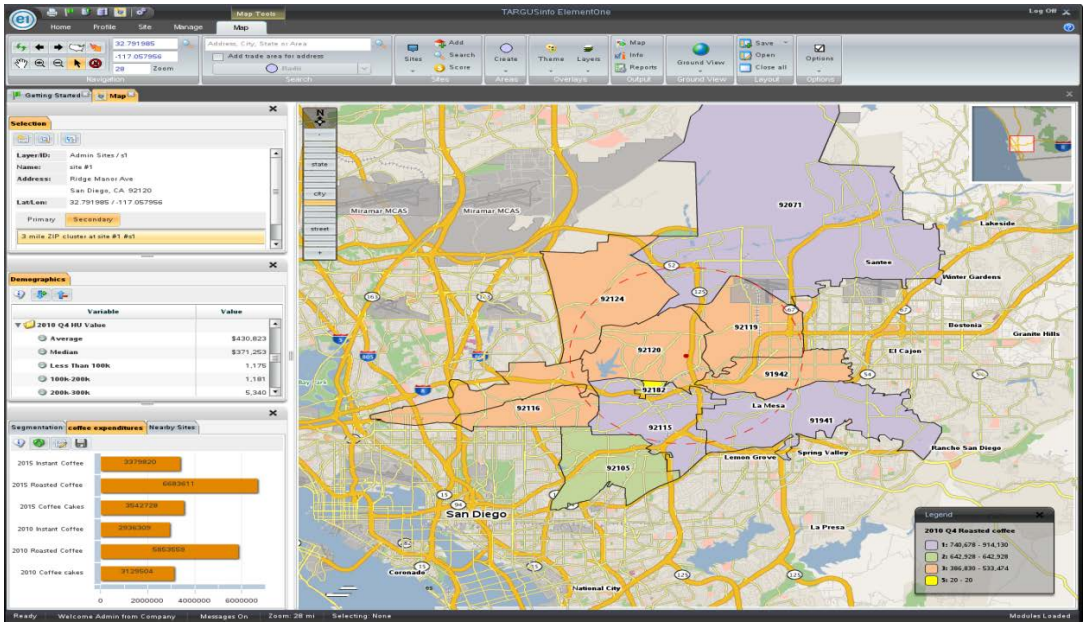
Neustar ElementOne Analytics Platform

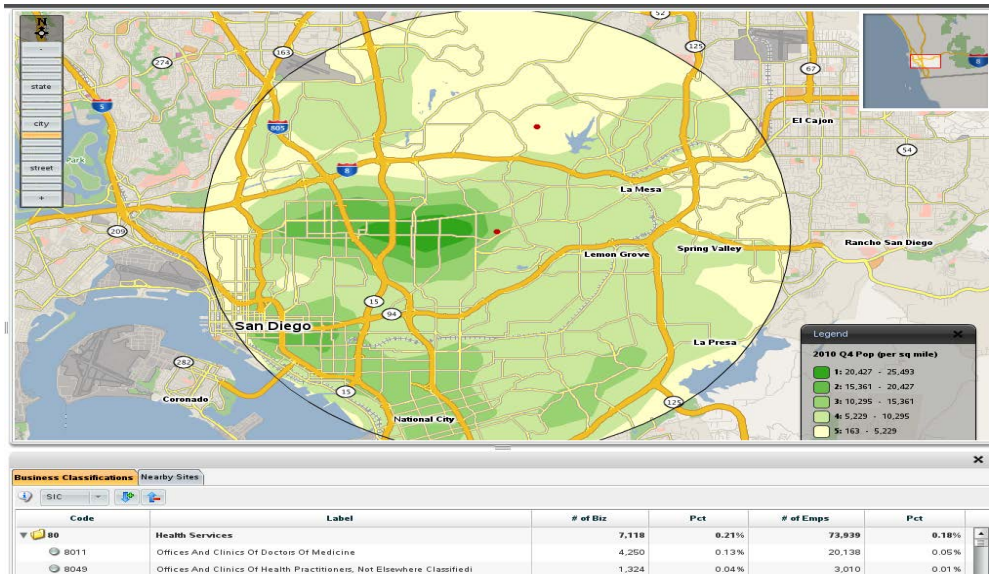
Technology and Tier Layout



- **Database Tier**
  - Oracle Database 11*g*
  - Oracle Spatial
  - Oracle Partitioning
  - Oracle Data Guard
- **Mid-Tier**
  - Oracle WebLogic 11*g*
  - MapViewer 11*g*
- **Front-Tier**
  - Adobe Flex

Neustar ElementOne Analytics

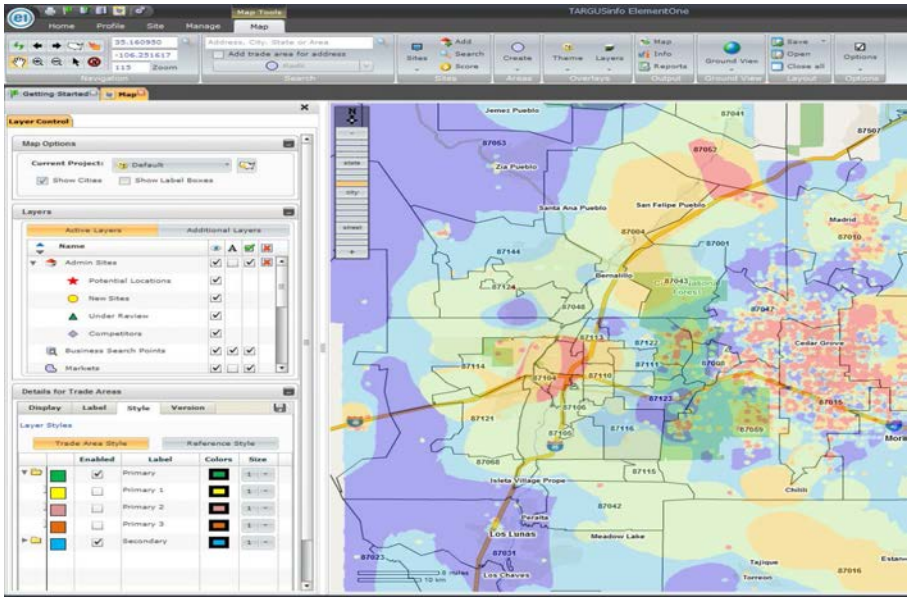
Use of Oracle Spatial Features



- SDO_TIN for Heat Map
- SDO_UTIL and SDO_GEOM for various geography creation and manipulation
  - SDO_BUFFER for polygon smoothing
  - SDO_INTERSECTION, SDO SDO_UNION, SDO_DIFFERENCE, POINT_AT_BEARING, POLYGONTOLINE, SDO_CONVEXHULL, & CONVERT_RADIAN for polygon creation and manipulation
  - SDO_MBR, SDO_AREA & SDO_CENTROID for polygon utility functions
- SDO_CS for Google Projection
- SDO_VALIDATE, RECTIFY_GEOM, and SIMPLIFY for polygon cleansing

Neustar ElementOne Analytics

Use of Oracle Spatial Features



- Benefits of MapViewer 11*g*
  - Tight integration with Oracle Spatial
  - Cached tile maps for high performance, scalability and portability
  - Highly flexible – full control over map detail and labels
- Benefits of Geo-Raster Image
  - Display and query of highly detailed markets and trade areas
- Scalable and High Performance
  - Handle large datasets (ZIP4 points, large customer and transaction level files)
  - Partitioning and SDO_JOIN

KKB Kredi Kayıt Bürosu A.S.

Integrated Credit Risk Scoring Solution

Objectives

- Spatial Analytics and Reporting Solution
- Based on >1 million geocoded credit transactions per day

Solution

- Combined OLTP and DWH/BI system based on Exadata to reduce cost
- Managing over 700 million credit accounts
- Complex spatial analytics including demographic data, 100x faster than before
- Used by Risk Managers and Sales in 150 member institutions, 400 mln. queries/year

«Oracle Exadata together with Infotech's LocationBox solution, allowed Banks to benchmark their loan portfolio with each other first time ever at low cost.»
Koray Kaya, EVP Strategic Planning, KKB

Bridge Consulting
Geomarketing Analysis

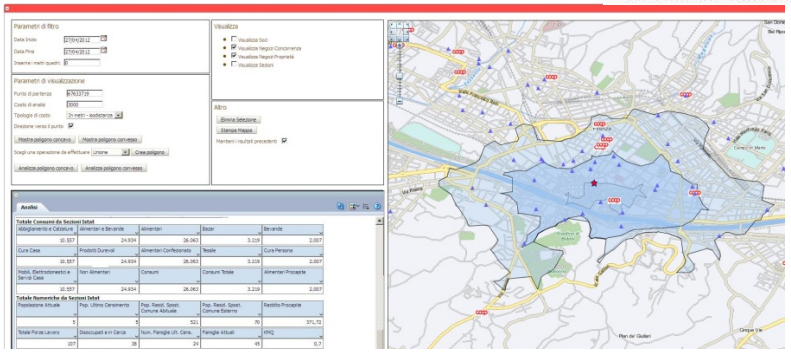
BRIDGE Consulting
Information Technology

OVERVIEW

- Incorporates all of Business Intelligence systems and all departmental systems
- Supports Marketing, Development and Management divisions

CHALLENGES

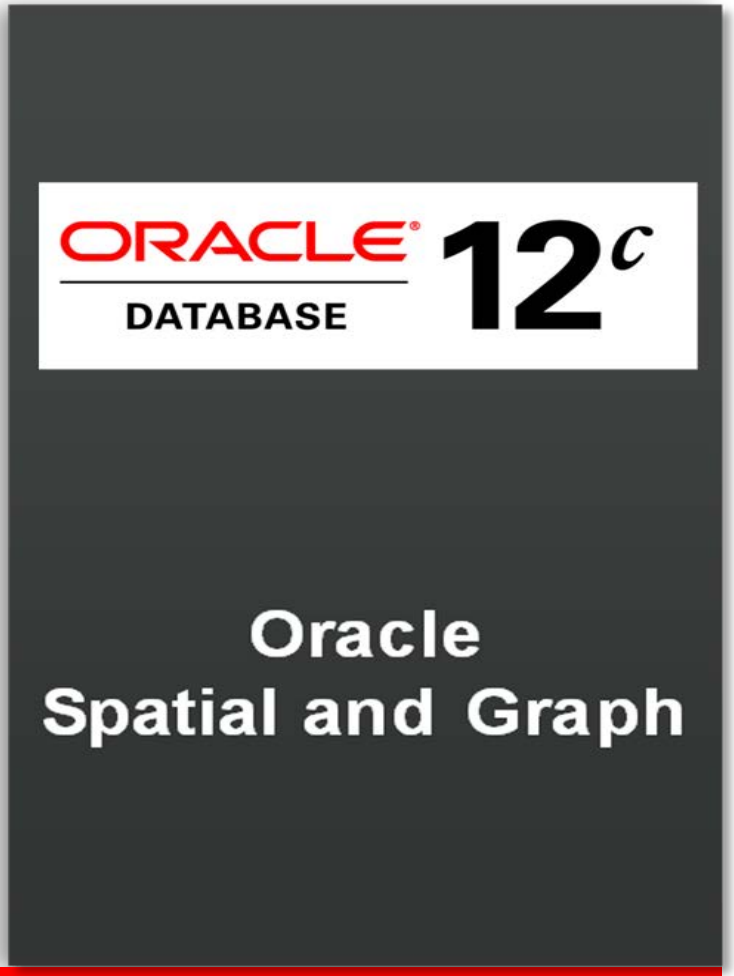
- Need a simple to use, standardized, complete and shared solution
- Need to integrate disparate data sets (statistical & internal)
- Need to relate more than 1.2 Million records with lat/long coordinates



RESULTS

- Consolidation of geo data and network data model
- Standardization of all addresses and coordinates in a consistent format and datum
- The Organization now better understands activities in context of location and directs marketing and assortment policies of the stores
- The Organization now explains the business events dependent on territorial characteristics
- The solution allows to save 35% of operational costs of the people involved

Mobile Tracking

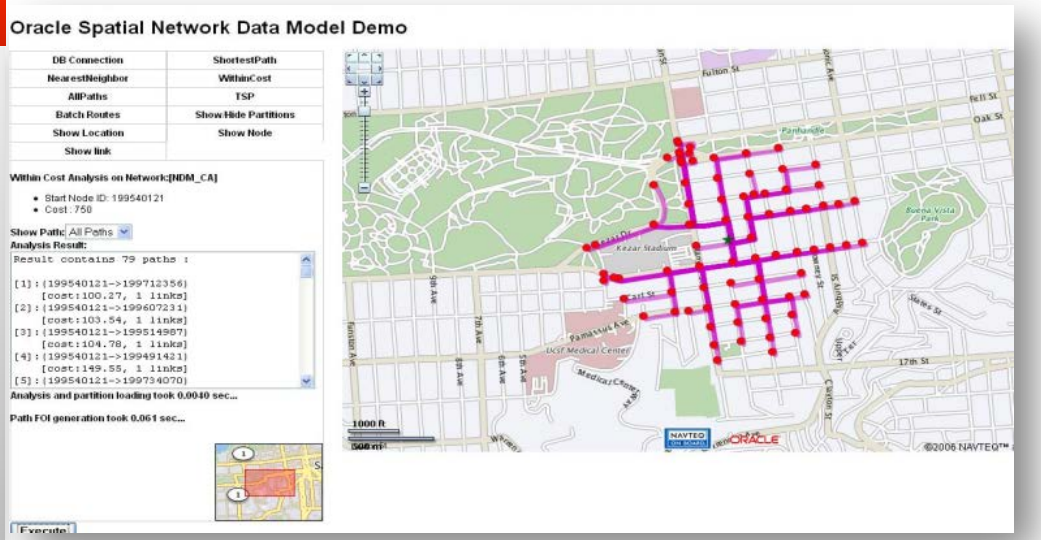


Oracle Spatial and Graph: Network Graph

Graph model to represent physical and logical networks

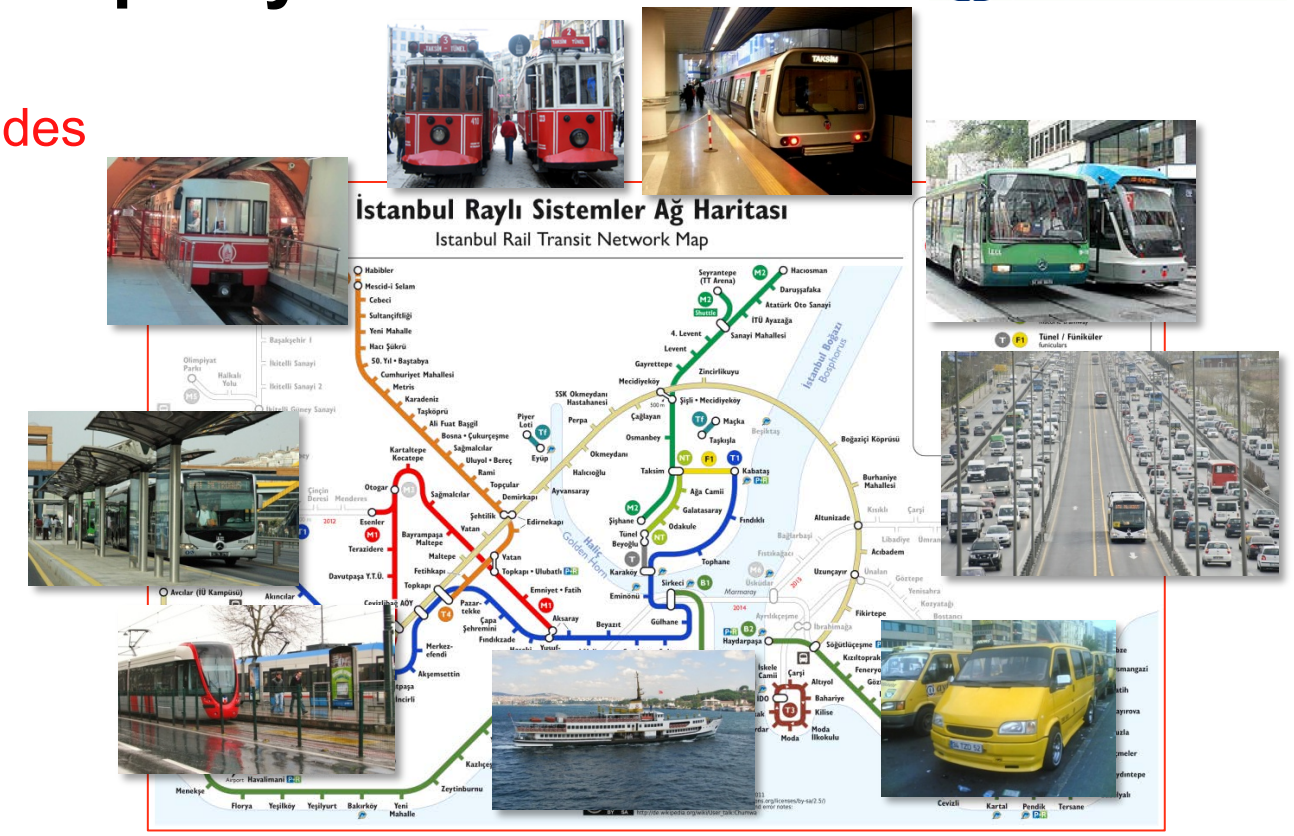
Key Features

- Explicitly stores and maintains connectivity
- Attributes at link and node level
- Java API to perform analysis in memory
- Multiple Cost Support in Path Analysis
- Traveling salesman, spanning tree, shortest path, sub-path, within cost, nearest neighbors



Istanbul Municipality

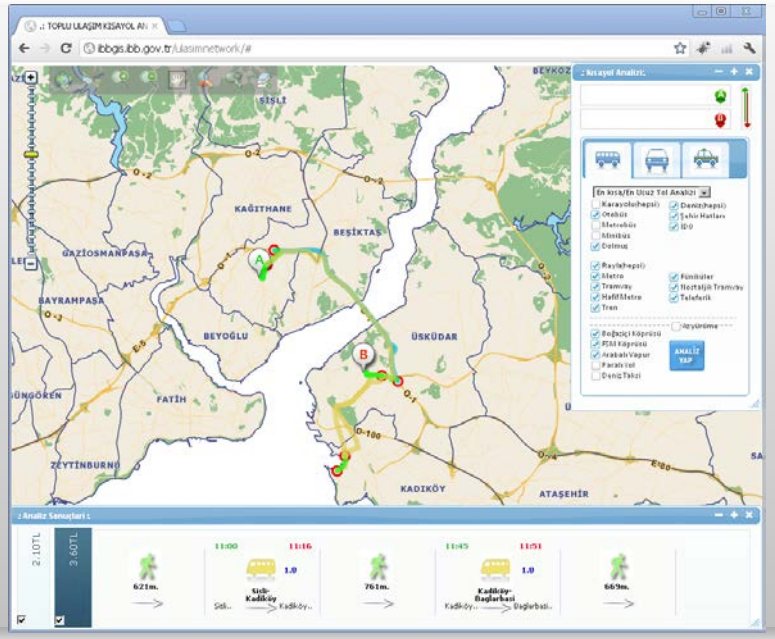
- Diverse Transport Modes
  - Buses
  - Tramways
  - Metro
  - Trains
- But also
  - Ferries
  - Private mini-buses
  - Shared taxis



Multi-Modal Routing Application

İSTANBUL BÜYÜKŞEHİR BELEDİYESİ

- Public service (web/mobile)
- Guidance for optimal route considering all transportation modes.
- Integrated network combining data from multiple agencies
- Also road network for interconnection
- Includes timetables and costs
- Uses Network Data Model



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USC Viterbi School of Engineering

Transportation Route Planning and Forecasting

USC Viterbi School of Engineering
Integrated Media Systems Center

Objective

- Optimize transport network for LA Metro Transportation Authority

Solution

- Route planning solution considers current traffic and forecasts future behavior
- Enables dynamic, real-time and historical data querying
- Transforms Big Data into actionable insight for decision makers

Benefits

- Typical driver saves 64 hours annually
- 70% performance improvement and reduced query times by 2 orders of magnitude
- More efficient service to the public

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CSX

Managing and Tracking Locomotive Tonnage

Objectives

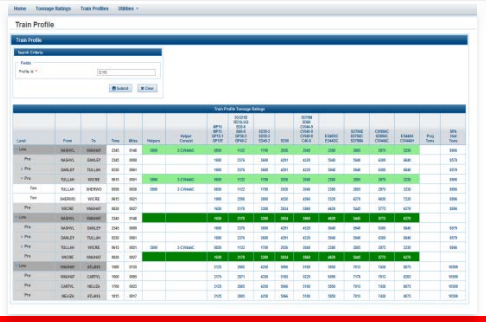
- Automate rail grid operations
- Monitor performance of rail components

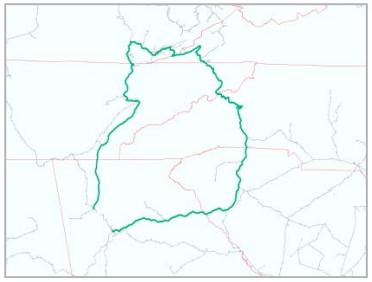
Solution

- Processes over 3 million train location points per day
- Optimizes train routing solutions via the load-on-demand NDM graph
- Provides dynamic segmentation of events on the rail network using LRS

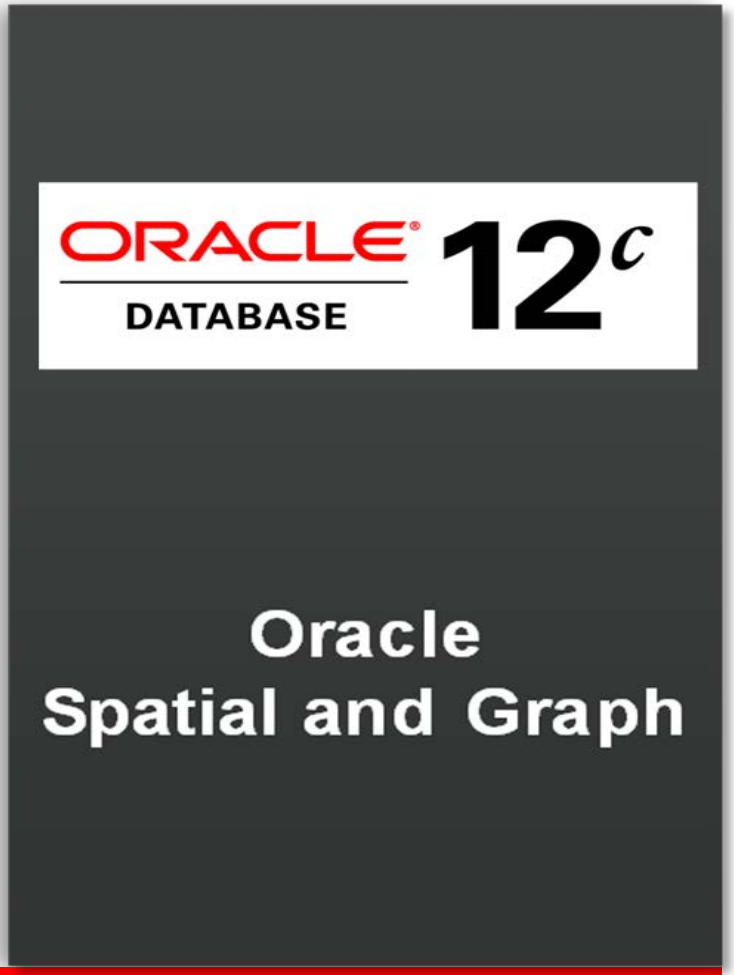
Benefits

- Improved electric grid reliability and efficiency
- Creates “actionable intelligence” from real-time and historic data on utility network
- Feeders automated and monitored for power flow, outages and asset device health





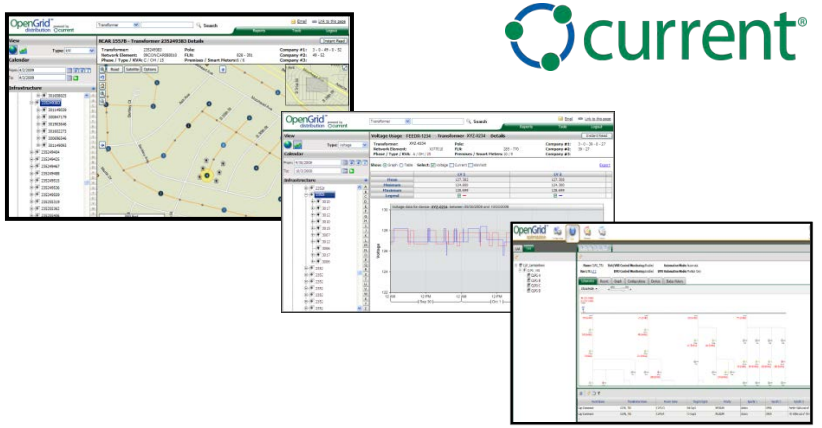
Internet of Things



What is Internet of Things?

- Unique objects (w/ sensors) with communicating …
- Machine to machine communication
- Supports wired and wireless connectivity
- Used for sensor monitoring, command & control, interaction
- Use cases: Smart cities

Xcel Energy – using Current OpenGrid®



OVERVIEW

- 4th investor-owned electric utility in U.S.
- Over 3.3 million electric customers
- Smart Grid solution provides distribution grid energy efficiency

CHALLENGES / OPPORTUNITIES

- Unified data storage with spatial query
- Model networks -"as-built" &"as-operated"
- Real-time and historic data with network topology for "actionable intelligence"
- Tracing with direction and shortest path
- Search using & user defined constraints
- Analysis of Cost, Depth, Distance, MBR

RESULTS

- Improved electric grid reliability and efficiency
- 4 Feeders Automated
- 23 Feeders monitored for power flow, outages and asset device health
- 4,192 Transformers monitored - real-time decisions

SFMTA's SF*park* Project

Oracle Spatial and Graph: Parking Management

SFMTA Municipal Transportation Agency

SFpark

Objectives

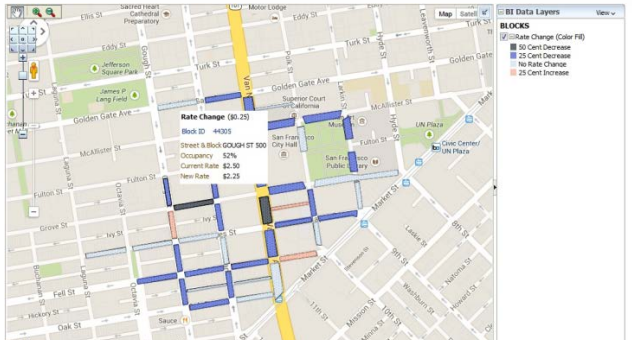
- Manage parking data
- Implement demand-responsive parking meter rate adjustments

Solution

- Manages meter configuration and location data for 28,000 metered spaces
- Recommends changes to meter rates based on occupancy and manages implementation workflow

Benefits

- Facilities complex analyses of data across multiple spatial and temporal dimensions
- Metadata standardizes analyses and asset management improves workflow



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Garmin

Connect Fitness Data Portal

GARMIN

Objectives

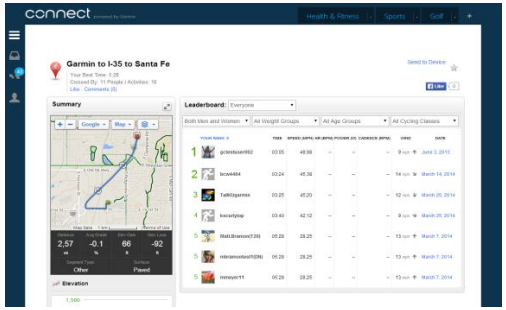
- Match user's fitness activities to popular routes
- Create leader boards for popular routes

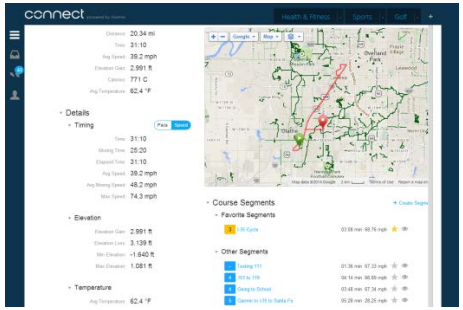
Solution

- Stores and simplifies processing of more than 5 billion miles of user activities
- Utilizes parallel processing, DB partitioning and pipelined table functions to analyze the data on Oracle Exadata
- Matches the user's activity to a segment using LRS

Benefits

- Added new feature to Garmin Connect
- Allows for fast performance of populating the leader boards
- Allows for additional reporting features about the use of Garmin fitness products





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Summary

Why Oracle Spatial for Business Intelligence?

- Leverage existing IT software investments
- Location-enabling business intelligence
- Deliver performance, reliability, and security
- Open and interoperable
- Scale and deliver for “Internet of Things”

Q & A