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Map Views in Oracle Business Intelligence Enterprise Edition, 11g

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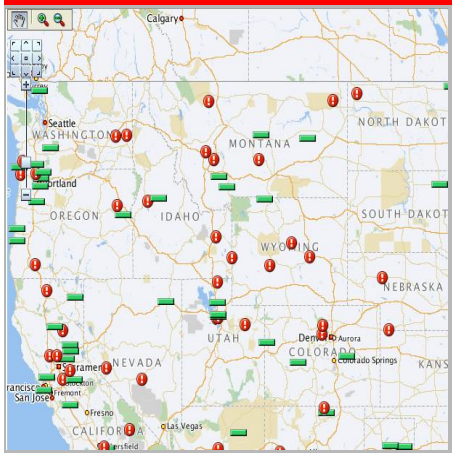
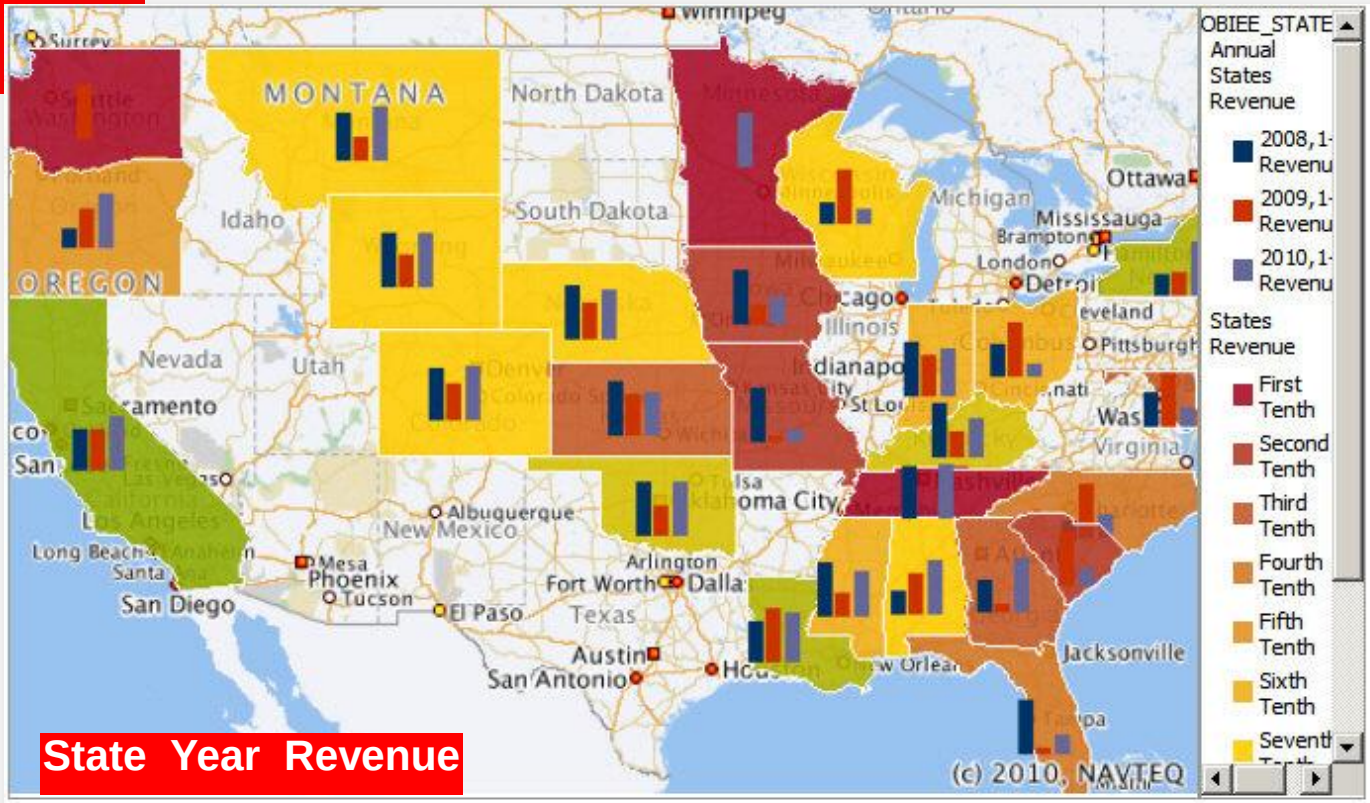
Agenda

- Introduction
- Key Concepts
- OBIEE-MapViewer integration
- Hands-on Lab
- Advanced Topics



INTRODUCTION

KEY CONCEPTS

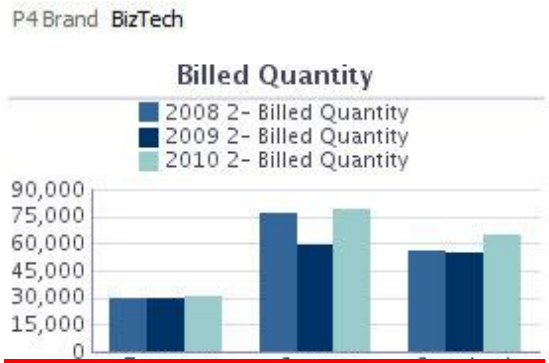


State Year Revenue

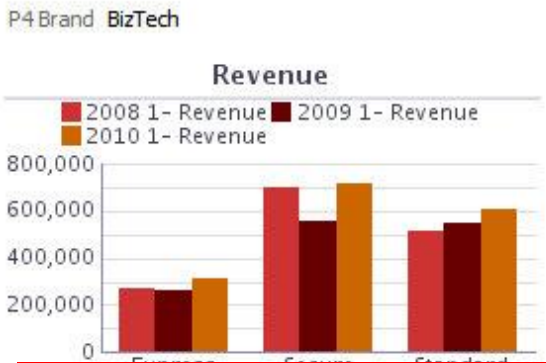
T05 Per Name Year **2008**

Brand	Order Type	Revenue	Billed Qty
BizTech	Express	270,014	29,884
	Secure	700,246	76,053
	Standard	515,766	55,811
FunPod	Express	293,237	30,378
	Secure	336,798	37,016
	Standard	646,056	68,732
HomeView	Express	138,559	13,403
	Secure	390,563	39,012
	Standard	241,828	23,660

ear Brand Order Typ Revenue



Brand Year Billed Quantity



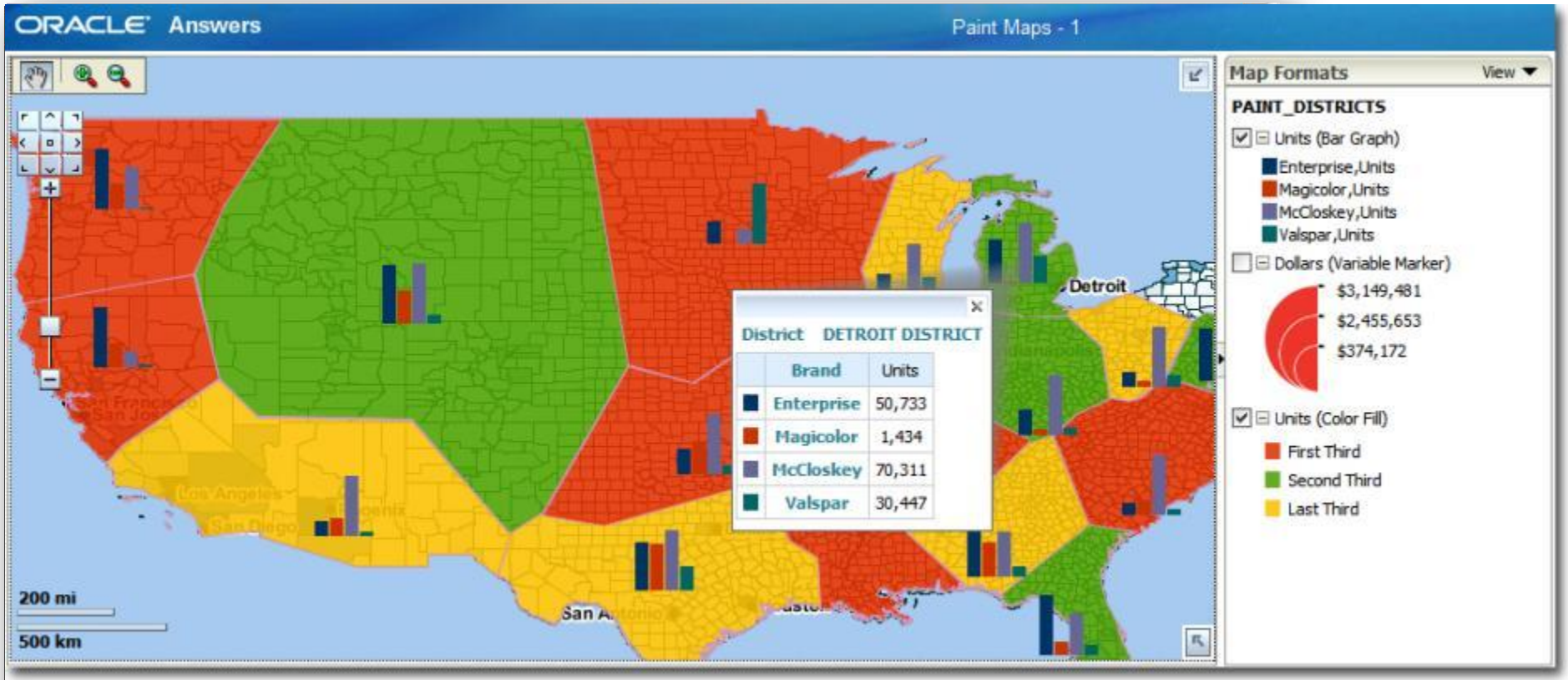
Brand Year Revenue

Brand Year Discount Amt

When are Map views useful

- Visualizing data related to geographic locations.
- Showing lots of data in a relatively small area.
- Showing or detecting spatial relationships and patterns.
- Drilling down from a (map) overview to a detailed report, chart, or graph.

Spatial Visualizations

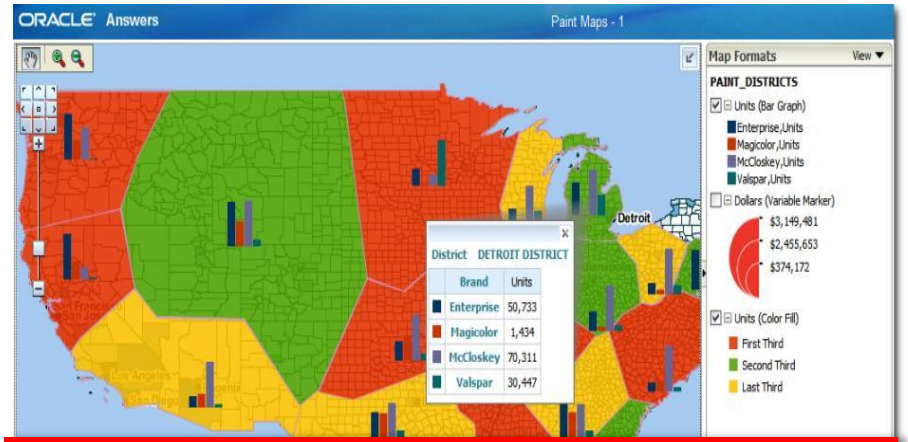


Pivot Table

MCO - Orlando International

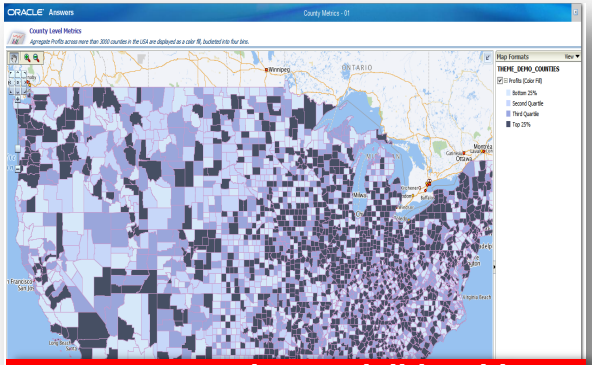
			# of Flights	% of Total	Delay Perf Index	Delay per Pax-K-Miles	Passengers x Miles
Grand Total			**2,062,832**	**100.0%**	**7.73%**	**0.134**	**147,466,128,945**
MCO-ABE	Orlando, FL - Allentown/Bethlehem/Easton, PA	Northeast Region	2,584	0.1%	6.74%	0.102	228,862,848
MCO-ABQ	Orlando, FL - Albuquerque, NM	West Region	8,126	0.4%	2.68%	0.046	1,194,773,263
MCO-ACY	Orlando, FL - Atlantic City, NJ	Northeast Region	368	0.0%	11.50%	0.006	1,040,118,192
MCO-ALB	Orlando, FL - Albany, NY	Northeast Region	12,646	0.6%	6.24%	0.109	1,256,708,330

Spatial Visualizations

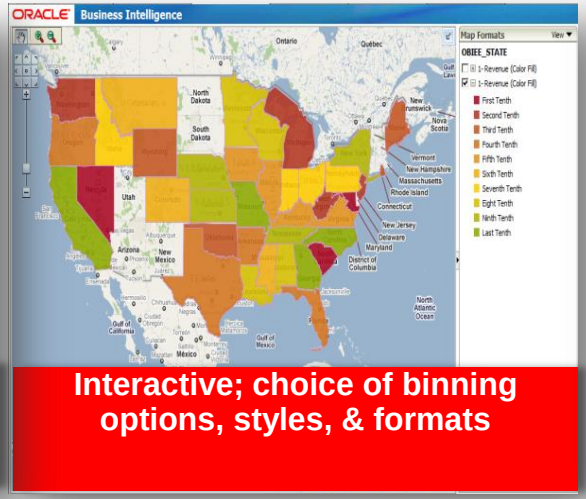


Visualize non-standard geographies

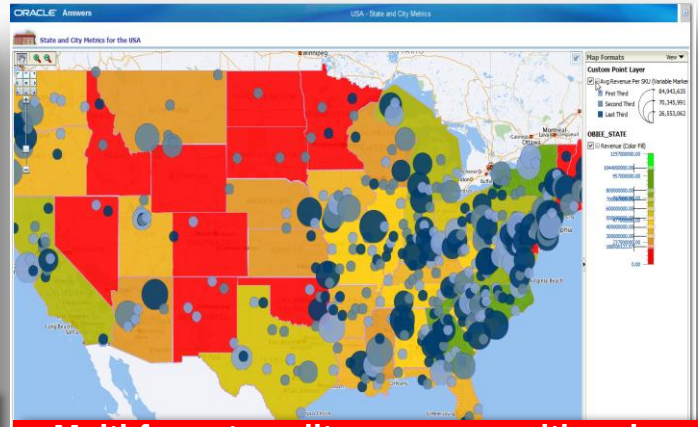
Floor-plans also



Detect trends not visible with traditional visualizations

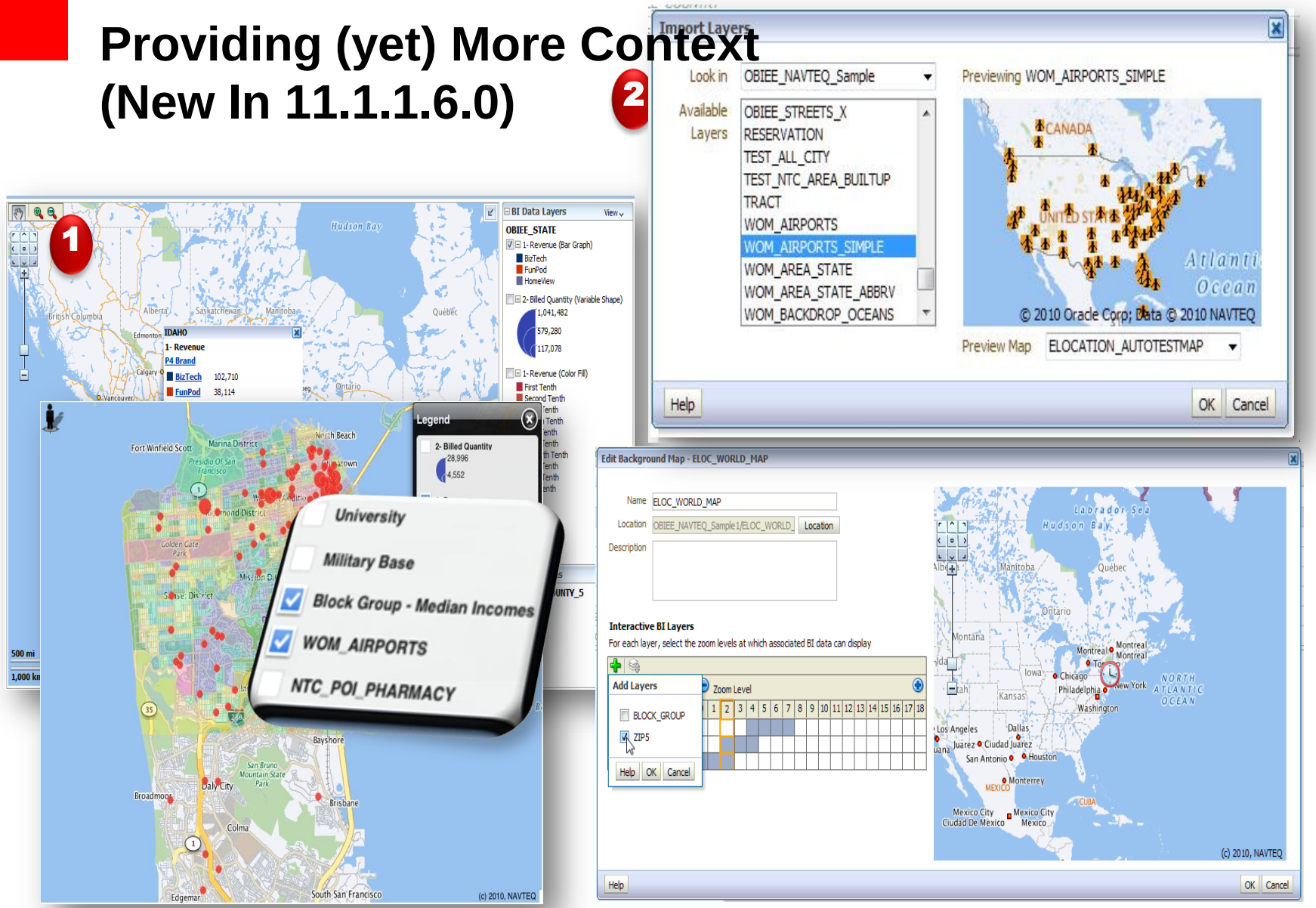


Interactive; choice of binning options, styles, & formats



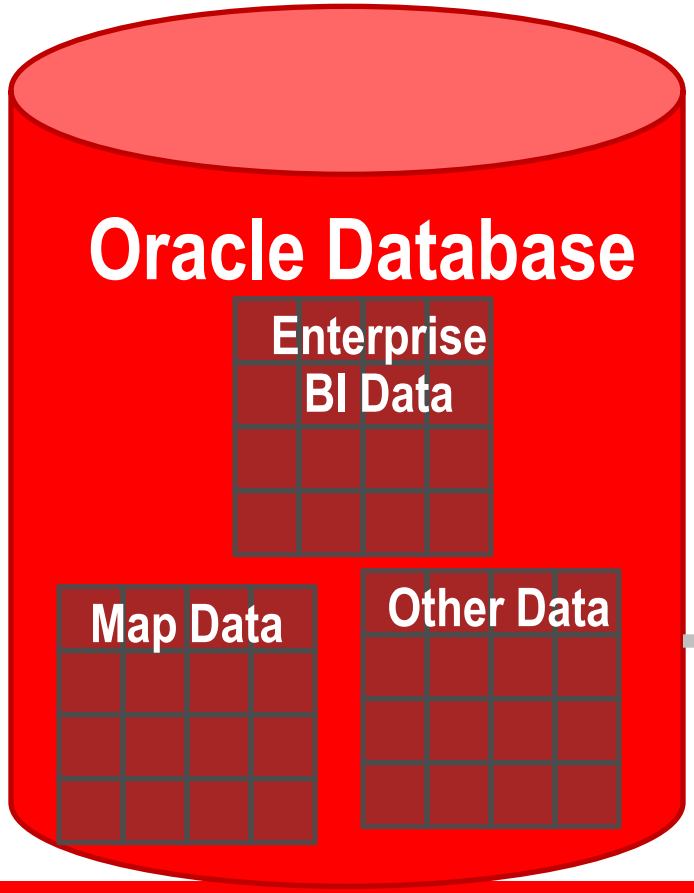
Multi-format, mulit-measure, multi-grain interactive visualizations

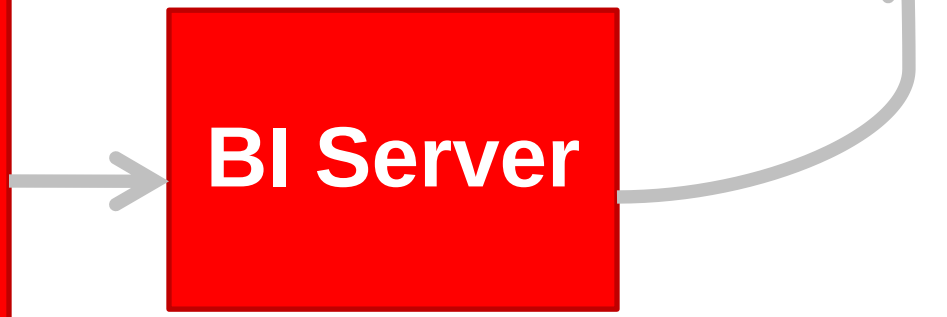
Providing (yet) More Context (New In 11.1.1.6.0)



Secure, Resident Data

- With this approach, all spatial and BI Data is safely housed inside your Oracle Database





OBIEE – MAPVIEWER INTEGRATION

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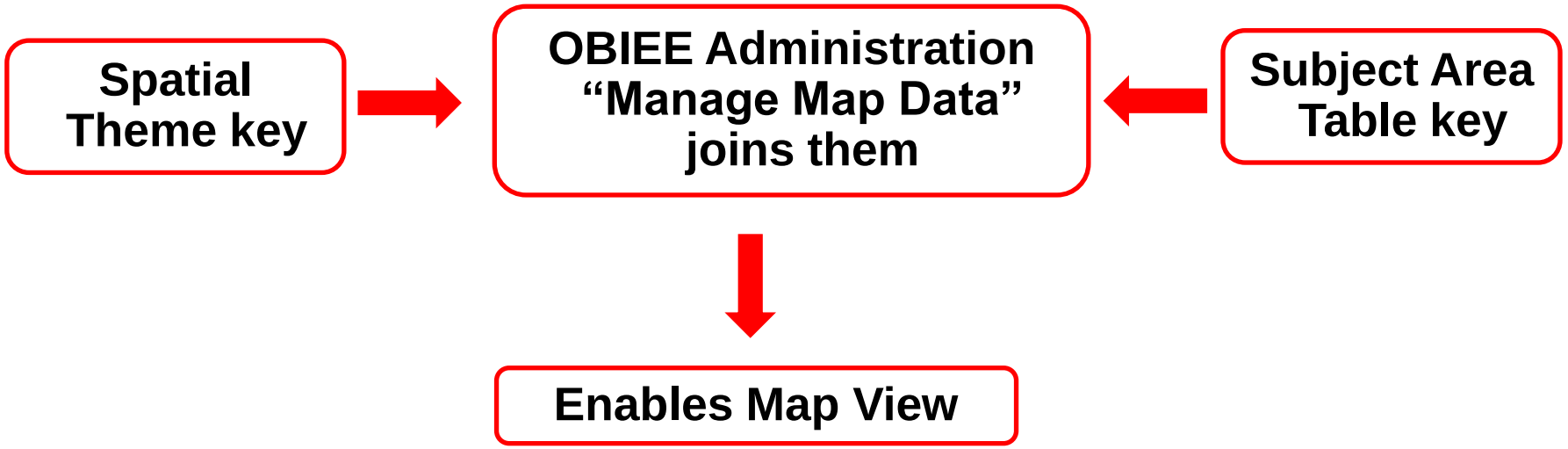
What is Spatial Data?

- Business data that contains or describes location
  - Geographic features (roads, rivers, parks, etc.)
  - Assets (cell tower, fire hydrant, electrical transformer, etc.)
  - Sales data (sales territory, customer registration, etc.)
  - Street and postal address (customers, stores, factory, etc.)
- Anything connected to a physical location
- Almost every database contains some form of business data that can be leveraged using spatial technologies
- Location is a “universal key”

What Spatial Data do you need ?

- Business Data
  - This is the data you need in order to show the results of your BI queries
  - For example: country boundaries, states, provinces, postal code areas, etc.
- Background Data
  - This is used to build maps on which the business data is displayed
  - Roads, rivers, forests, buildings, etc
  - Could also be from satellite or aerial photos.
  - Not always required
  - Provides context for the business data

Conceptual Picture



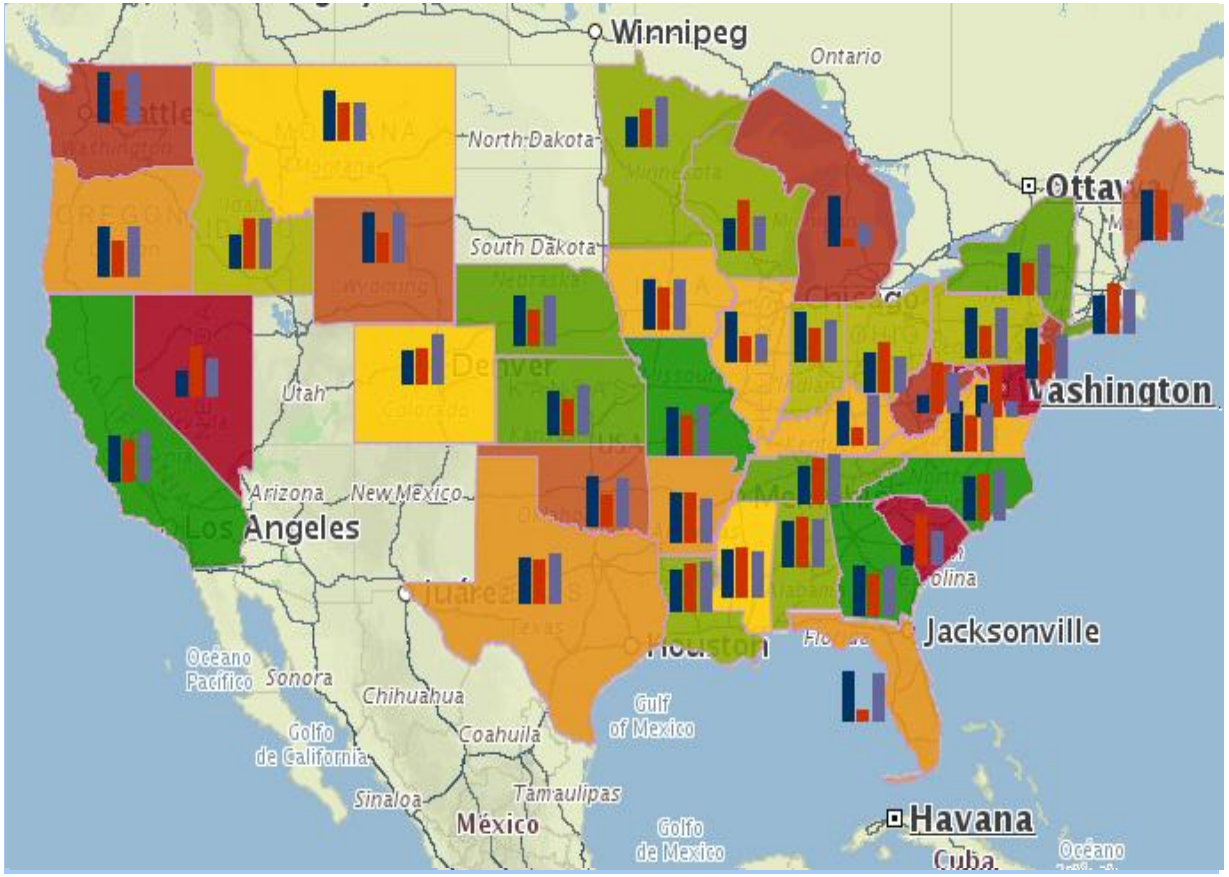
How do BI & Spatial Data Relate

Background Maps

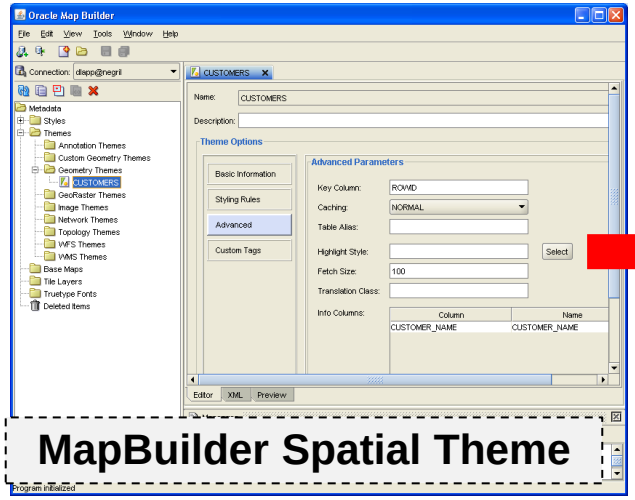
- Internal
  - MapViewer renders spatial data stored in Oracle
- External (3rd party map tile servers)
  - Oracle Maps (free)
  - NAVTEQ Maps (requires license)
  - Google Maps (requires license)
  - Others (may require license, planned for future release)

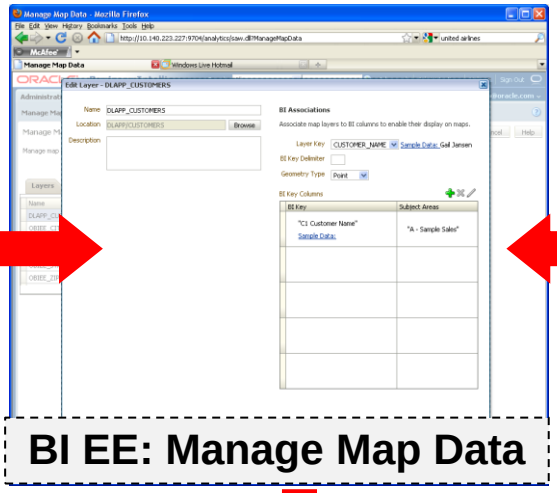
Map Views: The Mashup

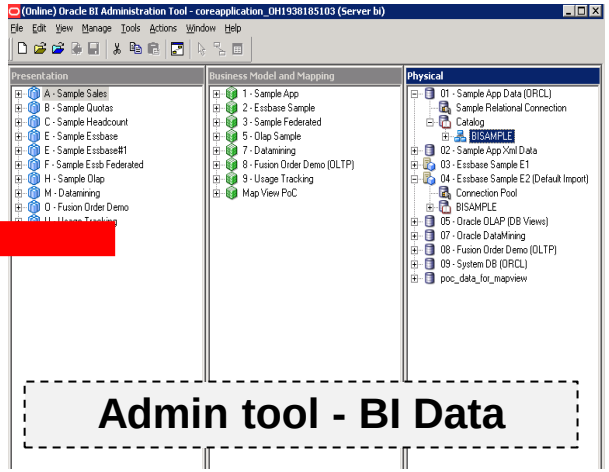
- The thematic shapes, formatted
- Tile imagery, from NAVTEQ Maps
- The mashup, created by OBIEE & MapViewer

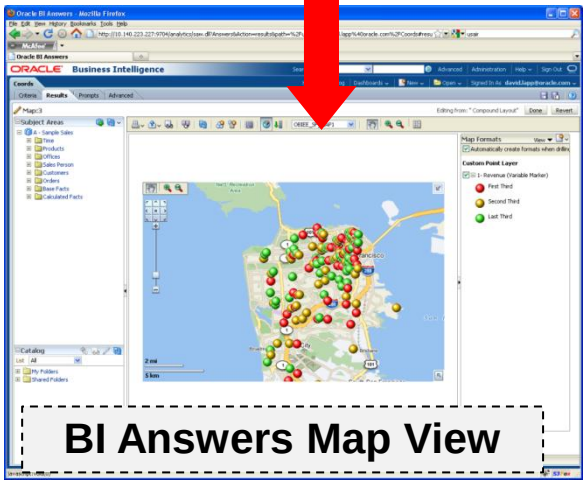


Functional Picture









Understanding Map Visualizations

Technical Detour: Foreign Key & NSDP Joins

Emp Table

EMPNO	ENAME	JOB	MGR	DEPTNO
7369	SMITH	CLERK	7902	20
7499	ALLEN	SALESMAN	7698	30
7521	WARD	SALESMAN	7698	30
7566	JONES	MANAGER	7839	20

```
select e.empno, e.ename,
d.deptno, d.dname, d.loc

from scott.emp e, scott.dept d

where e.deptno = d.deptno
```

DEPTNO	DNAME	LOC
10	ACCOUNTING	NEW YORK
20	RESEARCH	DALLAS
30	SALES	CHICAGO
40	OPERATIONS	BOSTON

Dept Table

EMPNO	ENAME	DEPTNO	DNAME	LOC
7782	CLARK	10	ACCOUNTING	NEW YORK
7839	KING	10	ACCOUNTING	NEW YORK
7934	MILLER	10	ACCOUNTING	NEW YORK
7566	JONES	20	RESEARCH	DALLAS
7902	FORD	20	RESEARCH	DALLAS
7876	ADAMS	20	RESEARCH	DALLAS
7369	SMITH	20	RESEARCH	DALLAS
7788	SCOTT	20	RESEARCH	DALLAS
7521	WARD	30	SALES	CHICAGO
7844	TURNER	30	SALES	CHICAGO
7499	ALLEN	30	SALES	CHICAGO
7900	JAMES	30	SALES	CHICAGO
7698	BLAKE	30	SALES	CHICAGO
7654	MARTIN	30	SALES	CHICAGO

Understanding Map Visualizations

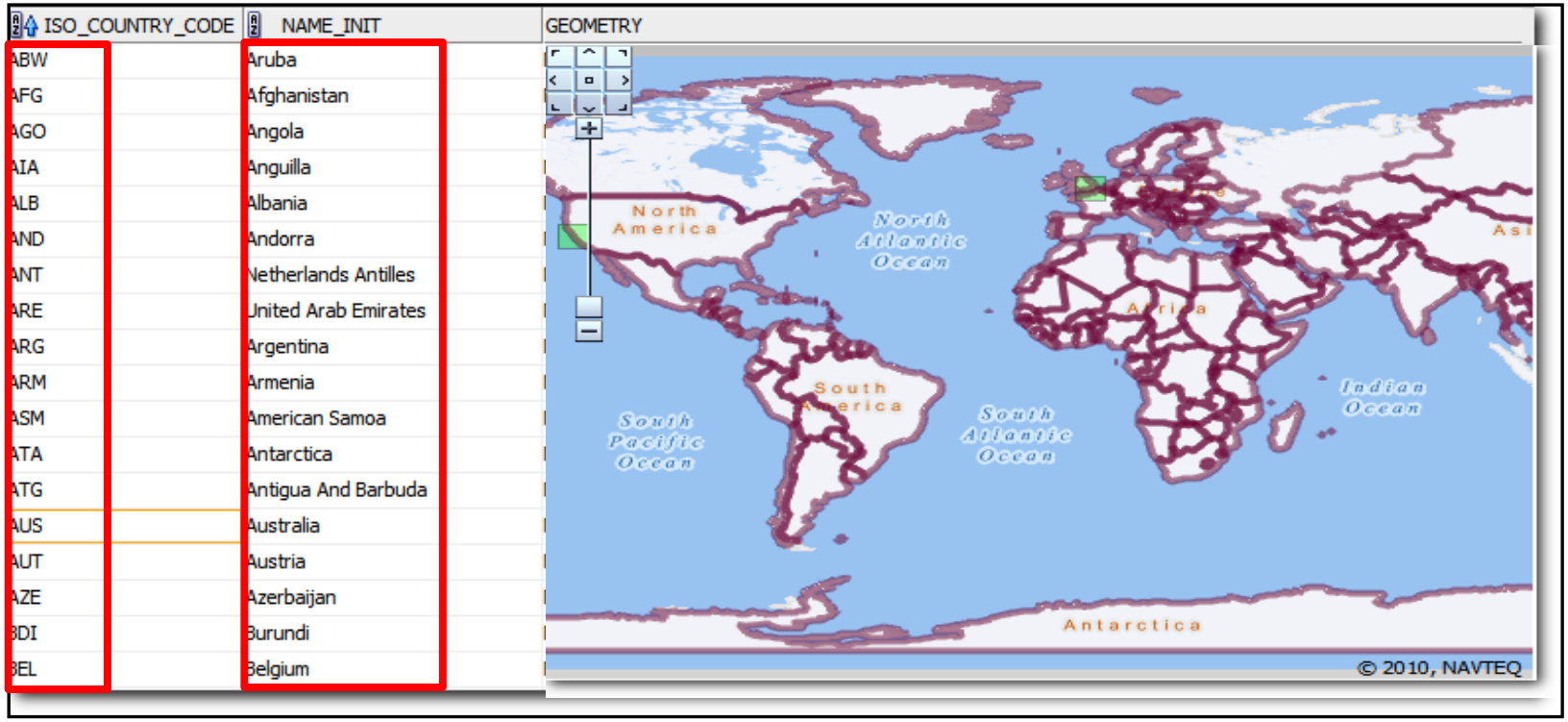
Technical Detour: Data

R61 Geo Country Code	R52 Country Name	1- Revenue
AFG	Afghanistan	142,854
ARE	United Arab Emirates	451,993
ARG	Argentina	1,332,024
AUS	Australia	5,408,727
AUT	Austria	43,990
AZE	Azerbaijan	32,608
BEL	Belgium	38,814
BEN	Benin	51,447
BGD	Bangladesh	48,232
BGR	Bulgaria	55,091
BOL	Bolivia	12,870
BRA	Brazil	870,195
CAF	Central African Republic	42,664
CAN	Canada	1,179,357
CHE	Switzerland	61,818
CHL	Chile	19,909
CHN	China	649,899
CIV	Côte D Ivoire	40,290
CMR	Cameroon	36,877
COD	Congo, Democratic Republic Of The	30,575
COG	Congo	59,591
COL	Colombia	32,885
CRI	Costa Rica	37,078
CUB	Cuba	43,203
CZE	Czech Republic	36,663

The Table View – From the Data Warehouse

Understanding Map Visualizations

Technical Detour: Map Definitions

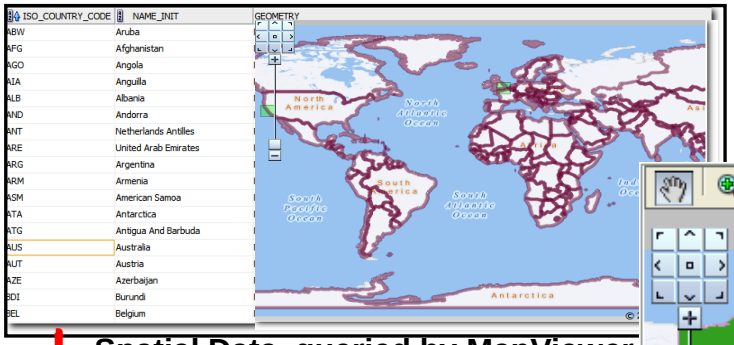


ISO_COUNTRY_CODE	NAME_INIT
ABW	Aruba
AFG	Afghanistan
AGO	Angola
AIA	Anguilla
ALB	Albania
AND	Andorra
ANT	Netherlands Antilles
ARE	United Arab Emirates
ARG	Argentina
ARM	Armenia
ASM	American Samoa
ATA	Antarctica
ATG	Antigua And Barbuda
AUS	Australia
AUT	Austria
AZE	Azerbaijan
BDI	Burundi
BEL	Belgium

The Spatial Table – Shape Information (sdo_geometry)

Understanding Map Visualizations

Technical Detour: Joining The Two



ISO_COUNTRY_CODE	NAME_INIT
ABW	Aruba
AFG	Afghanistan
AGO	Angola
AIA	Anguilla
ALB	Albania
AND	Andorra
ANT	Netherlands Antilles
ARE	United Arab Emirates
ARG	Argentina
ARM	Armenia
ASM	American Samoa
ATA	Antarctica
ATG	Antigua And Barbuda
AUS	Australia
AUT	Austria
AZE	Azerbaijan
BDI	Burundi
BEL	Belgium

Spatial Data, queried by MapViewer

NSDP
(Non Spatial Data Provider) Join

R61 Geo Country Code	R52 Country Name	1- Revenue
AFG	Afghanistan	142,854
ARE	United Arab Emirates	451,993
ARG	Argentina	1,332,024
AUS	Australia	5,408,727
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CAN	Canada	1,179,357
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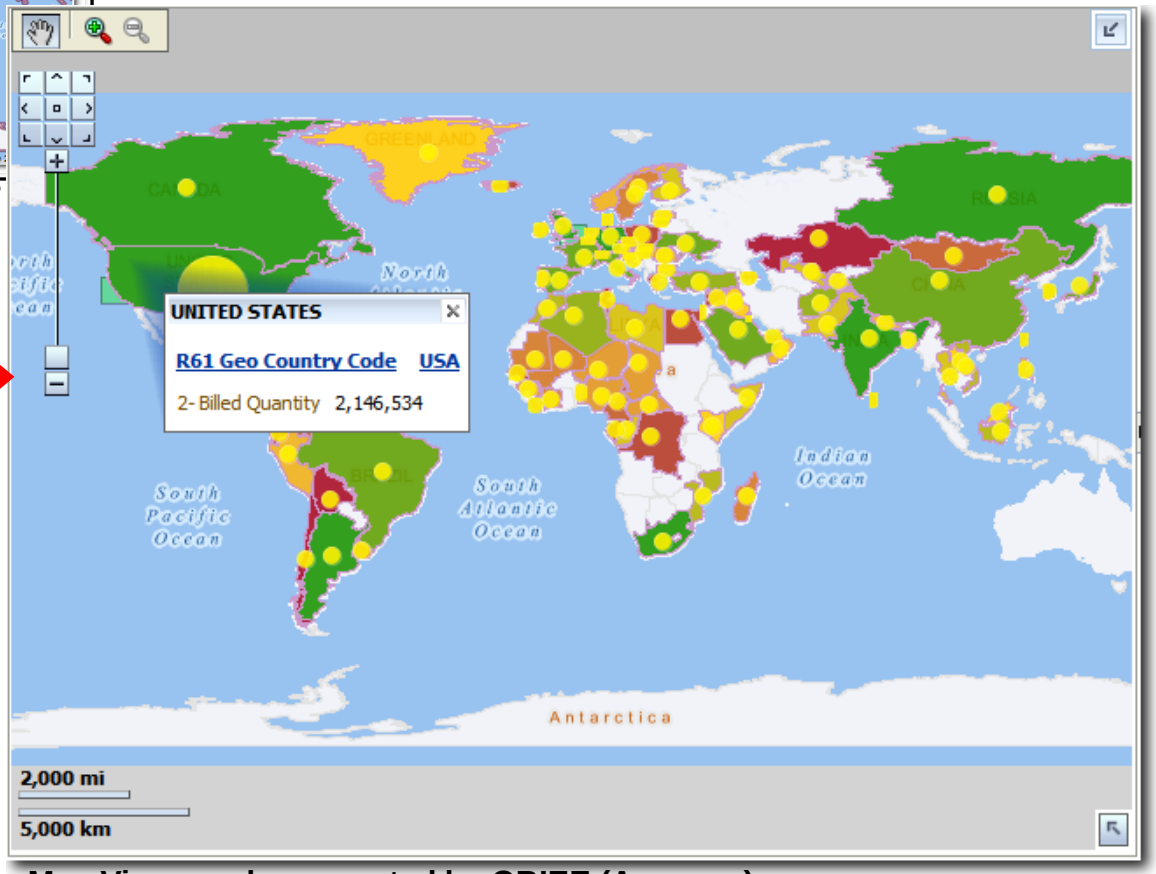
CHN	China	649,899
CIV	Côte D Ivoire	40,290
CMR	Cameroon	36,877
COD	Congo, Democratic Republic Of The	30,575
COG	Congo	59,591
COL	Colombia	32,885
CRI	Costa Rica	37,078
CUB	Cuba	43,203
CZE	Czech Republic	36,663

Analytics Data, queried by OBIEE

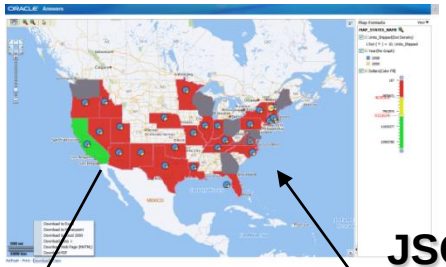


Map View mashup, created by OBIEE (Answers)

MapViewer BI Integration Architecture

Mapbuilder: Basemaps/ themes/ styles manager (thick client)

NSDP (Non-Spatial Data Provider) key MapViewer integration feature



NSDP

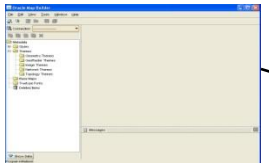
JSON/XML

Mapviewer

OBIEE

Oracle Fusion Middleware

Mapbuilder



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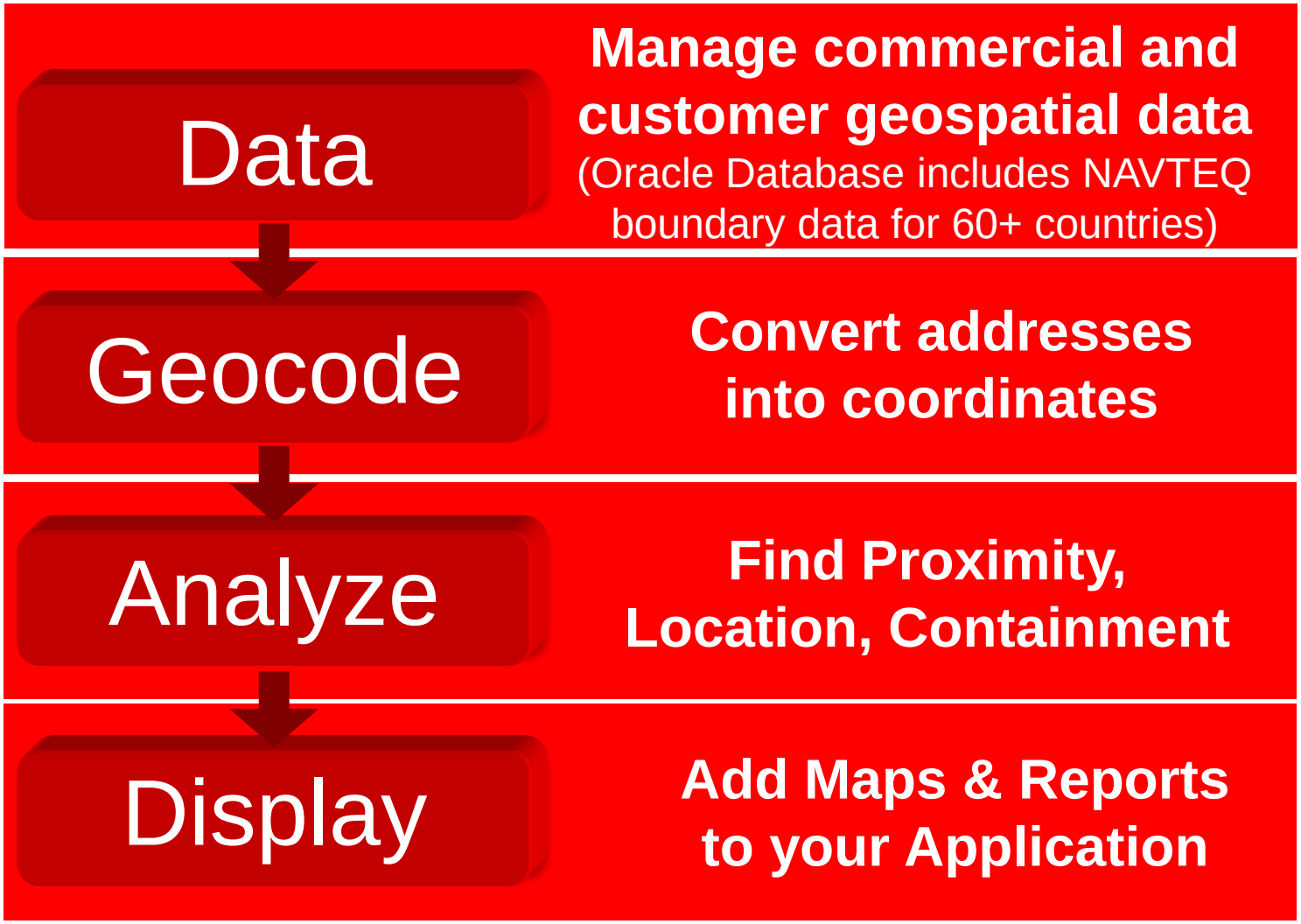
Oracle Database

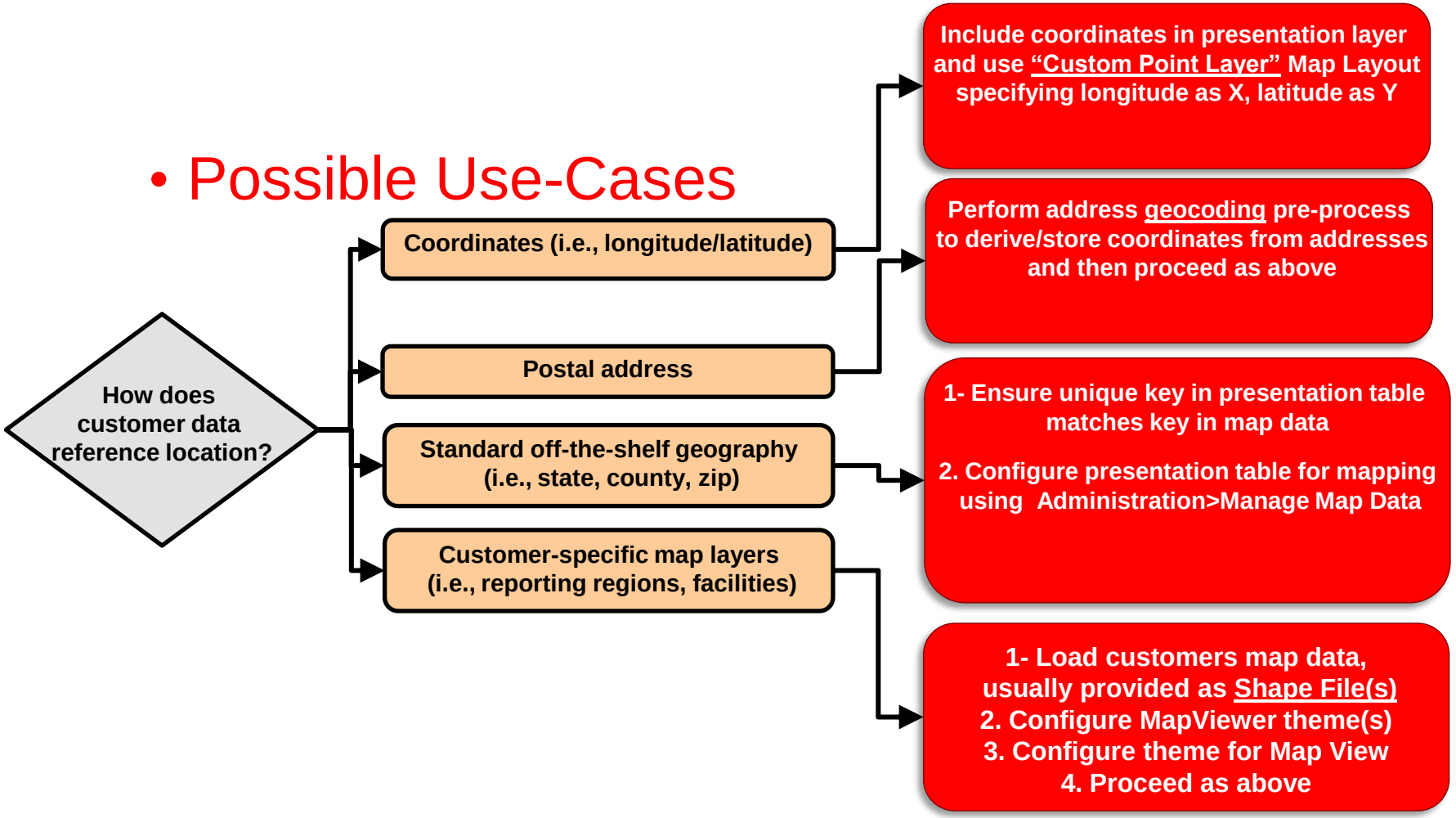
Other Oracle/non-Oracle databases, data warehouses …

Key Technologies



Using Spatial Data in OBIEE

- Possible Use-Cases



HANDS-ON LAB

Hands-on Lab

- Create a simple analysis with a map view
- Add charts to the map view
- Master-Detail lining via map views
- Action Links in map views
- Additional material
  - Distance queries
  - Geocoding
  - 3rd party map services
  - Full example (import data, create layers, create map views)

Spatial Analytics & Visualization

There is a Difference Between The Two

Spatial Analytics

- Use-cases: "*customers within X miles of store*"
- Requires at least one spatial dimension
- Results can be visualized with or without Map Views
- Mostly use Oracle Database Spatial (and Locator) features
- Not available OOTB in OBIEE
- Options for doing Spatial Analytics in OBIEE
  - Use the OBIEE EVALUATE function
  - Use the DIRECT DATABASE REQUEST option in Answers
  - Use an OPAQUE view in the RPD

Shops of Type PHARMACY Within 500m of 747 Howard St, San Francisco, CA 94103, US

Time run: 8/24/2011 3:34:08 PM

NAME	STORE_ID	STREET	PHONE
RITE AID	38,231,490	776 MARKET ST	+(1)-415-3970837
WALGREENS	800,675,903	116 NEW MONTGOMERY ST	+(1)-415-3440891
	996,567,584	730 MARKET ST	+(1)-415-3974800
	38,223,392	825 MARKET ST	+(1)-415-5439502

Pharmacies within 500m of specified location

Spatial Data Visualization

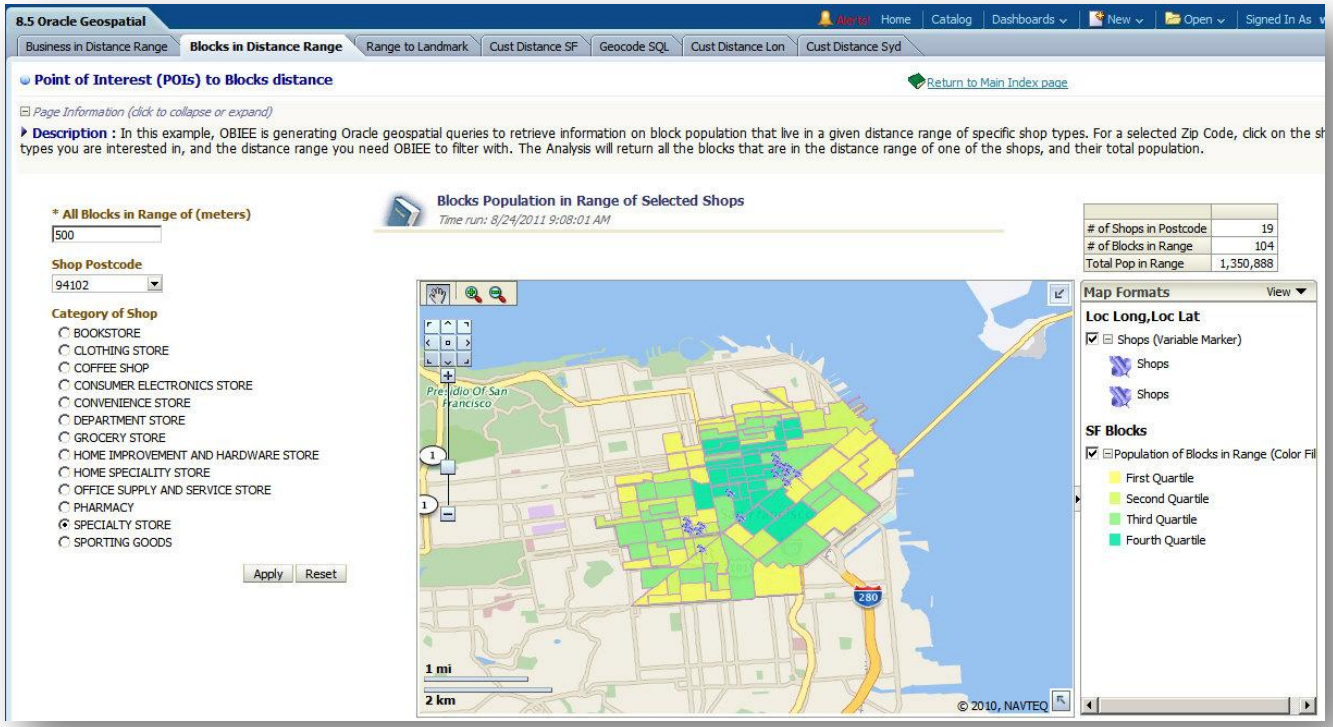
- Use-cases: "*plot states sales as color-fill*"
- Requires at least one spatial dimension
- Results MUST be visualized with Map Views
- Available as OOTB capability in
- abilities

Displaying Sales Region metrics on a map (aka thematic mapping)

Spatial Analytics Example 1

People Living Within Distance of Store Type

- Population Information (by census blocks) on people living within distance of specified Store Type



- Requires Spatial analytic function (`sdo_within_distance`)
- Combines non-BI data (population information)

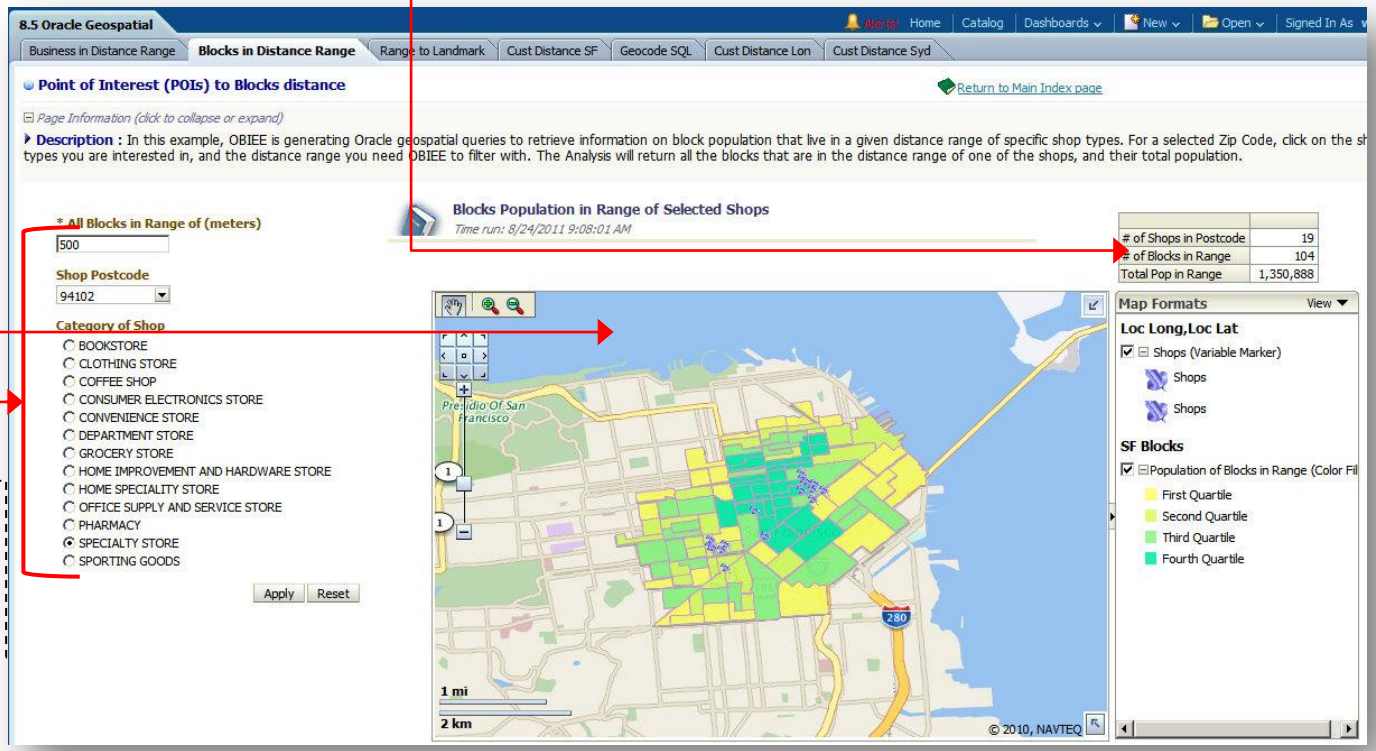
Deconstructing The Analysis

The Dashboard Components

Map View
Standard Answers view

Pivot View
Standard Answers view

Answers Criteria
Underlying table in RPD is an OPAQUE view with parameterized SQL containing Spatial functions

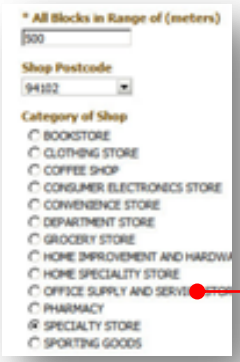


Distance, Postal Code, Category Prompts
Populate request variables; passed on down as Session Variables

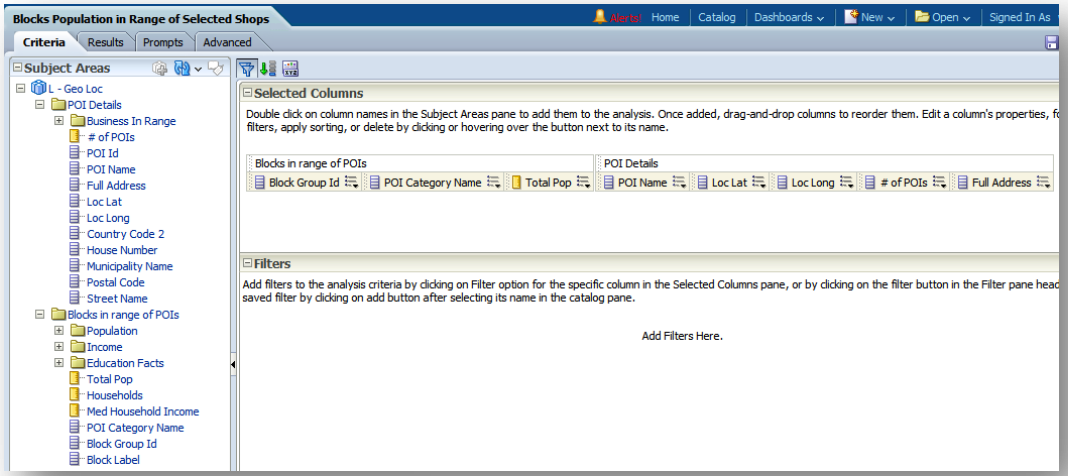
Deconstructing The Analysis

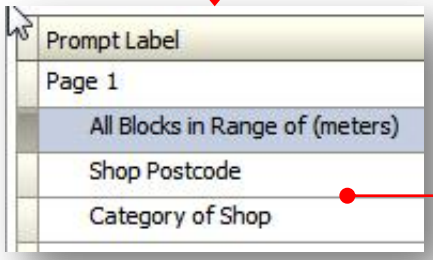
Prompts, Variables, Opaque Views

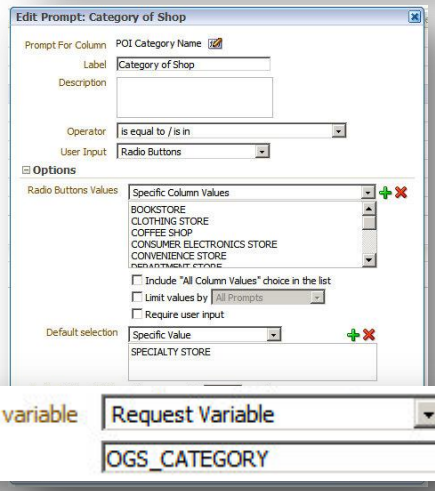
Answers Criteria Columns from Subject Area (L – Geo Loc)



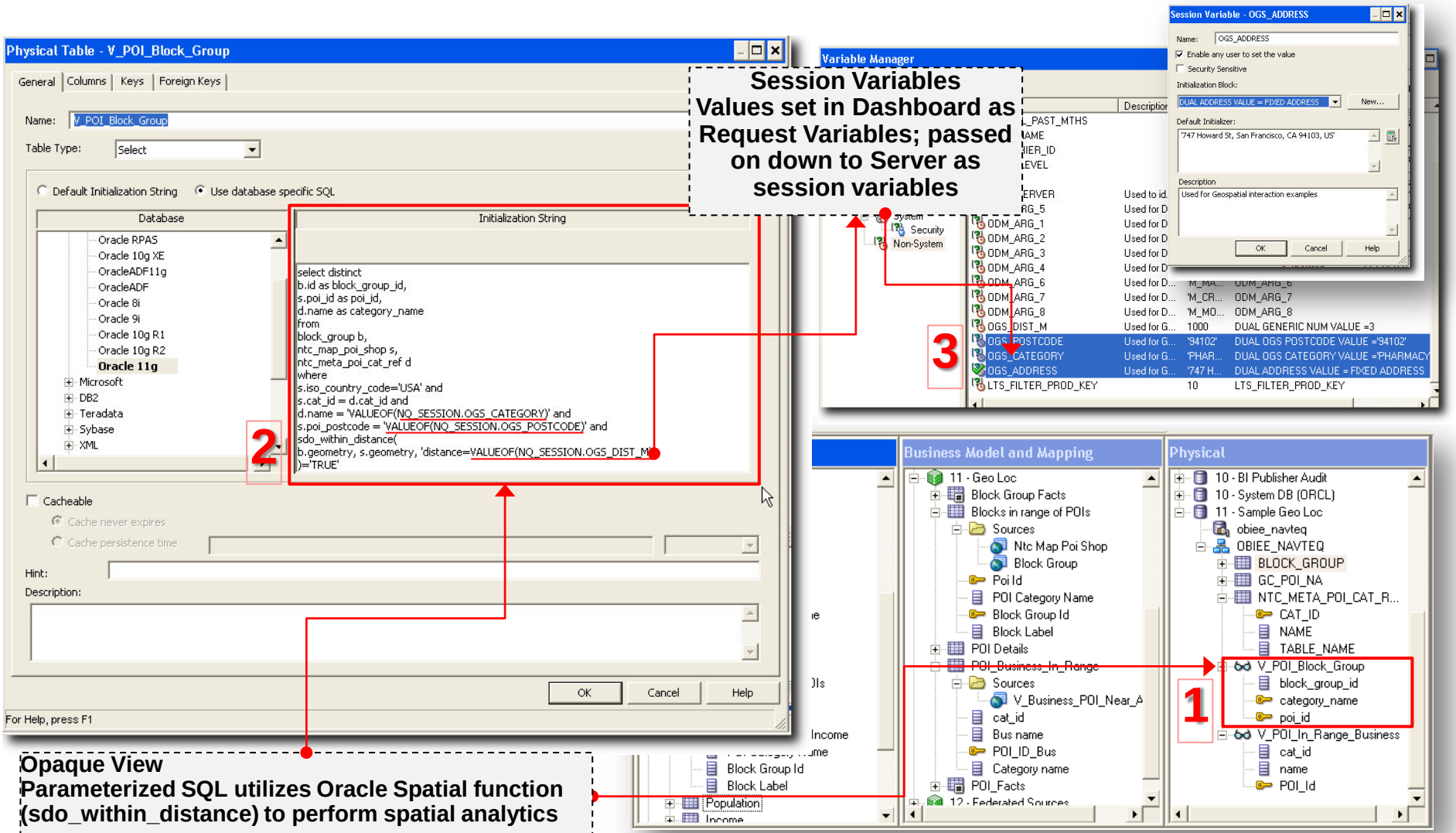
Prompts
Populate request variables; passed on down as Session Variables to BI Server







Deconstructing The Analysis

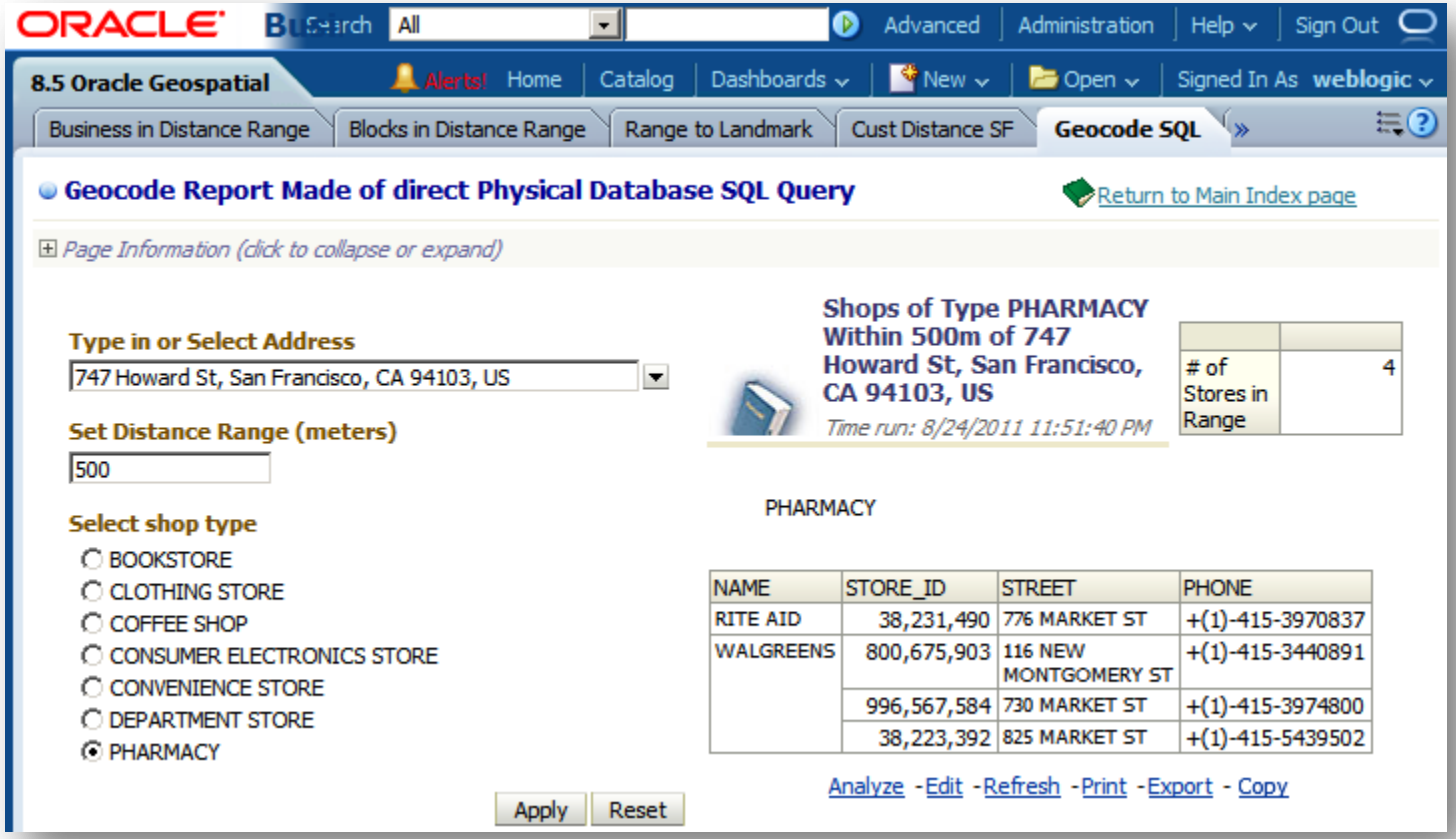


Opaque View
Parameterized SQL utilizes Oracle Spatial function (sdo_within_distance) to perform spatial analytics

Spatial Analytics Example 2

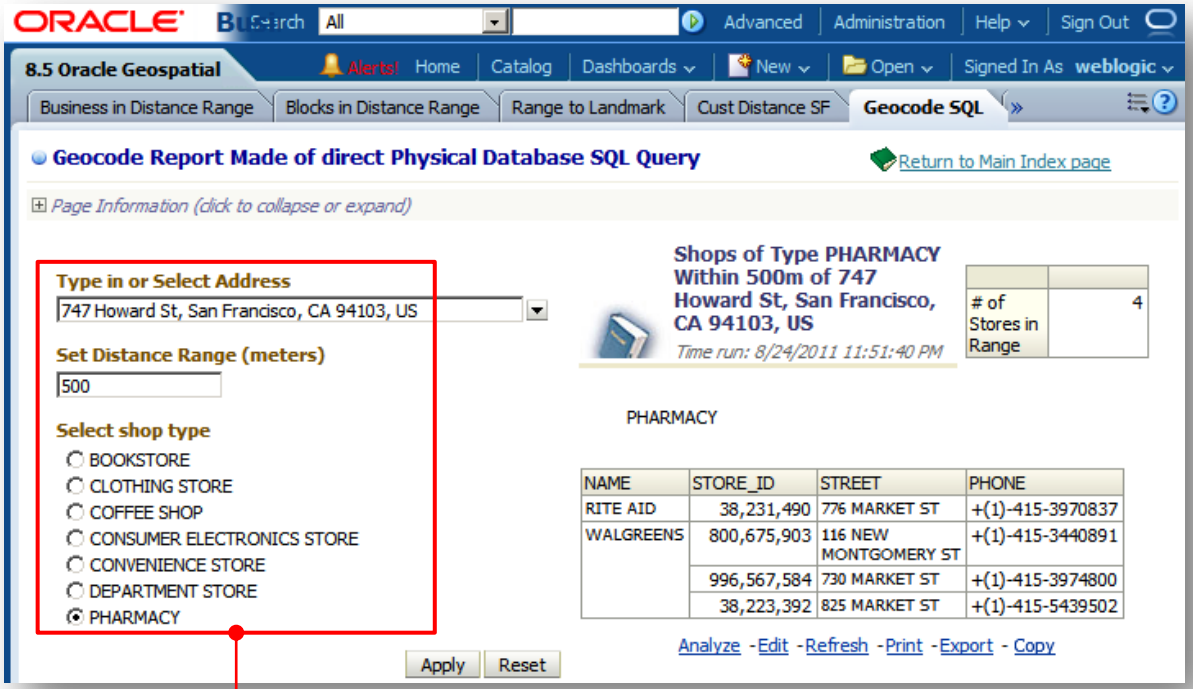
Stores Within Range of Address

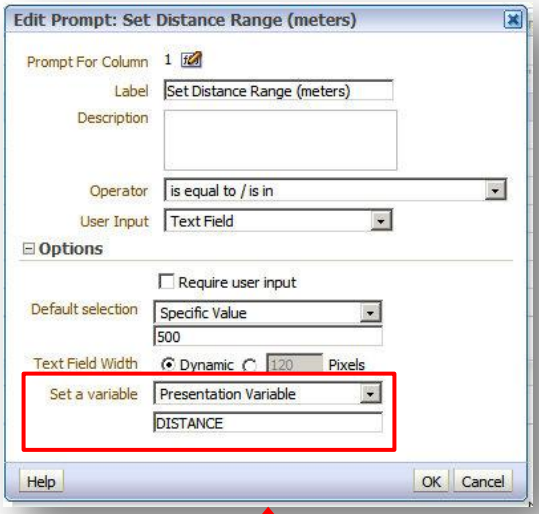
- Stores of selected type within range of street address



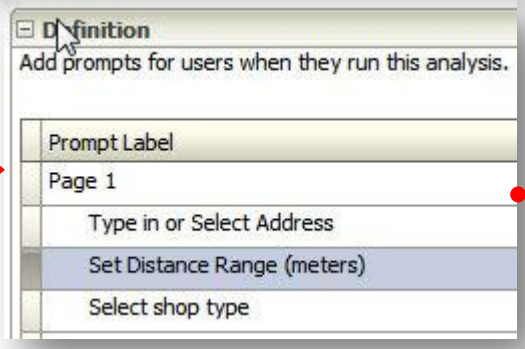
- **Requires Spatial analytic functions (`sdo_geocode` & `sdo_within_distance`)**

Deconstructing The Analysis





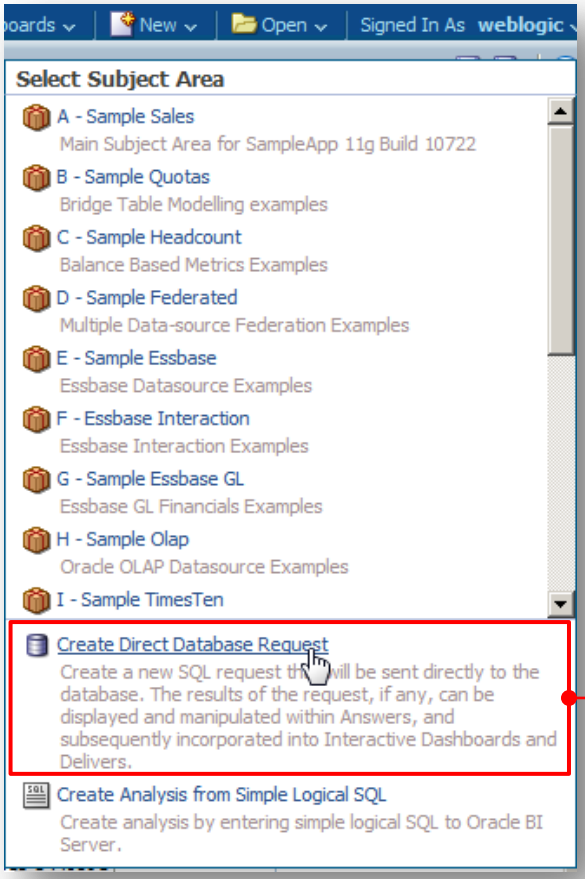
Prompts
Three prompts set in Dashboard: Address, Range, Shop-type



Prompts
E.g. Distance prompt sets @{DISTANCE} Presentation Variable

Deconstructing The Analysis

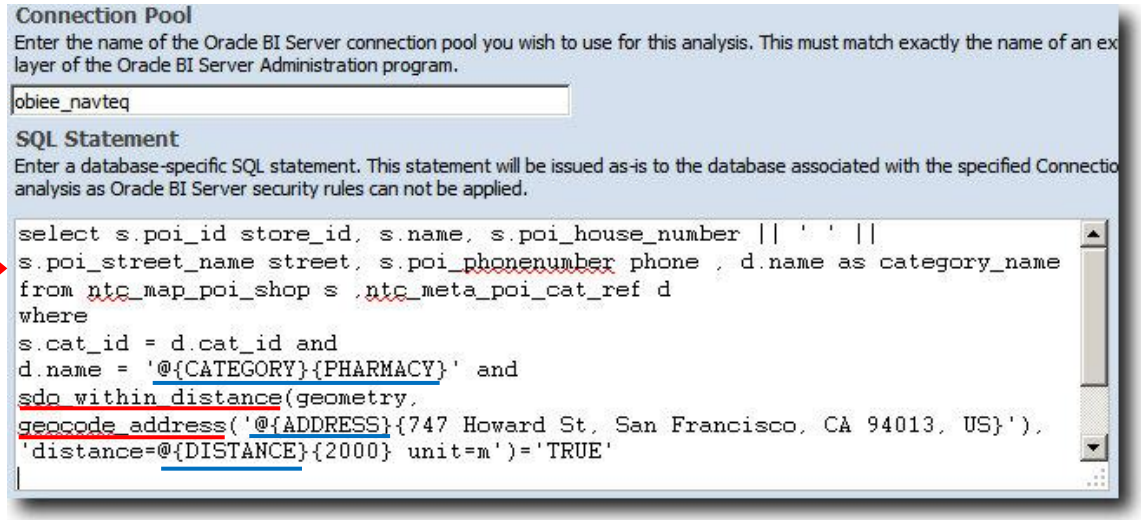
Creating a Direct Database Request

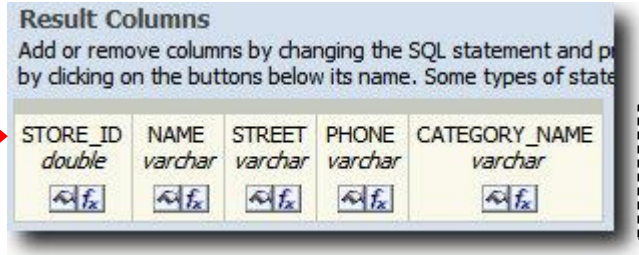


Direct Database Request Plugs in the three Prompts values via Presentation Variables

Spatial Functions
`sdo_distance_within`
`geocode_address`

Geocoding is the process of associating spatial locations (longitude and latitude coordinates) with postal addresses.





Result Columns Columns can be used to construct Answers views

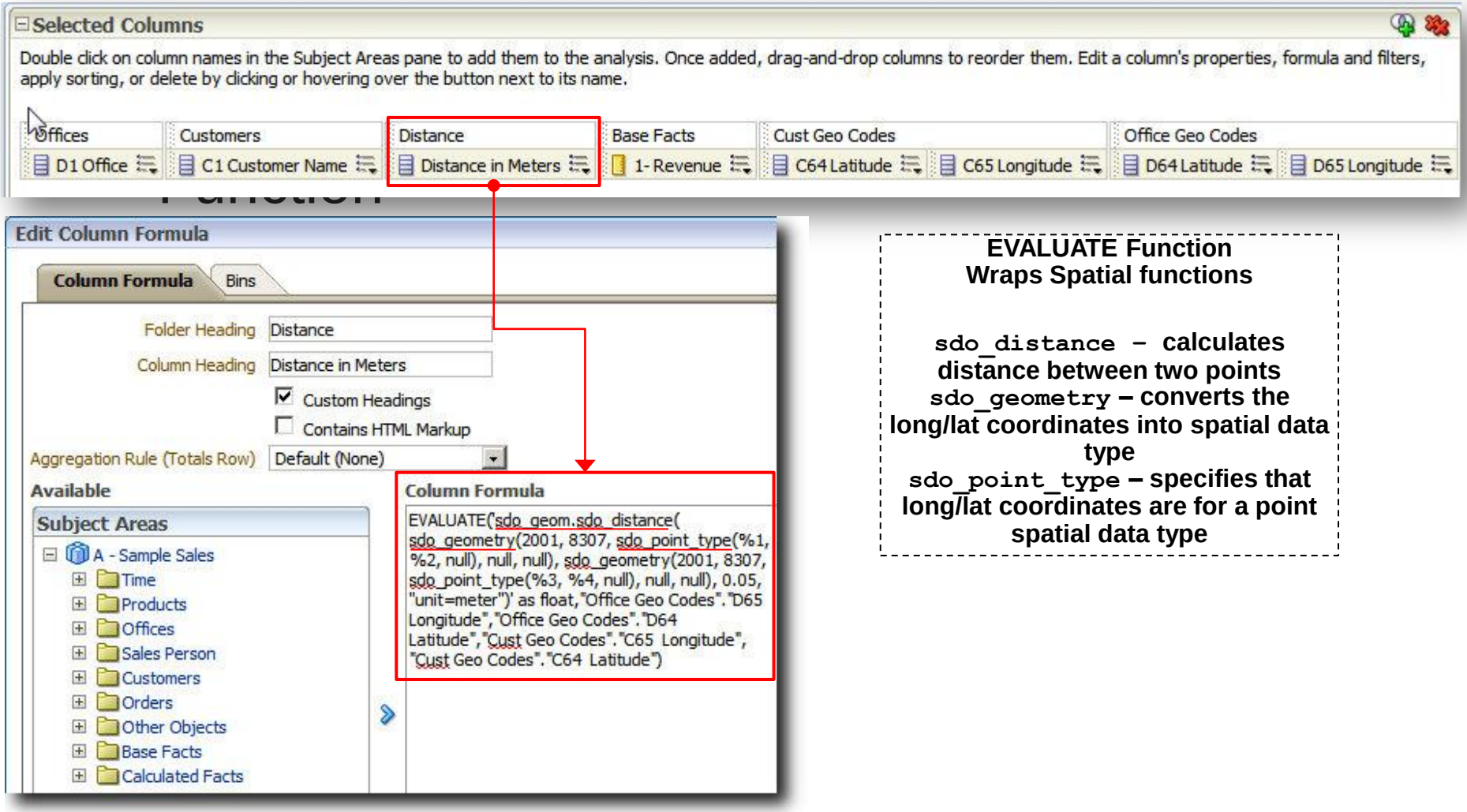
Spatial Analytics Example 3

Distance Between Offices and Customers

- Office locations
- Customer locations
- Calculate distance between Office and Office's Customers
- Display Office & Customer locations

- **Requires Spatial analytic functions (`sdo_geocode` & `sdo_distance`)**

Deconstructing The Analysis



EVALUATE Function
Wraps Spatial functions

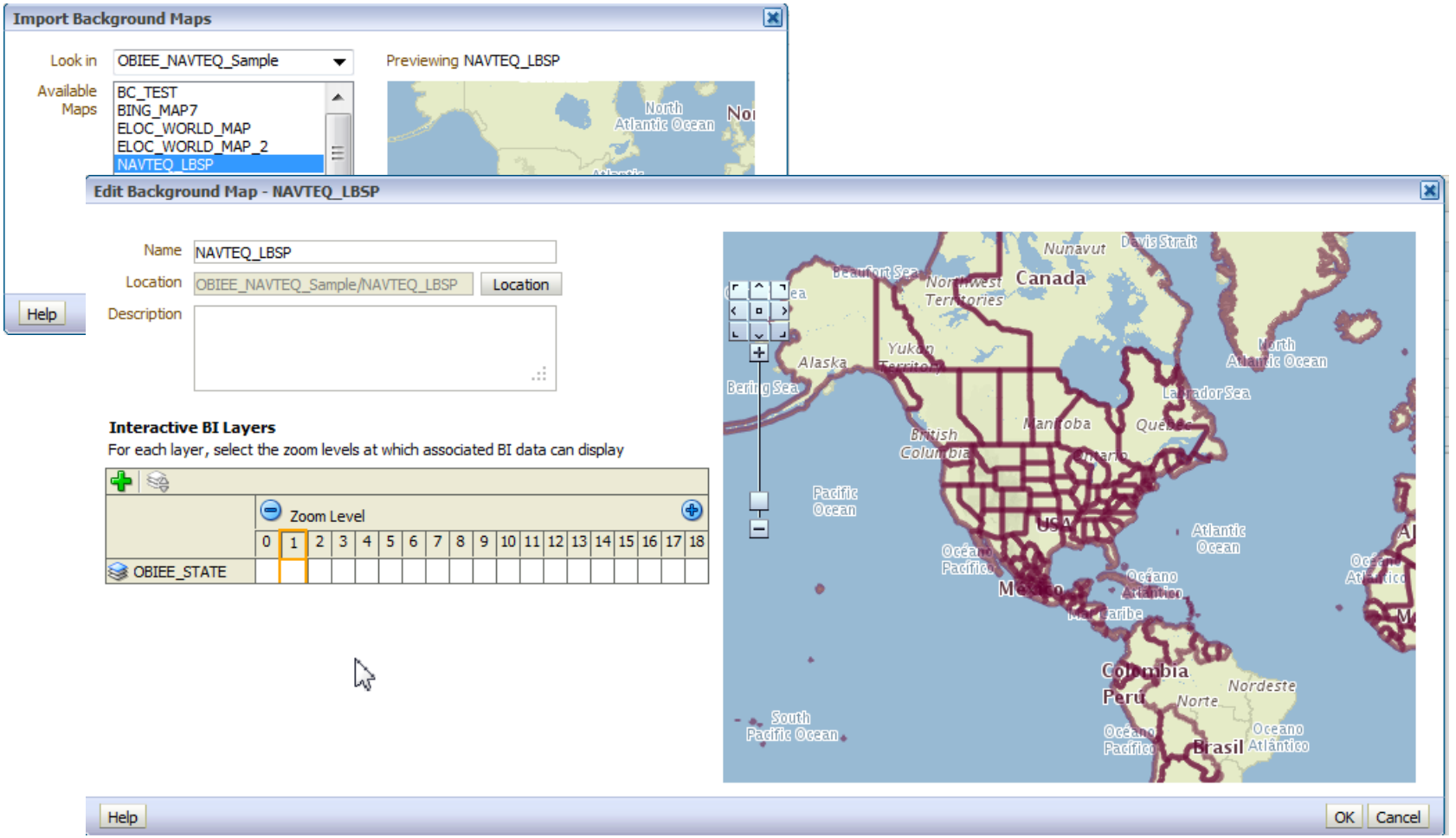
`sdo_distance` – calculates distance between two points
`sdo_geometry` – converts the long/lat coordinates into spatial data type
`sdo_point_type` – specifies that long/lat coordinates are for a point spatial data type

NAVTEQ Maps in Map Views

- Download required content and docs from NAVTEQ's developer site (www.navteq.com/oracle). Scroll down to Web Services section and get content for NAVTEQ's map service.
- Extract NAVTEQ_Map_Service.dmp from archive. Import it using Oracle imp/exp.
  imp username/password file=NAVTEQ_Map_Service.dmp full=y
- Add map definition to required metadata view
  insert into USER_SDO_CACHED_MAPS select * from NAVTEQ_MAP_SERVICE;
- Obtain license key (token) from enterprise@navteq.com
- Update metadata entry with key value
  Edit and use provided sql script or use MapViewer's Admin page

NAVTEQ Maps in Map Views

- Use in OBIEE once the map service is configured in MapViewer



SOFTWARE. HARDWARE. COMPLETE.

“Spatial” Tables

- Just like regular tables
- Contain a column of type SDO_GEOMETRY to store the geometric shape of the objects

```
CREATE TABLE map_countries (
  id            NUMBER PRIMARY KEY,
  name          VARCHAR2(30),
  geometry      SDO_GEOMETRY
);
```

Spatial Data

- Contains a list of X and Y coordinates for points that describe the shape

```
SQL> SELECT geometry FROM map_countries WHERE name =
'France';

SDO_GEOMETRY(
  2007, 8307, NULL,
  SDO_ELEM_INFO_ARRAY(1, 1003, 1, 2209, 1003, 1,
   2427, 1003, 1, 2465, 1003, 1, 2511, 1003, 1
  ),
  SDO_ORDINATE_ARRAY(
    6.63215688, 45.102186, 6.77118888, 45.142299,
    6.86673792, 45.115519, 6.90344604, 45.12864,
    ...
    -3.2208998, 47.377866, -3.245697, 47.353725
  )
)
```

Coordinate system of the shape (here Longitude/Latitude)

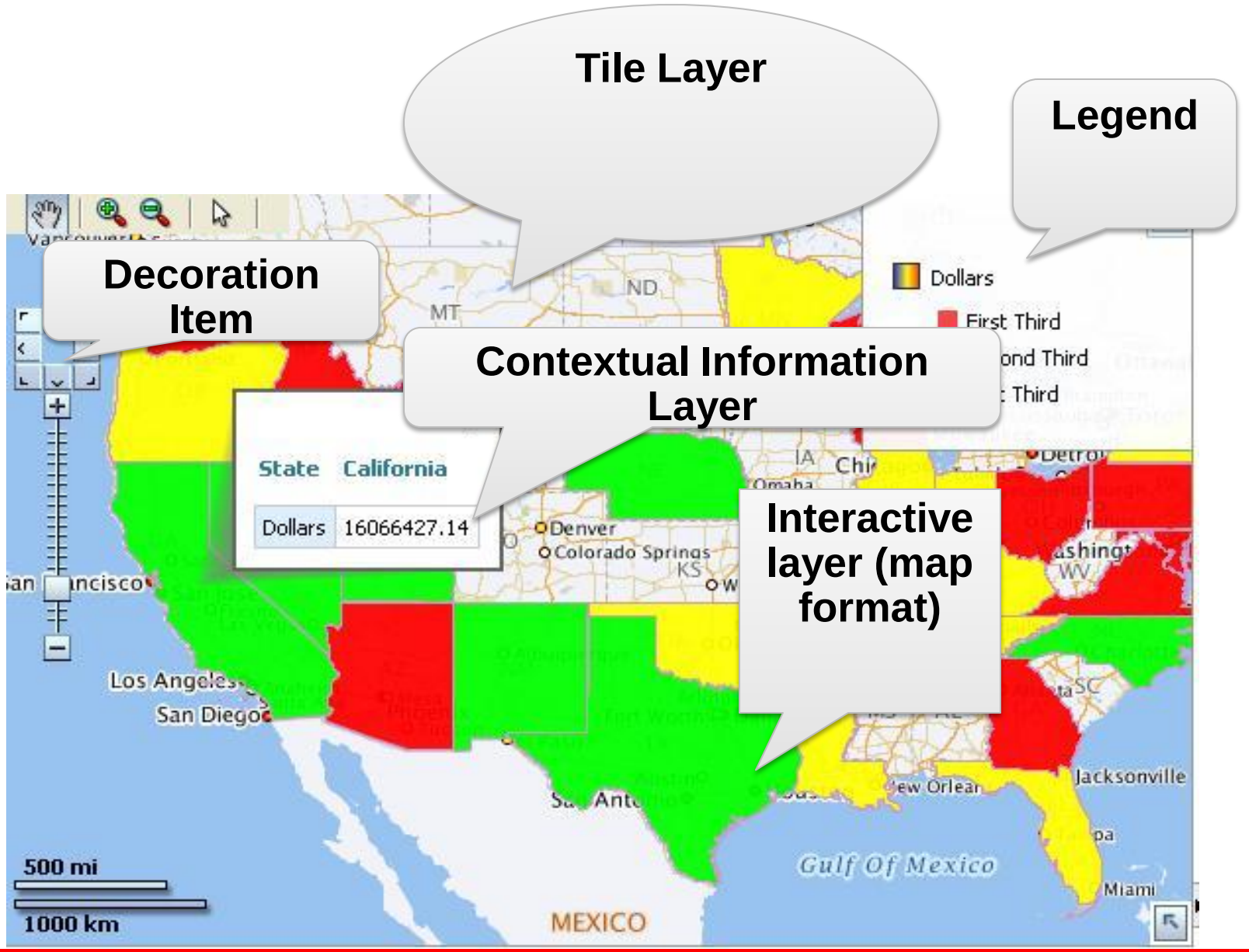
Coordinates of one point of the shape

Free data: "World Sample Data Set"

- World Sample Data Set
  - Country and region boundaries down to three levels:
    - Down to commune / municipality boundaries
  - Major roads
  - Major cities
- Provided by Navteq
  - Shipped with Oracle 11g
  - Downloadable from OTN
  - 300 MB zip file, 1.7GB in database
- Royalty free
  - But you still need to acknowledge Navteq's copyright!
- Good enough for simple mapping and analysis

NAVTEQ

Albania	Gibraltar	Portugal
Andorra	Great Britain	Puerto Rico
Australia	Greece	Romania
Austria	Hungary	Russia
Belgium	Ireland	San Marino
Bosnia and Herzegovina	Italy	Serbia and Montenegro
Bulgaria	Latvia	Slovak Republic
Canada	Liechtenstein	Slovenia
Croatia	Lithuania	Spain
Czech Republic	Luxemburg	Sweden
Denmark	Macedonia	Switzerland
Estonia	Moldova	Ukraine
Finland	Monaco	United States
France	Netherlands	Vatican City
Germany	Norway	
	Poland	



Spatial is a Natural BI Component

IDC recognized BI sector.