

APEX and Locator/Spatial

A Success Story



About Dimitri Gielis

- Director & Co-Founder of APEX Evangelists
- 12+ years of Oracle Experience
- OBUG APEX SIG Leader
- ‘Dimitri.Gielis@AE’ in the APEX forums
- Presenter at ODTUG, OOW, UKOUG, OBUG, ...
- OCP 8i/9i/10g + APEX Certified
- Oracle ACE Director
- “APEX Developer of the Year 2009”
- Blog @ <http://dgielis.blogspot.com>



[Dimitri Gielis](#) 



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Sign up for an APEX Evangelists account to view our solutions live and receive our two monthly newsletter via email to your inbox.

Upcoming Events (and meet AE)



29-MAR-2011 OBUG Connect
Tracking GPS locations in APEX



18-MAY-2011 AE Training
2-day APEX with John and Dimitri



27-JUN-2011 ODTUG Kaleidoscope
APEX 4.0 Charts Inside Out



28-JUN-2011 ODTUG Kaleidoscope
APEX Big Projects Many Dev.



APEX
Evangelists
Oracle Specialists

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Tweets



[sametbasaran](#) ([Samet Basaran](#)) RT @ApexNinjas: Came across this:Formspider is better than APEX <http://theformspider.com/product.php?descid=FormspiderVSOOracleApex> Anyone used it? #orclapex 20-MAR



[hans_de_vries](#) ([Hans de Vries](#)) RT @whitehorsesnl: RT @mvzoest: Cool! Our book is mentioned in the latest issue of #Oracle Magazine #orclapex <= congrats! 20-MAR



[deltalounge](#) ([PeterPaul](#)) RT @mvzoest: Cool! Our book is mentioned in the latest issue of #Oracle Magazine #orclapex <= congrats! 20-MAR

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Plugins

Location Map Image	17-MAR
Item Button with redirect	08-MAR
Multiple File Upload	03-MAR
SkillBuilders Calendar	28-FEB
SkillBuilders Geocode	28-FEB
SkillBuilders Save Value	28-FEB
SkillBuilders Password	28-FEB
OPpen Layers region	28-FEB
Text	20-FEB

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Blogs

Plugin: Location Map Image

Posted on 18-MAR-2011 07:00 by [Peter Raganitsch](#)

A couple of weeks i introduced a [Plugin](#) which helps the user to enter a postal address in an APEX Form.

Now i present a Plugin which lets you display an already stored address or location coordinates in a very simple and fast loading [Google Map Image](#) (png).

If you want you can put a link on this image which opens the address on maps.google.com in a separate Window where your user can interact with the Map.

These are the settings. Easy as can be :-)

Settings

Width

In the Picture



Schema Compare
for Oracle
rg

Request to list me too

Links

APEX Examples

[Carl Backstrom](#)

[Denes Kubicek](#)

[Dimitri Giellis](#)

[Hillary Farrell](#)

Outline

- What is AE GPS Tracker
- Demo AE GPS Tracker
- Technology Stack
 - Device Sending Geospatial Data
 - Locator / Spatial in the Database
 - Geospatial Server
 - Mapping API's (GUI)
 - APEX integration
 - Demo



What is AE GPS



What Is AE GPS Tracker?

- Application that can receive spatial data from different sources, combine it with existing information and turn that into a visual map with query possibilities.

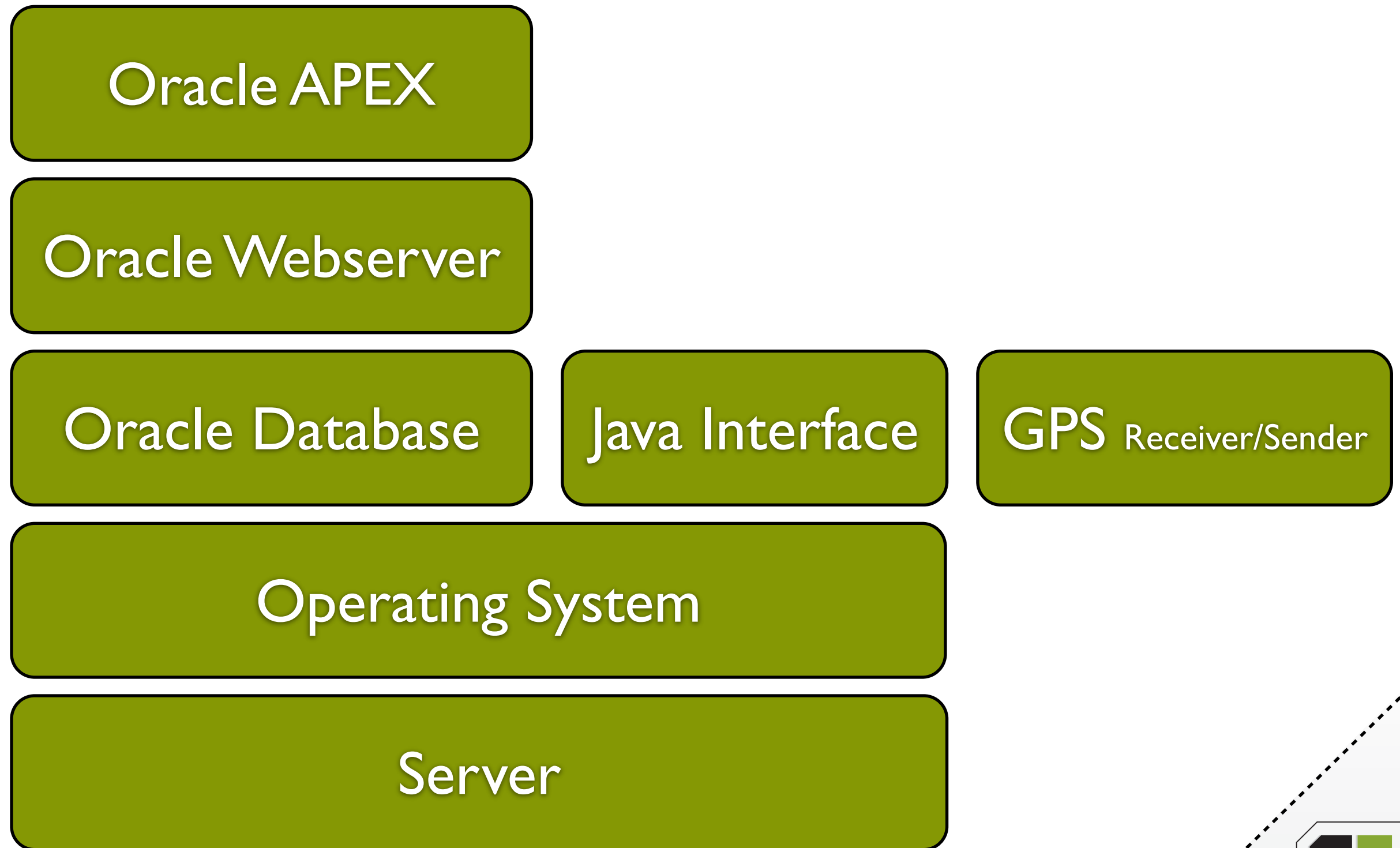
“AE GPS (Tracker) Intelligence is the Business Intelligence for map and spatial data.”



What Is AE GPS Tracker?



Architecture



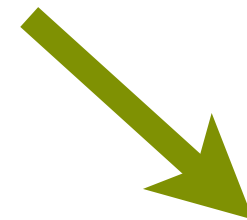
Two real World Use Cases



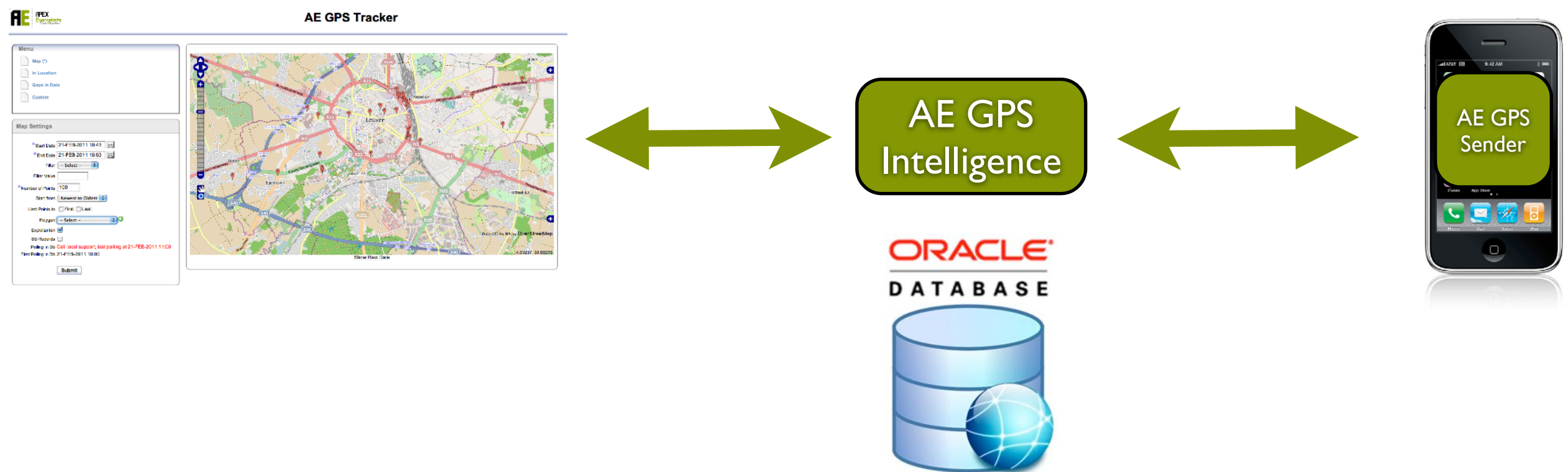
Customer Case - Buses



ORACLE
DATABASE



Customer Case - AE



Live Demo

DEMONSTRATION



Technology Stack



Device Sending Geospatial Data



Device Sending Geospatial Data

- iPhone development with XCode
- Android development with SDK
- ...
- (not covered in this presentation)



Locator / Spatial in the Database



Locator / Spatial in the Oracle DB

- Locator free with every Oracle database
- Spatial a cost option of Oracle EE database
 - Collection of tables and packages to work with geospatial data (MDSYS)



About Locator

- All geometric objects (points, lines, polygons)
- Indexing
- Spatial queries
- Proximity queries
- Distances
- Projections



About Spatial

- Locator AND
 - Geometric Transformations
 - Spatial Aggregations
 - Network Modelling
 - Topology
 - Raster
 - Geocoder
 - Spatial Data Mining
 - Web Services (WFS, CSW, OpenLS)



Spatial Data Storage

- SDO_GEOMETRY (for vectors)
 - Structure of SDO_GEOMETRY
 - SDO_GTYPE NUMBER
 - SDO_SRID NUMBER
 - SDO_POINT SDO_POINT_TYPE
 - SDO_ELEM_INFO SDO_ELEM_INFO_ARRAY
 - SDO_ORDINATES SDO_ORDINATE_ARRAY



Spatial Data Storage

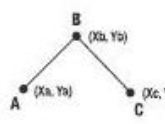
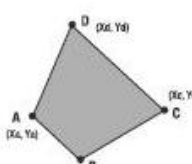
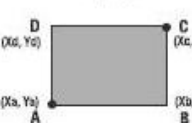
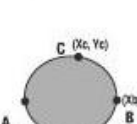
• SDO_GEOMETRY

Table 4-1. Values for D and T in the D00T Format of the SDO_GTYPE Attribute of SDO_GEOMETRY

Digit	Values
D (dimension of the geometry)	2 = Two-dimensional, 3 = Three-dimensional, 4 = Four-dimensional
T (shape/type of the geometry)	0 = Uninterpreted type, 1 = Point, 5 = Multipoint, 2 = Line, 6 = Multiline, 3 = Polygon/surface, 7 = Multipolygon/multisurface, 4 = Collection, 8 = Solid, 9 = Multisolid

SDO_SRID Spatial Reference System ID (8307, 4326)

Table 4-2. Values for SDO_ELEM_INFO (and SDO_ORDINATES) for Simple Geometries

Name	Element-Type (Etype)	Interpretation	SDO_ELEM_INFO: (1, Etype, Interpretation)	SDO_ORDINATES	Illustration
Point (for example, customer location)	1	N, where N is the number of points. 1 is for a single point; >1 is for a point cluster.	(1, 1, 1)	(Xa, Ya)	
Line string (for example, streets, highways)	2	1 = Connected by straight lines	(1, 2, 1)	(Xa, Ya, Xb, Yb, Xc, Yc)	
		2 = Connected by arcs	(1, 2, 2)	(Xa, Ya, Xb, Yb, Xc, Yc)	
Polygon (for example, city boundary, buffer zone)	1003	1 = Polygon boundary connected by straight lines	(1, 1003, 1)	(Xa, Ya, Xb, Yb, Xc, Yc, Xd, Yd, Xa, Ya)	
		3 = Rectangle polygon (only specify lower-left and upper-right corners)	(1, 1003, 3)	(Xa, Ya, Xc, Yc)	
		4 = Circle polygon (specify three points on)	(1, 1003, 4)	(Xa, Ya, Xb, Yb, Xc, Yc)	

Spatial Data Storage

- SDO_GEOMETRY Example

- create table loc (id number, location varchar2(100), geom sdo_geometry);
- insert into loc values (1, 'Santa Cruz', mdsys.sdo_geometry(2001,4326, mdsys.sdo_point_type(-121.7903,36.91039,NULL),NULL,NULL));
- INSERT INTO USER_SDO_GEOM_METADATA
(TABLE_NAME,COLUMN_NAME,DIMINFO,SRID) VALUES
('LOC','GEOM',MDSYS.SDO_DIM_ARRAY
(MDSYS.SDO_DIM_ELEMENT('X',-180,180,1),
mdsys.sdo_dim_element ('Y',-90,90,1)),4326);
- CREATE INDEX LOC_SPATIAL_INDEX ON LOC (GEOM) INDEXTYPE
IS MDSYS.SPATIAL_INDEX PARALLEL 1;



Spatial Data Storage

- SDO_GEOMETRY Example

- select id, location
from loc

where SDO_ANYINTERACT(geom,
SDO_GEOMETRY(2003, NULL, NULL,
SDO_ELEM_INFO_ARRAY(1,1003,3),
SDO_ORDINATE_ARRAY(4,6, 8,8))
) = 'TRUE';

- or
where SDO_ANYINTERACT(geom, SDO_GEOMETRY('POLYGON
((4.6862670898443 50.883106379164, 4.6939918518069
50.882889774757, 4.6888420104985 50.877690966882, 4.6862670898443
50.883106379164))',4326)) = 'TRUE'



Spatial Data Storage

- SDO_WITHIN_DISTANCE Example
 - ```
SELECT /*+ordered*/
 c.customer_id, c.first_name, c.last_name
FROM stores s, customers c
WHERE s.store_id = 101
AND sdo_within_distance (c.cust_geo_location,
 s.store_geo_location, 'distance=10 unit=KM') = 'TRUE';
```



# Locator / Spatial

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## DEMONSTRATION



# Geospatial Servers

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# Geospatial Servers

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- Universal interface for geospatial data
- Open Geospatial Consortium (<http://www.opengeospatial.org/>)
- Sits between Data and Visualization API
- Examples
  - Geoserver
  - Mapviewer
  - ArcGIS Server
  - MapServer



# Geospatial Servers

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- Different Services
  - Web Mapping Service (WMS)
  - Web Mapping Tiling Service (WMTS)
  - Web Feature Service (WFS) - Shape files...
  - ...



# Mapping API's (GUI)

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# Mapping API's (GUI)

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- Based on JavaScript
- Examples
  - Oracle Maps
  - Google Maps
  - OpenLayers
- Different Layers
  - Map Layer
  - User defined Layer (Tooltips, Polygons, ...)



# **APEX & Locator/Spatial**

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# APEX Integration

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- Manual
  - AE GPS Intelligence
- APEX 4.0 Plugin
  - Google Maps
  - Oracle Maps
  - OpenLayers



# APEX Integration

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## DEMONSTRATION



# Summary

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# Summary

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# Q&A



<http://apex-evangelists.com>