



Oracle Spatial Users Conference

April 27, 2006
Tampa Convention Center
Tampa, Florida, USA

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SPATIAL

April 2006

Oracle Spatial Users Conference

Michael Smith

Physical Scientist

Remote Sensing/GIS Center of Expertise

Army Corps of Engineers

Engineer Research & Development Center (ERDC)

Cold Regions Research Engineering Lab (CRREL)

Hanover, NH

Email: Michael.smith@erdc.usace.army.mil

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Google Earth, MapServer, GDAL/OGR and Oracle Spatial

Topics

- Getting data in – Open source alternatives
- Getting data out – Web Mapping
- Getting data out – Google Earth
- Performance questions with SDE (in ppt download)

Open Source Tools – GDAL / OGR

- The OGR Simple Features Library is a C++ open source library (and command line tools) providing read (and sometimes write) access to a variety of vector file formats including ESRI Shapefiles, S-57, SDTS, PostGIS, **Oracle Spatial**, and Mapinfo mid/mif and TAB formats.
- OGR is a part of the [GDAL](#) library.
- <http://www.remotesensing.org/gdal/ogr/>

GDAL / OGR

- `ogr2ogr -f OCI:scott/tiger@orcl states.shp -lco dim=2 -lco srid=8307 -lco geometry_storage=geom`
- It will load the geometry, add the `USER_SDO_GEOM_METADATA` entry and create the spatial index
- Supports export to other formats
- http://www.remotesensing.org/gdal/ogr/ogr_formats.html

Open Source Web Mapping MapServer

- Open Source Geospatial Foundation
 - Mapserver
 - <https://mapserver.osgeo.org/>
 - Formerly UMN Mapserver
 - <http://mapserver.gis.umn.edu>

MapServer

- Advanced cartographic output
 - Scale dependent feature drawing and application execution
 - Feature labeling including label collision mediation
 - Fully customizable, template driven output
 - TrueType fonts
 - Map element automation (scalebar, reference map, and legend)
 - Thematic mapping using logical- or regular expression-based classes
- Support for popular scripting and development environments
- PHP, Python, Perl, Ruby, Java, and C#
- Cross-platform support
 - Linux, Windows, Mac OS X, Solaris, and more
- Map projection support
 - On-the-fly map projection with 1000s of projections through the [Proj.4](#) library

MapServer

- A multitude of raster and vector data formats
 - TIFF/GeoTIFF, MrSiD, ECW, and many others via [GDAL](#)
 - ESRI shapefiles, PostGIS, ESRI ArcSDE, **Oracle Spatial**, MySQL and many others both native and via [OGR](#)
 - [Open Geospatial Consortium](#) (OGC) web specifications
 - WMS (client/server)
 - non-transactional WFS (client/server)
 - WCS
 - SLD

MapServer Output



US Army Corps
of Engineers

Missouri River Fish and Wildlife Recovery Plan

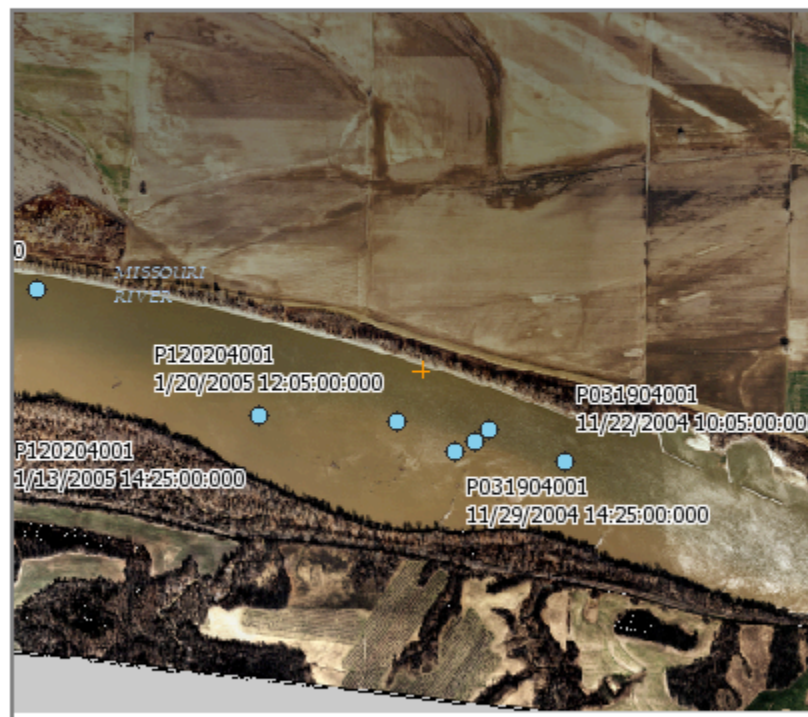


Home	Map Interface	Decision Support	Data Utilities	Spatial Data Catalog	Site Administration
------	---------------	------------------	----------------	----------------------	---------------------

Map
Zoom
Tools



Map
Utilities



X: 1696624.89

Y: 14157496.98

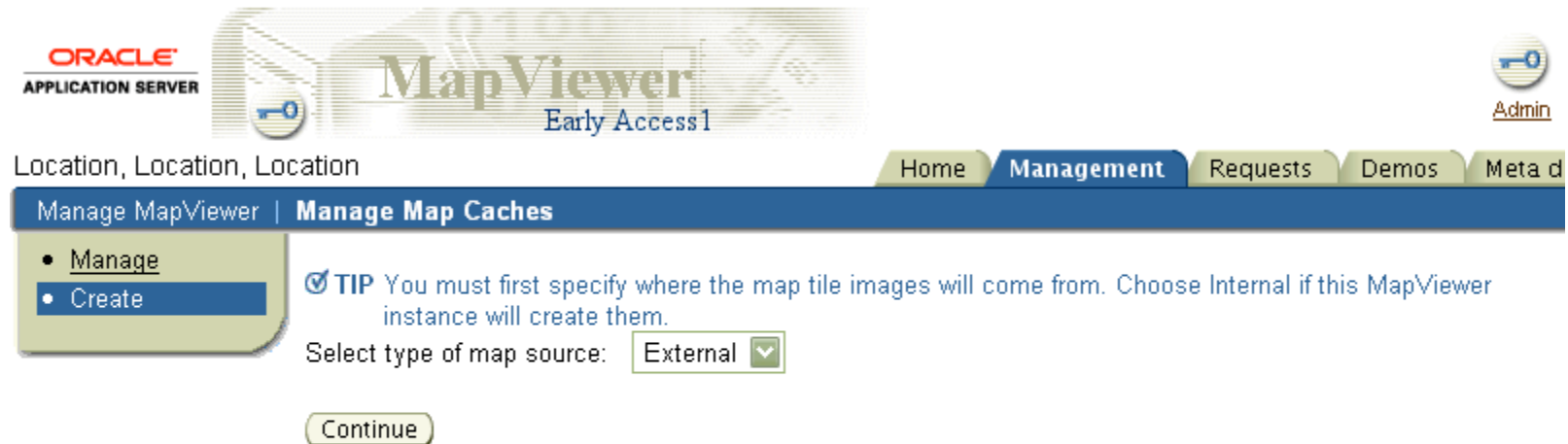
Scale: 1:51,026

Layers	Legend	Map View	Zoom By
Map Layers			
Missouri River Data			
Species Habitat and Locations			
☒ USGS Sturgeon Locations			
☐ FWS Critical Habitat			
☐ NWO T&E			
River Structures			
Hydrography			
Water Control Data			
Imagery			
☒ Gavins Point - 08/1996			
☒ Gavins Point - 05/1998			
☒ Fort Randall			
☒ Oahe			
☒ Garrison Headwater			
☒ Fort Peck			
☐ Yellowstone			
☒ MrSid			
Model Results			
Snow Map Data			
Base Data			

Oracle MapViewer

- Can connect to other WMS servers
- Very nice Java GUI layer/map editor
- PL/SQL API
- Oracle Maps – Google Maps-like
 - Can add FOI layers (dynamic layers on tiled base)
 - Very nice Javascript API
 - Still in Early-release
- Supports GeoRaster, Topology, and Network Layers

Oracle MapViewer – WMS Integration



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APPLICATION SERVER

MapViewer
Early Access1

Location, Location, Location

Home Management Requests Demos Meta d

Manage MapViewer | **Manage Map Caches**

- Manage
- Create

✓ **TIP** You must first specify where the map tile images will come from. Choose Internal if this MapViewer instance will create them.

Select type of map source: External ▼

Continue

MapView – WMS Setup

[Admin](#) [Lo](#)

Location, Location, Location

[Home](#) [Management](#) [Requests](#) [Demos](#) [Meta data](#)

[Return](#)

Create a cache for external map source

Name:
This name will be automatically prefixed with datasrc name.

Data Source:
MapView data source; for storing cache instance configurations

Map service Url:

Request method:

☐ HTTP proxy required

Adapter class:

Jar file location:
complete path to the adapter Jar file on the server

MapView – WMS Setup

☒ Adapter properties

Select and

Properties:

Select	name	value
☒	srs	EPSG:4326
☐	version	1.1.1

Cache storage:
Specify the root directory for cached image files.

SRID:
Maps will be displayed in this SRID

Min X:
Max X:
Min Y:
Max Y:

Tile width (pixels):
Tile height (pixels):
Tile format:

Zoom Levels:
Minimum Map Scale:
use ratio format. e.g., enter 1000 for a scale of 1:1000
Maximum Map Scale:

Discussion Forum

[Executing a script f](#)
[Connecting xhtml web](#)
[Dynamic FROM vari](#)



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Oracle MapViewer with MapServer WMS



CorpsMap

Map Browser

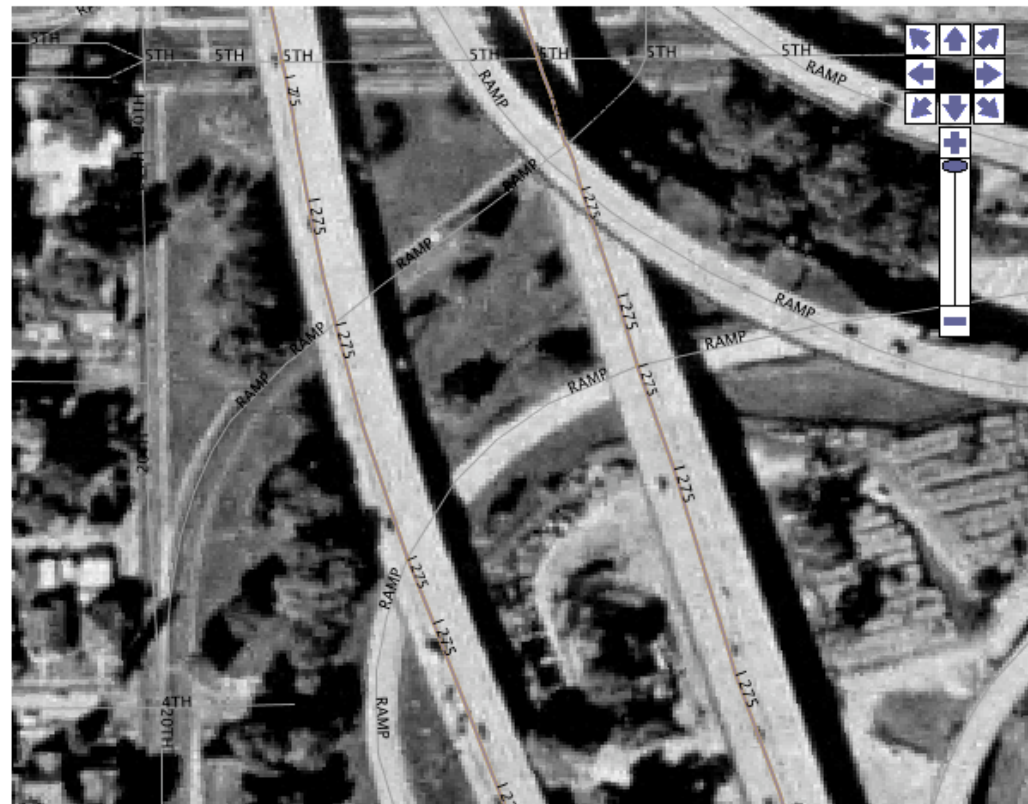
IENC Map Browser

Find

Data Catalog

Map Layers

- ☒ Base Map
- ☒ EDOQ Imagery



Google Earth

- Accepts data in KML format (XML-like)
- Tags are case sensitive
- Coordinates must be in Lat / Lon
- Coordinates require X, Y, Z
 - (although z can be 0)
- Can easily be exported from Oracle via
 - pl/sql
 - mod_pl/sql
 - apache

Google Earth

- Set Mimetype
 - owa_util.mime_header('application/vnd.google-earth.kml+xml', true, 'ISO-8859-1')

- Set initial KML Structure

```
http.p(  
  <?xml version="1.0" encoding="UTF-8"?>  
  <kml xmlns="http://earth.google.com/kml/2.0">  
    <Document>  
      <description>Cities</description>  
      <Folder>');
```

Google Earth

- Loop through points

For x in (Select name, s.geom.sdo_point.x lon, s.geom.sdo_point.y lat
from esri.cities s)

loop

http.p('<Placemark>

<name>'||x.name||'</name>

<Point>

<coordinates>'||x.lon||','||x.lat||', 0 </coordinates>

</Point>

</Placemark>');

End loop;

- End document

- http.p('</Folder></Document></kml>');

Google Earth

- Lines and Polygons are trickier
- Less work with 3d Spatial layers
 - (don't have to add z-coordinate)
- Version 10g needed
 - KML Lines and Polygons similar to GML
 - Can use *sdo_util.to_gmlgeometry*
 - But with *some modifications*

Google Earth

```
<MultiGeometry>
  <Polygon>
    <outerBoundaryIs>
      <LinearRing>
        <coordinates>...</coordinates>
      </LinearRing>
    </outerBoundaryIs>
  </Polygon>
  <Polygon>
    <outerBoundaryIs>
      <LinearRing>
        <coordinates>.....</coordinates>
      </LinearRing>
    </outerBoundaryIs>
  </Polygon>
</MultiGeometry>
```

KML

```
<gml:MultiPolygon>
  <gml:polygonMember>
    <gml:Polygon>
      <gml:outerBoundaryIs>
        <gml:LinearRing>
          <gml:coordinates>.....</gml:coordinates>
        </gml:LinearRing>
      </gml:outerBoundaryIs>
    <gml:Polygon>
      <gml:outerBoundaryIs>
        <gml:LinearRing>
          <gml:coordinates>.....</gml:coordinates>
        </gml:LinearRing>
      </gml:outerBoundaryIs>
    </gml:Polygon>
  </gml:polygonMember>
</gml:MultiPolygon>
```

GML

Google Earth

- A few replaces with change GML to KML
 - Remove the gml: namespace
 - Remove the <polygonMember/> tags
 - Change <MultiPolygon> to <MultiGeometry>
- Add z value to create coordinate tuples
 - Or convert 2D geometry to 3D
 - Ogr2ogr has a nice method to do this
 - (dim=2 or dim=3)

Google Earth

```
replace
  (replace
    (replace
      (replace
        (regexp_replace
          (sdo_util.to_gmlgeometry(u.shape),
            '([[:digit:]])(?-[[:digit:]])', '\1,0 \2\3')
          , 'gml:', '')
        , ' </coordinates>', ',0 </coordinates>')
      , 'MultiPolygon', 'MultiGeometry')
    , '<polygonMember>', '')
  , '</polygonMember>', '')
```

Google Earth

- Example URLs

- Points - https://rsgis.crrel.usace.army.mil/intro/rsgis_demo.genkmlpoints
- Polys - https://rsgis.crrel.usace.army.mil/intro/rsgis_demo.genkmlpoly_states

- Program Example

- Points - https://rsgis.crrel.usace.army.mil/rsgis_demo/genkmlpoints.txt
- Polys - https://rsgis.crrel.usace.army.mil/rsgis_demo/genkmlpoly_states.txt

Q&A



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Why Oracle Spatial

- We have a mix of uses
 - ESRI Clients (ArcGIS)
 - Bentley MicroStation (soon)
 - Web map clients
 - UMN Mapserver
 - ESRI ArcIMS
 - Oracle MapViewer
 - Spatial Analysis / Reporting
 - SQL / APEX reporting

Why Oracle Spatial

- Therefore → Oracle Spatial
 - Only option really for true cross platform interoperability
- But are we sacrificing performance for ESRI clients due to Oracle Spatial format
 - Used to read that in SDE configuration and tuning guide for Oracle
 - Implied by a lot of ESRI marketing folks
 - Decided to look at that for this conference

Performance Results Setup

- Tested against SDE 9.1 sp1 and SDE 8.3
- SDE 9.1sp1
 - Dell PowerEdge 2850 (2cpu) with Redhat Linux 4
 - 64bit Oracle 64 bit 10.2.0.1
 - LAN
- SDE 8.3
 - Sun E5500 12 processor Solaris 9
 - Oracle 64 bit 9.2.0.7
 - WAN



Performance Tests Data

- Polyline dataset of bluelines digitized for a watershed delineation in Western Riverside County, CA
- 110687 rows
- Loaded via ArcCatalog 9.1sp1
- DBTUNE Keywords
 - SDEBINARY
 - SDO_GEOMETRY



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Performance Tests Results

Format	Extent	Source	Time (avg sec 10 runs)
Oracle	Full	SDE 9.1	8.87
SDE	Full	SDE 9.1	7.17
Oracle	1:100,000	SDE 9.1	2.38
SDE	1:100,000	SDE 9.1	3.23
Oracle	Full	SDE 8.3	01:15.8
SDE	Full	SDE 8.3	01:16.5
Oracle	1:100,000	SDE 8.3	9.4
SDE	1:100,000	SDE 8.3	9.87

ESRI Tools

- SDE and ArcCatalog
- DB Tune
 - Change GEOMETRY_STORAGE to SDO_GEOMETRY
 - Add SDO_SRID, set to SRID Code for your projection (LL WGS84 -> 8307)
 - Have to set SDO_SRID for each projection
 - Use separate KEYWORD for each

Oracle Tools

- Java Shapefile Converter (don't use SHP2SDO)
- Usage
 - `java -cp %classpath%
SampleShapefileToJGeomFeature -h
localhost -p 1521 -s orcl -u scott -d
tiger -t states -f states -r 8307 -g
geom`
- Can be a little slow for large datasets