

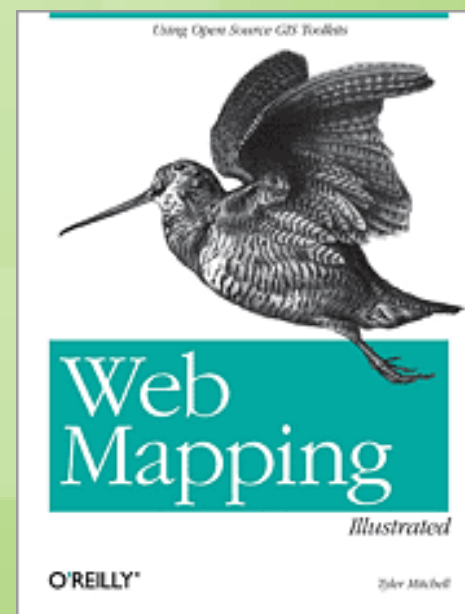
6.May.2008

The Open Source Geospatial Foundation

Open Source Tools for Geospatial Data Management

Tyler Mitchell

- Executive Director, Charter Member of OSGeo
- Author, *Web Mapping Illustrated* (O'Reilly, 2005)
- GIS Professional - Manager, User, R&D, Advocate
- Geographer





Lat : 52.1185112 N
Lon : 122.1260582 W



OSGeo 2007. All rights reserved





**OSSIM
Planet**

OSGeo 2007. All rights reserved



OSGeo

Your Open Source Compass

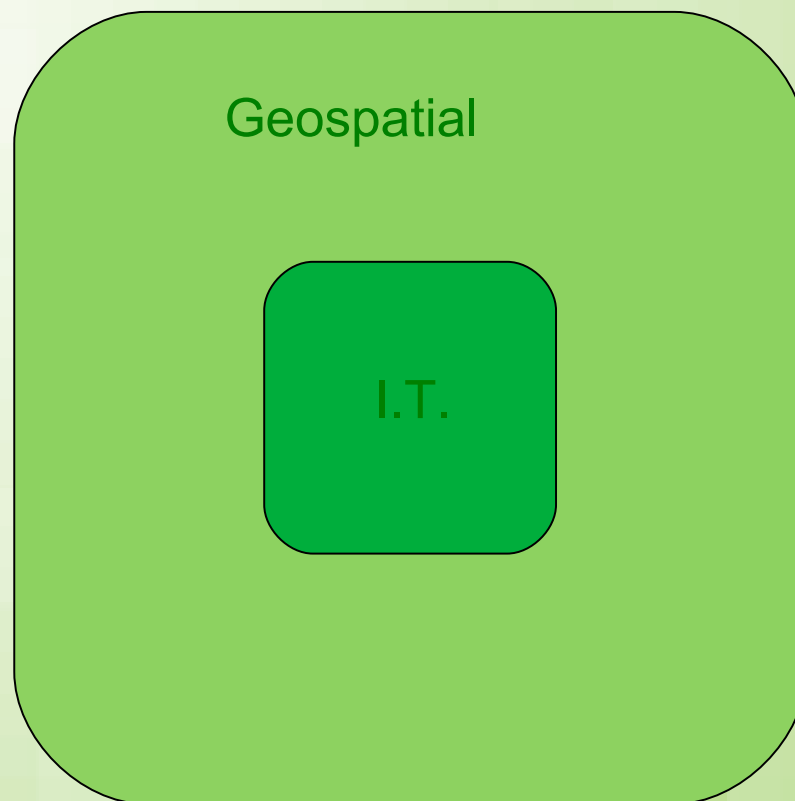
Open Source

“any program whose source code is made available for use or modification as users or other developers see fit...Open source software is usually developed as a public collaboration and made freely available.”

Open Source Examples

- Programming languages
- Linux operating system
- Apache web server
- Firefox web browser
- Thunderbird email client
- OpenOffice office suite
- Various databases
- GIS & mapping applications
- You name it...

Open Source Geospatial Building on top of Open Source I.T.

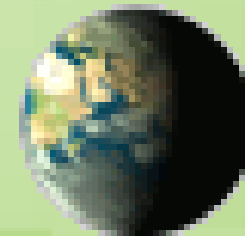
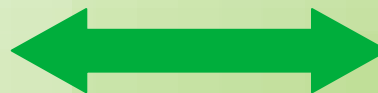


Open Source I.T.

- Open Source as core **I.T.** infrastructure
- Focused on **communications**
- Trading **bits of text** & multimedia
- **Limited** ways to communicate

01010101101

ABCDEFGH



Open Source Geography

- Geospatial as **interaction**/planning tool
- Focused on measurable **observations**
- Trading geographic **locations**
- **Unlimited** interaction with geography
- **Where** matters to all - common foundation



Array of Geospatial Tools

- Typical needs and tools:
 - data collection
 - sharing data
 - visualisation
 - decision making
- Extending our senses
- Geospatial information management ties it all

Project Success & Quality

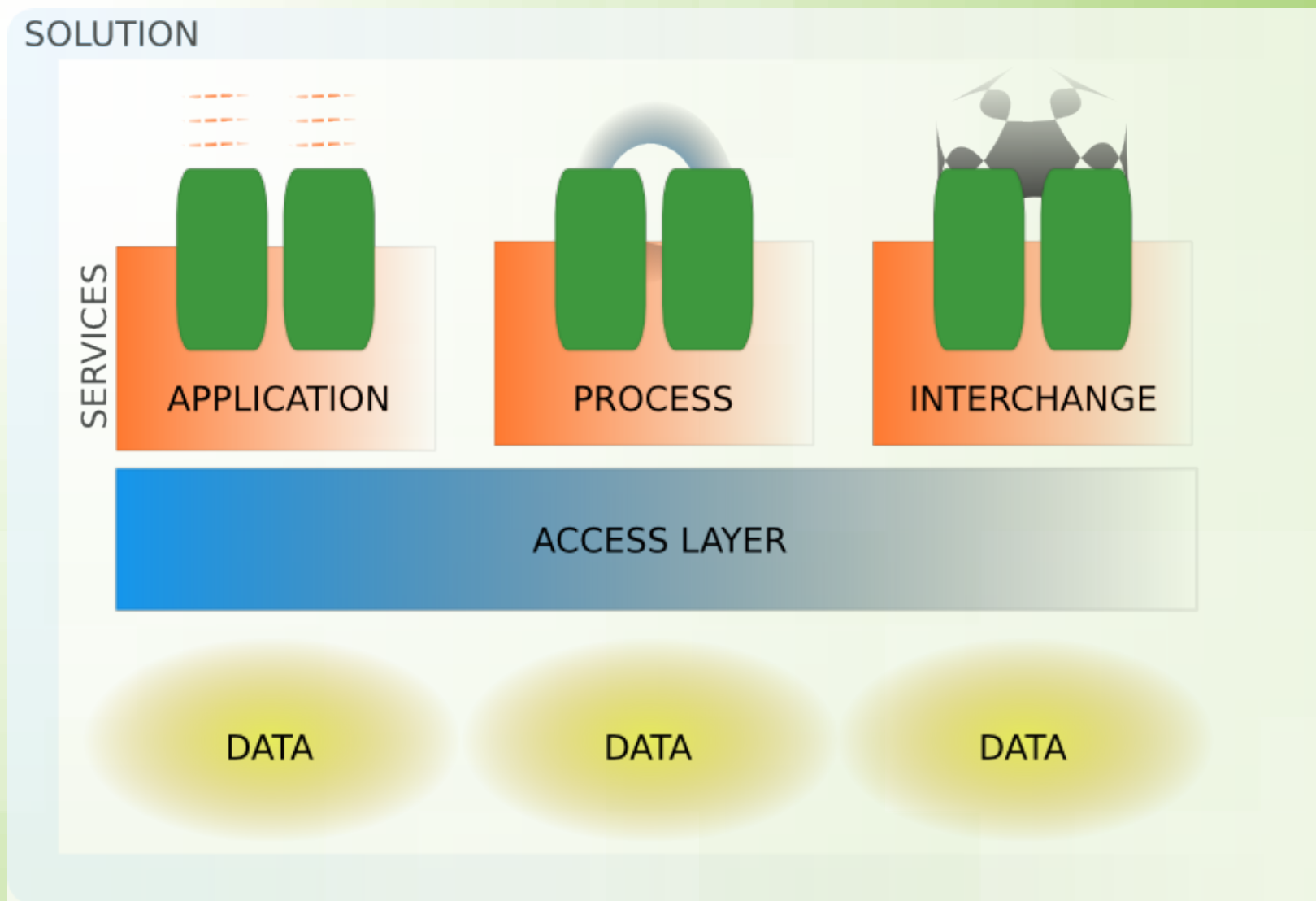
Quality depends on capability

- Limited by your abilities & staff
- Breadth of skills/experience required

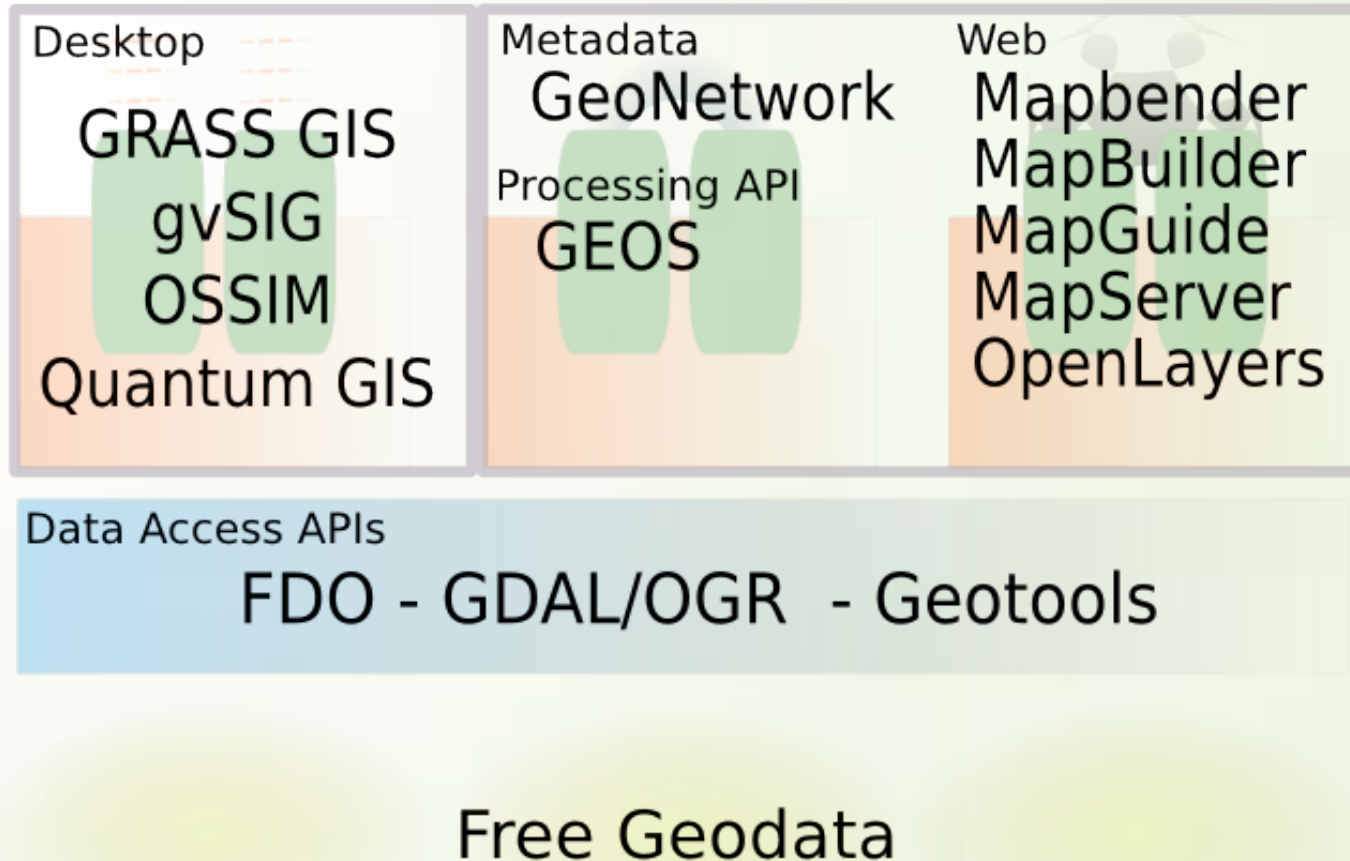
Need agility and an eye to the future

- standards
- platforms
- data issues
- what's next?
- beyond open source (OGC, etc.)

Software Stack



OSGeo Open Source Project Stack



Project Stats

- From ohloh.net
- Missing gvSIG and deegree

Replacement Cost of your Stack

This calculator estimates how much it would cost to hire a team to write each project from scratch. The cost is the sum of each project cost. [More »](#)

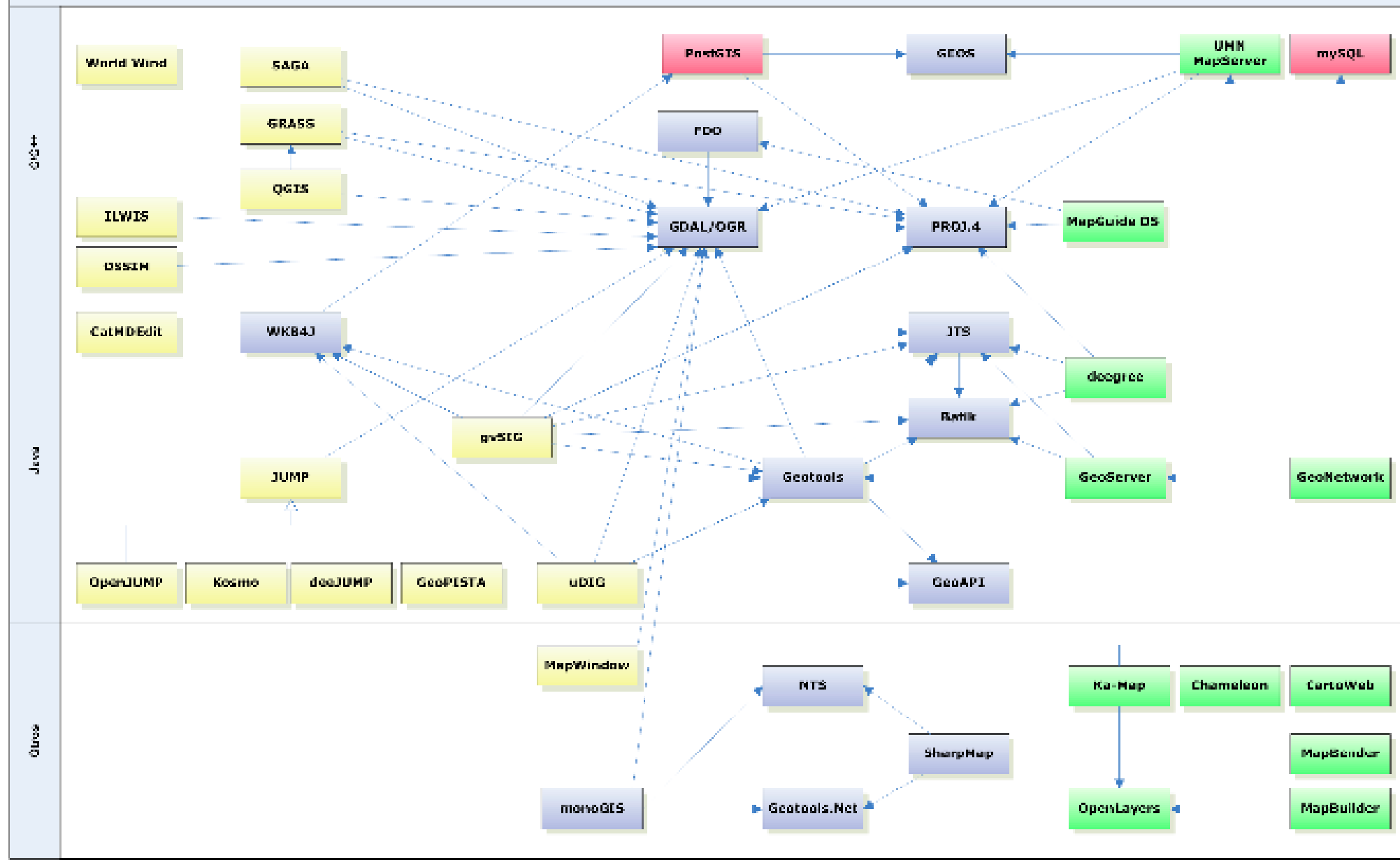
Include	<input type="text" value="Markup And Code"/>
Codebase	5,450,649
Projects	14
Contributors	200
Effort (est.)	1474 Person Years
Avg. Salary	\$ <input type="text" value="55000"/> year
\$ 81,072,382	

* <http://www.ohloh.net/stacks/151/report>

The OSGeo Software Stack

- **Data access libraries**
GDAL/OGR - GeoTools – FDO - GEOS
- **Desktop GIS/mapping applications**
GRASS - OSSIM - Quantum GIS - gvSIG
- **Web mapping clients & frameworks**
Mapbender - MapBuilder - OpenLayers
MapGuide Open Source - MapServer
- **Metadata catalog**
GeoNetwork opensource
- **OGC Specs: WMS, WFS, WCS, GML, CSW...**

RELACIÓN ENTRE LOS PRINCIPALES PROYECTOS FOSS - SIG



Producto Escritorio
Biblioteca
Base Datos
Servidor/ WebMapping

Data Access APIs

GDAL/OGR

Most widely used geospatial data access C++ library

50+ raster formats

20+ vector formats

Bindings in Python, C#, Java, Ruby, VB6, Perl

GeoTools

Java GIS toolkit

Serves data using various OGC specs.

Support for common geospatial data formats

Feature Data Objects (FDO)

GEOS

GDAL/OGR Libraries

- <http://www.gdal.org>
- GDAL – raster data access
- OGR – vector data access
- Available as programming libraries (C++, Python)
- Sample utilities are powerful
- Behind many products

GDAL Utilities

GDALINFO – get raster dataset info.

```
> gdalinfo globe.tif
Driver: GTiff/GeoTIFF
Size is 10800, 4800
Coordinate System is:
GEOGCS["unnamed",
  DATUM["unknown",
    SPHEROID["unnamed",6378137,298.2572235629972]],
  PRIMEM["Greenwich",0],
  UNIT[,0.0174532925199433]]
Origin = (-180.000000,90.000000)
Pixel Size = (0.008333333,-0.008333333)
Corner Coordinates:
Upper Left  (-180.0000000,  90.0000000)
Lower Left  (-180.0000000,  50.0000000)
Upper Right  (-90.0000000,  90.0000000)
Lower Right  (-90.0000000,  50.0000000)
Center      (-135.0000000,  70.0000000)
Band 1 Block=10800x1 Type=Byte, ColorInterp=Palette
  Color Table (RGB with 256 entries)
    0: 0,50,50,255
    1: 2,55,55,255
    2: 5,60,60,255
  ...
```

OGR Utilities

- **OGRINFO** – lists vector data info.

```
> ogrinfo testpoint.shp testpoint
```

```
INFO: Open of `testpoint.shp'  
using driver `ESRI Shapefile' successful.
```

```
Layer name: testpoint
```

```
Geometry: Point
```

```
Feature Count: 3
```

```
Extent: (427446.218809, 6010049.544707) - (430765.476087, 6012780.281191)
```

```
Layer SRS WKT:
```

```
PROJCS["NAD_1983_UTM_Zone_10N",  
    GEOGCS["GCS_North_American_1983",  
        DATUM["North_American_Datum_1983",  
            ...<snip>...  
        PARAMETER["Latitude_Of_Origin",0.0],  
        UNIT["Meter",1.0]]
```

```
Id: Integer (6.0)
```

```
pointname: String (10.0)
```

```
OGRFeature(testpoint):0
```

```
  Id (Integer) = 1
```

```
  pointname (String) = My Place
```

```
  POINT (427446.219 6012309.465)
```

```
>ogrinfo "PG:dbname=project1 host=localhost" mypointtable
```

GDAL Utilities

- **GDAL_TRANSLATE** – converts raster formats

```
> gdal_translate -of "ECW" ortho.tif ortho_out.ecw
```

```
Input file size is 800, 600
```

```
0...10...20...30...40...50...60...70...80...90...100 - done.
```

- **GDALWARP** – re-projects, rectifies using GCPs, converts formats
- **GDAL_MERGE.py** – Python script for merging datasets together

OGR Utilities

- OGR2OGR – converts between OGR datasets

```
> ogr2ogr output.shp input.dgn
```

- Defaults to ESRI shapefile format.

```
> ogr2ogr -f "DGN" output.dgn testpoint.shp
```

- More complex

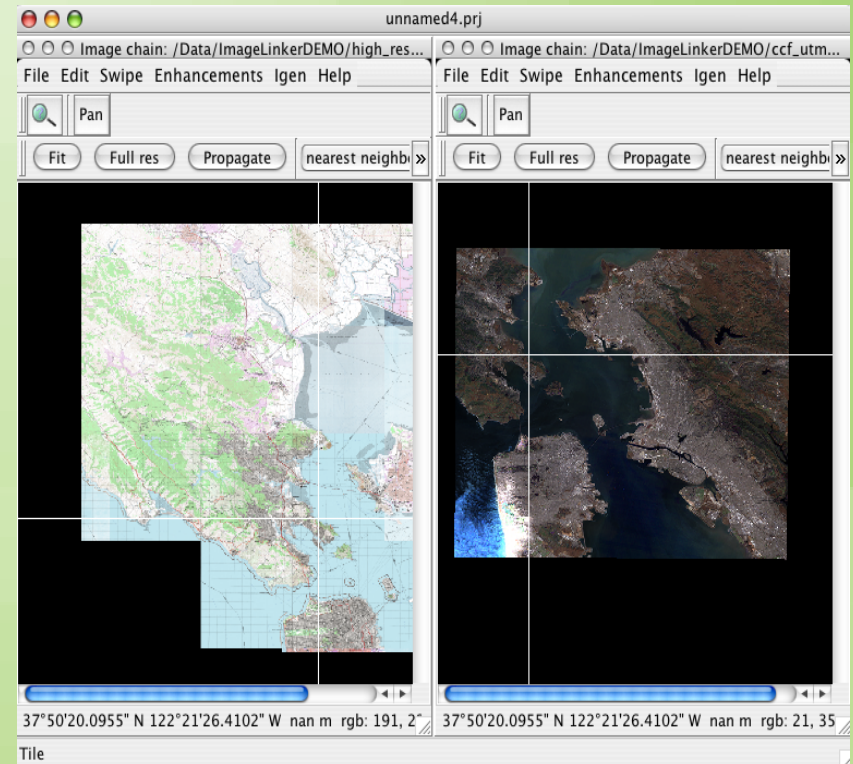
```
> ogr2ogr -f "ESRI Shapefile"  
-where "type=3 or type=4" <-- use attributes in data  
dgntoline.shp <-- output file  
c:\temp\93j016.dgn <-- input file  
-nlt LINESTRING <-- output data type
```

GIS & Image Processing

GRASS GIS



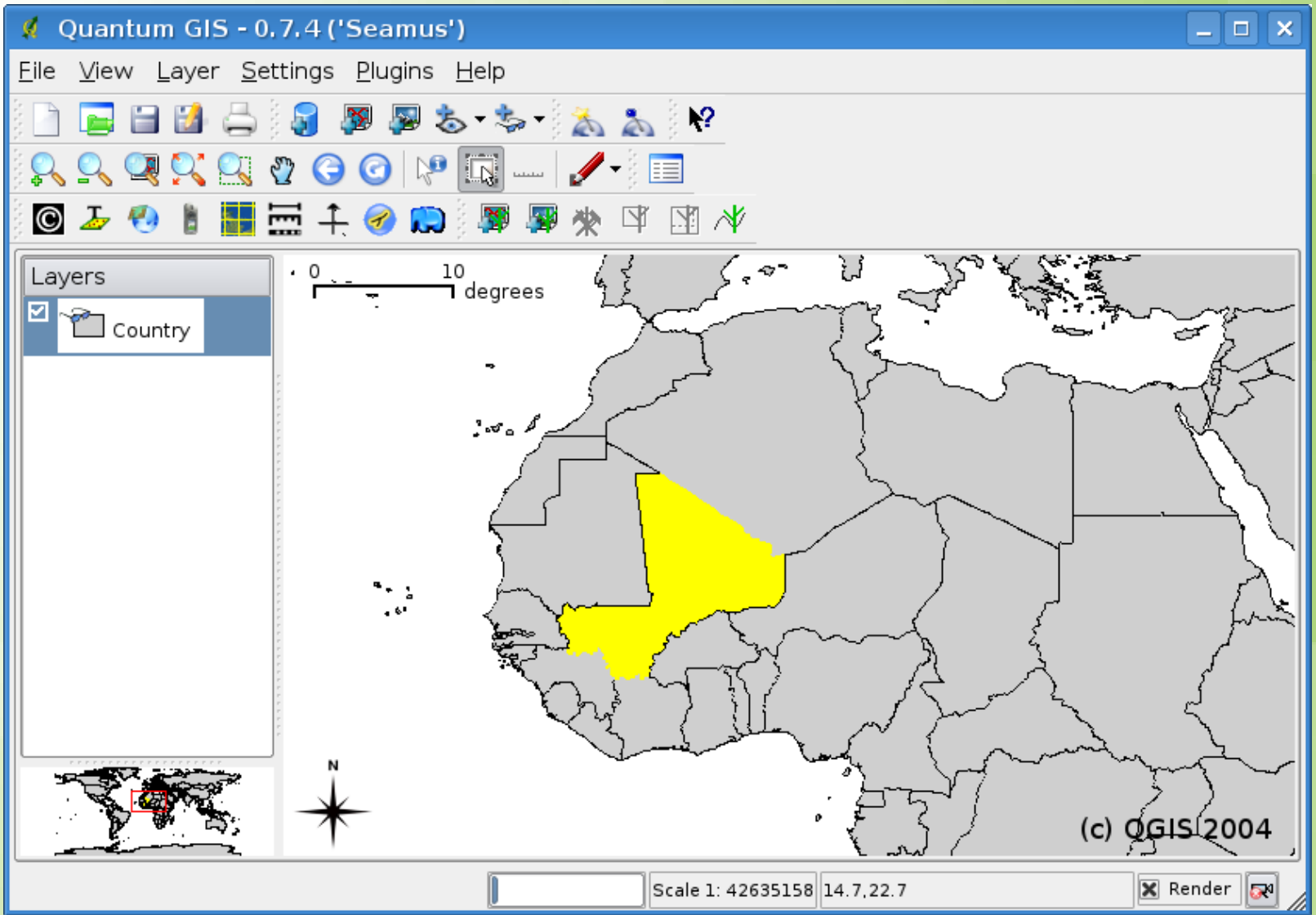
OSSIM Image Processing



gvSIG



Quantum GIS



City of Redding - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Refresh Print

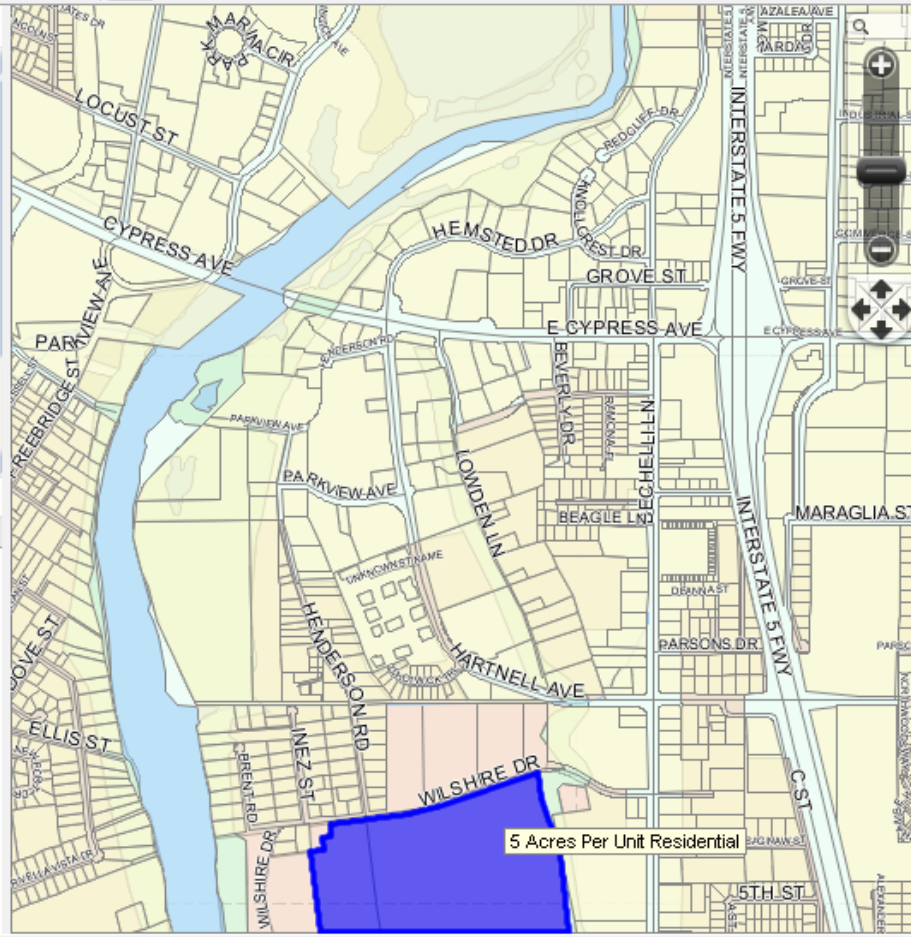
Address: http://localhost:8008/mapguide/mapviewerajax/?WEBLAYOUT=Library%3a%2f%2fRedding%2fLayouts%2fRedding.WebLayout

Layers

- Basemap
- Flood Zone
- Creeks
- Rivers
- River Trail
- City_Boundary
- 400 Scale Grid
- Transportation
 - Roads
 - Railroad
- Community
 - Parks_points
 - Parks
- Cadastral
 - Parcels
 - Contour Plan

Properties

Name	Value
GPID	552.000000
GP	5P
GP_CLASS	Residential
GP_DESC	5 Acres Per Unit Residential



5 Acres Per Unit Residential

Create a Buffer

Buffer settings

Select features on the image.

Distance around features:
 Kilometers


Layers to include in the buffer:

Name for the resulting buffer layer:

Merge buffer areas


Fill style	Border style
Fill pattern: <input type="text" value="Solid"/>	Line pattern: <input type="text" value="Solid"/>
Foreground color: <input type="text" value="Red"/>	Line color: <input type="text" value="Black"/>
Transparency: <input type="text" value="50"/> %	Line thickness: <input type="text" value="1"/>
Background color: <input type="text" value="transparent"/>	

X: 1969052.879314, Y: 636491.372683 (Meter) | 1 feature selected | 1: 14,368 | 32 x 47 (km) | Powered by MapGuide



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Land Cover




Zoom In



Zoom Out



View Full Map




Zoom to Region

S


M

L


Map Size




Get Info from Map

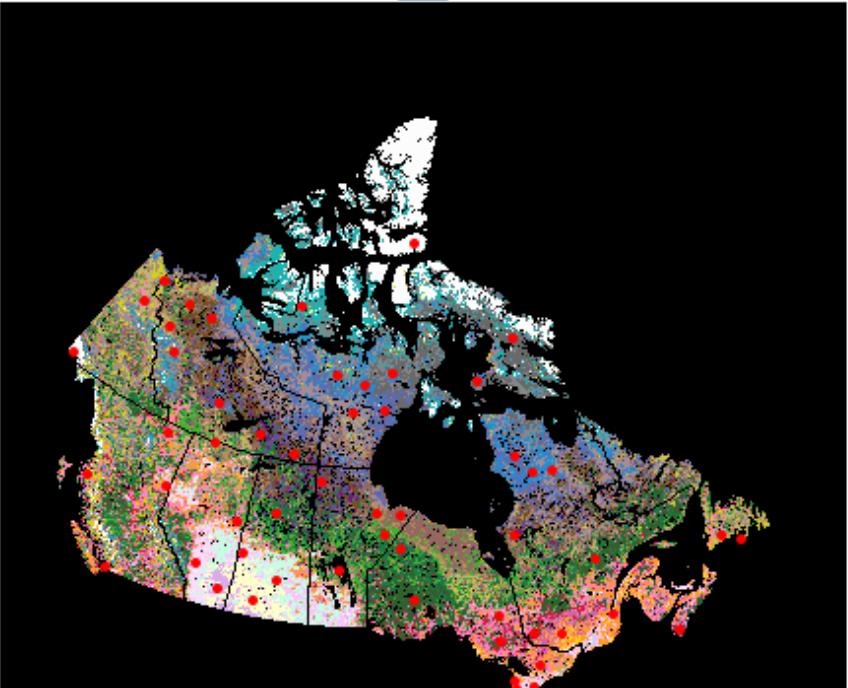


Print Preview



Help





Land Cover Description

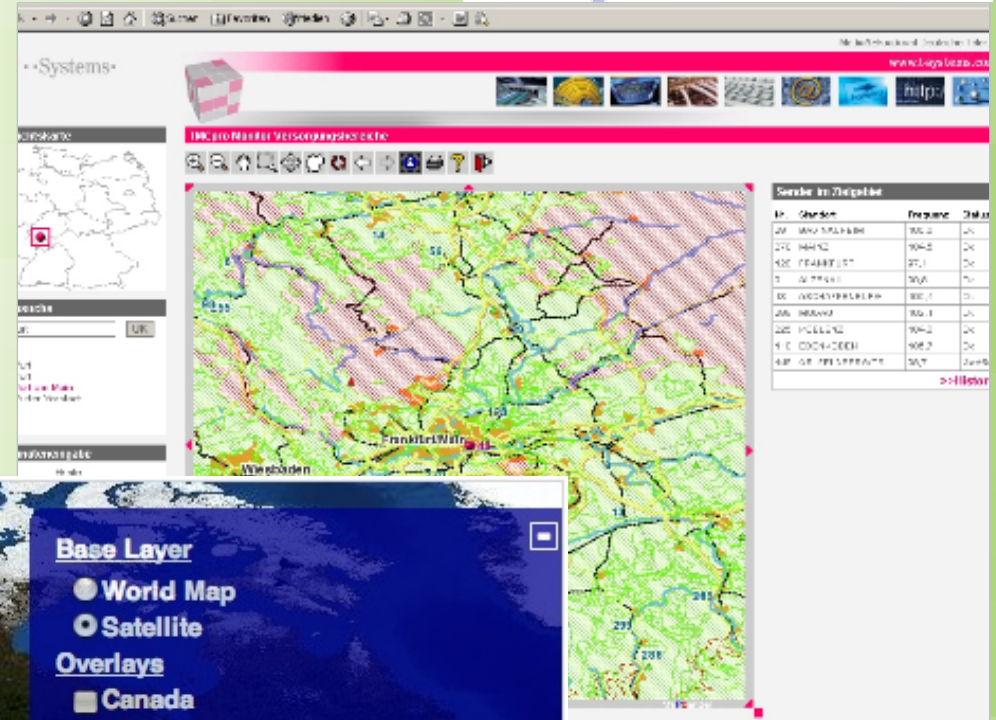
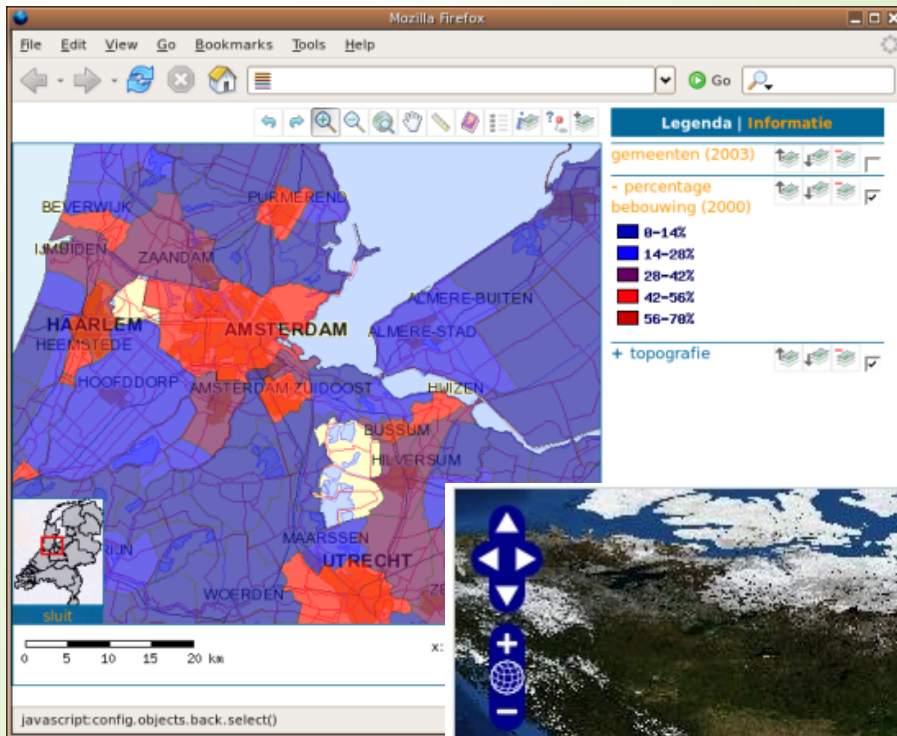
● Land Cover Type

Land Cover of Canada (Image)

- Coniferous Forest: High Density (1)
- Coniferous Forest: Medium Density - Southern (2)
- Coniferous Forest: Medium Density - Northern (3)
- Coniferous Forest: Low Density - Southern (4)
- Coniferous Forest: Low Density - Northern (5)
- Broadleaf Forest (6)
- Mixed Coniferous Forest (7)
- Mixed Uniform Forest (8)
- Mixed Heterogenous Forest (9)
- Mixed Broadleaf Forest (10)
- Bums: Low Green Vegetation Cover (11)
- Bums: Green Vegetation Cover (12)

Community MapBuilder

Mapbender



GeoNetwork opensource

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Find Interactive Maps, GIS datasets, Satellite Imagery and Related

Free Text

Map type

Digital Hard copy

Hits per page 10

GeoNetwork's purpose is:

- To improve access to and integrated use of spatial data and information
- To support decision making
- To promote multidisciplinary approaches to sustainable development
- To enhance understanding of the benefits of geographic information

GeoNetwork opensource allows to easily share geographically referenced thematic different organizations. For more information please contact: john@telascience.org

Featured map



[Hurricane Katrina Aftermath](#)

Katrina OWS Aftermath (NOAA-NGS)

Recent Additions

- [Hurricane Katrina Aftermath](#)
- [Physiographic Map of Eurasia \(SAMPLE DATA\)](#)
- [Hydrological basins in Africa \(SAMPLE DATA!\)](#)
- [Forests and Drylands P Homepage \(SAMPLE DATA!\)](#)
- [Globally threatened species \(SAMPLE DATA!\)](#)
- [Natural polar ecosystem \(PLEASE REMOVE BEFORE DEPLOYMENT!\)](#)
- [Original Forest Coverage](#)

FAO-UN GeoNetwork Portal to spatial data and information
 http://www.fao.org/geonetwork/srv/en/main.result?exte

FAO-UN GeoNetwork ARTEMIS/AGROMET FAO : SD Dimensions... Open Geospatial Con... ISO/TC211

GEO NETWORK

ENGLISH FRANÇAIS ESPAÑOL

SEARCH

Aggregate Results matching search criteria : 570


Hydrological basins in Africa

Abstract: Major hydrological basins and their sub-basins. This dataset divides the African continent according to its hydrological characteristics. The dataset consists of the following information:- numerical...[more...](#)

Purpose: To assess which part of the land area flows to which river. The dataset is developed as part of an assessment of water resources in Africa.

Keywords: watersheds, river basins, water resources, hydrology, Africa.

DESCRIPTION DOWNLOAD MAP




Irrigation cropping pattern zones in Africa

Abstract: Irrigation cropping pattern zones in Africa which are considered to be homogeneous with respect to crop calendar and cropping intensity. The delineation of the irrigation cropping pattern zones was d...[more...](#)

Purpose: To calculate irrigation water requirements it is necessary to know the irrigated crops grown, the cropping calendar and the cropping intensity. All these factors are represented in this dataset, whic...[more...](#)

Keywords: irrigation, crop calendar, cropping pattern, cropping intensity, Africa.

DESCRIPTION DOWNLOAD MAP



Inland water bodies in Africa

Abstract: Characterization of inland water bodies in Africa. This dataset originates from the

Done

PostGIS

- Spatial objects for PostgreSQL enterprise database
- Open source
- GIS functions available
- Various binary packages available
- Accessible through many programs – SQL interface

Using PostGIS

- Various ways to access and load data
 - shp2gpsql command line tool
 - ogr2ogr

```
CREATE TABLE "mypointtable" (gid serial, "id" int4, "pointname" varchar);
SELECT AddGeometryColumn("","mypointtable",'the_geom','-1','POINT',2);
INSERT INTO "mypointtable" (gid,"id","pointname",the_geom)
  VALUES ('0','1','My Place',GeometryFromText('POINT (427446.21 6012309.46)',-1) );
INSERT INTO "mypointtable" (gid,"id","pointname",the_geom)
  VALUES ('1','2','Your Place',GeometryFromText('POINT (430765.47 6012780.28)',-1) );
INSERT INTO "mypointtable" (gid,"id","pointname",the_geom)
  VALUES ('2','3','Work',GeometryFromText('POINT (430412.36 6010049.54)',-1) );
```

Select PostGIS data

- Using basic SQL

```
project1=# SELECT * FROM mypointtable;
```

<u>gid</u>	<u>id</u>	<u>pointname</u>	<u>the_geo</u>
0	1	My Place	SRID=-1;POINT(427446.21 6012309.46)
1	2	Your Place	SRID=-1;POINT(430765.47 6012780.28)
2	3	Work	SRID=-1;POINT(430412.36 6010049.54)

- Analyse using PostGIS functions

```
SELECT buffer(the_geom,10) FROM mypointtable; →Returns a polygon
```

```
SELECT housenumber FROM houses, counties
```

```
WHERE contains(counties.the_geom, house.the_geom); → houses in counties
```

```
SELECT transform(the_geom,4326) from mypoints;
```

```
→ POINT(-124.113655717351 54.2535931617935)
```

- And much more...

MapServer Reads PostGIS

- Map file layer definitions can be for PostGIS data

```
LAYER
  NAME mypoints
  TYPE POINT
  STATUS ON
  CONNECTIONTYPE POSTGIS
  CONNECTION "host=localhost dbname=project1"
  DATA "the_geom from mypointtable"
  CLASS
    NAME "Locations of interest"
    COLOR 0 0 0
    OUTLINECOLOR 255 255 255
    SYMBOL 'circle'
  END
END
```


Application Support

- MapServer
- Quantum GIS (QGIS)
- ArcMap via PgArc extension
- uDig
- JUMP

Other Initiatives

- Project Incubator
- Educational Curriculum
- Public Geodata
- Promotion & Visibility
- Local Chapters - 20+

Languages - Deutsch, Francophone, Español...

Countries - Japan, India, China, Spain...

Regions - Ottawa, New Mexico, South America...

How We Work

- Individual Volunteers
- Committees
- Project Steering Committees
- Board of Directors
- Funding

Invitation & Opportunity

- Practical ways to be involved
 - engage projects technically
- Strategic ways to show support
 - engage community
 - assist promotion
 - sponsorship
- Share your success stories

Contact

Sustaining Sponsors

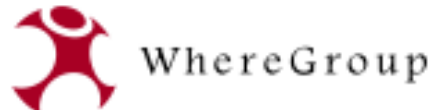
Autodesk

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INSTITUTO NACIONAL DE PESQUISAS ESPaciaIS

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Associate Sponsors



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wiki.osgeo.org

See you at FOSS4G 2008
Cape Town, end of September